REPUBLIC OF BULGARIA

MINISTRY OF ENVIRONMENT AND WATER

MINISTER

ОВОС-229

20 **February 2013**

Subject: *Notification for investment proposal for construction of "South Stream Offshore Pipeline – Bulgarian sector"*

Dear Minister,

Pursuant to Directive 2011 / 92 / EU on the assessment of the effects of certain public and private projects on the environment and Art. 3 of the Convention on EIA in a transboundary context (the Convention), please find enclosed a notification for investment proposal for construction of "South stream Offshore Pipeline – Bulgarian sector". Enclosed is also a supporting document prepared by the project proponent with a more detailed information on the expected environmental impact in a transboundary context.

We would like to inform you that a preliminary assessment of the environmental impact in a transboundary context has been prepared. Since this assessment contains no firm conclusion for a significant adverse transboundary environmental impact on the territory of neighbouring countries, please be informed that further assessment of possible tranboundary impact of the investment proposal, as well as its significance due to planned and unplanned events will be prepared as a part of the forthcoming EIA of the gas pipeline.

With regard to the above, we would like to assure you that if you do not state an intention to participate in the Bulgarian national EIA procedure, the EIA results, including those concerning the transboundary impact, will be reflected in the administrative act of the Bulgarian Ministry of Environment and Water. In this case and upon your request, after the completion of the EIA procedure on Bulgarian territory we can provide for your information the issued administrative act.

H. E. Ms. Rovana Plumb
Minister of Environment and Forests
12 Libertatii Blvd, Sector 5
Bucharest, ROMANIA

Sofia 1000, 22 Maria-Luisa Blvd.
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for your opinion on the enclosed to this letter documentation regarding the presumable impact on the territory of your country. In this connection, we would like to inform you that the next stage of the EIA procedure is the preparation of an EIA report in which your opinion concerning the transboundary impact part of the report will be taken into account. In this case it will be necessary to provide us with information about the condition of the components and factors of the environment of Romania, that you consider to be affected by the investment proposal.

In order to keep the regulated deadlines for the Bulgarian national EIA procedure, I would like to kindly ask you to send us your final reply according to Art 3.3. of the Convention within three weeks from the receipt of this letter. Please be informed that in absence of reply within the time specified and pursuant to Art. 3.4 of the Convention, we will consider that the there are not commitments for Bulgaria for implementation of the provisions of the Convention concerning the participation of Romania in a tranboundary EIA procedure for the investment proposal.

I avail myself of the opportunity to express my highest consideration and willingness for a fruitful cooperation.

Enclosure:

1. *Notification (a hard copy and a CD)*
2. *Supporting document to the notification (a hard copy and a CD)*

Sincerely Yours,

Nona Karadjova

South Stream Offshore Pipeline – Bulgarian Sector Notification to an Affected Party of a proposed activity under Article 3 of the ESPOO Convention

Espoo Notification Form

1. INFORMATION ON THE PROPOSED ACTIVITY
(i) Information on the nature of the proposed activity
Type of activity proposed: The South Stream Offshore Pipeline is the offshore component of the South Stream Pipeline System that will deliver natural gas from Russia to the countries of Central and South-Eastern Europe. When complete, the system will extend over more than 2,300 km. The South Stream Offshore Pipeline involves the construction and operation of four pipelines extending approximately 930 km across the Black Sea from the Russian coast near Anapa, through the Turkish Exclusive Economic Zone (EEZ), to the Bulgarian coast near Varna. This Espoo Notification Form focuses only on the Bulgarian Sector of the South Stream Offshore Pipeline, which is hereinafter referred to as the "Project".
Is the proposed activity listed in Appendix I to the Convention?: Yes. The South Stream Offshore Pipeline is classified within the Espoo Convention under Appendix I, item 8 referenced as "*Large-diameter pipelines for the transport of oil, gas or chemicals*".
Scope of proposed activity (e.g. main activity and any/all peripheral activities requiring assessment): The Project Area comprises three sections – an offshore section, nearshore section and a landfall section. Although the preferred route is yet to be finalised, approximate lengths for each section are provided below. The Project also includes marshalling yard(s) that will be used for storage of pipes and equipment and shore bases for construction, support and supply vessels. The scope of the Project includes the development, construction, pre-commissioning, operation and decommissioning of: – Approximately 4 x 233 km of offshore pipelines through the Bulgarian EEZ (210 km) and Bulgarian territorial waters (23 km); – Up to 4 x 3 km of buried pipelines on land; – Landfall facilities; and – Marshalling yard(s) and shore bases. The Construction Phase is expected to begin in 2014 and will involve:

- Offshore piplaying directly to the seafloor using a pipelay vessel and support vessels;
- Nearshore pipelaying in a trench (utilising either dredging or postlay trenching techniques) using a pipelay vessel, support vessels and land based equipment;
- Pipelaying in the landfall section using conventional open trench techniques; and
- Construction of the landfall facilities.

The Operational Phase will begin in 2015 with the delivery of 15.75 billion cubic meters (bcm) of natural gas per year with a gradual increase until the full operational capacity of 63 bcm per year is delivered in 2018. The Project will have an operational design life of 50 years, with decommissioning expected to start in 2065.

Scale of proposed activity:

Offshore Section

The offshore section extends from the border of the Turkish and Bulgarian EEZs to approximately 18 km from the coast, where the water depth is approximately 28 m. The offshore section is approximately 215 km long, 210 km of which are located within the Bulgarian EEZ and 5 km within Bulgarian territorial waters. In the offshore section, the pipelines will be laid directly on the seabed.

The offshore construction corridor will be approximately 500 m wide if Dynamically Positioned (DP) vessels are used or 3 km wide if an anchored pipe-laying vessel is used. The pipe-laying operation will be performed on a 24-hour basis.

Nearshore Section

The nearshore section commences approximately 18 km from the Bulgarian coast in a water depth of approximately 28 m and extends to the shore crossing location on Pasha Dere Beach. From the outer edge of the nearshore section to approximately 2.2 km from the coastline the pipelines may either be buried or laid directly on the seabed. From approximately 2.2 km offshore to the shore crossing the pipelines will be buried to a depth of approximately 2.5 m using a combination of dredging and a technique known as "post (lay) trenching".

The nearshore section will require a 500 m construction corridor during the pipe-lay process. In addition to this, there may be a need to temporarily store backfill and/or dredge material. The requirement for this is being investigated as part of the Project Front End Engineering Design (FEED) process. Storage areas will be located within the construction corridor wherever possible. Where this is not possible, the use of areas located outside the construction corridor will be investigated.

Landfall Section

The landfall section will commence at the shore crossing location on Pasha Dere Beach and extend inland to the permanent landfall facilities which will be located adjacent to the Receiving Terminal being developed by South Stream Bulgaria AD (SSB) as part of the 'South Stream Onshore Pipeline System on the territory of the Republic of Bulgaria'. It must be noted that, for engineering reasons, the landfall facilities must be adjacent to the Receiving Terminal being developed by South Stream Bulgaria (SSB). As such the siting of the landfall facilities also took into consideration the land take requirements of the Receiving Terminal.

Two options (Option 1 and Option 2) are currently being considered for the location of the landfall facilities which are adjacent to the site options being considered for the location of the Receiving Terminal. The landfall section is approximately 2.2 km (Option 1) or 2.8 km (Option 2) in length.

The construction corridor for the four pipelines will nominally be 60 m wide. However, Option 2 will require an approximately 1.1 km length of construction corridor that will extend out to a maximum width of 120 m to facilitate the crossing of a steep gully. A permanent Right of Way (RoW), approximately 40 m wide (5 m either side of the centreline of each pipeline), will also be adopted within the construction corridor, during the Operational Phase of the Project, for protection and maintenance of the pipelines.

Landfall facilities will consist of:

- An operational metering facility;
- Four pipeline inspection gauge (PIG) trap facilities (one per pipeline); and
- Four emergency shutdown (ESD) valve stations (one per pipeline).

The Project may also require a block valve station for each pipeline.

The overall permanent land take within the landfall section, which includes both the pipeline permanent RoW and the landfall facilities, will be approximately 31 hectares. in addition to the permanent RoW there will be Safety Exclusion Zones for the protection of public health and infrastructure. These exclusion Zones will be based on the results of a Quantitative Risk Analysis (QRA) undertaken for the landfall section of the Project. The exact width of these Zones is subject to the development of a Project Specific Design Code. These Zones are subject to agreement with the relevant authorities.

Marshalling Yards

One or more marshalling yards and shore bases will be required for the storage of pipe and equipment necessary to construct the pipelines. The shore base(s) for the construction fleet is the base port for all vessels involved in the pipeline construction activities. Both facilities will be located at one or more ports on the Bulgarian Black Sea coast. The location of the yard(s) and base(s) is under investigation as part of the Project FEED process.

Description of proposed activity (e.g. technology used):

There will be four 236 km long steel pipelines, each 32 inches (813 mm) in diameter with a wall thickness of 39 mm. The pipelines will be made of 12 m long sections, which will be welded together on site. The pipe sections will be coated both inside and outside. The internal coating will be an epoxy paint which improves internal cleanliness and the operational gas flow rate, whilst the external coating will be made of three-layer-polypropylene (3LPP) to protect the pipelines from corrosion.

Shallow water sections of the offshore pipelines (typically for water depths less than 100 m) will be additionally coated with reinforced concrete to increase their weight and improve stability against sea currents, with the additional advantage of protecting the pipe from external damage. In addition, the pipelines will be protected against corrosion by a cathodic protection system consisting of sacrificial anodes for the offshore and nearshore sections and an impressed current system or sacrificial anodes for the landfall section.

Construction activities will include both land based activities (on the beach and on land) and marine based activities. On land, activities will include trenching and pipelaying and the construction of a cofferdam in the beach area to assist with pipeline installation. In the sea, in the shallower water (out to a depth of approximately 28 m) activities will include nearshore dredging, trenching, pipe laying and backfilling. In deeper water areas (approximately 28 m to 2,200 m) pipes will be laid directly on the seabed with no dredging or trenching required. These activities will require both shallow and deepwater vessels and the use of equipement such as backhoes and trailing suction dredger hoppers.

After each pipeline has been installed a number of activities, known as pre-commissioning activities, will be undertaken to ensure that the pipelines meet operational requirements. The primary objective of these activities is to verify that the pipeline has been laid without significant defects that it is in a suitable condition to be filled to transport the gas at anticipated pressures and to deliver the gas to the required specifications. The equipment required for the pre-commissioning activities will be used for cleaning, gauging, hydrotesting (if required) and drying of the installed pipeline.

Hydrotesting is done to test that there are no leaks in the pipeline. Hydrotesting involves filling the pipeline with water at a pressure that exceeds the maximum operating pressure. The water required for hydrotesting will be drawn from the Black Sea. The hydrotest water will be filtered and an oxygen scavenger may be added to prevent internal corrosion of the pipeline prior to dewatering. OSPAR's1 list of chemicals that Pose Little or No Risk to the environment (PLONOR) will be used as a guide for any chemicals required as part of adopted good international industry practice GIIP.

Following completion of hydrotesting, dewatering of the pipeline will be carried out. Upon completion of the dewatering process the pipelines will be dried to prepare them for transporting gas.

The pipeline will have a design pressure of 300 bar although the expected maximum operating pressure is anticipated to be approximately 284 bar. During operation, the pipeline will be monitored and controlled from a central control room at a location yet to be confirmed. During operation, continuous measurements of pressure and flow rates will be performed. In the unlikely event of damage to the pipeline, or if a leak is detected, emergency procedures will be implemented. These procedures include emergency shutdown and the requirement for internal inspection of the pipeline.

The external condition of the subsea pipeline, including the condition of the cathodic protection system, will be monitored on a regular basis using Remotely Operated/Autonomous Underwater Vehicles (ROV or AUV) and/or Remotely Operated Towed Vehicles (ROTV) and inspection technologies ranging from sonar to visual (camera) will be employed.

Onshore, the pipeline permanent RoW will be indicated by markers and have an access route suitable for inspection purposes along the centreline. It will be maintained during the Operational Phase of the Project in order to secure accessibility to the pipeline route.

Description of purpose of proposed activity:

[1] Refers to the Oslo and Paris Conventions for the Protection of the marine Environment of the North-East Atlantic (OSPAR Conventions), 1992.

To transport natural gas from the Russian gas network to the countries of Central and South-Eastern Europe.

Rationale for proposed activity (e.g. socio-economic basis, physical geographic basis):

The South Stream Offshore Pipeline – Bulgarian Sector, as part of the South Stream Offshore Pipeline and the South Stream Pipeline System, will diversify the supply routes of gas to Europe and enable a greater response to energy demands in Europe. This will result in an increase in European energy security and greater price stability due to increased reliability of gas transport infrastructure.

Additional information/comments:

Additional information on the proposed activities of the Project is provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

(ii) Information on the spatial and temporal boundaries of the proposed activity

Location:

The Project is the Bulgarian Sector of the South Stream Offshore Pipeline. The Project extends for 233 km from the border between the Turkish and Bulgarian EEZs to the Bulgarian coastline at a location approximately 11 km south of Varna where it crosses the shore at Pasha Dere Beach south of the existing Galata gas pipeline. The Project then extends on land for approximately 3 km. The landfall facilities will be located adjacent to the Receiving Terminal that is being developed by SSB as part of the 'South Stream Onshore Pipeline System on the territory of the Republic of Bulgaria'. The Receiving Terminal and pipelines inland of the Receiving Terminal are not part of the Project.

One or more marshalling yards and shore bases will be required for the storage of pipe and equipment prior to offshore, nearshore and landfall construction activities and for the use of support and supply vessels. It is anticipated that marshalling yards and shore bases will be strategically located at one or more ports on the coast of the Bulgarian Black Sea. The locations for these yards and bases have yet to be determined.

A map showing the pipeline route is provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

Description of the location:

The offshore section of the Project is largely located on the abyssal plain in a water depth of approximately 2,000 m below sea level. This section of the Project also includes the continental slope and continental shelf where the water depth decreases as the pipeline route approaches the Bulgarian coast.

The shore crossing is located on Pasha Dere Beach. The shoreline is characterised by a 20 to 30 m wide sandy beach. There are cliffs approximately 8 m in height leading up to forested areas beyond the beach. The Galata onshore gas pipeline Right of Way is located approximately 120 m north of the pipeline route. The pipeline route on land will cross areas of woodland (predominately native) and plantation woodland habitat. The closest residential area to the pipeline route and landfall facilities is Rakitnika located approximately 2 km to the

north of the shore crossing although there are a number of individual residential receptors within 1 km. The pipeline route is in the proximity of the nationally protected areas Liman and Rakitnik (which it avoids) and it crosses two Natura 2000 sites: the Galata Special Protected Area (SPA) (Natura 2000 site code: BG0002060) and the Galata Site of Community Importance (SCI) (Natura 2000 site code: BG0000103). At its closest point in the offshore environment, the Project is located approximately 90 km south-west, 82 km south-west from the EEZ borders of Ukraine and Romania, respectively. The South Stream Offshore Pipeline will cross from the waters of the Turkish EEZ directly into the Bulgarian EEZ and therefore shares a direct border. The Project, at its closet point, is located approximately 105 km, 85 km and 271 km from the territorial lands of Turkey, Romania and Ukraine, respectively. Additional detail, including maps, is provided in the: "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".
Rationale for location of proposed activity: The identification of a preferred route for the Project was undertaken through a systematic review and assessment of alternative options which has been informed by environmental, socio-economic, cultural heritage and technical criteria. A 1 km corridor centred on the preliminary route alignment was surveyed to identify engineering constraints and marine archaeological features. Given the complexity associated with the identification of a continental slope crossing, this aspect was assessed first. The continental slope is an unstable region where the depth of the sea rapidly changes and the seabed is generally characterised by unstable sediments, dynamic conditions (e.g. submarine slumps and turbiditic flows) and irregular morphology. Canyons typically provide a stable and shallow gradient route up the continental slope. Two canyons, immediately adjacent to each other were deemed adequate for the laying of the pipelines (three pipelines in the larger canyon and one pipeline in the smaller, narrower canyon). The continental slope area also has a number of known gas seeps which constitute a geo-hazard. The identified routes avoided the majority of seeps. Following selection of the continental slope crossing, a route was identified to extend the pipelines across the abyssal plain towards the border with the Turkish EEZ as well as a route from the top of the continental slope to the Bulgarian coast, across the continental shelf. No major engineering constraints of significance were identified along the preferred pipeline route. Once the crossing of the continental slope was selected, the shore crossing location and landfall section of the Project was chosen. A major constraint for the selection of suitable locations for the landfall facilities along the Bulgarian Black Sea coast is that a large portion of the Bulgarian coastline is designated as either Natura 2000 protected areas or nationally designated protected sites. Furthermore, there are a number of residential communities and tourist sites located along the coast. Two potential shore crossings (VLF-A and VLF-B) were identified on Pasha Dere Beach. VLF-B was considered likely to generate greater environmental impacts due to its closer proximity to

the Liman Wetland (a nationally protected wetland). VLF-A, located immediately adjacent to the Galata pipeline Right of Way was consequently identified as the preferred option. Following the identification of VLF-A as the preferred shore crossing, potential locations for locating the Project's landfall facilities and associated buried pipelines were identified. The assessment of the sites for the landfall facilities identified two locations within the Galata SPA Natura 2000 site, Option 1 and Option 2. A comparative assessment of the two options identified Option 2 as the preferred location for the landfall facilities and the associated pipeline route. This reflects the location of Option 2 within a non-native forestry area of relatively lower ecological value and its greater distance to surrounding residential sensitive receptors in comparison to Option 1. Although Option 2 is identified as the preferred option, both Option 1 and 2 are considered as viable and will be further assessed as part of further design and the EIA/ESIA process of the Project.
Time frame for proposed activity: The majority of construction will occur at sea. Deep-water pipe laying and landfall section construction will start in 2014 and run until 2017/2018. Since the individual pipelines will be constructed sequentially (rather than all at once) gas will begin to flow through the first pipeline as early as 2015.
Maps and other pictorial documents connected with the information on the proposed activity: Maps are provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*"
Additional information/comments: Additional information on the spatial and temporal boundaries of the Project is provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*"
(iii) Information on expected environmental impacts and proposed mitigation measures
Scope of assessment (e.g. consideration of: cumulative impacts, evaluation of alternatives, sustainable development issues, impact of peripheral activities): South Stream Transport is committed to implementing Good International Industry Practice (GIIP) in environmental and social performance and that the Project will be planned, constructed and operated in compliance with the laws of the Republic of Bulgaria which require an Environmental Impact Assessment (EIA) for Projects of this type. The Project, as required by Bulgarian legislation, will be assessed under Chapter 6 of the Environmental Protection Act (EPA) (disseminated in the State Gazette in 2002, amended and supplemented in July 2012); and the Ordinance on the conditions and order for carrying out an EIA (disseminated in the State Gazette in 2003, amended and supplemented in 2011). The Bulgarian EIA will consider the impacts associated with all phases of the Project including Construction & Pre-commissioning, Operational and Decommissioning Phases. The EIA will be available for public review and comment following submission to and acceptance by the

Bulgarian Ministry of Environment and Water.

In addition to meeting national EIA requirements, South Stream Transport will follow the standards and guidelines of international financial institutions (IFIs) for Environmental and Social Impact Assessment (ESIA) such as the requirements for a Category A project under the Equator Principles (EPs) and the OECD Revised Council Recommendaton on Common Approaches on the Environment and Officially Supported Export Credits (OECD Common Approaches). Both the EPs and the OECD Common Approaches are underpinned by the IFC Performance Standards (PSs). The IFC PSs, EPs and OECD Common Approaches current as of 1 January 2012 are applicable to the Project.

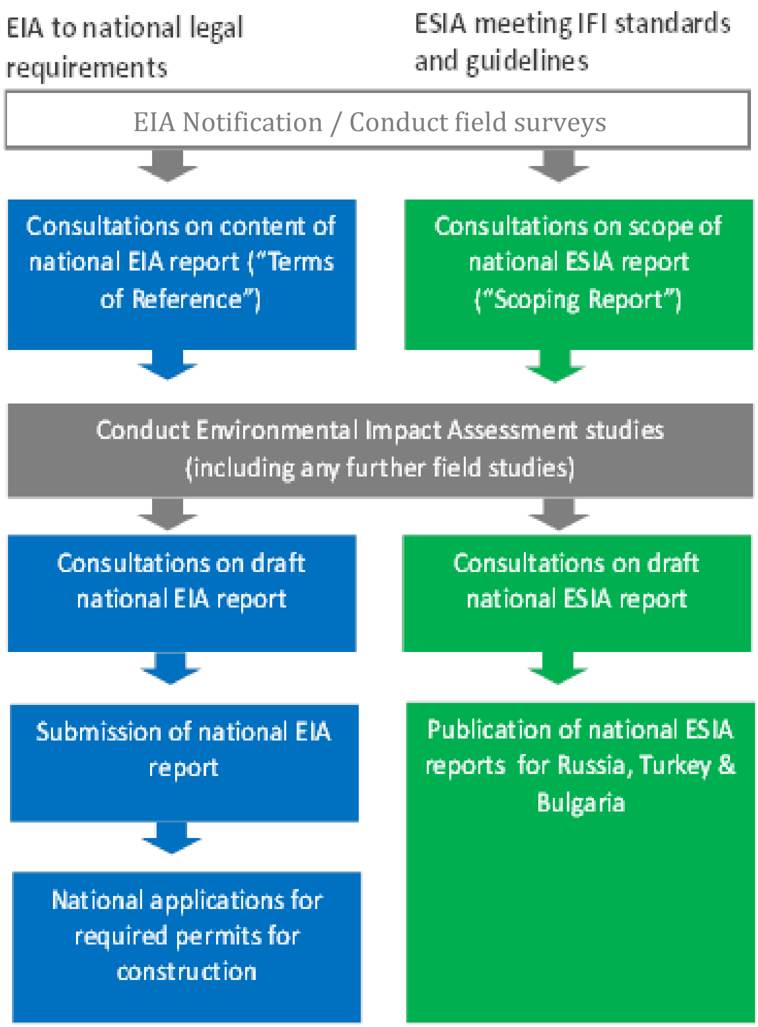
South Stream Transport describes the EIA and ESIA process as a systematic approach to identifying the environmental and social risks and impacts of a project, throughout its lifecycle, and describing mitigation, management and monitoring measures to address these. A description of project components and activities is used to guide the scope and level of effort devoted to the risks and impacts identification and provides the basis for mitigation, management and monitoring approaches.

The steps of the Bulgarian EIA process include:

- Screening;
- Scoping;
- Detailed project description;
- Analysis of project alternatives, including the zero alternative;
- Baseline surveys;
- Impact assessment and mitigation measures;
- Cumulative and transboundary impacts;
- Unplanned events and accidents; and
- Environmental and Social Management Plans.

Similar steps are involved in the international ESIA process and the processes are outlined in Figure 1.1:

Figure 1.1: General EIA and ESIA Process



Engagement with stakeholders and disclosure of Project and EIA / ESIA information is on-going throughout the EIA and ESIA processes to ensure that stakeholders can input into the assessments and, where appropriate, influence the Project from the design stage through to the development of mitigation, management and monitoring measures.

Under the Bulgarian regulatory process, draft Terms of Reference must be developed and consulted upon, to guide the structure and content of the EIA report to be submitted as part of the Bulgarian national requirements. The international ESIA guidelines include a scoping stage to help identify potentially significant environmental, socio-economic and cultural heritage impacts related to the Project.

As the requirements for the content of the Terms of Reference document in Bulgaria are similar to the nature and content of the Scoping Report which is developed to meet the standards and guidelines of IFIs, one report was developed by the Project to meet the needs of both the national and international processes. This report is referred to as the 'Scoping

Report' and can be found on the South Stream Offshore Pipeline website. The report functions as both the Terms of Reference for the national EIA and the Scoping Report for the international ESIA process. The Report was submitted to the Ministry of Environment and Water by South Stream Transport on 22 January 2013. Throughout this Notification Form the report is referred to as the Terms of Reference/Scoping Report. The aim of the Terms of Reference/Scoping Report is to provide information on the Project and its potential impacts to stakeholders, who can then provide input into the EIA and ESIA process and, where appropriate, the Project design. It is important to note that the information provided in the Terms of Reference/Scoping Report is preliminary. The *"South Stream Offshore Pipeline – Bulgarian Sector Espoo Notification Document"* has been prepared to inform the Espoo Notification process. The Espoo Notification Document contains the same information as the Terms of Reference/Scoping Report issued for the EIA and ESIA processes, with the addition of a chapter containing more detailed information on potential transboundary environmental impacts.
Expected environmental impacts of proposed activity (e.g. types, locations, magnitudes): Potential environmental, socio-economic and cultural heritage impacts have been preliminarily assessed for the Construction and Pre-commissioning and Operational Phases of the Project with respect to Project sections (offshore, nearshore and landfall). Decommissioning impacts will be assessed as part of the EIA process. The preliminary assessment is contained in the Terms of Reference/Scoping Report for the Project which was submitted to the Ministry of Environment and Water on 22 January 2013. The details of the preliminary assessment are also contained in the *"South Stream Offshore Pipeline – Bulgarian Sector Espoo Notification Document"*. The preliminary identification of impacts has been based on the Project information currently available, the baseline information collected to date and the experience gained in similar projects constructed in similar environmental, socio-economic and cultural heritage contexts. The preliminary identification of impacts concludes that impacts generated during the Construction and Pre-commissioning Phase of the Project will typically be temporary in nature and localised in extent. Temporary impacts will include temporary access restrictions to the Pasha Dere Beach, noise and air emissions generated by construction equipment In the marine environment these temporary impacts include disturbance of seabed sediments and alteration of marine water quality during dredging and pipe-laying activities. Water quality may also be affected by the discharge of hydrotest water (depending on the hydrotesting approach selected - more detail is provided in the *"South Stream Offshore Pipeline – Bulgarian Sector Espoo Notification Document"*). There will be limited restriction to fishing activities as a result of the exclusion zone around the pipeline construction activities. Impacts to known cultural heritage objects as a result of construction activities will be minimised through the routing of the pipelines away from such objects. However, the marine Project Area has a high archaeological potential and construction activities may interfere with currently unidentified cultural heritage items. Temporary construction impacts will be minimised as far as practicable with the application of mitigation measures and management

practices.

On land, temporary impacts will include temporary access restrictions to the Pasha Dere Beach and noise and air emissions generated by construction equipment. The construction corridor will require clearance of vegetation and permanent crops within a 60 m wide and 2.2 km (Option 1) or 2.8 km (Option 2) long corridor. A wider construction corridor of up to 120 m wide may be required at certain locations such as the beach area and the crossing of the steep gully in Option 2. Upon completion of the construction of the onshore pipelines, the ground and soil conditions of the construction corridor will be reinstated. The Pasha Dere Beach cliff face shall be restored in a manner that offers a stable and visually acceptable profile compatible with the adjacent undisturbed section. Vegetation and permanent crops may be replanted within the corridor with the exception of the 40 m wide Right of Way within which deep rooting vegetation and permanent crops will not be permitted. The clearance of vegetation from the construction corridor will result in the loss of natural habitat and disturb local flora and fauna. These impacts will be predominantly temporary and localised in nature and partially mitigated through re-vegetation (enhanced by the reinstatement of the original topsoil). A longer term impact will result from the restrictions within the Right of Way, which require regular clearance of deep rooting vegetation. The significance of both temporary and longer term impacts on habitats, flora, fauna and permanent crops/agriculture will be assessed in the EIA and ESIA.

During the Operational Phase of the Project there will be permanent limitations on land use surrounding the onshore pipelines such as the restrictions within the RoW (as above) or further developmental restrictions as a result of the adoption of Safety Exclusion Zones. Impacts on the landscape will be partially mitigated through the restoration of the original landscape along the pipeline route. Limited restriction to fishing activities will also occur as a result of the exclusion zone over the offshore section of the pipeline.

Transboundary impacts are likely to be minimal and associated primarily with unplanned events in the marine environment. Impacts generated by unplanned events, such as the accidental release of hydrocarbons to the marine environment during the Construction Phase or the accidental release of natural gas to the atmosphere during the Operational Phase, are unlikely and strict management measures will be in place to ensure that such impacts will be minimised and contained.

The section above presents the likely key impacts. Within the EIA and ESIA process the Project will assess all potential impacts to determine their significance and likelihood and this will form the basis of the EIA and ESIA reports. A full review of the preliminary assessment of potential Project impacts can be found in the "*South Stream Offshore Pipeline Espoo Notification Document*".

Inputs (e.g. raw material, power sources):

Key inputs for construction of the Project are expected to include the following:

- Steel for the pipelines;
- Concrete for landfall facilities foundations and pipeline coating;
- Backfill material;
- Welding materials;
- Water for general construction operations;

- Water for hydrotesting (sourced from the Black Sea);
- Fuel for:
  - Power generators for construction plant in the landfall section;
  - Construction, support and supply vessels; and
  - Land based construction vehicles.

Power for construction activities in the landfall and nearshore sections of the Project during the Construction Phase is likely to be supplied by standalone power generators fuelled by diesel. The Pre-commissioning, Operational and Decommissioning Phases will also require power generation which will be supplied from the national grid of Bulgaria.

Outputs (e.g. amounts and types of: emissions into the atmosphere, discharges into the water system, solid waste):

During the Construction and Pre-commissioning Phase key outputs are likely to include:

Terrestrial

- Emissions (for example CO_2, NO_x, SO_x and PM_{10}) to the atmosphere from use of machinery, construction vehicles and power generators;
- Discharge of hydrotesting water;
- Small volumes of hazardous waste such as sludge from pipeline cleaning, sump oil, batteries, oily rags, grease, oil, cement, antifreeze etc.; and
- Non- hazardous solid waste including dredged spoil, food waste, packaging, scrap metal and wood.

Marine*

- Emissions (for example CO_2, NOx, SO_X and PM_{10}) to the atmosphere from vessel engines and power generators;
- Small volumes of hazardous waste such as oily rags, grease, oil, chemicals etc.;
- Non- hazardous solid waste including food/galley waste, cooking oil, scrap metal, wood and general waste;
- Black and grey water; and
- Dredge material.

No significant outputs are expected during the Operational Phase. Sources of outputs include:

- Operation of the receiving terminal;
- Maintenance vessels;
- Sludge from cleaning of the pipe lines if required.

The outputs volumes will be minor and for the last two, irregular.

*All waste generated offshore will be stored and shipped to shore for disposal at a licensed treatment facility.

Transboundary impacts (e.g. types, locations, magnitudes):

Transboundary impacts are those that may affect countries other than the country or countries in which a project will be constructed and operated. The potential transboundary impacts of the Project will be assessed as part of the EIA and ESIA and will include planned activities and unplanned events.

At its closest point in the offshore environment, the Project is located approximately 90 km south-west from the EEZ border of Ukraine and 82 km south-west from the EEZ border of Romania (Figure 6.1). The South Stream Offshore Pipeline will cross from the waters of the Bulgarian EEZ directly into the Turkish EEZ and therefore shares a direct border. On land, the Project is located approximately 105 km, 85 km and 271 km to the territorial land of Turkey, Romania and Ukraine, respectively.

In view of the localised and temporary nature of the environmental impacts associated with the construction and pre-commissioning activities of the Project, and the distance between the Project Area and the land and sea borders of neighbouring countries, it is unlikely that there will be significant adverse transboundary environmental impacts resulting from planned activities for the Project.

Unplanned events such as the accidental release of vessel fuel (diesel) from the construction vessels into the sea, may generate spills that could be transported by marine currents into the waters of neighbouring countries. The likelihood of significant adverse transboundary environmental impacts resulting from such an unplanned event is low due to the relatively small volumes of hydrocarbons, the nature of the hydrocarbons (diesel) and the distance between the nearshore and offshore sections of the Project and neighbouring countries. Transboundary accidental environmental impacts associated with such a spill are unlikely to be significant.

Although the likelihood of unplanned events is low, management plans will be developed and implemented to ensure that such impacts will be minimised and contained (e.g. vessel specific Oil Spill Response Plan). Further assessment of the significance of transboundary environmental impacts resulting from planned activities and unplanned events will be performed as part of the EIA and ESIA.

A preliminary assessment of potential transboundary environmental impacts resulting from Project activities can be found in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

Proposed mitigation measures (e.g. if known, mitigation measures to prevent, eliminate, minimize, compensate for environmental effects):

Mitigation measures will be implemented to enhance potential benefits and prevent or reduce potential adverse impacts. Details of these proposed measures will be provided in the EIA following the impact assessment. Some possible mitigation measures have already been identified as part of the preliminary assessment contained in the Terms of Reference for the EIA/Scoping Report for the ESIA and these include (but are not limited to) the development and implementation of:

- An Environmental and Social Management System;
- Environmental and Social Management Plans;
- Activity-Specific Construction Management Plans;
- Oil Spill Response Plan;
- Traffic Management Plan;

- Construction Site Management Practices;
- Waste Management Plans and practices in accordance with local and national regulations;
- Re-vegetation and restoration of temporary construction sites;
- Marine Operations Plan;
- Operation of all vessels in accordance with MARPOL.

All work will be undertaken in accordance with Good International Industry Practice (GIIP).

Further information on possible mitigation measures is provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

Additional information/comments:

Further details on potential environmental, socioeconomic and cultural heritage impacts and possible mitigation measures are provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

(iv) Proponent/developer

Name, address, telephone and fax numbers:

South Stream Transport B.V.
Parnassusweg 819,
1082 LZ Amsterdam,
The Netherlands

esia@south-stream-transport.com
www.south-stream-offshore.com

(v) EIA documentation

Is the EIA documentation (e.g. EIA report or EIS) included in the notification?	~~Yes~~ / No

If the answer to the above is no or partially, description of additional documentation to be forwarded and (approximate) date(s) when documentation will be available:

An Environmental Impact Assessment (EIA) will be prepared for the Project to meet Bulgarian national legislative requirements and an Environmental and Social Impact Assessment (ESIA) will also be prepared following the standards and guidelines of international financial institutions(IFIs). Potential transboundary impacts will be assessed as part of the Project's EIA and ESIA processes.

Additional information/comments:

Additional detail is provided in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*".

2. POINTS OF CONTACT

(i) Points of contact for the possible affected Party or Parties

Authority responsible for coordinating activities relating to the EIA (refer to decision I/3, appendix) - Name, address, telephone and fax numbers:

On the basis of the preliminary assessment of potential transboundary environmental impacts contained in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*", it is not expected that any significant adverse transboundary environmental impacts will occur as a result of the construction, pre-commissioning, operation and decommissioning of the Project. Nevertheless, in line with the spirit of the Espoo Convention which has as one of it's aims to 'enhance international co-operation in assessing environmental impact in particular in a transboundary context' notification could be sent to the Espoo Convention signatory countries that border the land and sea territories of Bulgaria – the countries of Romania and Ukraine.

Romania
Ms. Dorina MOCANU
Director
Directorate for Pollution Control and Impact Assessment
Ministry of Environment and Forests
12, Blvd. Libertatii, Sector 5, Bucharest RO - 040129
Telephone: +40 21 316 7735
Fax: +40 21 316 0421
E-mail: dorina.mocanu@mmediu.ro

Ukraine
Mrs. Nataliya ZHYNKINA
Third Secretary
Division for Environmental Issues
Directorate General for Economic Cooperation
Ministry of Foreign Affairs
Mykhaylivska sqr.,1 01018 KYIV
Telephone: +380 44 238 1791
Fax: +38 044 238 1894
E-mail: n.zhynkina@mfa.gov.ua

List of affected Parties to which notification is being sent:

On the basis of the preliminary assessment of potential transboundary environmental impacts contained in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*", it is not expected that any significant adverse transboundary environmental impacts will occur as a result of the construction, pre-commissioning, operation and decommissioning of the Project. Nevertheless, in line with the spirit of the Espoo Convention which has as one of it's aims to 'enhance international co-operation in assessing environmental impact in particular in a transboundary context' notification could be sent to the Espoo Convention signatory countries that border the land and sea territories of Bulgaria – the countries of Romania and Ukraine.

(ii) Points of contact for the Party of origin

Authority responsible for coordinating activities relating to the EIA (refer to decision I/3, appendix) - Name, address, telephone and fax numbers: Minister Nona Karadjova Ministry of Environment and Water 22 Maria Louiza Blvd. Sofia, 1000 Bulgaria Telephone: +359 2 988 2577 Fax: +359 2 986 2533
Decision-making authority if different than authority responsible for coordinating activities relating to the EIA - Name, address, telephone and fax numbers: Same as responsible authority for activities relating to the EIA.
3. INFORMATION ON THE EIA PROCESS IN THE COUNTRY WHERE THE PROPOSED ACTIVITY IS LOCATED
(i) Information on the EIA process that will be applied to the proposed activity
Time schedule: The Project expects to deliver the EIA Report to the Ministry of Environment and Water in March/April 2013. In accordance with Bulgarian legislation (Environmental Protection Act and Regulation on the conditions and order for implementing environmental impact assessment), the Ministry of Environment and Water is expected to decide on the EIA Report within 45 days after conducting the last public hearing on the Report.
Opportunities for the affected Party or Parties to be involved in the EIA process: The stakeholder engagement (consultation) programme for the Project, following national EIA and international ESIA requirements and guidelines, is outlined in the "*South Stream Offshore Pipeline - Bulgarian Sector Espoo Notification Document*". Consultation related to the Espoo Convention will be integrated, as required, into the stakeholder engagement for the EIA and ESIA processes.
Opportunities for the affected Party or Parties to review and comment on the notification and the EIA documentation: The potentially affected Parties will have the opportunity to review the following documentation: - Notification Stage – Espoo Notification Form and Espoo Notification Document; - Scoping Stage – Terms of Reference/Scoping Report - EIA Report Disclosure and Public Hearing Stage – Draft EIA Report
Nature and timing of the possible decision: In accordance with Bulgarian legislation (Environmental Protection Act and Regulation on the conditions and order for implementing environmental impact assessment), the Decision on the EIA Report is expected be taken by the competent authority, the Ministry of Environment and Water, within 45 days after conducting the last public hearing on the Report and

considering the results of the public discussions.

Process for approval of the proposed activity:

In line with Bulgarian national requirements an EIA will be prepared for the Project and submitted to the Ministry of Environment and Water for review. Once a positive evaluation is received, the EIA report will be disclosed to the public via public hearings. The results of the public hearings will be submitted to the competent authority within 10 days following the last public hearing. In accordance with Bulgarian legislation (Environmental Protection Act and Regulation on the conditions and order for implementing environmental impact assessment), the competent authority is expected to decide on the EIA Report within 45 days after conducting the last public hearing.

The Project is part of the wider South Stream Offshore Pipeline and the required documentation to support the Russian and Turkish sections of the South Stream Offshore Pipeline will be prepared and submitted to the relevant authority for approval.

Additional information/comments:

4. INFORMATION ON THE PUBLIC PARTICIPATION PROCESS IN THE COUNTRY OF ORIGIN

Public participation procedures:

Upon disclosure of the Terms of Reference/Scoping Report for the EIA/ESIA, engagement with stakeholders in Bulgaria will provide further information about the Project. Stakeholder engagement meetings will be held with representatives of:

- Municipal and local authorities;
- Marrine Authorities;
- Potentially project-affected communities (PACs);
- Marine Users and Business Associations; and
- Local and national non-government organisations (NGOs).

Expected start and duration of public consultation:

Project Notification was made to the competent authorities on 27th June 2012, by submission of the 'Notification Concerning the Investment Proposal of the South Stream Offshore Pipeline Project – Bulgarian Sector' to the Bulgarian Ministry of Environment and Water.

The Project is following both national EIA and international ESIA processes, as explained earlier in this Form. Public consultation processes will be co-ordinated for both processes and any required consultation under the Espoo Convention will be integrated into the consultation planning.

In accordance with the Bulgarian EIA process, meetings were held in January 2013 with organisations specified by the Ministry of Environment and Water in their response to the Project Notification, including:

- the Ministry of Health;
- the Regional Inspectorate of Environment and Water (RIEW) in Varna;
- the Water Supply and Sanitation (WSS) company in Varna; and
- the Basin Directorate for Water Management in the Black Sea Region.

These meetings were held in January 2013, prior to the broader programme of ESIA scoping consultations, in order to provide the Ministry of Environment and Water with the timely feedback required for their consideration of the Terms of Reference/Scoping for the EIA/ESIA.

The proposed broader programme of ESIA consultations will take place in February 2013 and the planned meetings are detailed in Table 1

Table 1: EIA/ESIA Scoping Consultation Activities

Meeting Type	Stakeholder Group	Date	Location
Roundtable Meeting	Local Authorities	Feb 2013	Varna
Open houses in potential Project-Affected Communities	PACs	Feb 2013	Galata, Priseltsi
Roundtable Meeting	Regional and national NGOs	Feb 2013	Varna
Roundtable Meeting	Marine Authorities	Feb 2013	Varna
Roundtable Meeting	Marine users / Business associations	Feb 2013	Varna

Key objectives of the EIA and ESIA Scoping consultation process are to:

- determine the scope and content of the EIA study; and
- ensure that stakeholder priorities, views and concerns regarding the Project are understood and considered.

The Terms of Reference for the EIA/Scoping Report for the ESIA was made publicly available for review on 23rd February 2013 and will be available for review for a period of 30 days. During this time, stakeholders will have the opportunity to review and comment on the Terms of Reference/Scoping Report. The Terms of Reference/Scoping Report is available on the South Stream Transport website (www.south-stream-offshore.com). During this review period, South Stream Transport will be holding meetings with a range of stakeholders.

Additional information/comments:

5. DEADLINE FOR RESPONSE

Date:

ATTACHMENTS TO ESPOO NOTIFICATION

South Stream Offshore Pipeline
South Stream ENERGISING EUROPE

South Stream Offshore Pipeline – Bulgarian Sector

Espoo Notification Document

DocID:	URS-EIA-REP-201147
External DocID:	46369085_Doc398_Rep_Rev01
Date of Issue:	31 January 2013

This report has been prepared by URS Infrastructure & Environment UK Limited on behalf of South Stream Transport B.V.

Cover image: stock photo of Bulgarian Black Sea coastline. Please note that this is not the Pasha Dere beach.

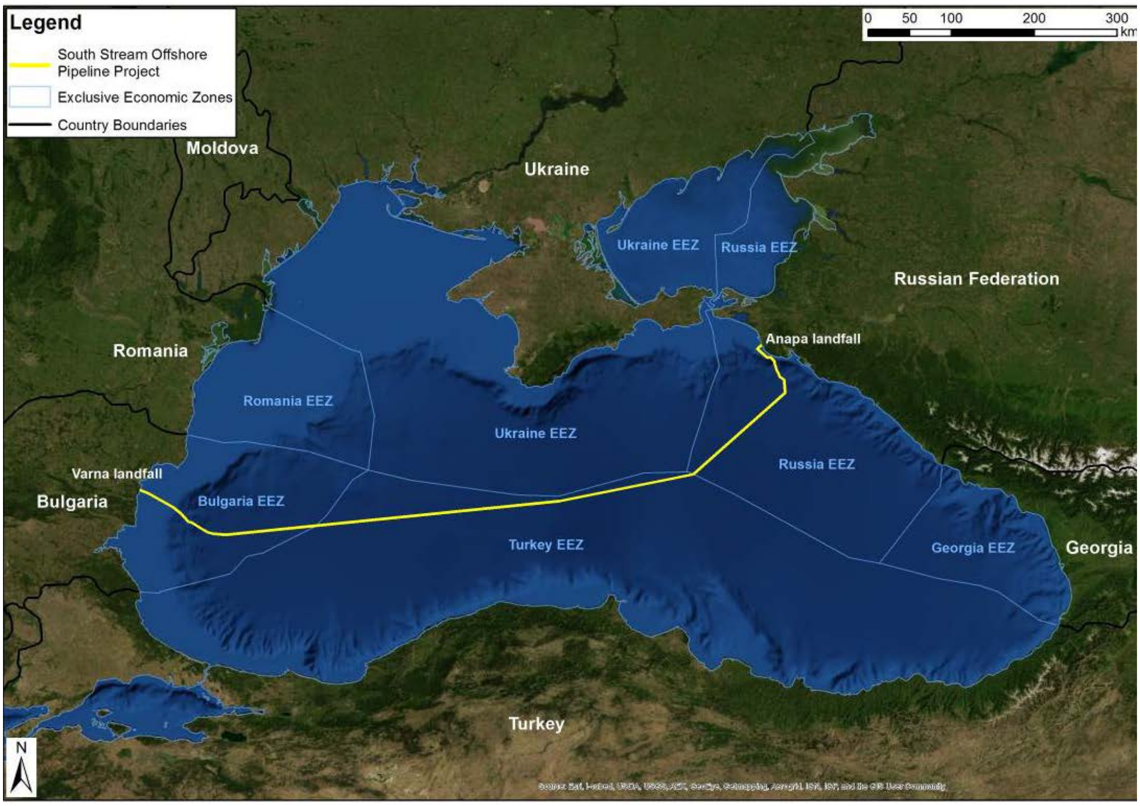
South Stream Offshore Pipeline – Bulgarian Sector Summary

Introduction

The South Stream Offshore Pipeline is the offshore component of the South Stream Pipeline System that will deliver natural gas from Russia to the countries of Central and South-Eastern Europe. When complete, the pipeline system will extend over more than 2,300 km.

The South Stream Offshore Pipeline will comprise four adjacent and parallel 32 inch (813 mm) diameter pipelines extending approximately 930 km across the Black Sea from the Russian coast near Anapa, through the Turkish Exclusive Economic Zone (EEZ), to the Bulgarian coast near Varna (Figure 1). In addition to the offshore pipelines, the South Stream Offshore Pipeline will also consist of short onshore parts, known as landfall sections, in Russia and Bulgaria, with landfall facilities.

Figure 1: South Stream Offshore Pipeline



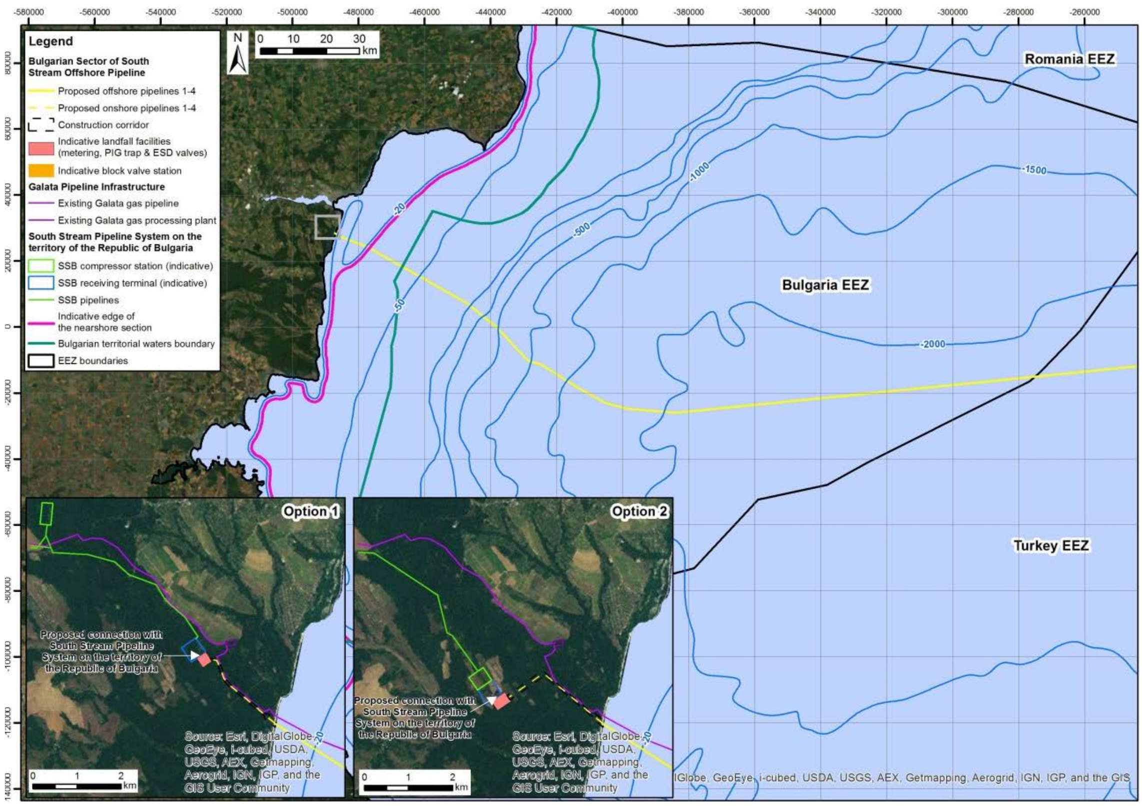
The Bulgarian part of the South Stream Offshore Pipeline is known as the 'South Stream Offshore Pipeline – Bulgarian Sector' and is referred to here as 'the Project'.

The Project is approximately 236 km in length from the border between the Bulgarian and Turkish EEZs to a coastal location approximately 11 km south of the city of Varna. Of the 236 km, up to 3 km are onshore, 23 km are within Bulgarian territorial waters, and 210 km are within the Bulgarian EEZ (Figure 2).

South Stream Transport is a joint venture company, and is responsible for developing the Project. The Russian company OAO Gazprom holds a 50% stake. The Italian company Eni S.p.A. has a 20% stake. The French energy company EDF and German company Wintershall Holding GmbH (BASF Group) each hold 15%.

Engineering and design studies for the Project began in 2008. This included the evaluation of several options for the transport of gas from Russia, before selecting the current shore crossing and landfall section. The choice of route for the offshore and nearshore sections was based on technical and environmental factors. These factors led to the selection of the current route (Figure 2) from the landfall section to the border between the Bulgarian and Turkish EEZs.

Figure 2: South Stream Offshore Pipeline – Bulgarian Sector

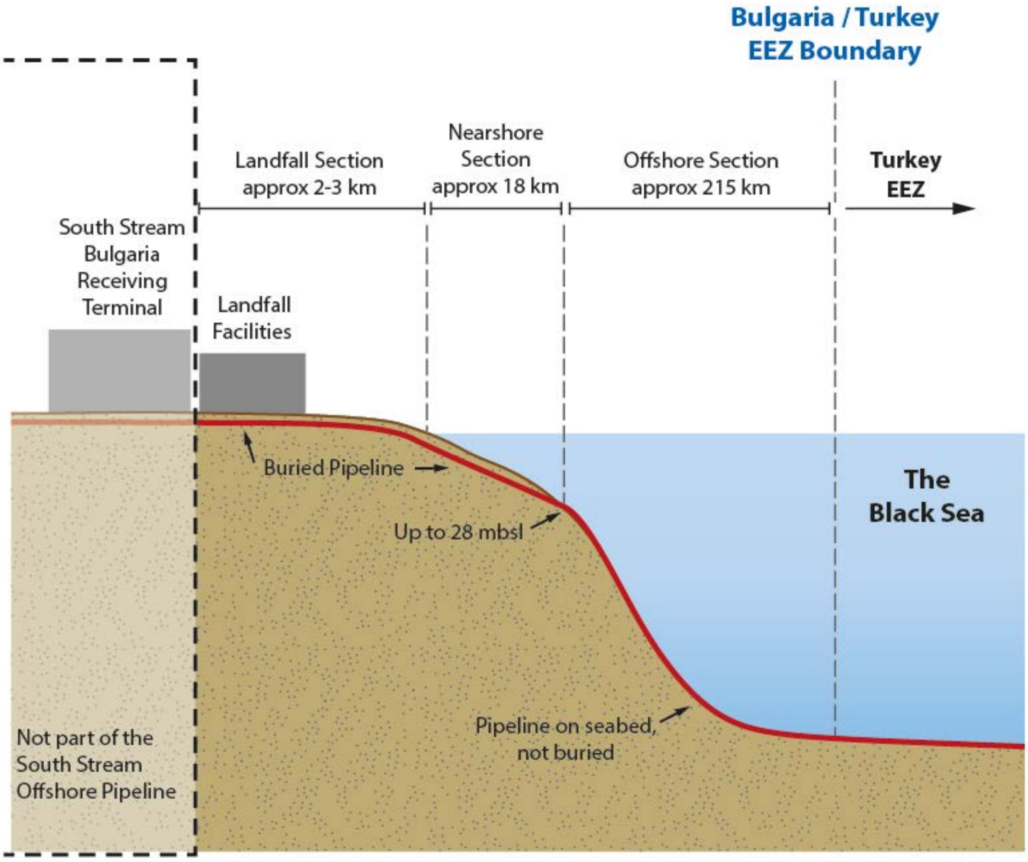


The permanent facilities of the Project will consist of the four 236 km pipelines and the permanent landfall facilities. The landfall facilities will consist of an operational metering facility, emergency shut-down (ESD) valve stations and pipeline inspection gauge (PIG) receiver facilities for each of the four pipelines.

For the purpose of this report, the Project Area has three sections: the offshore, nearshore and landfall sections (Figure 3).

The majority of construction will occur at sea. Deep-water pipe laying and landfall section construction will start in 2014 and run until 2017/2018. Since the individual pipelines will be constructed sequentially (rather than all at once) gas will begin to flow through the first pipeline as early as 2015. The pipelines will be designed to deliver gas for at least 50 years. The maximum capacity of all four pipelines together will be 63 billion cubic metres (bcm)/year, or approximately 15 bcm/year per line. The pipelines will each have a design pressure of 300 bar.

Figure 3: Offshore, nearshore and landfall sections of the Project



EIA and ESIA Scoping Process

South Stream Transport is committed to implementing Good International Industry Practice (GIIP) in environmental and social performance. The Project will be planned, constructed and operated in compliance with the laws of the Republic of Bulgaria which require an Environmental Impact Assessment (EIA) for Projects of this type. In addition to meeting national EIA requirements, South Stream Transport will follow the standards and guidelines of international financial institutions (IFIs) for Environmental and Social Impact Assessment (ESIA).

Under the Bulgarian regulatory process, draft Terms of Reference must be developed and consulted upon, to guide the structure and content of the EIA report to be submitted as part of the Bulgarian national requirements. The international ESIA guidelines include a scoping stage to help identify potentially significant environmental, socio-economic and cultural heritage impacts related to the Project. As the requirements for the content of the Terms of Reference document in Bulgaria are similar to the nature and content of the Scoping Report which is developed to meet the standards and guidelines of IFIs, one report was developed to meet the needs of both the national and international processes. This report is referred to as the ‘Scoping

Terms to Know:

***Project Area**: the landfall, nearshore, and offshore sections.*

***Metering facility**: an operational metering facility will allow for pipeline flows and volumes to be monitored.*

***PIG receiver**: A terminal to receive pipeline inspection and cleaning tools without interrupting gas flow. There will be one Pipeline Inspection Gauge (PIG) receiver per pipeline*

***Valve Stations**: valves are used to isolate parts of the pipeline for inspection and repair.*

***Post (lay) Trenching**: Removal of sediment from below a pipeline after it has been laid.*

***Dredging:** involves the movement or removal of material from the sea floor. Some dredging will be required to construct the pipeline in the nearshore section.*

***Exclusive Economic Zone (EEZ)**: a seazone for which a state has special rights over the exploration and use of marine resources, including production of energy from water and wind. It stretches from the seaward edge of the state's territorial sea out to 200 nautical miles from its coast (or to a neighbouring EEZ).*

***Pipe-laying Vessel**: a specialised ship or barge for underwater pipeline construction.*

Cathodic Protection System: a *method of neutralising the corrosive static electric charges in a submerged steel structure.*

***Marshalling Yard:** an area for the temporary storage of equipment and supplies.*

Report' and can be found on the South Stream Offshore Pipeline website. The report functions as both the Terms of Reference for the national EIA and the Scoping Report for the international ESIA process.

The aim of the Scoping Report is to provide information on the Project and its potential impacts to stakeholders, who can then provide input into the EIA and ESIA process and, where appropriate, the Project design. It is important to note that the information provided in the Scoping Report is preliminary.

Purpose of the Espoo Notification Document

The Republic of Bulgaria has been a signatory to the 1991 United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context (Espoo Convention) since 1995. The South Stream Offshore Pipeline is classified under Appendix 1, Item 8 of the Espoo Convention referenced as "*Large-diameter pipelines for the transport of oil, gas or chemicals*".

Under the Espoo Convention, where an activity may cause a significant adverse transboundary environmental impact a Party of origin (the country which is signatory to the Convention and within which the proposed activity will take place) shallnotify potentially affected Parties (other signatories to the Convention that may be affected by significant adverse transboundary environmental impacts) of the proposed activity and provide information on the potential environmental transboundary impacts.

This Espoo Notification Document (referred to as the 'Document') has been prepared to assist the Government of Bulgaria in assessing whether the Project is likely to have significant adverse transboundary environmental impacts. The Document contains the same information as the Terms of Reference/Scoping Report issued for the EIA and ESIA processes, with the addition of a chapter containing more detailed information on potential transboundary environmental impacts (Chapter 7).

Unless explicitly stated otherwise, all baseline information, potential impacts, potential mitigation measures, and proposed technical studies referred to in this Document are to be considered of relevance and applicable to both the EIA and ESIA processes for the Project and to any transboundary impact assessment undertaken as part of those processes.

Project Description

The pipelines will be constructed from 12 m sections of steel pipe, which will be welded together and coated both inside and out to improve internal cleanliness and gas flow and protect the pipelines from corrosion. The pipes will have a wall thickness of 39 mm. Shallow water sections of each pipeline (up to approximately 100 m depth) will be coated with reinforced concrete to improve stability and protect the pipe from damage. The pipeline will be further protected against corrosion by a cathodic protection system.

Offshore and Nearshore Sections

The offshore section extends for approximately 215 km, from the Turkish – Bulgarian EEZ border towards the Bulgarian coast until a water depth of approximately 28 m is reached (approximately 18 km offshore). For this deep-water section (where water depths range from 2,200 m to 28 m), the four pipelines will be installed using a pipe-laying vessel (a specialised ship or barge for underwater pipeline construction, an example of which is shown in Figure 4). Pipes are lined up and welded together on board the vessel, and welded sections are lowered into the sea as new segments are added.

Figure 4: Example of Pipelaying Vessel

Image supplied courtesy of Allseas, Switzerland.

The nearshore section begins approximately 18 km offshore at a water depth of approximately 28 m, and extends to the proposed shore crossing on Pasha Dere Beach. In contrast to the offshore section, the pipeline within the nearshore section will be buried beneath the seabed, to a depth of approximately 2.5 m, to protect the pipeline from external damage and ensure the pipelines do not affect any beach or water users. In the nearshore section, some dredging will be done to bury the pipelines. In the offshore section, the pipeline will be laid directly on the seabed.

Temporary storage facilities will be needed for the offshore and nearshore construction processes. It is expected that there will be one or more marshalling yards (an area within a port where equipment and supplies are temporarily stored) as well as one or more shore bases for the offshore fleet of construction, support and supply vessels involved in laying the pipeline at sea. Both facilities will be located at one or more ports on the Bulgarian Black Sea coast. Deliveries of pipe segments and equipment to the marshalling yards will be made by rail or by sea, while deliveries of pipe segments from the marshalling yards to the pipe-laying vessels (for near-shore and offshore construction) will be made by sea.

Landfall Section

The landfall section will be up to 2.8 km long, depending on which Receiving Terminal option is adopted, and comprise four buried pipelines extending from the shore crossing at Pasha Dere Beach to the landfall facility. The pipelines will be buried with a minimum soil cover of between 0.8 and 1.5 m to limit impacts to land use and for safety reasons. The buried onshore pipelines will run inland for 2.2 km (Option 1) or 2.8 km (Option 2) to the permanent landfall facilities.

The landfall facilities will be constructed adjacent to the identified SSB Receiving Terminal location, which is part of the South Stream Pipeline System on the territory of the Republic of Bulgaria. For both options, the landfall facilities will include a metering facility, PIG receiver facilities, and emergency shutdown valve stations.

Terms to Know:

Baseline: *the existing environmental, socio-economic and cultural heritage characteristics of the area (i.e. before the Project). The baseline provides a starting point for the prediction of potential impacts.*

Construction Corridor: *The area of land that will be required to construct the pipelines.*

Right-of-way: *an area of land above each pipeline on which the Project proponent/owner will have the rights of access to maintain and inspect the pipeline throughout its operational life (50 yrs). Some plants and crops will be allowed in this area, but deep-rooting vegetation will not be permitted.*

Safety Exclusion Zones: *areas of land, including the rights-of-way, where permanent facilities such as buildings will be restricted for the protection of public health and infrastructure.*

Mitigation measures: *activities designed to avoid or minimise potential adverse impacts of the Project.*

Enhancement measures: *activities designed to enhance potential benefits of the Project.*

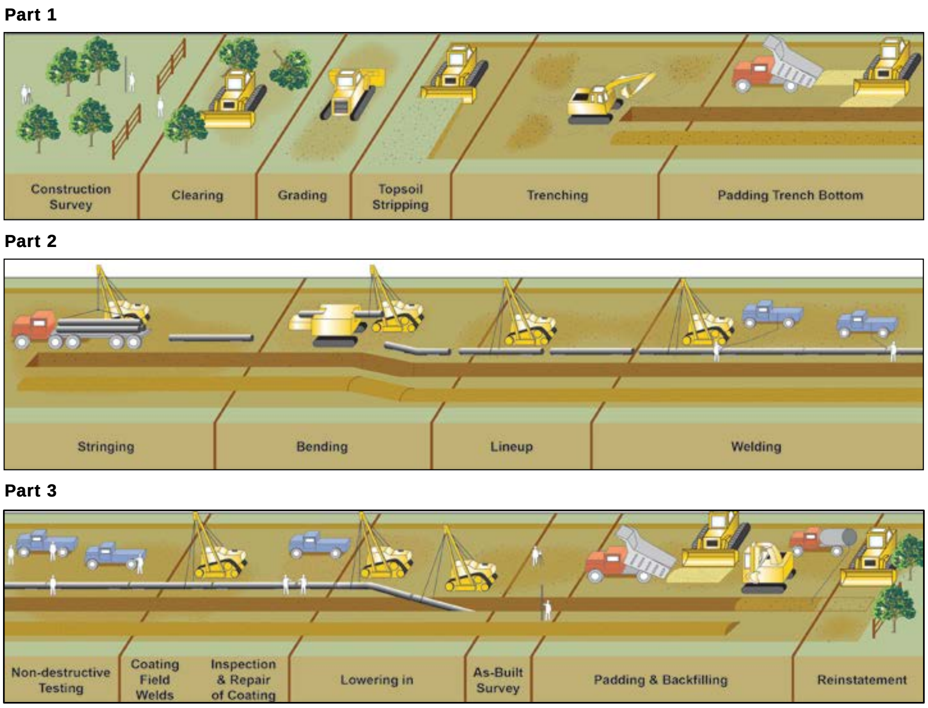
ESMP: *an Environmental and Social Management Plan will be prepared for the Project. This will bring together the mitigation, enhancement and management measures that address the potential impacts of the Project.*

Stakeholder engagement: *the process of informing people about the Project and listening to their views.*

Deliveries of pipe segments and equipment to the landfall section construction sites will be made by road and the construction corridor. The Project will require the upgrade of some existing roads and may also require some new roads to be built for access and construction.

On land, construction will be carried out within a predominantly 60 m wide strip of land called the construction corridor. Work areas will be clearly marked and fenced. There will also be some temporary facilities including areas used for storage, catering and sanitary purposes. The onshore construction sites are likely to be in use for up to five years. Construction shall use a common open cut method, in which trenches for the pipeline will be excavated, and then refilled following its installation. These areas will be reinstated when construction ends (Figure 5). Topsoil removed for construction will be carefully stored and then replaced to enable the re-vegetation of the area utilising the seed-bank contained in the stored topsoil.

Figure 5: Typical Open-cut Pipeline Construction Technique



Pre-Commissioning, Operation and Decommissioning

Once the pipeline has been built, it will be tested to ensure that it is safe, intact and fit to operate. This process is called pre-commissioning and may include testing the pipeline with water (hydrotesting), which is done to test that there are no leaks in the pipelines.

The pipeline will operate in compliance with internationally recognised standards and in line with Bulgarian national regulatory requirements. It will be regularly maintained and monitored from a central control room at a location yet to be confirmed. During operation, continuous measurements of pressure and flow rates will be performed. In the unlikely event of damage to the pipeline, or if a leak is detected, emergency procedures will be implemented. These procedures include emergency shutdown and internal inspection of the pipeline.

On land, the pipeline's permanent right of way will be maintained during operations in order to ensure that the pipeline route is accessible. It will consist of an approximately 40 m wide corridor (5 m wide corridor either side of each pipeline) and will be indicated by markers. Trees will not be allowed to grow, but bushes and other shallow rooted vegetation may be allowed to grow naturally or will be planted. In addition to the permanent right of way there will be statutory safety exclusion zones within which there will be restrictions on residential and non-residential development.

At the end of its operational life (i.e. after an expected 50 years), the pipeline will be decommissioned (shut down). Decommissioning of the pipeline will be undertaken in accordance with legislation, in liaison with the regulatory authorities.

Environmental and Social Baseline

It is important to understand the environmental, socio-economic and cultural heritage conditions and characteristics of the area where the Project will be built and operated so that the effects, or impacts, of the Project can be assessed and addressed. The description of these conditions in the EIA and ESIA documents is called a baseline.

Some baseline studies were carried out as part of the feasibility studies for the Project between 2008 and 2011. Site visits to the landfall section in 2012 provided further baseline information. Some information is still needed, and additional studies are being carried out to fill these gaps.

Marine (at sea)

The Black Sea is a semi-enclosed sea connected to the shallow (10 to 20 m deep) Azov Sea through the Kerch Straits and to the Mediterranean Sea through the Bosphorus Straits, the Marmara Sea and the Dardanelles Straits. The flat abyssal plain (at a depth of approximately 2,000 m) rises to the continental shelves along the surrounding coasts.

In deeper waters the marine environment is dominated by anoxic conditions, associated with poor mixing, elevated hydrogen sulphide (H_2S) concentrations and the presence of strong saline stratification (typically less saline in surface and coastal waters). In general, water and sediment quality is relatively good, although local variation and contamination occurs with proximity to urban areas and river mouths.

The survey data collected to date has identified a number of objects of potential cultural heritage interest (e.g. wrecked ships). Due to the anoxic conditions found in water depths greater than approximately 150 m, corrosion and microbial degradation is inhibited beyond this depth, resulting in potentially well preserved objects. Six shipwrecks have been identified within 150 m of the offshore pipelines. In addition, sea levels in the area have risen considerably over time and it is likely that former terrestrial coastal areas, potentially containing items of cultural and heritage significance, are now permanently inundated.

In the marine area near the landfall section, fishing and commercial shipping are the principal socio-economic activities. The majority of the offshore section of the Project falls within areas where only pelagic fishing can take place, because of the absence of any species at depths in excess of approximately 150 m, below which the Black Sea is anoxic.

Three species of protected marine mammals have been identified - the harbour porpoise (*Phocoena phocoena),* bottlenose dolphin (*Tursiops truncatus)* and common dolphin (*Delphinus delphis).* Two species of offshore birds (the black-throated diver, *Gavia arctica,* and the black-headed gull, *Larus ridibundus*) are also classified as rare or endangered. In the Black Sea as a whole, there are a number of IUCN Red List and Black Sea Red Data Book species such as sturgeons, eels, blennies and stingrays.

Terrestrial (on land)

The landfall section of the Project is located approximately 2 km southeast of Rakitnika, a community south of Galata in the Varna region. Rakitnika is the closest of several communities located in the vicinity of the landfall section, or near roads that may be used to access construction sites. Other communities of importance in the area are Borovets-Kantara, Priboj-Fichoza, and Priseltzi. Tourism is well established in the Varna region and the coastal towns of Rakitnika and Priboj are popular summer holiday locations.

The area around and between these villages is primarily woodland or agricultural land. Vineyards account for most of the agricultural land, although the level of active cultivation varies. The pipeline will be located within the gently sloping Pasha Dere catchment, which contains the local water course, the Pasha Dere River and the nationally protected Liman Wetland area located at its mouth. The nationally protected Rakitnik site is located in close proximity to the north. The pipeline will not extend into either the Liman or Rakitnik protected areas.

The pipelines and landfall facilities will be constructed within designated Natura 2000 protected areas (Special Protection Area ‘Galata’ and Site of Community Importance ‘Galata’). These sites have been designated, in accordance with EU Directives, in order to conserve the natural habitats and bird populations of the area. In particular, the region has been recognised as being of importance to certain bird species, including the Syrian woodpecker (*Dendrocopus syriacus*), woodlark (*Lullula arborea*), honey buzzard (*Pernis apivorus*) and red-backed shrike (*Lanius collurio*). Further proposed Natura 2000 areas are currently under consideration by the Bulgarian government in the proximity of the Project Area.

The area has a rich anthropological history and is known to contain a number of late Antique, Hellenistic, Roman and early medieval/Byzantine sites and artefacts.

Project Impacts

The preliminary identification of impacts has been based on information currently available and concludes that impacts during the Construction and Pre-commissioning Phase of the Project will typically be temporary and localised.

Offshore, temporary impacts will include noise and air emissions from construction equipment, disturbance of seabed sediments, and alteration of marine water quality during dredging and pipe-laying activities. Benthic and non-mobile species are the marine species likely to be most affected by the Project. Water quality may also be temporarily affected by the discharge of hydrotest water. Impacts to known shipwrecks and submerged cultural heritage objects as a result of construction activities will be avoided or minimised as far as practicable through the routing of the pipelines, so as to avoid them. In general, disturbances to other marine users (e.g. through navigational hazards, anchoring zones) are likely to be minor. The most affected receptors will be the Pasha Dere Beach users, who may be affected by changes to beach amenity due to temporary access restrictions during construction.

Temporary noise and air emissions from construction equipment will also occur as a result of onshore construction activities. The construction corridor will require clearance of vegetation and permanent crops within a 60 m wide corridor for the length of the onshore pipelines. Following construction of the onshore pipelines, the ground and soil of the construction corridor will be reinstated. Vegetation and permanent crops may be replanted within the corridor with the exception of the 40 m wide right of way (5 m wide corridor either side of the centreline of each pipeline) within which deep-rooting vegetation and permanent crops will not be permitted. The clearance of the construction corridor from vegetation will result in impacts to habitats, flora and fauna within the construction corridor. These will be temporary and localised and will be partially mitigated by re-vegetation. Impacts to known cultural heritage objects as a result of construction activities will be avoided or minimised as far as possible through routing of the pipelines.

Operational impacts will include permanent restrictions on land use above the onshore pipelines, such as the restrictions within the right of way and within the Safety Exclusion Zones. These restrictions will limit the future development potential of the surrounding land and will impact habitats, flora and fauna, as deep rooting vegetation will need to be regularly cleared away. Impacts on the landscape will be managed through the restoration of the original landscape along the pipeline route. At sea, there will be limited restriction to fishing activities as a result of the exclusion zone over the offshore section of the pipeline.

Transboundary impacts are likely to be minimal and associated primarily with unplanned events in the marine environment. Impacts generated by unplanned events, such as the accidental release of hydrocarbons to the marine environment during the Construction Phase or the accidental release of natural gas to the atmosphere during the Operational Phase, are unlikely and strict management measures will be in place to ensure that such impacts will be minimised and contained.

As far as practicable, mitigation measures and management practices will be implemented to avoid or minimise construction and operational impacts.

After further surveys, studies and consultation, the likely impacts of the Project will be assessed and ranked in more detail. South Stream Transport will identify mitigation measures and ways to enhance beneficial impacts. Impact assessment and mitigation details, including for any potential transboundary impacts, will be provided in the EIA and ESIA documentation. The EIA and ESIA schedule is shown in Tables 1 and 2 below.

Table 1: EIA Schedule

Activity	Period
Submission of Notification document for Bulgarian EIA	June 2012
Terms of Reference/Scoping Report Disclosure	January 2013
Submission of Espoo Notification Form	January 2013
National EIA Report Disclosure	Second Quarter 2013
National EIA Consultation Period	Second Quarter 2013
National EIA Review Period	Second Quarter 2013 to Third Quarter 2013

Table 2: ESIA Schedule

Activity	Period
Scoping Report/Terms of Reference Disclosure	January 2013
Additional Technical Field Surveys	Second Quarter 2012 to Second Quarter 2013
Draft ESIA Consultation Period	Second Quarter 2013
Final ESIA Report Disclosure	Second Quarter 2013 to Third Quarter 2013

EIA and ESIA Stakeholder Engagement

Stakeholders are people or groups who may be affected by the Project, or who have an interest in it. Stakeholder engagement includes consultation and dialogue about the EIA and ESIA process and content, including project design, expected impacts, and measures taken to mitigate and manage impacts. Key objectives of the EIA and ESIA consultation process, are to:

- determine the scope and content of the impact assessment studies to be undertaken; and
- ensure that stakeholder priorities, views and concerns regarding the Project are understood and considered in the relevant decision making processes.

In accordance with the Bulgarian EIA process, meetings were held in January 2013 with organisations specified by the Ministry of Environment and Water (MoEW) in their response to the Project Notification, to discuss the South Stream Offshore Pipeline Project – Bulgarian Sector Scoping Report. These organisations included:

- the Ministry of Health;
- the Regional Inspectorate of Environment and Water (RIEW) in Varna;
- the Water Supply and Sanitation (WSS) company in Varna; and
- the Basin Directorate for Water Management in the Black Sea Region.

In addition, a broader programme of ESIA consultations to discuss the Scoping Report will take place in February 2013. The planned meetings are detailed in Table 3.

Table 3: ESIA Scoping Consultation Activities

Meeting Type	Stakeholder Group	Date	Location
Roundtable Meeting	Local Authorities	Feb 2013	Varna
Open houses in potential Project-Affected Communities	PACs	Feb 2013	Galata, Priseltsi
Roundtable Meeting	Regional and national NGOs	Feb 2013	Varna
Roundtable Meeting	Marine Authorities	Feb 2013	Varna
Roundtable Meeting	Marine users / Business associations	Feb 2013	Varna

Stakeholders have also been invited to submit their comments on the Scoping Report, in writing. Any stakeholder engagement required under the Espoo Convention will be integrated with the consultation for the national EIA process.

Table of Contents

1 Introduction

1.1 Project Overview

The South Stream Offshore Pipeline is the offshore component of the South Stream Pipeline System that will deliver natural gas from Russia to the countries of Central and South-Eastern Europe. When complete, the System will extend over more than 2,300 km (Figure 1.1).

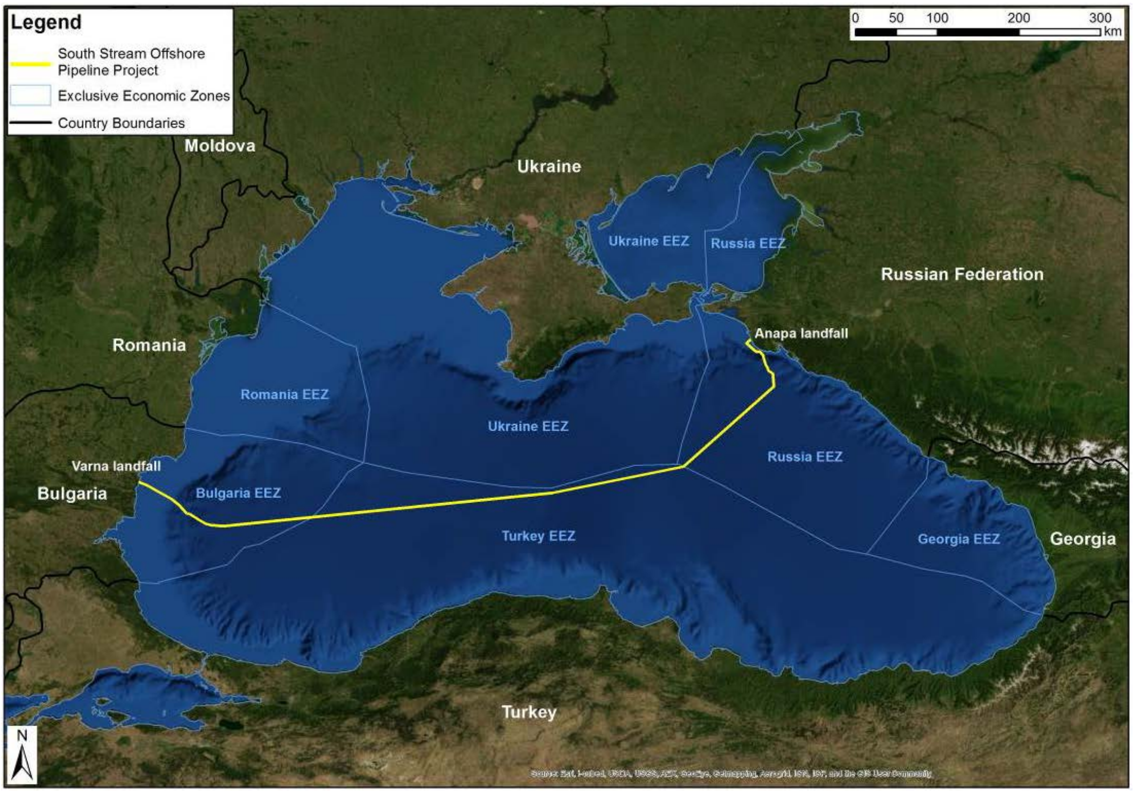
Figure 1.1: South Stream Pipeline System

The South Stream Offshore Pipeline will comprise four adjacent and parallel 32 inch (813 mm) diameter pipelines extending approximately 930 km across the Black Sea from the Russian coast near Anapa, through the Turkish Exclusive Economic Zone (EEZ), to the Bulgarian coast near Varna (Figure 1.2). In addition to the offshore pipelines, the South Stream Offshore Pipeline will also consist of short onshore parts, known as landfall sections, in Russia and Bulgaria, with landfall facilities.

At maximum capacity, 63 billion cubic metres (bcm) of natural gas can be transported per year. Each of the four pipelines will have a maximum flow rate of approximately 15.75 bcm per year, and a maximum design pressure of 300 bar.

The Bulgarian part of the South Stream Offshore Pipeline is known as the ‘South Stream Offshore Pipeline – Bulgarian Sector’ and is referred to as ‘the Project’ throughout this Espoo Notification Document (the ‘Document’).

Figure 1.2: South Stream Offshore Pipeline Project



The Project is approximately 236 km in length from the border between the Bulgarian and Turkish EEZs to a coastal location approximately 11 km south of the city of Varna. Of the 236 km, approximately 210 km are within the Bulgarian EEZ, 23 km lie within Bulgarian territorial waters, and up to 3 km are onshore. The South Stream Offshore Pipeline Project – Bulgarian Sector is presented in Figure 1.3.

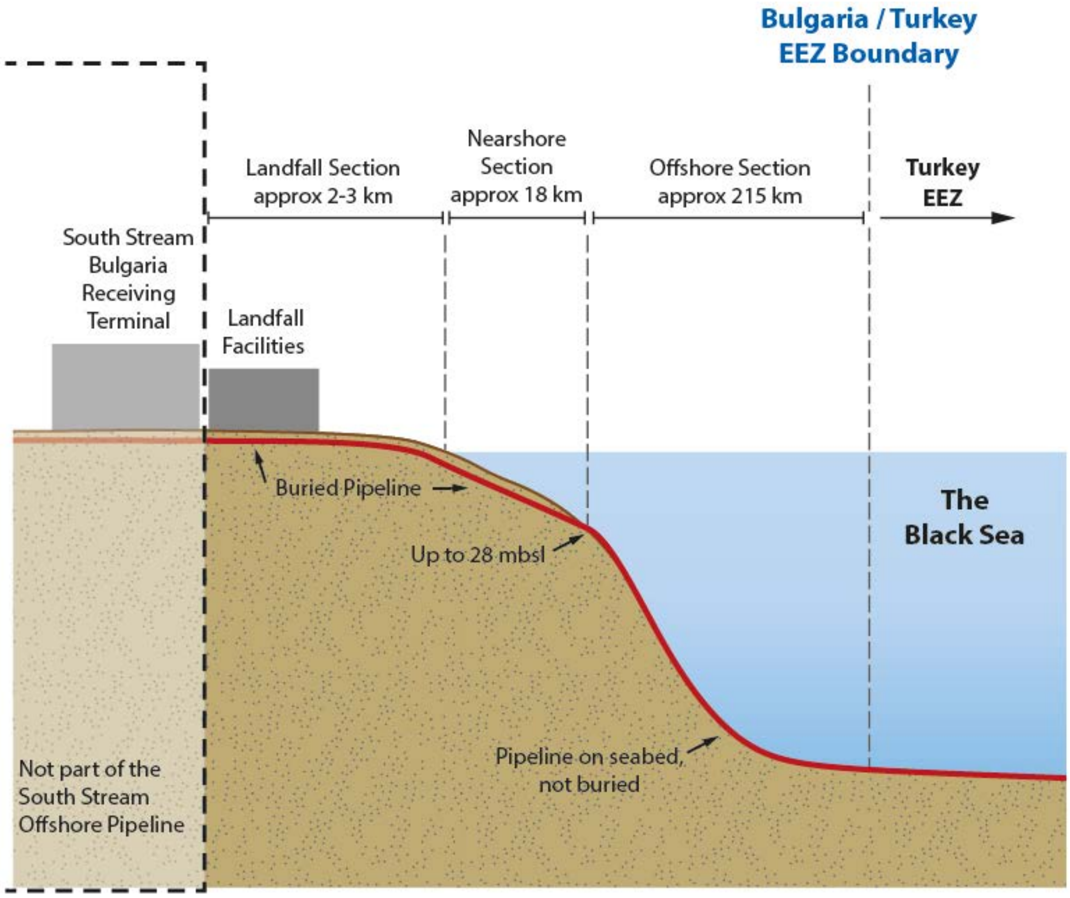
The offshore pipelines will be connected to permanent landfall facilities via four 2.2 km (Option 1) or 2.8 km (Option 2) long onshore buried pipelines. The landfall facilities will be connected to a Receiving Terminal (a facility to monitor and control gas flow and pressure). The Receiving Terminal is not part of the Project and will be designed and installed as part of the project known as “South Stream Pipeline System on the territory of the Republic of Bulgaria” that is being developed by South Stream Bulgaria AD (SSB).

Where this Document refers to the South Stream Offshore Pipeline and not to ‘the Project’, the intent is to refer to the overall South Stream Offshore Pipeline covering all three countries (Russia, Turkey and Bulgaria).

1.2 Project Proponent

The South Stream Offshore Pipeline is being developed by South Stream Transport B.V., an international joint venture established on 14 November 2012 in Amsterdam, the Netherlands for the planning, construction, and subsequent operation of the offshore gas pipeline through the Black Sea. South Stream Transport B.V. took over the management of the Project from South Stream Transport AG. The Russian company OAO Gazprom holds a 50% stake in South Stream Transport B.V. The Italian company Eni S.p.A. has a 20% stake. The French energy company EDF and German company Wintershall Holding GmbH (BASF Group) each hold 15%.

Figure 1.3: South Stream Offshore Pipeline – Bulgarian Sector



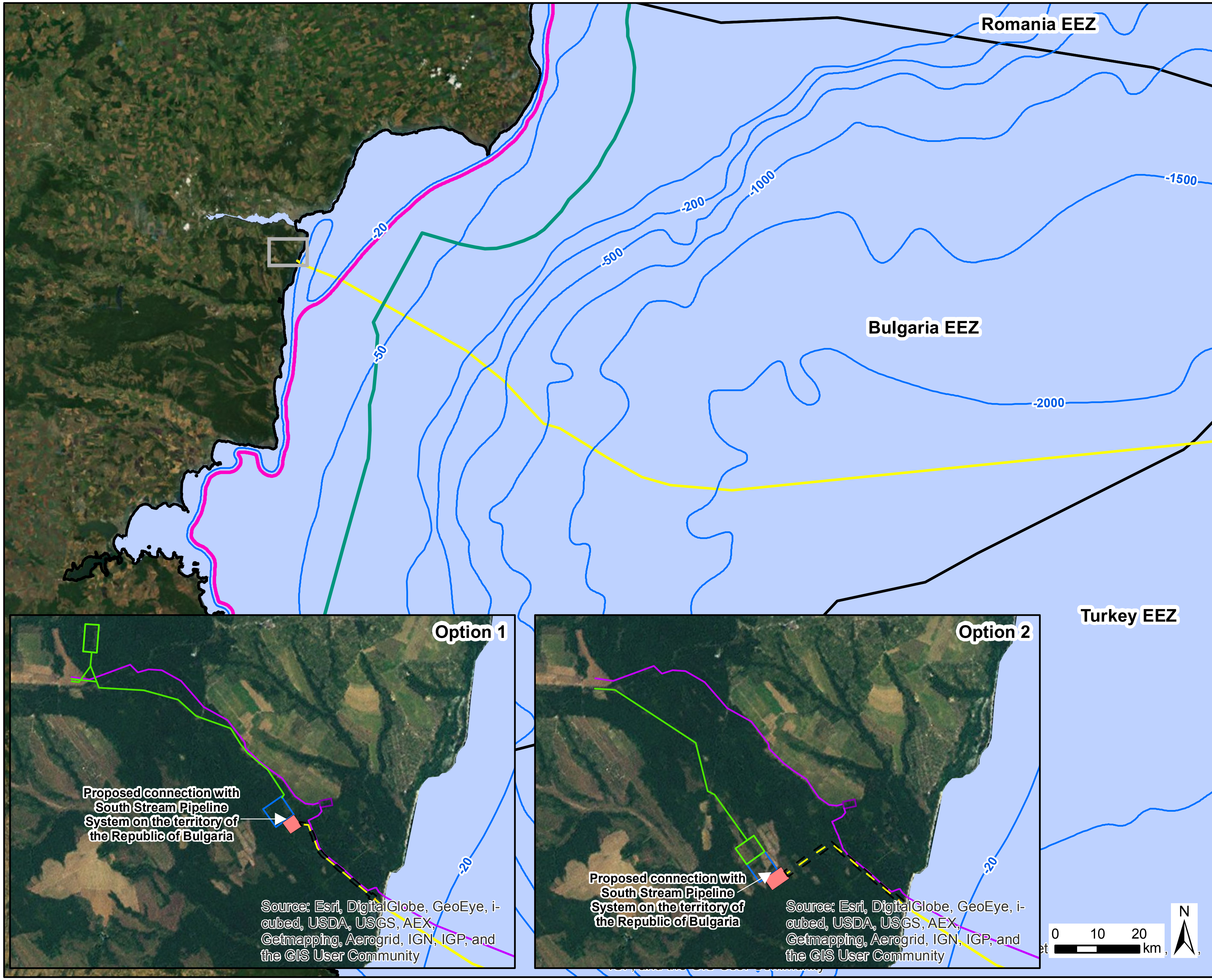
1.3 The Project Area

The Project Area comprises three distinct sections – offshore section, nearshore section and a landfall section (see Figure 1.4).

The Project also includes marshalling yard(s) that will be used for storage of pipe and equipment.

1.3.1 Offshore Section

Four pipelines, each approximately 215 km in length, will be laid directly on the seabed from the boundary between the Turkish and Bulgarian EEZs to approximately 18 km from the Bulgarian coast in a water depth of approximately 28 m.



LEGEND

Bulgarian Sector of South Stream Offshore Pipeline
- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Construction corridor
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station

Galata Pipeline Infrastructure
- Existing Galata gas pipeline
- Existing Galata gas processing plant

South Stream Pipeline System on the territory of the Republic of Bulgaria
- SSB compressor station (indicative)
- SSB receiving terminal (indicative)
- SSB pipelines
- Indicative edge of the nearshore section
- Bulgarian territorial waters boundary
- EEZ boundaries

Projection: Lambert Conformal Conic

Revision Details	By Check	Check Date	Suffix

Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: SOUTH STREAM OFFSHORE PIPELINE – BULGARIAN SECTOR

Drawn	Checked	Approved	Date
DH	RW	MW	07/01/2013

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Drawing Number: Figure 1.4 | Rev

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File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 1.4 South Stream Offshore Pipeline – Bulgarian Sector.mxd

1.3.2 Nearshore Section

The nearshore section commences approximately 18 km from the Bulgarian coast in a water depth of approximately 28 m and extends to the shore crossing location on Pasha Dere Beach. Within this section the pipelines will be buried either in pre-dredged trenches or by means of post-trenching techniques (see Chapter 4).

1.3.3 Landfall Section

The landfall section will commence at the shore crossing location on Pasha Dere Beach. The buried onshore pipelines will run inland and connect with one of two (Option 1 and Option 2) potential locations for landfall facilities. The final location of these facilities will be determined based on the preferred location of the Receiving Terminal that is to be developed as part of the South Stream Pipeline System on the territory of the Republic of Bulgaria Project being developed by SSB. The landfall facilities will be constructed adjacent to the Receiving Terminal. As two locations for the Receiving Terminal are currently being considered, two options for the location of the landfall facilities and onshore pipeline routing are being considered. Option 1 would involve a 2.2 km long pipeline to connect the shore crossing to the landfall facilities and Receiving Terminal. Option 2 would require a 2.8 km long onshore pipeline.

The Project's landfall facilities will consist of:

- An operational metering facility;
- Four Pipeline Inspection Gauge (PIG) receiver facilities (one per pipeline); and
- Four Emergency Shutdown (ESD) valve stations (one per pipeline).

The Project may also require a block valve station for each pipeline. This requirement is being investigated as part of the on-going Front End Engineering Design (FEED) process.

1.3.4 Marshalling Yards

One or more marshalling yards will be required for the storage of pipe and equipment necessary to construct the offshore, nearshore and landfall sections of the Project.

It is anticipated that marshalling yards will be strategically located at one or more ports on the Bulgarian coast of the Black Sea. The locations for these yards are currently being finalised.

1.4 Project Phases and Timeline

The Project development includes five key phases:

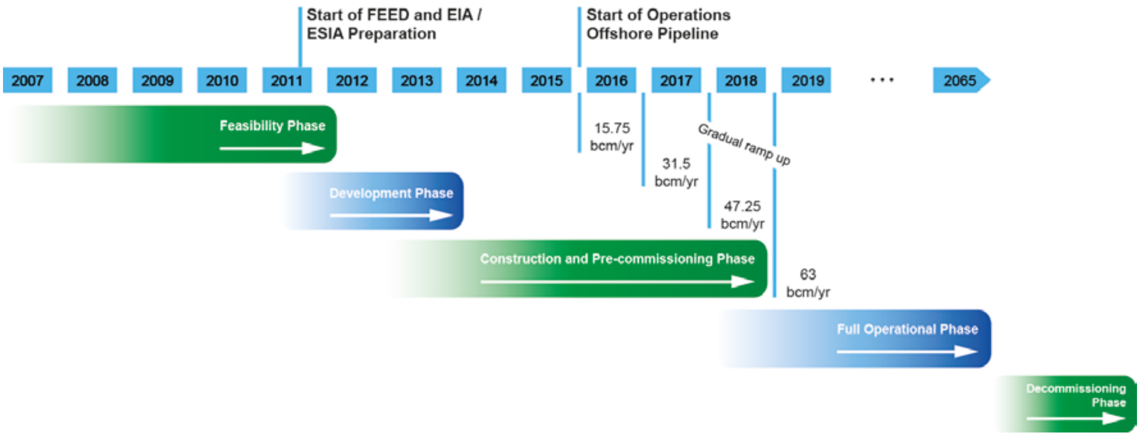
- **Feasibility Phase** (2007 to February 2012) initiated by Gazprom. This Phase involved the development of Feasibility Studies in which a number of gas pipeline routes and landfall options were assessed and a preliminary engineering (conceptual) design was developed.
- **Development Phase** (March 2012 to 2013) currently being undertaken by South Stream Transport. This Phase involves development of the FEED together with the country-specific Environmental Impact Assessment (EIA) for national permitting requirements. This Phase

also includes development of an Environmental and Social Impact Assessment (ESIA), an Environmental and Social Management System (ESMS) and Environmental and Social Management Plans (ESMP) in line with Good International Industry Practice (GIIP) and to meet the standards and guidelines of International Financial Institutions (IFIs).

- **Construction and Pre-Commissioning Phase** (2013 to end 2018). This Phase will involve all construction activities including an operational ramp-up period from late 2015 (with 15.75 bcm of capacity being added per year over four years) to late 2018 (after which the total Project capacity will be 63 bcm per year).
- **Full Operational Phase** (end of 2018 to 2065). The Project will have an operational design life of 50 years.
- **Decommissioning Phase** (2065 onwards).

An indicative timeline for the South Stream Offshore Pipeline is presented in Figure 1.5.

Figure 1.5: South Stream Offshore Pipeline Project Timeline



1.5 EIA and ESIA Requirements for the Project

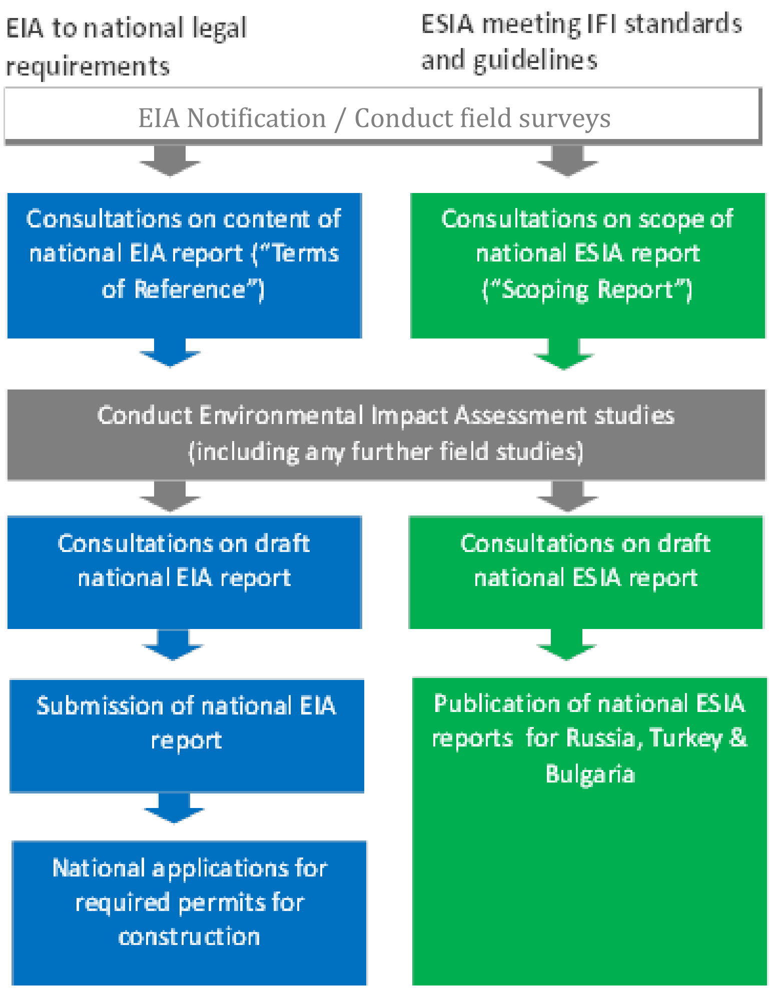
As the Project is located within the territory and waters of the Republic of Bulgaria, an EIA will be prepared in compliance with legal requirements and regulations (see Section 2.3).

In addition, in line with Good International Industry Practice (GIIP) and for finance purposes, the Project will meet the standards and guidelines of IFIs including those for Environmental and Social Impact Assessment (ESIA) (see Section 2.2).

Under the Bulgarian regulatory process, a draft Terms of Reference must be developed and consulted upon, to guide the structure and content of the EIA report to be submitted as part of the Bulgarian national requirements. The international ESIA guidelines include a scoping stage to help identify potentially significant environmental, socio-economic and cultural heritage impacts related to the Project. As the requirements for the content of the Terms of Reference document in Bulgaria are similar to the nature and content of the Scoping Report which is developed to meet the standards and guidelines of IFIs, a single Scoping Report was developed to meet the needs of both the national and international processes. This report is referred to as the 'Scoping Report' and can be found on the South Stream Offshore Pipeline website. The report functions as both the Terms of Reference for the national EIA and the Scoping Report for the international ESIA process.

Where this Document refers to the EIA it means the documentation developed to meet the legislative requirements of the Republic of Bulgaria, and where the document refers to ESIA it means the documentation produced to meet the standards and guidelines of IFIs. The general EIA and ESIA processes are illustrated in Figure 1.6. Unless explicitly stated otherwise, all baseline information, potential impacts, potential mitigation measures, and proposed technical studies referred to in this report are to be considered of relevance and applicable to both the EIA and ESIA processes for the Project and to any transboundary impact assessment undertaken as part of those processes.

Figure 1.6: General EIA and ESIA Process



In addition to the EIA and ESIA for Bulgaria, the following documentation will be prepared for the South Stream Offshore Pipeline:

- A Turkish national EIA to meet Turkish legislative requirements;
- A Russian national EIA to meet Russian legislative requirements; and
- An ESIA for both Turkey and Russia to meet applicable IFI standards and guidelines, where necessary.

Transboundary environmental and social impacts will be assessed as part of the ESIA processes for each country and will be reported in the EIAs and national ESIAs where appropriate.

1.5.1 EIA / ESIA Process

The EIA and ESIA process is a systematic approach to identifying the environmental and social risks and impacts of a project, throughout its lifecycle, and describing mitigation, management and monitoring measures to address these. A description of project components and activities is used to guide the scope and level of effort devoted to the risks and impacts identification and provides the basis for mitigation, management and monitoring approaches.

Both the EIA and ESIA processes generally include the components illustrated in Figure 1.7.

Figure 1.7: EIA and ESIA Process

Engagement with stakeholders and disclosure of Project and EIA / ESIA information is on-going throughout the EIA and ESIA processes to ensure that stakeholders can input into the assessments and, where appropriate, influence the Project from the design stage through to the development of mitigation, management and monitoring measures.

The stakeholder engagement programme for the Project is outlined in Chapter 9.

1.5.2 Environmental and Social Management System and Plan

Construction and operation of the Project will be supported by an Environmental and Social Management System and Environmental and Social Management Plans (ESMP), which will be developed as part of the EIA / ESIA process. The ESMS will be part of the South Stream Offshore Pipeline Health & Safety, Security and Environmental Integrated Management System (HSSE-IMS) through which the environmental and social risks and impacts of the Project will be managed.

The ESMPs are the key management tool through which the commitments to mitigation and management measures, many of which are made as part of the EIA / ESIA process, will be implemented. The ESMP will include the plans and the actions, including monitoring, that are needed to ensure that the identified environmental and social risks and impacts of the Project are addressed, and that environmental and social performance standards are achieved. The management procedures, auditing requirements and corrective action procedures required to ensure continual improvement in environmental and social performance will be included within the HSSE-IMS, in line with the requirements of ISO 14001.

1.6 Purpose of this Document

This document has been prepared to inform the Espoo Notification process and provides a preliminary overview of the Project and a preliminary assessment of the potential environmental transboundary impacts. The Document contains the same information as the Scoping Report issued for the EIA and ESIA processes, with the addition of a chapter containing more detailed information on potential transboundary environmental impacts (Chapter 7).

It is important to note that the information provided in this Document is preliminary. The Document is not intended to provide comprehensive and detailed information regarding the Project and its potential impacts. Rather, it provides an initial overview intended to:

- Highlight potential environmental, socio-economic and cultural heritage issues and impacts (including transboundary environmental impacts) relating to the Project;
- Outline the methodologies used to date and planned in the assessment of impacts; and
- Inform the development of the EIA and ESIA process and the Project design.

This Document includes:

- An outline description of the Project at the time of writing. Where elements of the Project are under development and yet to be confirmed this is acknowledged within the report and, where the information is available, the options being considered are discussed;

- A summary of the various Project alternatives considered and a justification of why the Project has been identified as the preferred option for development;
- Preliminary identification of environmental, socio-economic and cultural heritage constraints and sensitivities;
- Preliminary identification of potentially significant impacts, both positive and adverse;
- Possible mitigation and enhancement measures for further discussion and refinement;
- A preliminary assessment of potential transboundary environmental impacts arising as a result of the Project;
- Identification of gaps in information and an outline of proposed further work to fill those gaps; and
- Identification of the way forward for further stages of the EIA / ESIA and associated consultation process.

Further detail on the Project and potential impacts and mitigation measures will be presented in the EIA and ESIA reports.

2 Policy, Regulatory and Administrative Framework

2.1 South Stream Transport Sustainability Policy

South Stream Transport is committed to implementing Good International Industry Practice (GIIP) in relation to environmental and social performance in all phases of the South Stream Offshore Pipeline including its development, construction, pre-commissioning, operation and decommissioning. This commitment will be captured in a South Stream Transport Sustainability Policy which will be made publicly available.

2.2 Republic of Bulgaria Regulatory Framework

The Project will be planned, constructed and operated in compliance with applicable Bulgarian laws and regulations. A list of relevant environmental legislation is provided in Appendix A. The EIA procedure in Bulgaria is briefly presented in Section 2.3.2.

2.2.1 Republic of Bulgaria EIA Requirements

The EIA process in the Republic of Bulgaria is controlled at the national level by:

- Chapter 6 of the Environmental Protection Act (EPA) (disseminated in the State Gazette in 2002, amended and supplemented in July 2012); and
- The Ordinance on the conditions and order for carrying out an EIA (disseminated in the State Gazette in 2003, amended and supplemented in 2011) (Ref. 2).

The above legislative documents have been transposed from the EU EIA Directive (85/337/EEC, amended and supplemented with Directive 97/11/EC, amended and complemented with Directive 2003/35/EC) (Ref. 3). Compliance with further related Bulgarian environmental legislation requirements (e.g. the Appropriate Assessment Regulation (published SG 73/11.09.2007)) will also be considered within the EIA process. The requirements for an Appropriate Assessment are outlined in Section 2.3.3.

Table 2.1 sets out the different stages of the EIA process in Bulgaria and provides an overview for each stage. This process is summarised in Figure 2.1.

2.2.2 Screening – Notification

The Notification document was submitted by South Stream Transport to the MoEW on 27th June 2012. South Stream Transport received MoEW's official response on 19th July 2012 (Ref. No.OBOC-229/19.07.2012) which requested the provision of further information about the Project, regarding the potentially affected areas and the nature of the proposed works. This additional information was provided to MoEW on 4th September 2012. The MoEW's official response to this additional information (Ref. No. EIA-229/28.09.2012) confirmed that:

- The Project is subject to the mandatory EIA procedure;

- Due to the transboundary nature of the Project, the competent authority for this procedure will be the MoEW;
- An Appropriate Assessment would need to be undertaken to assess the potential impacts upon Natura 2000 sites;
- A detailed Terms of Reference of the Project's EIA would need to be developed;
- Going forward all documentation submitted to MoEW should include a short update on the progress of the procedures in Russia and Turkey; and
- An Espoo Notification Form for the Project would be required to support the Bulgarian government with the Espoo procedure with regards to Environmental Impact Assessment in a Transboundary Context.

The response received from the MOEW has been duly taken into consideration and reflected in the ToR/Scoping Report for the Project's EIA.

Figure 2.1: Bulgarian EIA Procedure

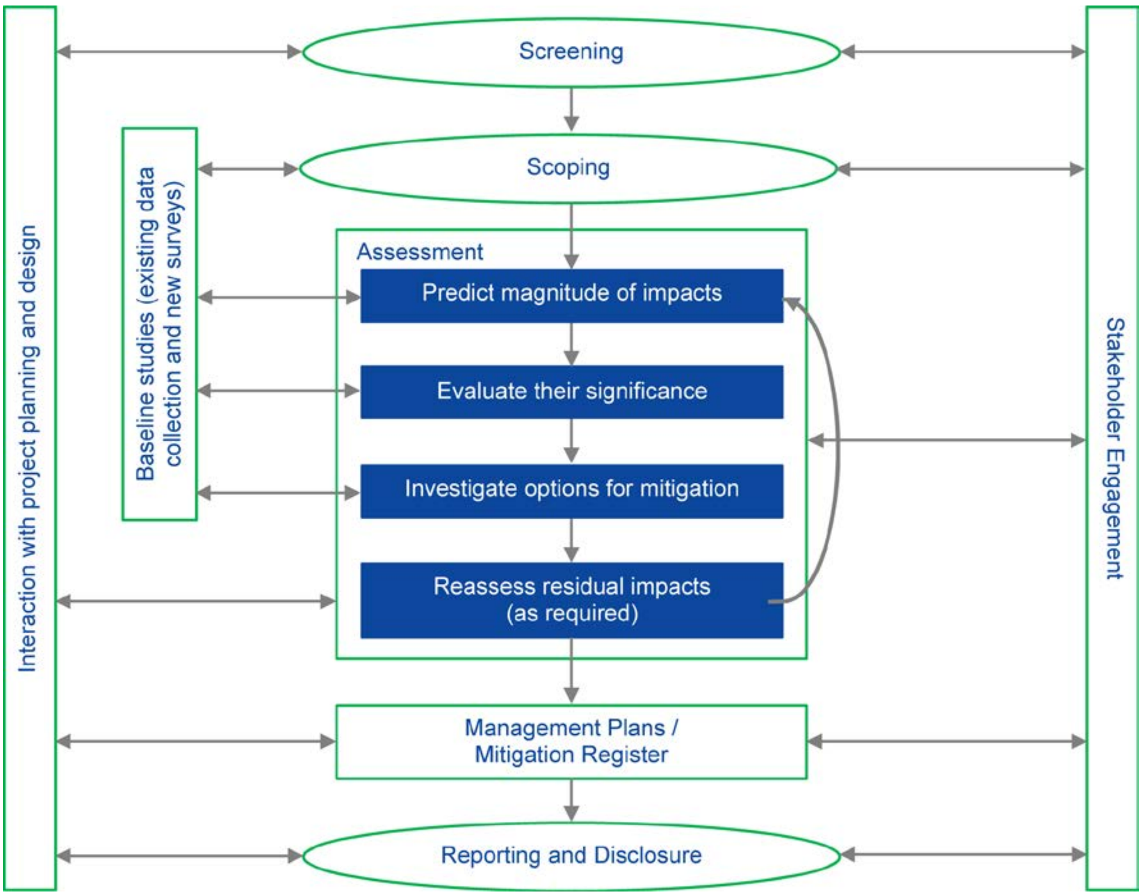


Table 2.1: Bulgarian EIA Process

Stage	Overview	Status
1. Screening – Notification	This stage entails the preparation of the Notification document for the investment proposal (i.e. the Project) in line with Article 4 paragraph 3 of the Bulgarian EIA Ordinance. The Notification is submitted to the Ministry of Environment and Water (MoEW), and to the affected local municipal authorities, thus formally initiating the EIA procedure. The MoEW will screen the Notification and within 14 days advise regarding the necessity of an EIA and Appropriate Assessment (AA) study and required activities to be undertaken.	Completed
2. ToR of EIA (Scoping)	This stage includes the preparation of the Terms of Reference (ToR) for the Project and coordination with the MoEW. The Scoping procedure in Bulgaria is regulated in Chapter 3 of the EIA Ordinance and Article 95 of the EPA. Additionally, the competent authority will provide instructions and recommendations for the EIA consultations and specify the mandatory stakeholders to be consulted for the Project as part of the EIA process.	Completed. Scoping consultations in early February 2013
3. EIA	The EIA will comply with the requirements of Article 96 (1) of Environmental Protect Act, the ToR and the MoEW's comments and recommendations to the ToR. The EIA will include the Appropriate Assessment that will be appended to the EIA. The EIA will be submitted to the MoEW for review. Once a positive evaluation is received, the EIA report can be disclosed to the public via public hearings. This stage will also present the mitigation measures in accordance with identified and assessed impacts and includes the preparation of management plans.	Preparation of the EIA is in progress. The submission of the EIA is scheduled for Q1 2013
4. Reporting and Disclosure	Public Hearings will be undertaken as determined by the MoEW in accordance with the requirements of Chapter 5 of the EIA Ordinance. The results of the Public Hearings will be submitted to the competent authority within 10 days from the date of the last Public Hearing.	Dates to be determined.
5. Decision Making	The competent authority will decide on the EIA Report within 45 days from the date of the last Public Hearing.	Dates to be determined.

2.2.3 Requirements for an Appropriate Assessment

Article 6 (3) and (4) of the Habitats Directive 92/43/EEC (Ref. 4) outlines the assessments that are required where a project may give rise to significant effects upon a Natura 2000 site. Article 6 paragraph 3 states *"any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in* *combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives."*

The development of the Project has the potential to effect the ecological integrity of the Galata Special Protection Area (SPA) (Natura 2000 site code: BG0002060) and the species for which it is considered to be of European importance and the Galata Site of Community Importance (SCI) (Natura 2000 site code: BG0000103). An separate Appropriate Assessment is, therefore, required for each site. It is also noted that the Bulgarian government is currently assessing the expansion and modification of the Galata SCI as well as the potential establishment of an offshore marine SCI known as Emona.

The Appropriate Assessment will follow the four stages recommended in EU guidance (Ref. 5) and will include an assessment of project alternatives in regards to impacts upon Nature 2000 sites. Bulgarian EIA legislation also requires the assessment of project alternatives for the Project as a whole. An Alternatives Assessment report, capturing both Appropriate Assessment and EIA requirements, will be prepared and will be appended to the EIA documentation.

2.3 International Financial Institutions Standards and Guidelines

The ESIA will document the alignment of the South Stream Offshore Pipeline Project with the standards and guidelines of International Financial Institutions (IFIs) such as the requirements of a Category A project under the Equator Principles (EPs) and the OECD Revised Council Recommendation on Common Approaches on the Environment and Officially Supported Export Credits (OECD Common Approaches). Both the EPs and the OECD Common Approaches are underpinned by the IFC Performance Standards (PSs). The IFC PSs, EPs and OECD Common Approaches current as of 1 January 2012 are applicable to the Project.

The IFC PS are directed towards project developers, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations for the Project. There are eight performance standards:

- IFC PS 1: Assessment and Management of Environmental and Social Risks and Impacts - Establishes requirements for social and environmental performance management throughout the life of a project.
- IFC PS 2: Labour and Working Conditions - Highlights the need for workers rights regarding income generation, employment creation, relationship management, commitment to staff, retention and staff benefits..
- IFC PS 3: Resource Efficiency and Pollution Prevention - Defines an approach to pollution prevention and abatement in line with current internationally disseminated technologies and good practice.
- IFC PS 4: Community Health, Safety and Security - Specific requirements for mitigating any potential for community exposure to risks and impacts arising from equipment accidents, structural failures and releases of hazardous materials.

- IFC PS 5: Land Acquisition and Involuntary Resettlement - Recognises that project related land acquisition and restrictions could have adverse effect on communities or persons that use the land and outlines a policy to avoid or minimise involuntary physical resettlement as a consequence of development.
- IFC PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources - Sets out an approach to protect and conserve biodiversity, including habitats, species and communities, ecosystem diversity, and genes and genomes, all of which have potential social, economic, cultural and scientific importance.
- IFC PS 7: Indigenous Peoples - Recognises that Indigenous Peoples can be marginalised and vulnerable (e.g. if their lands and resources are encroached upon by or significantly degraded by a Project).
- IFC PS 8: Cultural Heritage - Aims to protect irreplaceable cultural heritage and to provide guidance for protecting cultural heritage throughout a Project's life cycle.

Not all of the Performance Standards are necessarily applicable; those currently anticipated to be relevant to the Project comprise PS1, PS2, PS3, PS4, PS5, PS6 and PS8. The applicable standards will be confirmed as part of the impact assessment process.

Similarly, the EPs are a set of ten environmental and social standards adopted by a number of global financial institutions which must be adhered to prior to the provision of Project financing. Based on and in alignment with the IFC PS, the EPs focus on Project environmental and social standards and responsibilities. In particular, they highlight the protection of indigenous peoples, labour standards, and the importance of consultation with local affected communities.

OECD signatory governments have agreed a Common Approach on the environment and officially supported export credits that ensures governments consider environmental and social aspects when providing officially supported export credits. Amongst the objectives of the Common Approaches is the promotion of coherence between policies regarding officially supported export credits and policies for the protection of the environment, including relevant international agreements and conventions, thereby contributing towards sustainable development.

2.4 International Conventions and Agreements

International Conventions and Protocols of relevance to the Project include:

- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus, 1998);
- Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS 1996);
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972);
- Convention on the Protection of the Black Sea against pollution (1st, 2nd and 3rd protocol - land based sources, oil & other harmful substances and dumping respectively (Bucharest 1992);

- The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar, Iran 1971);
- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991);
- Protocol of the Espoo Convention on Strategic Environmental Assessments (SEA) (Kyiv, 2003);
- International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) – Annex I - VI; and
- United Nations Convention on the Law of the Sea (UNCLOS 1982).

A list of Conventions and Protocols relevant to the Project, including ratification status, is given in Appendix B.

2.4.1 The Espoo Convention Procedure

The United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, known as the Espoo Convention, was signed in Espoo, Finland on 25th February 1991. It requires that EIA assessments be extended across borders between Parties to the Convention when a planned activity may cause significant adverse environmental transboundary impacts. The Convention has been incorporated into the EU EIA Directive 85/337/EEC as amended and has been implemented into the national legislation of the EU Member States.

The National Assembly of Bulgaria ratified the Convention on 16th March 1995 (SG, 28/1995) by means of a declaration in pursuance to Art. 15 (2) of the Convention on Dispute Resolution and promulgated in SG, No 86/1999 and amended in SG, No 89/1999.

Appendix I of the Espoo Convention lists activities that automatically require application of the Espoo Convention, if significant adverse environmental impacts may extend across country borders (Ref. 3). The Project is classified under Appendix I, item 8 as a "*Large-diameter pipelines for the transport of oil, gas or chemicals*". As such, application of the Espoo Convention is required.

As Bulgaria has ratified the Espoo Convention it will consult on major projects that may result in significant adverse environmental impacts across international boundaries. The assessment process required under the Espoo Convention will be integrated with the Bulgarian EIA procedure. This document has been prepared to inform the Espoo Notification process.

3 Alternatives Assessment

This assessment of alternatives comprises an examination of feasible alternatives to the source of Project impacts and provides an overview of the rationale for selecting each particular course of action proposed.

The purpose of the alternatives assessment is to inform decisions on project design, construction and operation, based on feasible alternatives to the Project. This assessment is intended to ensure that environmental, socio-economic and cultural heritage criteria are considered at early stages of Project development and incorporated in Project decision-making. This Section provides a summary of the methodology and findings of the assessment undertaken. A more detailed assessment of alternatives will be presented in the EIA and ESIA.

The following Project alternatives are considered in the subsequent sub-sections:

- Alternative means of gas transportation;
- Pipeline routing across the Black Sea;
- Landfall sites; and
- Onshore pipeline routing.

As the EIA and ESIA scoping process is intended to facilitate the identification of potential project impacts and identify possible measures to mitigate these impacts, it is not appropriate at the scoping stage to discuss the ‘no project’ or ‘zero alternative’ option, however, this option will be discussed within the EIA and ESIA reports.

3.1 Alternative Means of Gas Transportation

The South Stream Pipeline System is to provide a new gas transportation route between the gas deposits of Russia and the consumers of Central and South-Eastern Europe by crossing the Black Sea.

Two main alternatives for transporting natural gas across the Black Sea were assessed:

- Liquefaction and transportation of Liquefied Natural Gas (LNG) using LNG Tankers; and
- Gas Transportation by Offshore Pipeline.

Three factors were considered in the assessment of these alternatives:

1. Liquefaction and transportation of LNG to gas markets is usually undertaken for ‘stranded gas’ deposits where the source of gas is so distant and isolated from its markets as to make transportation by pipeline uneconomic. This is not the case for the gas deposits in Russia and its proposed markets in the countries of Central and South-Eastern Europe.
2. LNG transports gas that is cooled to -161^{o}C at 1 atmosphere until it reaches a liquid state, resulting in a volume reduction of approximately 600 times (Ref. 6). In comparison to transporting natural gas by pipeline, the energy required to convert natural gas to LNG, and the fuel required for the tankers, result in significant energy consumption and subsequent carbon emissions.

3. Liquefaction and transportation of LNG would require approximately 600 to 700 LNG tanker movements per year to export 63 bcm of natural gas per year. This would equate to approximately two full LNG tanker movements per day through the Turkish Straits, which include the densely populated Bosphorus Strait in Istanbul. These figures may be perceived as an unacceptable risk in view of the nature of the cargo, the high density of maritime traffic through the Turkish straits and the density of population around the Bosphorus Strait in Istanbul.

On the basis of the above considerations, the LNG alternative was discarded at the very early stages of the Feasibility Phase.

3.2 Pipeline Routing across the Black Sea

Following the selection of an offshore pipeline as the means of transportation across the Black Sea, the next step in the alternatives assessment was the selection of offshore routes.

Two landfall sites were identified in Russia: one in Anapa and one in Beregovaya. The main criteria for the selection of the sites was the siting of the compressor station required to increase gas pressure to pump the gas across 930 km of the Black Sea. Following a comparative assessment of the sites, the Anapa site was selected.

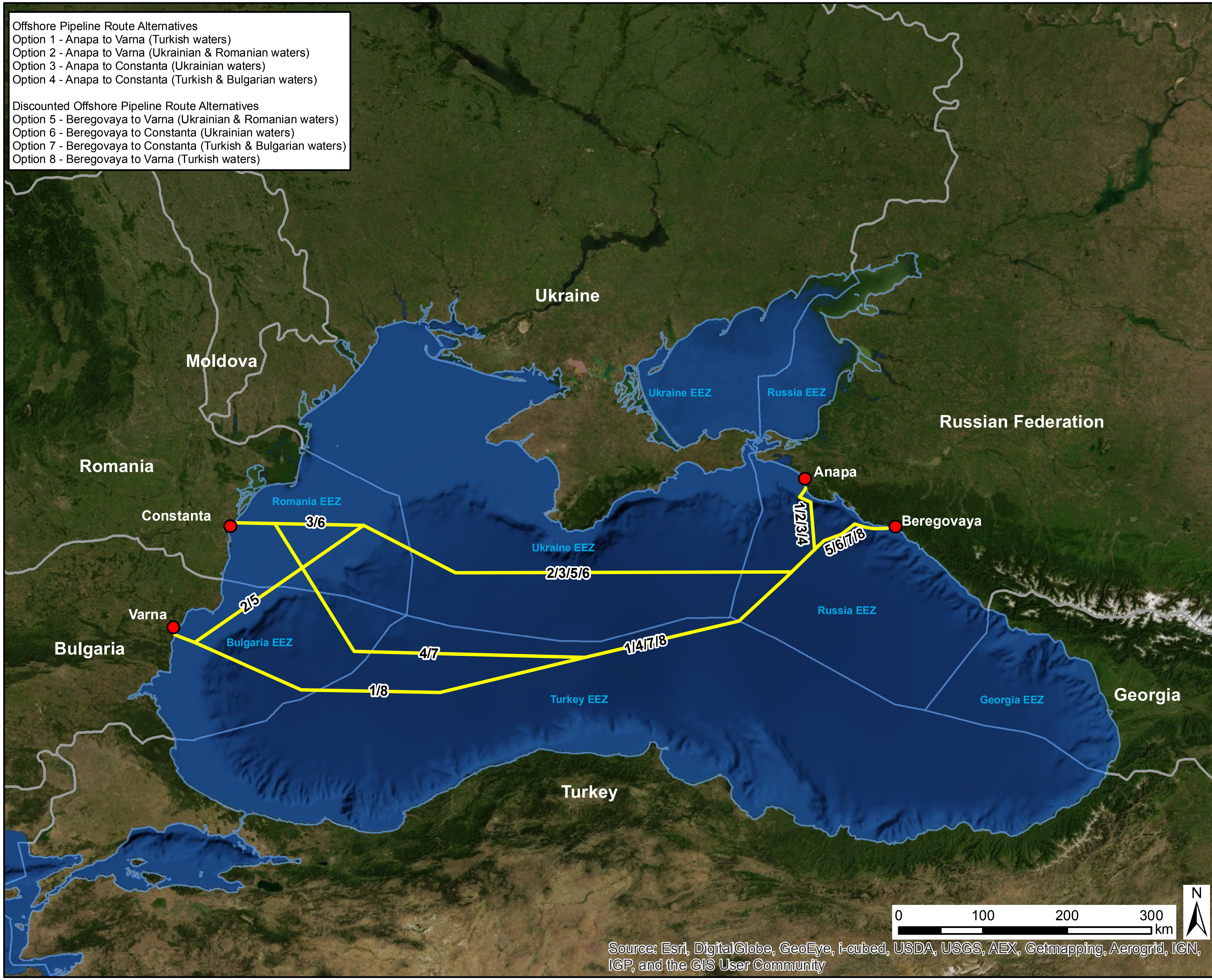
Four offshore pipeline corridors were then assessed for crossing the Black Sea starting from the Anapa landfall (Table 3.1). Four additional offshore pipeline corridors were also initially considered from the Beregovaya landfall section (Options 5, 6, 7 and 8) but were discounted early in the process (Figure 3.1).

Table 3.1: Offshore Pipeline Route Alternatives

Option	Landfall (Russia)	Landfall (S. Europe)	Transit EEZs	Length of Assessed Route (km)
1	Anapa	Varna	Turkey	940.3
2	Anapa	Varna	Ukraine (and Romania)	928.4
3	Anapa	Constanta	Ukraine	933.2
4	Anapa	Constanta	Turkey (and Bulgaria)	931.3

Of these four corridors, two cross the Turkish EEZ (Options 1 and 4) and two cross the Ukrainian EEZ (Options 2 and 3). Options 2 and 3 could not be surveyed within the timeframe required and as such had to be discarded. Further technical investigations were performed only for Options 1 and 4.

Bulgaria was then selected as the preferred onshore transit country of the Black Sea Coastal states for the South Stream Pipeline System, resulting in the selection of Option 1 as the preferred offshore pipeline route.



LEGEND

Exclusive Economic Zones

Route Alternatives

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A 1 km corridor centred on the preliminary route alignment was surveyed to identify engineering constraints and marine archaeological features. Given the complexity associated with the identification of a continental slope crossing, this aspect was assessed first. The continental slope is an unstable region where the depth of the sea rapidly changes and the seabed is generally characterised by unstable sediments, dynamic conditions (e.g. submarine slumps and turbiditic flows) and irregular morphology.

Two factors were considered in the assessment of alternatives for crossing the Bulgarian continental slope:

1. The continental slope off the Bulgarian coast is characterised by canyons. Canyons typically provide a stable and shallow gradient route up the continental slope. Identification of canyons capable of channelling the pipelines to the top of the slope was investigated through use of an autonomous underwater vehicle (AUV).
2. Avoidance of localised constraints (e.g. shipwrecks, areas of possible shallow gas, and areas of potential gravitational slides).

Two canyons, immediately adjacent to each other were deemed adequate for the laying of the pipelines (three pipelines in the larger canyon and one pipeline in the smaller, narrower canyon). The continental slope area also has a number of known gas seeps (Figure 5.6 in Chapter 5) which which constitute a geo-hazard. The identified routes avoided the majority of seeps, passing through the northern edge of a single seep.

Following selection of the continental slope crossing, a route was identified to extend the pipelines across the abyssal plain towards the border with the Turkish EEZ as well as a route from the top of the continental slope to the Bulgarian coast, across the continental shelf. No major engineering constraints of significance were identified along the preferred pipeline route.

3.3 Landfall Sites and Shore Crossing Options

Once the crossing of the continental slope was selected, the landfall was chosen on the basis of technical, environmental, socioeconomic and cultural heritage criteria.

A major constraint for the selection of suitable locations for the landfall facilities along the Bulgarian Black Sea coast is that a large portion of the Bulgarian coastline is designated as either Natura 2000 protected areas or nationally designated protected sites. Furthermore, there are a number of residential communities and tourist sites located along the coast.

An analysis of the coastline identified three potential landfall sites outside the boundaries of designated protected areas and a safe distance from residential or tourist areas. The three locations identified were:

- Location A, located near Krapets approximately 66 km north-east of Varna;
- Location B, located near Kamchia Beach approximately 17 km south of Varna; and
- Location C, located approximately 34 km south-east of the city of Burgas.

Stability of the beach at Location A was seen to be poor and potential coastal erosion was considered to pose a risk to the integrity of the pipelines. Location A was also to require a longer onshore pipeline section to connect to the 'South Stream Onshore Pipeline System on the territory of the Republic of Bulgaria', resulting in more significant onshore environmental and social impacts. Location B is in close proximity to a popular tourist area with substantial tourism infrastructure. The magnitude of socio-economic impacts associated with the potential development of Location B was considered likely to be high. Similarly, Location C is characterised by steep rock cliffs, with a range of both residential and tourism development in close proximity to the site. Consequently, none of the three options were deemed suitable for a pipeline landfall site.

Further assessment of the coastline was therefore performed, including technically viable landfalls within protected conservation areas. Consequently, a site was selected immediately adjacent to the existing Galata gas pipeline (operated by Melrose Resources plc.), which crosses the shore at Pasha Dere Beach located approximately 11 km south of Varna. It was considered that a landfall in close proximity to a previously disturbed area would minimise impacts upon the surrounding natural environment.[1] The chosen landfall avoids two Nationally Protected Sites (Liman and Rakitnik) and is within the boundaries of the Special Protection Area (SPA) 'Galata' and the Site of Community Importance (SCI) 'Galata' (see Section 5.2). A detailed constraints map for this area is reported in Figure 5.7 in Chapter 5.

Two potential shore crossings (VLF-A and VLF-B) were identified on Pasha Dere Beach (Figure 3.2). VLF-B was considered likely to generate greater environmental impacts due to its closer proximity to the Liman Wetland (a nationally protected wetland). VLF-A, located immediately adjacent to the Galata pipeline Right of Way was consequently identified as the preferred option.

3.4 Onshore Pipeline Routing

Following the identification of VLF-A as the preferred landfall site, potential locations for locating the Project's landfall facilities and associated buried pipelines were identified. The site and route identification was based on engineering, environmental, socioeconomic and cultural heritage criteria.

All of the sites identified were considered of ecological interest, particularly with regards to the potential to act as breeding, nesting and foraging grounds for a number of important and protected bird species (e.g. Syrian woodpecker (*Dendrocopus syriacus*), woodlark (*Lullula arborea*), honey buzzard (*Pernis apivorus*) and red-backed shrike (*Lanius collurio*)).

The assessment of the sites for the landfall facilities identified two locations within the Galata SPA Natura 2000 site, Option 1 and Option 2. It must be noted that, for engineering reasons, the landfall facilities must be adjacent to the Receiving Terminal being developed by South

[1] The approach of 'bundling' has been successfully adopted previously for pipeline projects, including, for example, the Breagh Pipeline Project (Ref. 21) in the United Kingdom, which selected a pipeline route and landfall site adjacent to existing pipeline corridors as this was deemed to have the lowest environmental impact despite the landfall site being situated in a Natura 2000 Special Protection Area (SPA).

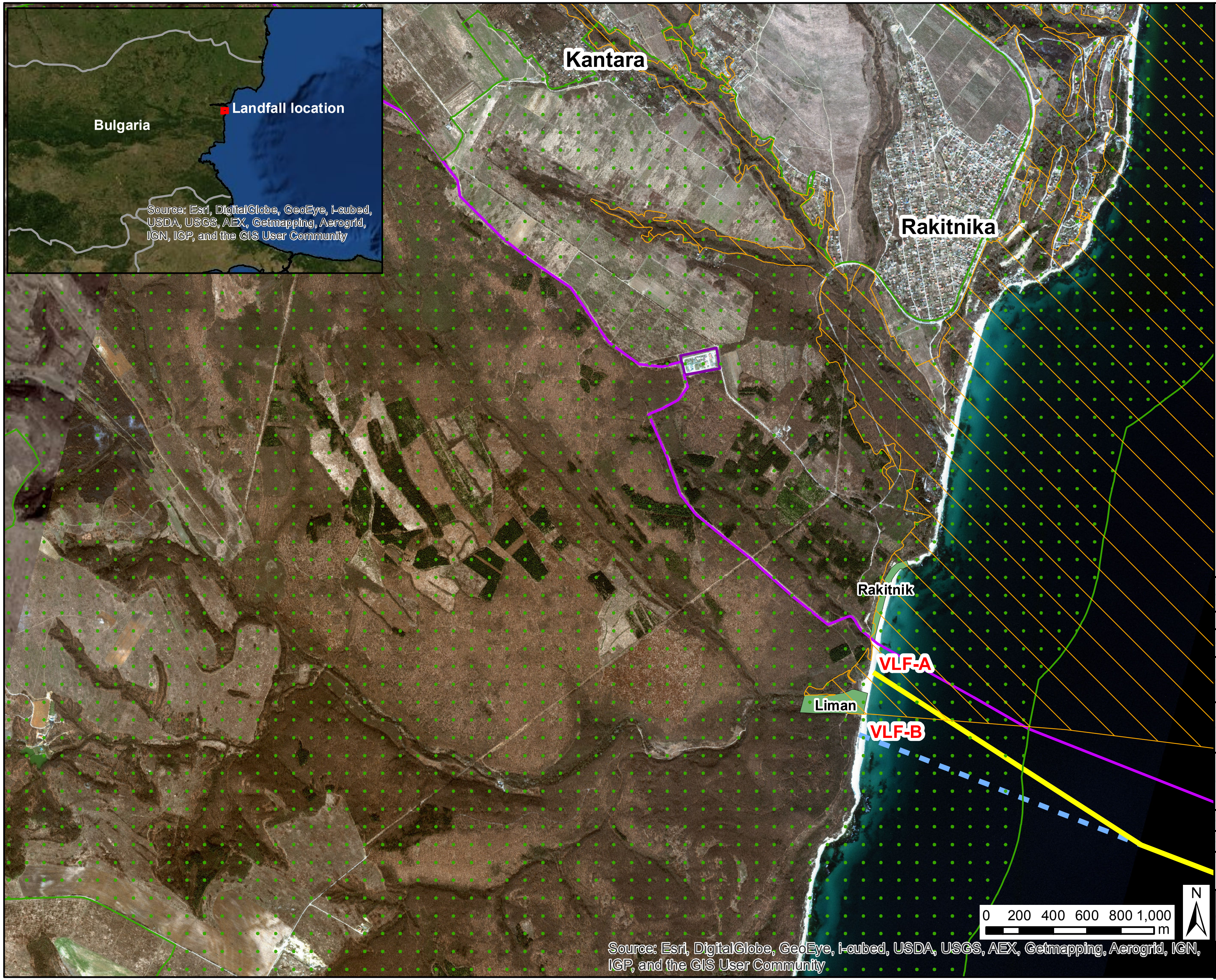
Stream Bulgaria (SSB). As such the siting of the landfall facilities also took into consideration the land take requirements of the Receiving Terminal.

A comparative assessment of the two options identified Option 2 as the preferred location for the landfall facilities and the associated pipeline route. This reflects the location of Option 2 within a non-native forestry area of relatively lower ecological value and its greater distance to surrounding residential sensitive receptors in comparison to Option 1. A brief description of the ecological sensitivities of both sites is reported below:

- Option 1 – located in native planted woodland considered to be critical habitat on the basis of its ability to support a number of EU protected species such as spur-thighed tortoise (*Testudo graeca*) and stag beetle (*Lucanus cervus*);
- Option 2 – located in an area of predominantly non-native plantation woodland with some native planted woodland. As with Option 1, the native woodland may support a number of of EU protected species such as spur-thighed tortoise (*Testudo graeca*) and stag beetle (*Lucanus cervus*).

Although Option 2 is identified as the preferred option, for the purposes of this Document, both Option 1 and 2 are considered as viable. Options 1 and 2 are illustrated in Figure 3.3.

Further optimisation of the design (including the location) of landfall facilities and pipeline routing is continuing as part of the FEED process during the Development Phase of the Project and takes into consideration technical, environmental, socio-economic and cultural heritage constraints. The outcome of the design optimisation process will be documented and will form part of the alternatives assessment to be included in the EIA and ESIA.



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Plot Date: 03/01/2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 3.3 Landfall Facilities Options 1 and 2.mxd

LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Proposed right of way
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station
- Construction sites (indicative)

Galata Pipeline Infrastructure

- Existing Galata gas pipeline
- Existing Galata gas processing plant

South Stream Pipeline System on the territory of the Republic of Bulgaria

- SSB compressor station (indicative)
- SSB receiving terminal (indicative)
- SSB pipelines

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4 Project Description

4.1 General Description

The Project entails the construction, pre-commissioning, operation and decommissioning of four offshore pipelines that will transport dry natural gas (predominantly methane).

The permanent facilities[2] of the Project will consist of the following.

Pipelines

There will be four 236 km long steel pipelines, each 32 inches (813 mm) in diameter with a wall thickness of 39 mm. The pipelines will be made of 12 m long sections, which will be welded together on site. The pipe sections will be coated both inside and outside. The internal coating will be an epoxy paint which improves internal cleanliness and the operational gas flow rate, whilst the external coating will be made of three-layer-polypropylene (3LPP) to protect the pipelines from corrosion.

Shallow water sections of the offshore pipelines (typically for water depths less than 100 m) will be additionally coated with reinforced concrete to increase their weight and improve stability against sea currents, with the additional advantage of protecting the pipe from external damage. In addition, the pipelines will be protected against corrosion by a cathodic protection system consisting of sacrificial anodes for the offshore and nearshore sections and an impressed current system or sacrificial anodes for the landfall section.

The South Stream Offshore Pipeline will have a design pressure of 300 bar although the expected maximum operating pressure is anticipated to be approximately 284 bar. The operating pressure of the pipeline will have fallen to between 65 and 87 bar where the pipeline makes landfall in Bulgaria. The operating temperature of the gas will be approximately -5°C when it makes landfall after having travelled through the Black Sea from Russia.

Permanent Landfall Facilities

The permanent landfall facilities will consist of an operational metering facility, ESD valve stations and PIG receiver facilities for each of the four pipelines. These facilities will include both below and above ground infrastructure such as buildings, walls and hardstanding and security fencing. There may also be a requirement for block valve stations.

As discussed in Section 3.3, the permanent landfall facilities will be located adjacent to a Receiving Terminal being developed by SSB as part of the South Stream Onshore Gas Pipeline on the territory of the Republic of Bulgaria. Two options are being considered for the location of the Receiving Terminal, referred to as Option 1 and Option 2, respectively. Therefore, the base case landfall section discussed in this chapter assumes the construction of either Option 1 or

[2] For the purpose of this report "permanent facilities" are those facilities that will be required throughout the lifetime of the Project i.e. 50 years.

Option 2. The indicative location of each of these facilities is shown in Figures 4.1a (Option 1) and 4.1b (Option 2). The exact location of the facilities will be defined during the FEED process.

The operational metering facility will continuously measure the composition, temperature, flow rate and pressure of the gas being transported by the pipelines. ESD valve stations enable the offshore section pipeline to be isolated from the landfall facilities for maintenance work or in case of a rupture or leak.

A PIG receiver facility will be constructed to allow pre-commissioning tests and maintenance of the pipeline. PIGs are used for activities such as checking for defects (gauging), cleaning, drying and inspection of the inside of the pipeline.

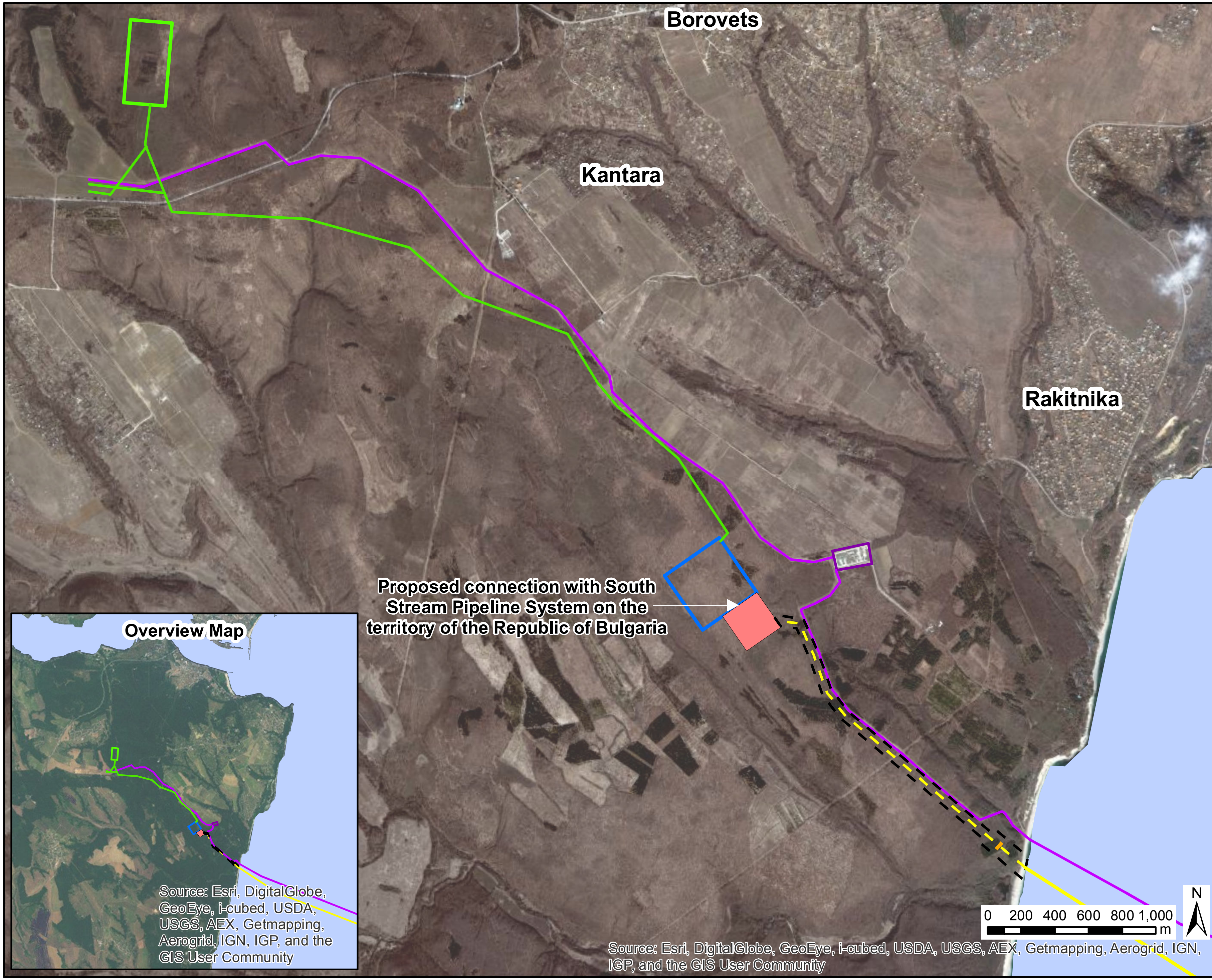
The requirement for a block valve station for each pipeline is being investigated as part of the FEED process. If required, the block valves will be located approximately 200 m inland from the landfall location. Block valves enable a segment of the pipeline to be isolated for maintenance work or in case of a rupture or leak.

Sections 4.2 to 4.5 provide general information on the construction, pre-commissioning, operation and decommissioning methods that will be used for the offshore, nearshore and landfall sections of the Project. Project details are being further developed and defined during the ongoing FEED process, and more specific detail will be presented in the EIA and ESIA.

4.1.1 Project Area

The Project Area is subdivided into the following sections of the pipeline: offshore, nearshore and landfall. The Project Area also includes marshalling yards, which will only be needed for the duration of the Construction Phase of the Project. The Project sections are shown in Figures 1.3 and 4.2 and are described below.

- The offshore section extends from the border of the Turkish and Bulgarian EEZs to approximately 18 km from the coast, where the water depth is approximately 28 m. The offshore section passes through approximately 215 km of Bulgarian waters, 210 km of which are located within the Bulgarian EEZ and 5 km within Bulgarian territorial waters. In the offshore section, the pipelines will be laid directly on the seabed.
- The nearshore section commences approximately 18 km from the Bulgarian coast in a water depth of approximately 28 m and extends to the shore crossing location on Pasha Dere Beach. From the edge of the nearshore section at approximately 18 km from the coast in to a point approximately 2.2 km offshore the pipelines may either be buried or laid directly on the seabed. From approximately 2.2 km offshore to the shore crossing the pipelines will be buried to a depth of approximately 2.5 m. The exact maximum depth of burial of the pipelines will be determined by soil conditions, pipeline stability, seabed erosion and protection requirements.
- The landfall section will commence at the shore crossing location on Pasha Dere Beach and extend inland to the permanent landfall facilities. The landfall section described in this chapter considers two options for the location of the landfall facilities, associated with the two site options for the Receiving Terminal being considered by SSB. The landfall section is approximately 2.2 km (Option 1) or 2.8 km (Option 2) in length. Within this section the



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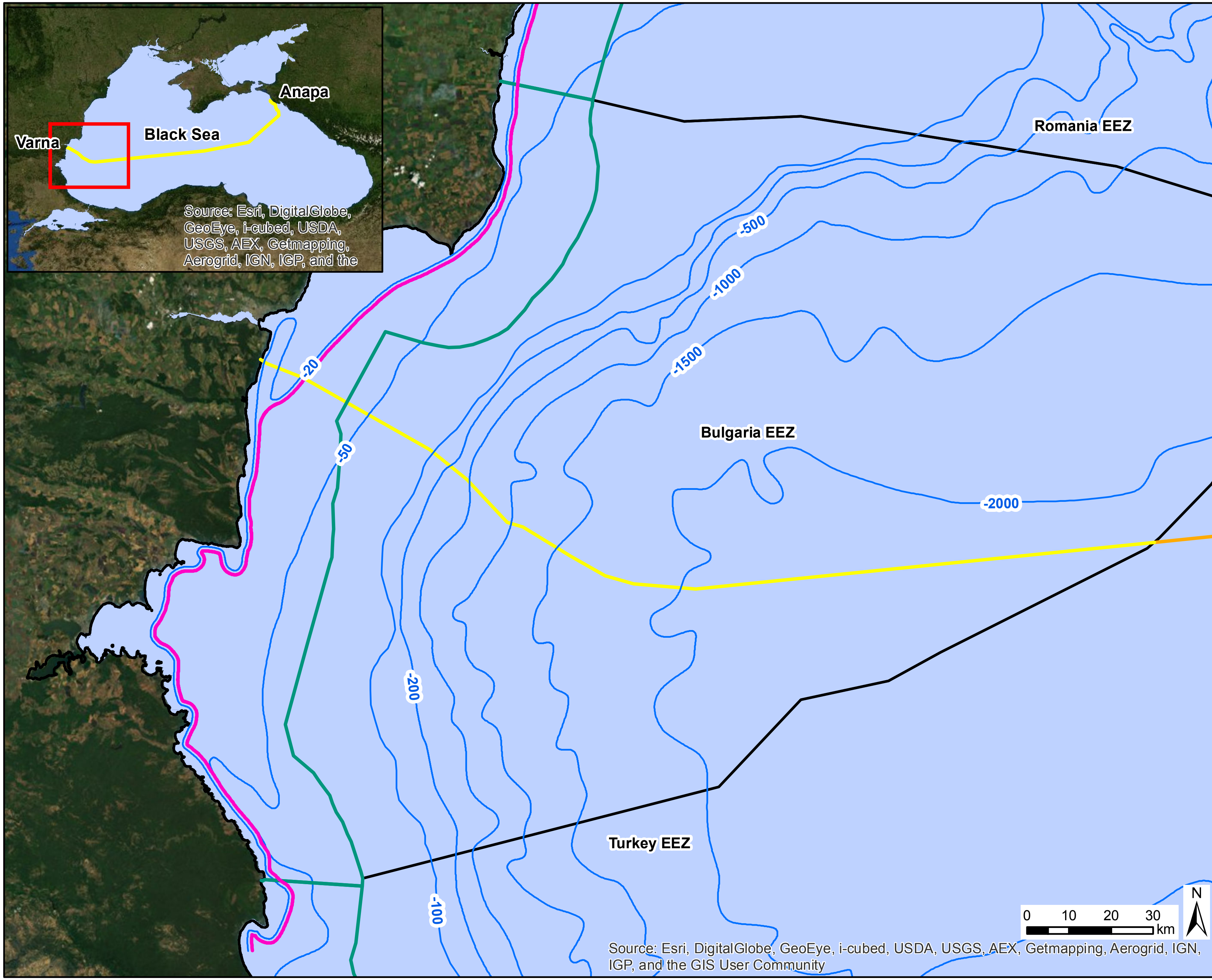

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Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: BULGARIAN SECTOR (NEARSHORE AND OFFSHORE SECTIONS)

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pipelines will be buried using open-cut construction techniques. For safety reasons the buried onshore pipeline will have a minimum soil cover ranging between 0.8 and 1.5 m. The permanent landfall facilities are within the landfall section.

- One or more marshalling yards and shore bases will be required for the storage of pipe and equipment necessary to construct the pipelines. The shore base(s) for the construction fleet is the base port for all vessels involved in the pipeline construction activities. Both facilities will be located at one or more ports on the Bulgarian Black Sea coast. The location of the yard(s) and base(s) is under investigation as part of the FEED process.

4.1.2 Pipeline Routing and Spacing

The pipeline route corridors are shown in Figures 4.1a, 4.1b and 4.2 respectively. Pipeline routes will be defined during the FEED process and final route alignments will be provided in the EIA and ESIA.

Throughout the offshore and nearshore sections, the pipeline spacing will range between 20 and 100 m, measured from the centreline of the pipelines. At the shore crossing the spacing may be reduced to less than 10 m to minimise the width of trench between the cofferdams and the associated sheet piled dam wall that will be required to prevent seawater ingress in the trench. In the landfall section, the distance between the pipelines will be approximately 10 m (Figure 4.2).

4.1.3 Access Routes and Temporary Facilities

Temporary facilities to support the offshore construction will be required. These include marshalling yards for pipe storage at one or more ports, and one or more supply bases for the vessels involved (see Section 4.2.3).

Pipe and equipment that is required for the landfall section will be delivered by road. The Project will require the upgrade of some existing roads and may also require the construction of some new roads for access and construction. The roads to be upgraded, their length, and the length and alignment of new roads are currently being investigated.

Areas will be needed to house a number of temporary facilities required throughout the Construction and Pre-commissioning Phase, such as pipe, equipment, materials and spoil storage areas and catering and sanitary facilities for workers. These areas will be rehabilitated following completion of the construction works and are described in Sections 4.2.3 and 4.3 below. Given the proximity of the route of the landfall section of the pipeline to the city of Varna, a construction workers camp is not expected to be required.

4.2 Construction Phase

4.2.1 Offshore Section

In the offshore section, the pipelines will be laid with a pipe-laying vessel, although unlike in shallow water (as described in Section 4.2.2), there is no requirement to bury the pipelines in trenches and they will be laid directly on the seabed.

The installation of the offshore pipeline section may require both intermediate depth and deep water pipe-laying vessels. An intermediate depth pipe-laying vessel is capable of working in a water depth range of approximately 20 m up to approximately 600 m. These vessels may be either anchored or dynamically positioned and install the pipeline by the S-Lay method. A deep water pipe-laying vessel is capable of laying pipe in water depths from approximately 300 m to any depth required depending on the pipeline dimensions. These vessels are dynamically positioned and may use either the S-Lay or J-Lay methods.

In the J-Lay method, the pipes are assembled and welded vertically in a tower erected on the centre or side of the pipe-laying vessel. As the platform moves forward, the jointed pipeline is lowered near vertically in a J-shape from the launching point down to the bottom of the sea. The J-lay method is considered to be suitable from minimum 300 m water depth depending on pipeline diameter. Figure 4.3 presents a schematic drawing of the J-Lay pipe laying method and Figure 4.4 shows a typical J-Lay vessel.

The offshore construction corridor will be approximately 500 m wide if DP vessels are used or 3 km wide if an anchored pipe-laying vessel is used. The pipe-laying operation will be performed on a 24-hour basis. Notifications will be issued in accordance with statutory procedures to ensure navigational and operational safety.

Figure 4.3: J-Lay Pipe Laying Technique

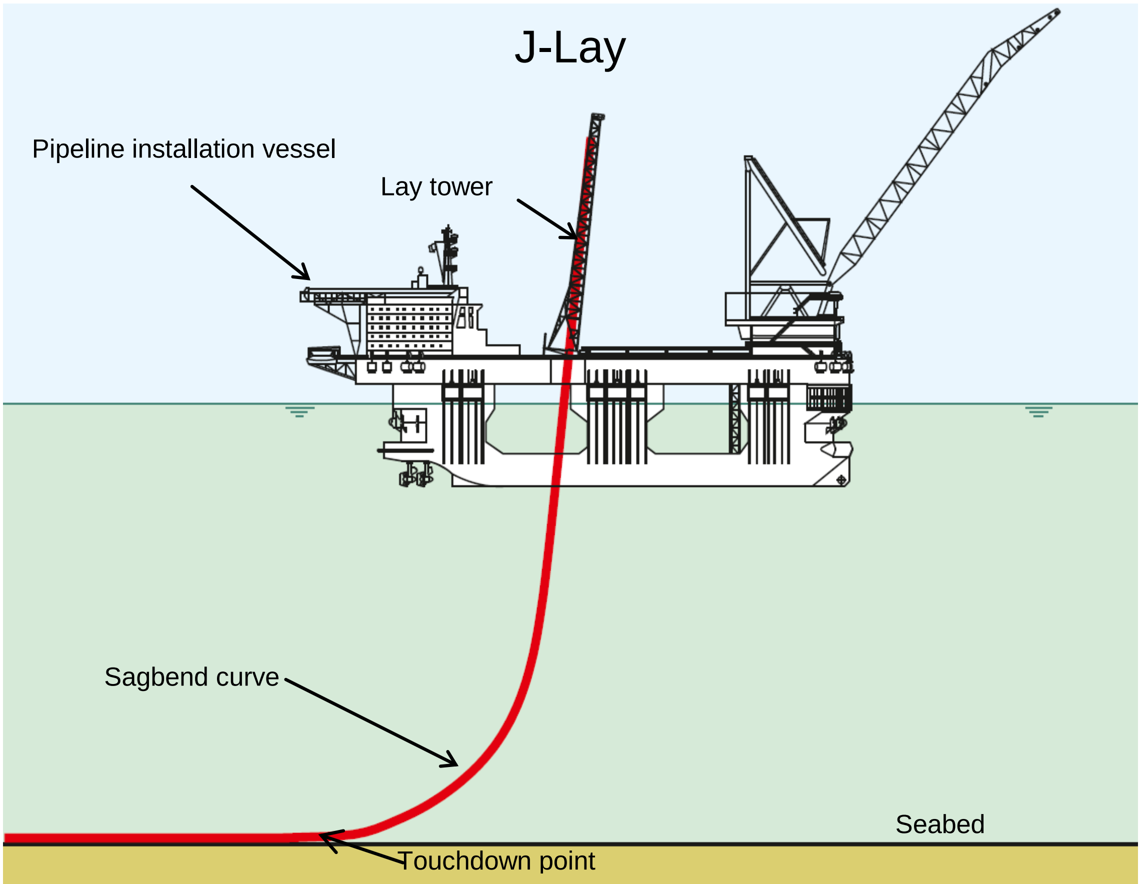

Figure 4.4: Typical J-Lay Vessel

Image supplied courtesy of Saipem.

The vessels to be employed for pipe laying have yet to be finalised and will be defined after award of the construction contracts.

In addition to the pipe-laying vessel(s), additional support vessels (anchor handling, survey, dive support, crew change) and supply vessels (pipes, fuel and provisions), will be involved in the pipe-laying activities. The 12 m pipe will be supplied to the pipe-laying vessels by supply vessels that will operate between the ports / marshalling yards and the location of the pipe-laying vessel. The location of the ports and marshalling yards will be defined during the FEED process.

4.2.2 Nearshore Section

Construction activities in the nearshore section will include both land based activities (on the beach) and shallow water vessels to undertake nearshore dredging, trenching, pipe laying and backfilling.

To ensure the protection of the pipelines in shallow water they will be buried or lowered beneath the seabed or will be laid directly on the seabed. Protection will be provided by a concrete coating around the pipeline. It is anticipated that from the shore crossing at Pasha Dere Beach, out to 2.2 km offshore, the pipelines will be buried using a combination of dredging and a technique known as “post (lay) trenching”. From here, out to the end of the nearshore section approximately 18 km offshore) the pipeline may be buried using post trenching or laid directly on the seabed with pipeline protection provided by concrete coating.

Burial or concrete coating of the pipelines is undertaken to provide on bottom pipeline stability and also acts as a safety measure to avoid damage and interaction with respect to third parties’ infrastructure (for example, trawling gear and anchors). The nearshore section will require a 500 m construction corridor during the pipe-lay process. In addition to this, there may be a need to temporarily store backfill and/or dredge material. The requirement for this is being investigated as part of the FEED process. Storage areas will be located within the construction corridor wherever possible. Where this is not possible, the use of areas located outside the construction corridor will be investigated.

Where burial is required, pipelines will be buried to a depth of approximately 2.5 m. The exact maximum depth of dredging and the trenching depth of the pipelines will be determined by soil conditions, pipeline stability, seabed erosion and protection requirements as part of the FEED process.

Land-based Activities Associated with the Shore Crossing

Open cut construction techniques will be employed for the installation of the pipeline at the shore crossing. The pipeline will be buried to a depth that ensures a smooth transition profile between the nearshore and landfall sections.

As a minimum, the following equipment is typically foreseen for the onshore based construction at the shore crossing: excavator, bulldozers, tracked cranes, wheel loader, trucks for backfill materials (rock and sand) transport, survey equipment, site offices, workshops, anchors and winch or sheaves (depending on the pipe pulling method).

The construction of the open cut trench at the shore crossing will typically include the following sequence of activities:

- Preparatory works;
- Excavation within the cofferdam;
- Pipeline installation; and
- Backfill and reinstatement.

The main tasks to be completed as part of the preparatory work are access road preparation, site grading and levelling and the installation of temporary site facilities, including pipe pulling equipment and associated foundations.

It is anticipated that a single trench approximately 30 to 40 m wide will be constructed to install the four pipelines at the shore crossing. This will require a short section where the pipeline spacing will be reduced to between 5 and 10 m. Two parallel sheet piled dam walls will be constructed to form a cofferdam, which will extend approximately 200 m offshore. A cofferdam will be constructed on either side of the trench to ensure its stability. The spacing between the two parallel sheet piled dam walls will be adequate to temporarily store the spoil excavated from the trench.

Within the cofferdam, the trench will typically be excavated using land based equipment such as excavators with clamshell buckets. The excavated spoil will be stored adjacent to the cofferdam within the two parallel sheet piled dam walls so that the excavator can travel over the top of the excavated spoil. This allows the excavator to systematically excavate the trench from the shore outwards towards the end of the cofferdam. It is anticipated that the trench within the cofferdams will be excavated to an approximate depth of 5 m below the seabed. The final overall length of the cofferdam and construction methodology will be determined during the FEED process, although the indicative location of the cofferdam can be seen in Figure 4.5.

Following completion of the excavated trench, the preferred method for the installation of each pipeline at the shore crossing is a ‘shore pull’, whereby the pipeline is constructed and welded on a pipe-laying vessel stationed offshore as illustrated in Figure 4.6. The completed pipeline is then pulled to the shore, through the pre-dredged trench after removal of the temporary cofferdam (perpendicular to the trench), using land based winches that will be located within the beach construction area.

Following completion of the shore pull, the remainder of the nearshore section pipeline will be installed by the pipe-laying vessel as described in the following section.

Upon completion of all four shore pulls, the trench will be backfilled with the excavated spoil. Similar equipment used to excavate the trench will be used for backfilling. If the excavated sediment is not suitable for backfilling, a suitable engineered backfill material will be imported and the spoil will be disposed of at a permitted disposal location. This will be determined during the FEED process.

After installation of the pipelines and backfilling of the trench, the cofferdam will be removed and the beach will be reinstated to its original profile.

Marine-Based Activities in the Nearshore Section

From the end of the cofferdam to a water depth of approximately 10 m the pipelines will be buried in a pre-dredged trench. From 10 m to approximately 28 m water depth the pipelines will may be installed either by laying concrete coated pipe directly on the seabed or by “post trenching” technique. This technique is used to lower the pipeline below the seabed surface after the pipeline has been laid. The exact water depth (and therefore the length of the dredged / trenched sections) will be determined during the FEED process on the basis of an analysis of meteorological and oceanographic conditions.

For the dredged length of pipeline from the end of the cofferdam out to approximately 10 m water depth, a shallow water dredging vessel such as a trailing suction hopper dredger (TSHD) or backhoe dredger will be employed. The TSHD uses a drag head attached to a suction pipe to excavate material from the seabed. The excavated material is then stored in compartments (hoppers) on the vessel itself. The excavated spoil is temporarily stored offshore until re-utilised to bury the pipeline. A schematic of a typical TSHD vessel is shown in Figure 4.7.

A backhoe dredger is a mechanical excavator mounted on a flat barge. The barge is kept in position by poles that penetrate into the seabed below the barge itself. The excavated material is loaded onto separate split hopper barges and transported away from the site to designated temporary or permanent spoil dumping grounds. A schematic of a typical backhoe dredger is shown in Figure 4.8.

Pipe-laying in the nearshore section is accomplished by the sequential alignment, welding and lowering of pipe from the pipe-laying vessel. Pipe sections (12 m each) are transported to the pipe-laying vessel pre-coated. The sections are joined together using automatic welding techniques. All welds are tested and coated and the pipeline is subsequently lowered under tension to the seafloor.

The S-Lay pipe-laying method will be used in shallow waters. This method involves welding the pipe sections horizontally, and continuously ‘feeding’ the jointed sections over the vessel’s pipe-laying stinger in such a way that the pipeline forms an “S” shape from the vessel’s exit point to the touchdown point on the seafloor. Figure 4.9 presents a schematic drawing of the S-Lay pipe laying method and Figure 4.10 shows a typical S-Lay vessel.

Pipe-laying vessels can either be positioned and moved by anchors or can be dynamically positioned (DP) using a computer controlled system that drives the vessels thrusters (directional propellers). If anchors are used, up to 12 anchors may be deployed from each vessel and the position of the anchor itself could be as far as 1.5 km from the centreline of the vessel, depending on the water depth.

Once nearshore pipe-laying is complete the pipeline is buried to a depth of approximately 2.5 m. This is done either through post lay trenching or, if laid in a pre-dredged trench, by direct placement of the previously excavated sediment over the pipeline (backfilling). If the excavated sediment is not suitable for backfilling, a suitable backfill material will be imported and the spoil will be disposed of at a permitted disposal location to be determined during the FEED process.

4.2.3 Landfall Section

Open-cut Pipeline Construction

Within the landfall section the pipelines will be installed by conventional open-cut trenching techniques. The shore crossing is located on Pasha Dere Beach approximately 120 m south of the existing Galata pipeline. The landfall section will run adjacent to the southern edge of the existing Galata pipeline Right of Way (RoW) for approximately 1.5 km.

The pipelines will be installed using open-cut trench methods that will require the use of excavators, welding units, side-booms and dozers (see Figure 4.11). It is anticipated that all four pipelines will be laid in one construction period to avoid the impacts associated with four separate construction periods. The general process for open-cut technique is shown in Figure 4.11.

LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Construction corridor
- Temporary cofferdam (indicative location)

Galata Pipeline Infrastructure

- Existing Galata gas pipeline

Projection: Lambert Conformal Conic

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Drawing Title: INDICATIVE COFFERDAM LOCATIONS

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DH	RW	MW	04/01/2013

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Drawing Number: Figure 4.5 | Rev

Plot Date: 04 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 4.5 Indicative Cofferdam Locations.mxd

Figure 4.6: Nearshore Pipeline Installation by Shore Pull Method

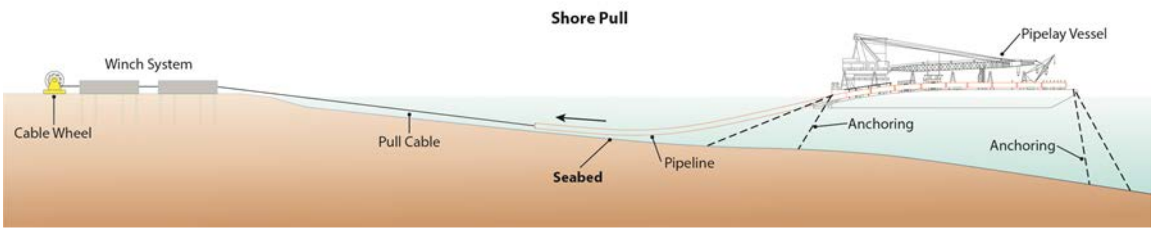


Figure 4.7: Schematic of Suction Dredging Operation

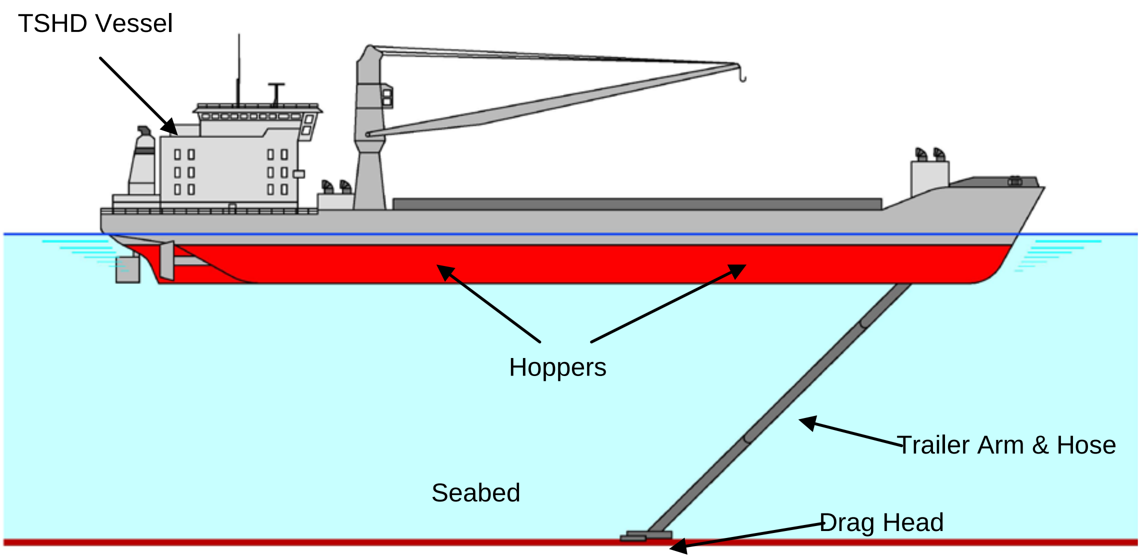


Figure 4.8: Schematic of Backhoe Dredger

Figure 4.9: Schematic of S-Lay Pipe Laying Method

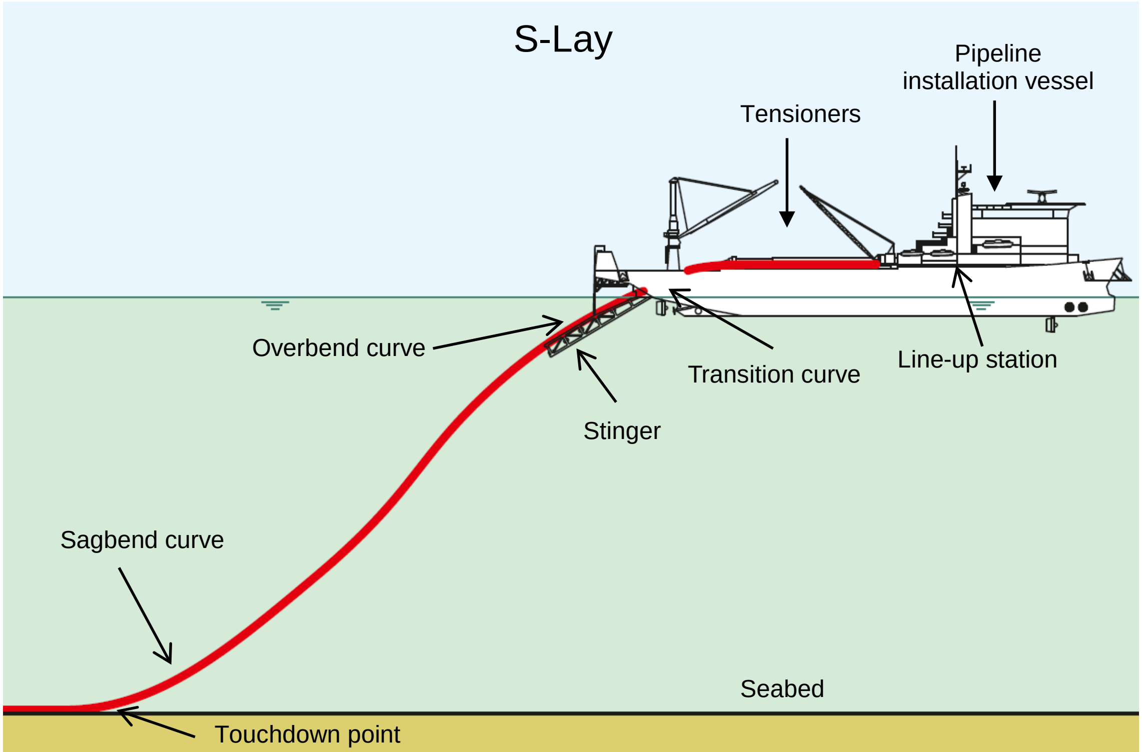


Figure 4.10: Typical S-Lay Vessel

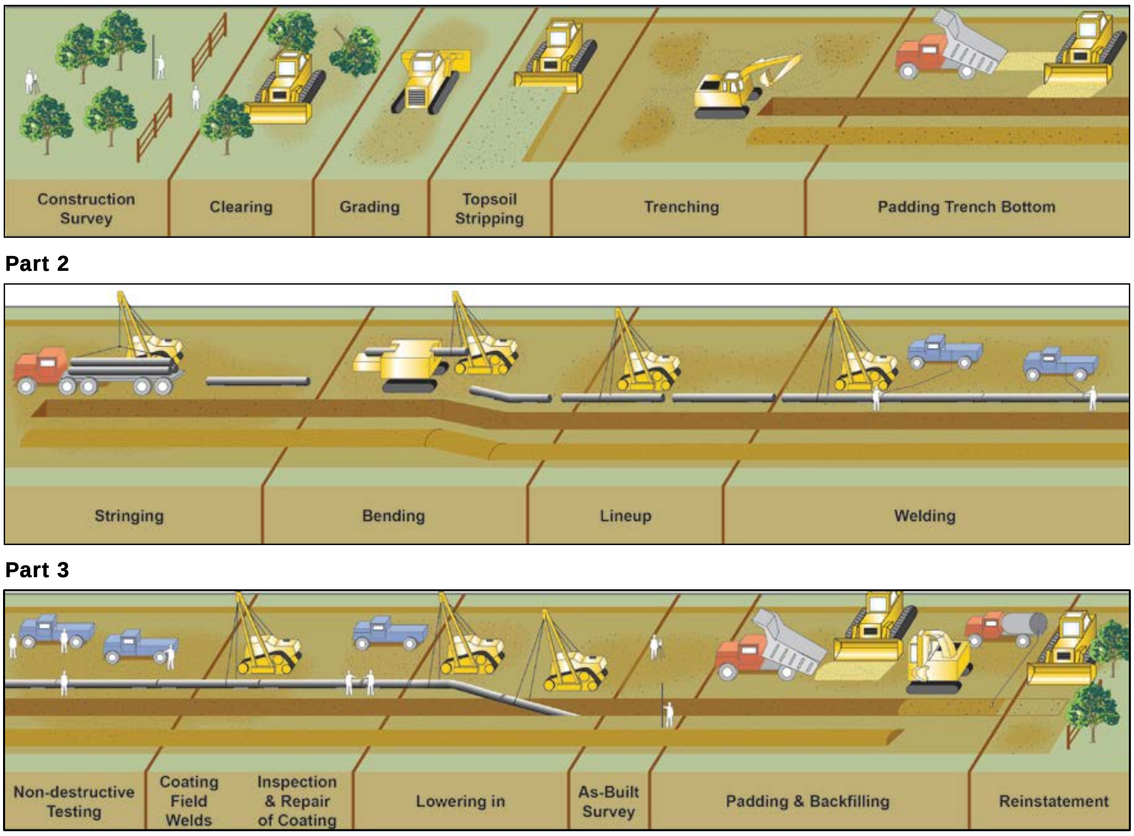
Image supplied courtesy of Allseas, Switzerland.

Figure 4.11: Typical Open-cut Pipeline Construction Technique

Part 1

Part 2

Part 3



All open-cut pipeline construction activities will be undertaken within a 60 m wide temporary construction corridor (a typical cross-section is shown in Figure 4.12). A wider construction corridor of up to 120 m wide may be required at certain locations, namely the beach area and the crossing of the steep gully in Option 2. The wider construction corridor is required to enable access and accommodate additional equipment needed for the shore pull (see Section 4.2.2) and facilitate the crossing of the gully (see Figure 4.1b).

The construction corridor will be clearly marked and, where required, fenced. Existing third-party services will be located and marked. Warning posts will be erected for overhead cables and temporary crossings will be clearly marked.

The topsoil will be stripped across the construction corridor and then stored to be used when reinstating the construction corridor. Some areas of the construction corridor may be benched or graded to enable safe working. The open-cut pipeline trenches will be dug with mechanical excavators to a typical depth of 1.8 to 2.5 m to allow for a minimum reinstated cover of 0.8 to 1.5 m. The material excavated from the trenches (trench spoil) will be stored separately from the topsoil to prevent mixing of subsoil and topsoil that might hamper successful reinstatement.

In rock or stony ground, sand will be imported and used to bed the pipeline to protect the pipe coating from damage.

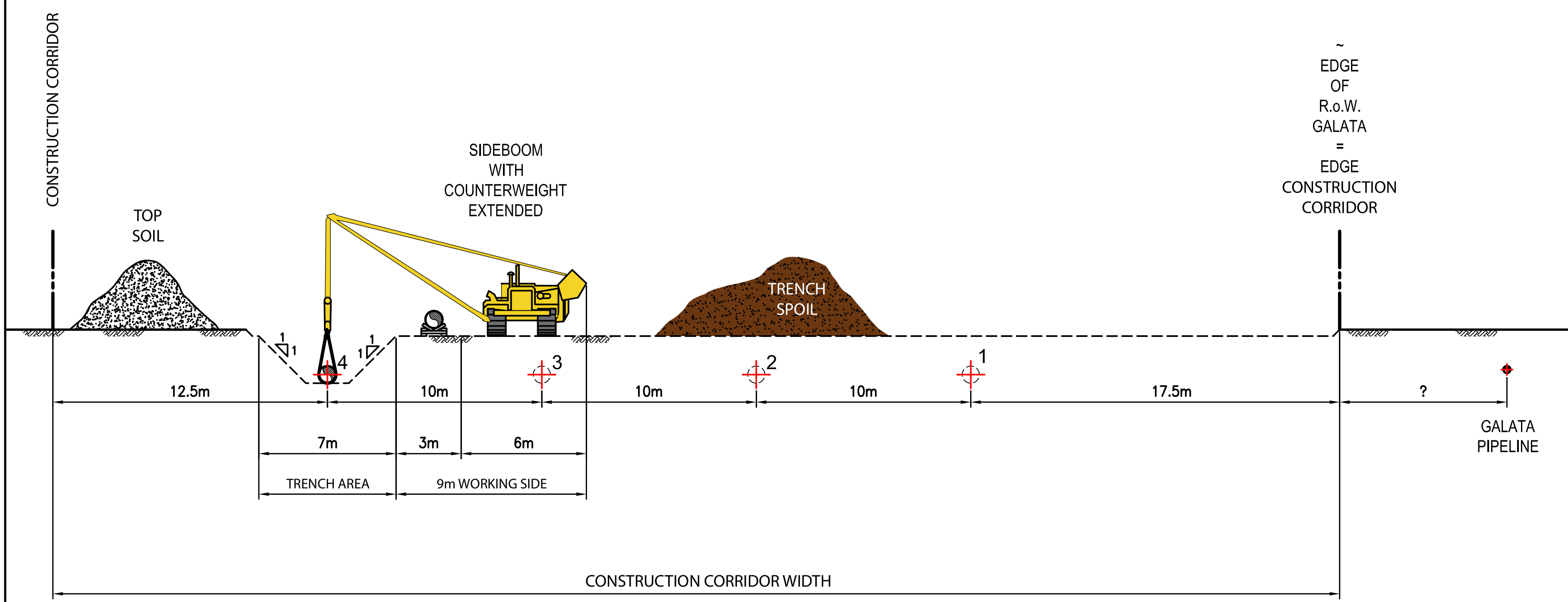


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Figure 4.12	

Known commonly as ‘stringing’, the pipe sections will be placed end to end alongside the trench in preparation for welding. Once welded, the welds will be subject to non-destructive testing and approved before a coating is applied to the welds on site. Following inspection of the weld coatings, the pipe will be carefully lowered into the trench in a continuous operation with the aid of side booms.

The pipeline trench will then be backfilled with trench spoil in the reverse order in which it was excavated. Any surplus or unsuitable backfilling material (such as inert waste) will be removed from site and taken for disposal to an approved waste handling facility. Following this the topsoil will be replaced to enable re-vegetation of the area utilising the seed-bank contained in the stored topsoil. This process will assist with the natural reinstatement of native vegetation.

Within the landfall section, the pipeline does not cross any major roads or watercourses. However, Option 2 will require the crossing of a gully associated with an ephemeral tributary of the Pasha Dere stream. Construction methodologies for this crossing will be determined as part of the FEED process.

Temporary Facilities

A number of temporary facilities will be required throughout the Construction and Pre-commissioning Phase. A summary of the estimated areas of land required for these temporary facilities is shown in Table 4.1; these areas may be revised during the FEED and further design process. This land will be rehabilitated following completion of construction.

Table 4.1: Estimated Area Requirements for Onshore Temporary Facilities

Temporary Site	Length (m)	Width (m)	Area (ha)
Shore Crossing Construction Site	250	25	0.63
Landfall Facilities Construction Site	150	150	2.25
Temporary Storage Area	100	50	0.50
Landfall Pipeline Construction Site	190	150	2.85
Block Valve Station Construction Site (if required)	50	40	0.20
Access Road (to construction sites)	To be confirmed during FEED		

4.2.4 Marshalling Yards

Each of the four pipelines making up the South Stream Offshore Pipeline will consist of approximately 75,000 individual pipe sections. These pipe sections will be shipped by rail or sea from the pipe mills that manufacture them to a marshalling yard where they will be temporarily stored prior to being shipped out to the pipe-laying vessel in the Black Sea.

It is envisaged that the entire 930 km route of the pipeline can be serviced by two marshalling yards of approximately 25 ha each, one located in Russia and the other located in Bulgaria with approximately half of the pipeline length being delivered from each yard. In the event that two pipelines are built in parallel, additional land may need to be prepared to increase the capacity of the marshalling yard.

The marshalling yards will be required for the duration of the Construction Phase. A number of potential ports along the Bulgarian Black Sea coast are currently being investigated with a view to identifying a suitable location for a marshalling yard. Depending on the port selected, some investment in port facilities and surrounding infrastructure may be necessary. The extent of the work needed will not be known until a port is selected.

One or more shore bases will also be needed for the construction fleet involved in the pipeline construction activities. It is envisaged that the same port location(s) used for marshalling yards will also serve as the base(s) for the construction fleet vessels.

The marshalling yards located in both Russia and Bulgaria will also be used for the storage of pipe and as the base for the construction fleet required to construct the offshore pipelines located within the Turkish EEZ.

4.3 Pre-commissioning Phase

After each pipeline has been installed a number of activities, known as pre-commissioning activities, will be undertaken to ensure that the pipelines meet operational requirements. The primary objective of these activities is to verify that the pipeline has been laid without significant defects and that it is in a suitable condition to be filled to transport the gas at anticipated pressures and to deliver the gas to the required specifications. The equipment required for the pre-commissioning activities will be used for cleaning, gauging, hydrotesting (if required) and drying of the installed pipeline.

Hydrotesting is undertaken to test that there are no leaks in the pipeline. Hydrotesting involves filling the pipeline with water at a pressure that exceeds the maximum operating pressure. After the test pressure is reached, the pressure in the system is monitored to ensure that there are no leaks, which would result in a loss of water pressure within the pipeline.

The Project hydrotesting approach and design are under development and will be finalised during the FEED process. General principles are described below.

The hydrotesting element of the pre-commissioning activities involves flooding, gauging and cleaning the pipeline in a series of ‘pigging’ operations. After flooding the pipeline, hydrotesting immediately follows using pumps to achieve the desired water pressure. After testing, the pipes are dewatered and dried. Pre-commissioning equipment includes PIGs, compressors, generators and pumps and may be located on offshore barges or in a temporary designated area within the landfall section for the pre-commissioning and dewatering equipment.

The water required for hydrotesting will be drawn from the Black Sea. The hydrotest water will be filtered and an oxygen scavenger may be added to prevent internal corrosion of the pipeline prior to dewatering.

OSPAR's[3] list of additives that Pose Little or No Risk to the environment (PLONOR) will be used as a guide for any additives required as part of adopted GIIP.

Following completion of hydrotesting, dewatering of the pipeline will be carried out by running a series of PIGs from the PIG facilities to the test head location using compressed air to push out the water. The PIGs and any debris they have gathered will be collected prior to discharging the water at sea.

Upon completion of the dewatering process the pipelines will be dried. A number of methods exist that may be employed to dry the pipeline to prepare it for gas filling including using compressors to push dry air and foam PIGs through the pipeline or chemical drying using PIGs coated with inhibitors to absorb water.

The pre-commissioning approach for the South Stream Offshore Pipeline is currently under development. The current hydrotest scenario involves testing only the pipelines between the landfall facilities and 30 m water depth.

Following completion of hydrotesting, the whole pipeline from the PIG trap facilities in Russia to the PIG receiver facilities in Bulgaria will undergo cleaning, gauging and drying.

4.4 Operational Phase

The pipeline will have a design pressure of 300 bar although the expected maximum operating pressure is anticipated to be approximately 284 bar. When the gas makes landfall in Bulgaria the operating pressure of the pipeline will have fallen to between 65 and 87 bar and the temperature of the gas will be approximately -5°C. Any potential effects of the low temperature of the gas on the surrounding soils and sediments will be assessed as part of the EIA and ESIA.

During operation, the pipeline will be monitored and controlled from a central control room at a location yet to be confirmed. During operation, continuous measurements of pressure and flow rates will be performed. In the unlikely event of damage to the pipeline, or if a leak is detected, emergency procedures will be implemented. These procedures include emergency shutdown and the requirement for internal inspection of the pipeline.

The area requirements for the permanent landfall facilities during the Operational Phase of the Project are shown in Table 4.2.

The pipeline will be brought into service by the introduction of gas from the connection with the Russian gas network. This is done only after all control and monitoring systems have been commissioned at both ends of the pipeline.

The external condition of the subsea pipeline, including the condition of the cathodic protection system, will be monitored on a regular basis using Remotely Operated/Autonomous Underwater Vehicles (ROV or AUV) and/or Remotely Operated Towed Vehicles (ROTV) and inspection

[3] Refers to the Oslo and Paris *Conventions for the Protection of the marine Environment of the North-East Atlantic* (OSPAR Conventions), 1992.

technologies ranging from sonar to visual (camera) will be employed. Following pre-commissioning tests, internal inspection of the pipelines is not expected to be required for about 5 years. Internal pipeline cleaning is not anticipated to be required because of the composition of the dry gas that will be transported through the pipelines. However, any cleaning that may be required will be undertaken using PIGs.

Table 4.2: Estimated Area Requirements for Operational Phase Permanent Landfall Facilities

Permanent Site		Length (m)	Width (m)	Area (ha)
Landfall Facilities (metering, PIG receivers and ESD valves)	Option 1	250	250	6.25
	Option 2	370	250	9.25
Block valve station (possible facility)		50	20	0.10

In the landfall section, the pipeline permanent Right of Way (RoW) will be indicated by markers and it will have an access route suitable for inspection purposes along the centreline of each pipeline. The permanent RoW will be approximately 40 m wide (5 m either side of the centreline of each pipeline) and 2.2 km (Option 1) or 2.8 km (Option 2) long. The RoW will be maintained during the Operational Phase of the Project in order to secure accessibility to the pipeline route. Deep rooting trees or permanent crops will not be allowed to grow, however bushes and other shallow rooted vegetation will be allowed to grow naturally or will be planted.

In addition to the permanent RoW there will be Safety Exclusion Zones for the protection of public health and infrastructure.

These Zones will be based on the results of a Quantitative Risk Analysis (QRA) (Ref. 7) undertaken for the landfall section of the Project. The exact width of these Zones is subject to the development of a Project Specific Design Code.

Operational environment and safety issues will be managed and monitored as part of the overall project Health, Safety, Security and Environmental Integrated Management System (HSSE-IMS).

4.5 Decommissioning Phase

The expected service lifetime of the South Stream Offshore Pipeline is 50 years. Decommissioning of the pipeline will be undertaken in accordance with the legislation prevailing at that time, in liaison with the relevant regulatory authorities. The eventual decommissioning requirements will be taken into account in the design stage by ensuring that a range of possible options will be available. The pipeline will transport only processed gas and therefore it is unlikely that the disposal of spent cleaning fluid will be of concern.

Within the South Stream Offshore Pipeline timeframe of 50 years there may be changes to statutory decommissioning requirements, as well as advances in technology and knowledge. South Stream Transport will therefore utilise GIIP during all decommissioning operations.

4.6 Health, Safety, Security and Environment Integrated Management System (HSSE-IMS)

An integrated HSSE-IMS will be developed in accordance with GIIP and in line with the requirements of ISO 14001:2004 (environmental management system) and OHSAS 18001:2007 (health & safety management system). The management system will be developed and refined as the FEED process and ESIA studies progress. The following section describes the approach to safety issues, a key component of the HSSE-IMS relating to the installation and operation of the pipelines.

4.6.1 Construction, Installation and Operational Safety

Safety is a key priority for the Project both during construction, installation and operation. Accordingly a safety management plan will be prepared in order to reduce all risks to "as low as reasonably practicable" (ALARP).

The landfall section of the Project is located in areas with low density of population and is relatively short. Furthermore, almost the full lengths of the pipelines in the landfall section will be installed below ground. In the nearshore section, the pipelines will be buried in a trench to ensure stability and reduce the risk of damage in shallow waters.

Risk workshops and hazard identification (HAZID) studies have already been held covering different aspects of the Project. The risks that have been identified will be addressed through measures aimed at reducing either the likelihood or the consequences (or both) of the risks. Such measures will be developed during FEED and further design process of the Project.

The risks identified as a result of the workshops and studies have been assessed qualitatively and this assessment will be followed by an overall risk assessment that will cover design, construction, installation, operations and simultaneous operations (SIMOPS), as required.

Simultaneous Operations (operation-installation) are studied separately, addressing risks in which one activity generates additional hazards for the other activity.

During the FEED process, the aim is to identify design approaches to minimise risks to personnel (construction, installation and operations personnel) as well as to the local community. Occupational Health and Safety (OH&S) (including detailed work procedures, job safety analyses (JSAs), toolbox talks etc.) for procurement, construction, installation and operations will be managed by the Project and the respective contractors.

Major accident hazards (MAHs) during construction, installation and operation of the pipelines, in relation to the local community will be addressed in the EIA/ESIA and refined during further design. Plans for dealing with the effects on the community of construction, installation and operation of the pipelines such as increased traffic, transportation of hazardous substances, waste water discharge; solid waste disposal etc. will be managed by the Project and the respective contractors.

Finally, an operational hazard assessment will be performed. Such assessment will consist of the examination of the pipeline design to determine whether the safety measures included in the design are sufficient to ensure that the pipelines are safe to operate, even under extreme or unusual conditions.

4.7 Pipeline System Design Codes and Standards

The execution of the South Stream Offshore Pipeline will be undertaken in compliance with internationally recognised standards for the design, materials, fabrication, installation, testing, commissioning, operation and maintenance of pipeline systems.

The South Stream Offshore Pipeline will be designed in accordance with pipeline industry standards, notably those of Det Norske Veritas (DNV), and European Standards (EN) for additional guidance where necessary.

The overall code framework provided by the DNV OS-F101 code 'Submarine Pipeline Systems, 2012' will be the basis for the design and will be supported, where required, by other recognised codes and standards including material design standards for line-pipe and welding as stipulated in the codes and standards of the DNV OS-F101, American Petroleum Institute (API), American Society for Non-destructive Testing (ASNT), American Society for Testing Materials (ASTM), British Standard Institution (BSI/BS), International Organization for Standardisation (ISO) and National Association of Corrosion Engineers (NACE).

Bulgaria is a member of the European Committee for Standardization (CEN) and thus all European Standards are applicable. A number of Bulgarian Ordinances / Regulations and Bulgarian Institute for Standardization (BDS) Standards may apply to the Project.

The applicable ordinances / standards will be confirmed with the relevant Bulgarian authorities as part of the permitting process which is being run in parallel with the FEED process. The confirmed ordinances / standards will be reported in the EIA and ESIA.

5 Environmental, Socio-Economic and Cultural Heritage Baseline

5.1 Introduction

This Chapter describes the environmental, socio-economic and cultural heritage characteristics (the baseline) of the Project Area.

The information presented in this section is drawn from secondary data (e.g. scientific literature, published information) and information gathered from field surveys. The field surveys performed to date to collect baseline data for the Project are listed in Table 5.1.

The areas for which the environmental, socio-economic and cultural heritage baseline data was collected are referred to as the 'study area' throughout this Document and are illustrated in Figures 5.1 to 5.4 and Figure 5.5a (Option 1) and 5.5b (Option 2).

The offshore cultural heritage baseline was investigated within a 1 km wide corridor along the pipeline route, whilst the offshore environmental data was collected for a range of survey points along the pipeline route.

The onshore environmental, socio-economic and cultural heritage baseline was investigated within a 2 km wide zone around the landfall section. The socio-economic baseline also included a 300 m zone either side of potential (existing) access roads. Communities for which any part falls within the socio-economic study area are defined as potential PACs. PACs will be confirmed following finalisation of marshalling yard locations and transport routes. The cultural heritage field visit also included visits to some sites located outside the 2 km wide zone.

The baseline characteristics of the Project Area have been mapped, based on the data collected to date, and this is presented in Figures 5.6 (nearshore and offshore sections) and 5.7 (landfall section).

For the purposes of presenting the baseline information, the offshore and nearshore sections of the Project are covered under marine environment and the landfall section of the Project is covered under terrestrial environment.

Environmental, socioeconomic and cultural heritage baseline surveys undertaken to date for the Project are listed in Table 5.1. The survey locations and survey areas are presented in Figures 5.1 to 5.5b.

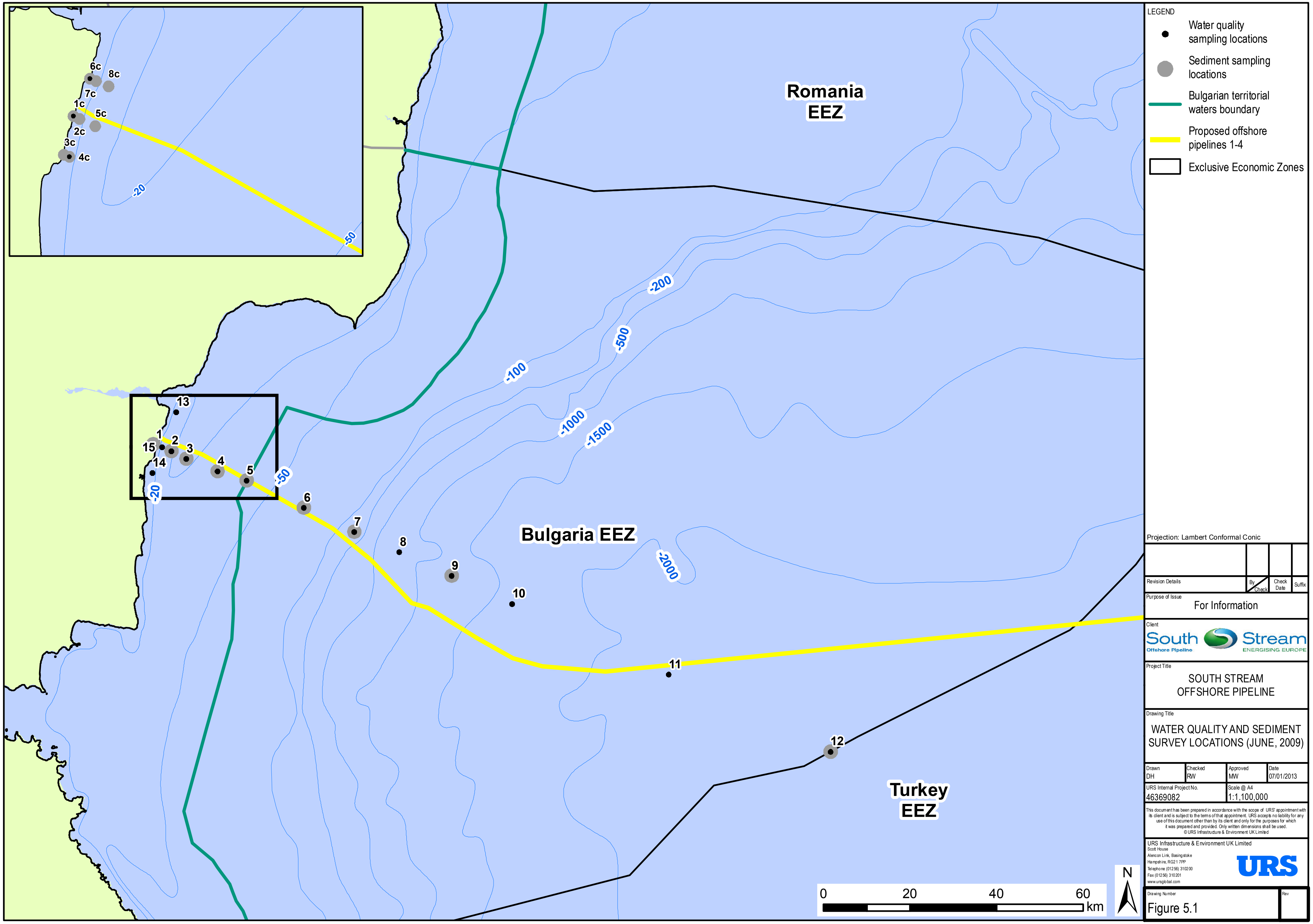
Table 5.1: Environmental and Cultural Heritage Surveys

Survey	Month, Year	Type of Survey
Bulgarian Territorial and EEZ Waters		
Offshore marine environmental surveys	Jun, 2009	Water and sediment quality.
	Apr-May, 2011	Seabirds, marine mammals.
	Jun, 2011	Fish surveys using gill nets.
	Aug-Sep, 2011	Seabirds, marine mammals.
Coastal Waters Marine Environmental Surveys	Jul, 2011	Plankton, macro-algae and zoo-benthos.
Marine hydrochemistry survey	May, 2011	Hydrochemistry.
	Sep, 2011	Hydrochemistry.
Offshore geophysical survey	Aug, 2011	Side-scan sonar, sub-bottom profiler, and multi-beam echosounder.
	Nov 2011 – Jan 2012	Side-scan sonar and AUV.
Offshore Cultural Heritage Survey	Jun, 2012	Cultural Heritage survey using ROV
	Sep, 2012	Cultural Heritage survey using ROV
Project Area onshore		
Terrestrial Ecology Surveys	Jun, 2011	Breeding birds using transects
	May, 2012	Breeding birds using transects
	Jun, 2012	Crepuscular Birds (owls) based on fixed point observation
	Aug, 2011	Migrating Birds based on vantage – point survey
	Sep, 2011	Migrating Birds based on vantage – point survey
	Aug, 2012	Migrating Birds based on vantage – point survey
	Aug, 2011	Mammals (General) using transects
		Mammals (General) using camera traps
		Mammals (General) using baited small mammal traps
		Mammals (Otter) walkover survey

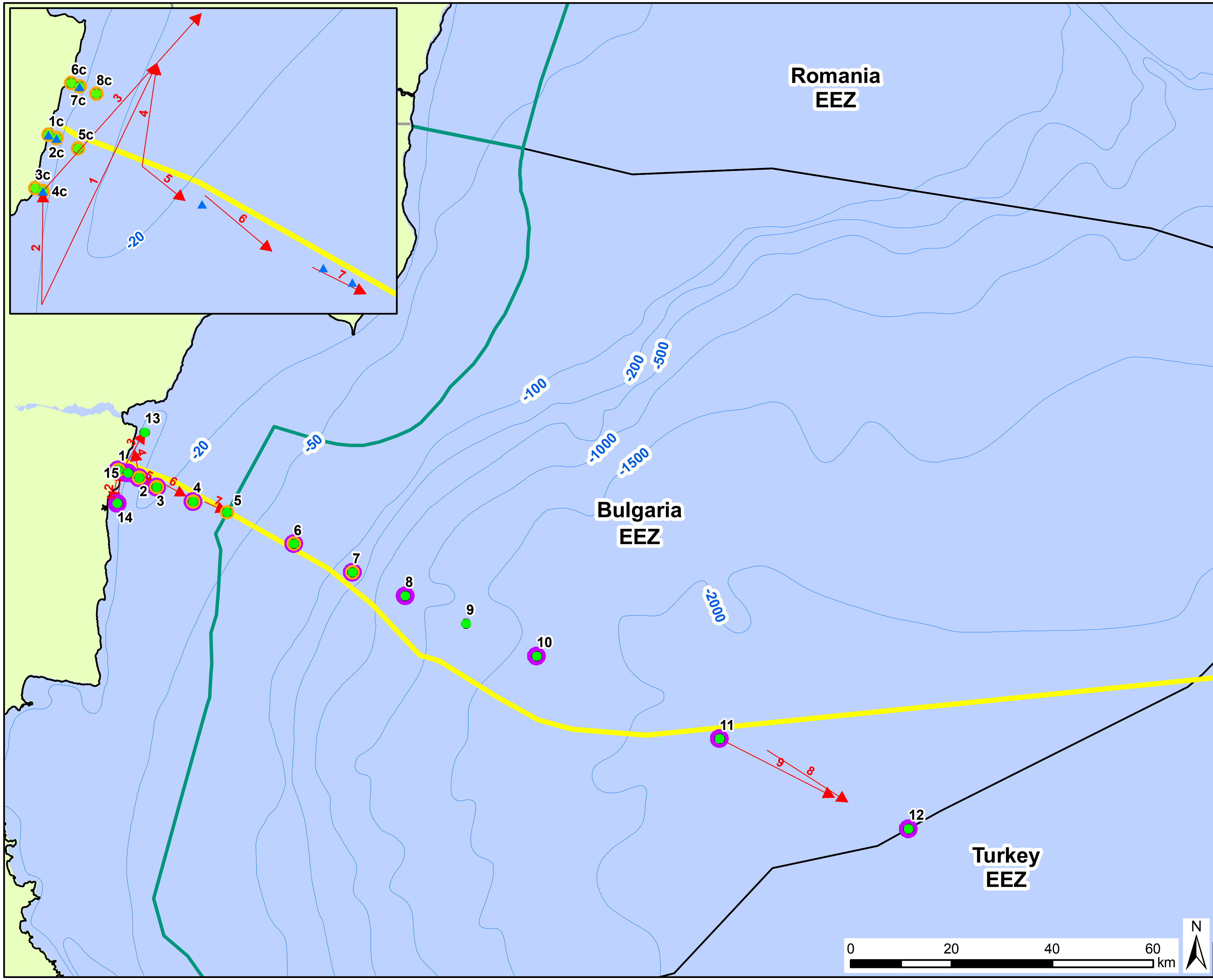
Continued...

Survey	Month, Year	Type of Survey
Terrestrial Ecology Surveys (continued...)	Aug, 2012	Mammals (Dormouse) based on fixed point observation
		Mammals (Bats) based on fixed points and transects using detectors
	Aug-Sep, 2011	Mammals (Bats) using mist nets
		Mammals (Bats) based on the assessment of trees
	Jun, 2012	Mammals (Bats) using transects using detectors
	Jun-Aug, 2012	Mammals (Bats) using static recorders
	Aug, 2012	Amphibians (Newts) using fyke nets
	Jul, 2011	Amphibians using hand nets
	Jul, 2011	Aquatic turtles – incidental records
	May-Aug, 2012	Terrestrial herptiles using transects
	Jul-Aug, 2011	Terrestrial herptiles – incidental Records
	May- Aug, 2012	Habitats and flora – plot samples
	Sep, 2011	Flora (woodland ground flora) walkover survey
	May, 2012	Habitats and flora walkover and plot samples
	Jun-Aug, 2012	Terrestrial Invertebrates (General) by collecting and ID
		Terrestrial Invertebrates (Stag Beetle) based on habitat assessment
	Jul-Aug, 2012	Invertebrates (Molluscs) by collecting and ID
	Jul, 2012	Aquatic (Plankton) using nets
	Aug, 2011	Aquatic (Macroinvertebrates) using benthic grabs
	Aug, 2011	Fish Electro using fishing and fyke net
Terrestrial Groundwater Survey	2011	Groundwater quality survey
Terrestrial Socio-Economic Survey	Jun, 2012	Reconnaissance visit
Terrestrial Cultural Heritage Surveys	Jul-Aug, 2011	Terrestrial cultural heritage survey 1 km either side of RoW
	Aug, 2012	Terrestrial cultural heritage survey of the Project Area and in communities within a 5 km radius of the Project.

Completed.



Plot Date: 07 Jan 2013
File Name:I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.1 Water Quality and Sediment Survey Locations (June, 2009).mxd



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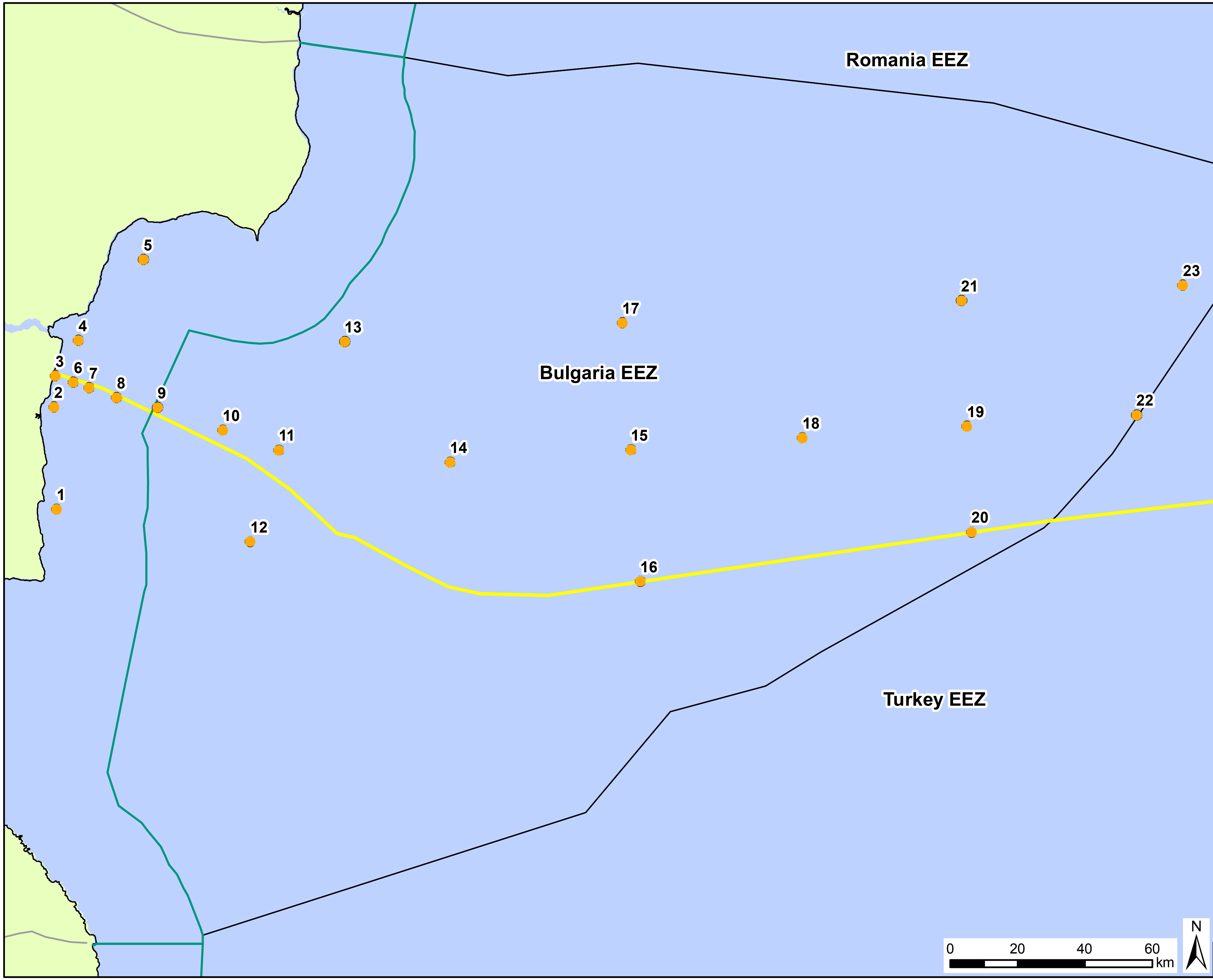
Plot Date: 07 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.2 Marine Ecology Survey Locations (June, 2009).mxd



Projection: Lambert Conformal Conic

Revision Details | By / Check | Check Date | Suffix

Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — Stream ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: OFFSHORE PIPELINE CORRIDOR OPTIONS

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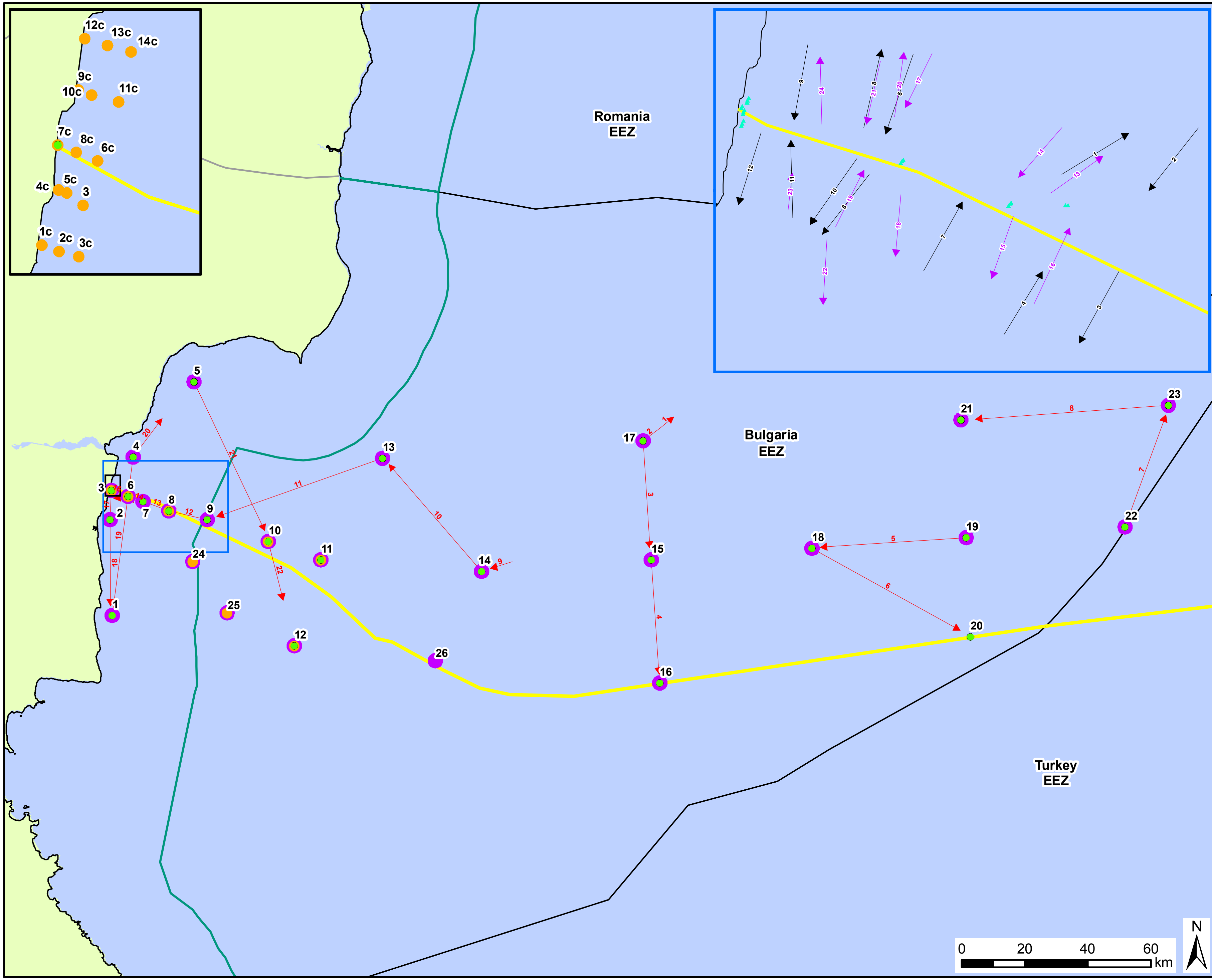
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.3 Water Quality Survey Locations (May and September 2011).mxd



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Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: MARINE ECOLOGY SURVEY LOCATIONS (MAY AND SEPTEMBER 2011)

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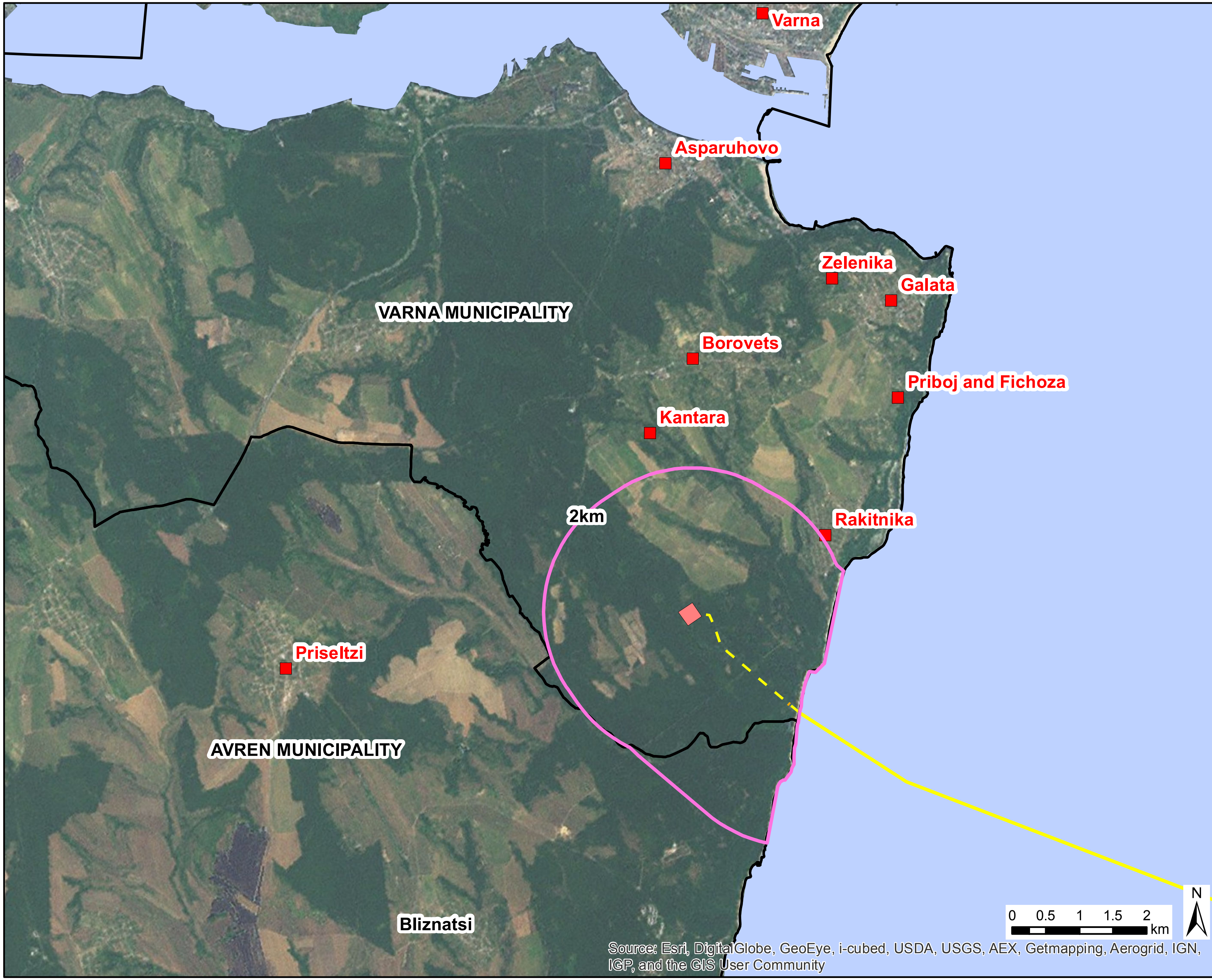

LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station
- Municipality boundaries
- Socio-economic study area
- Project affected communities (PACs)

Projection: Lambert Conformal Conic

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: ONSHORE STUDY AREAS AND PROJECT-AFFECTED COMMUNITIES (OPTION 1)

Drawn	Checked	Approved	Date
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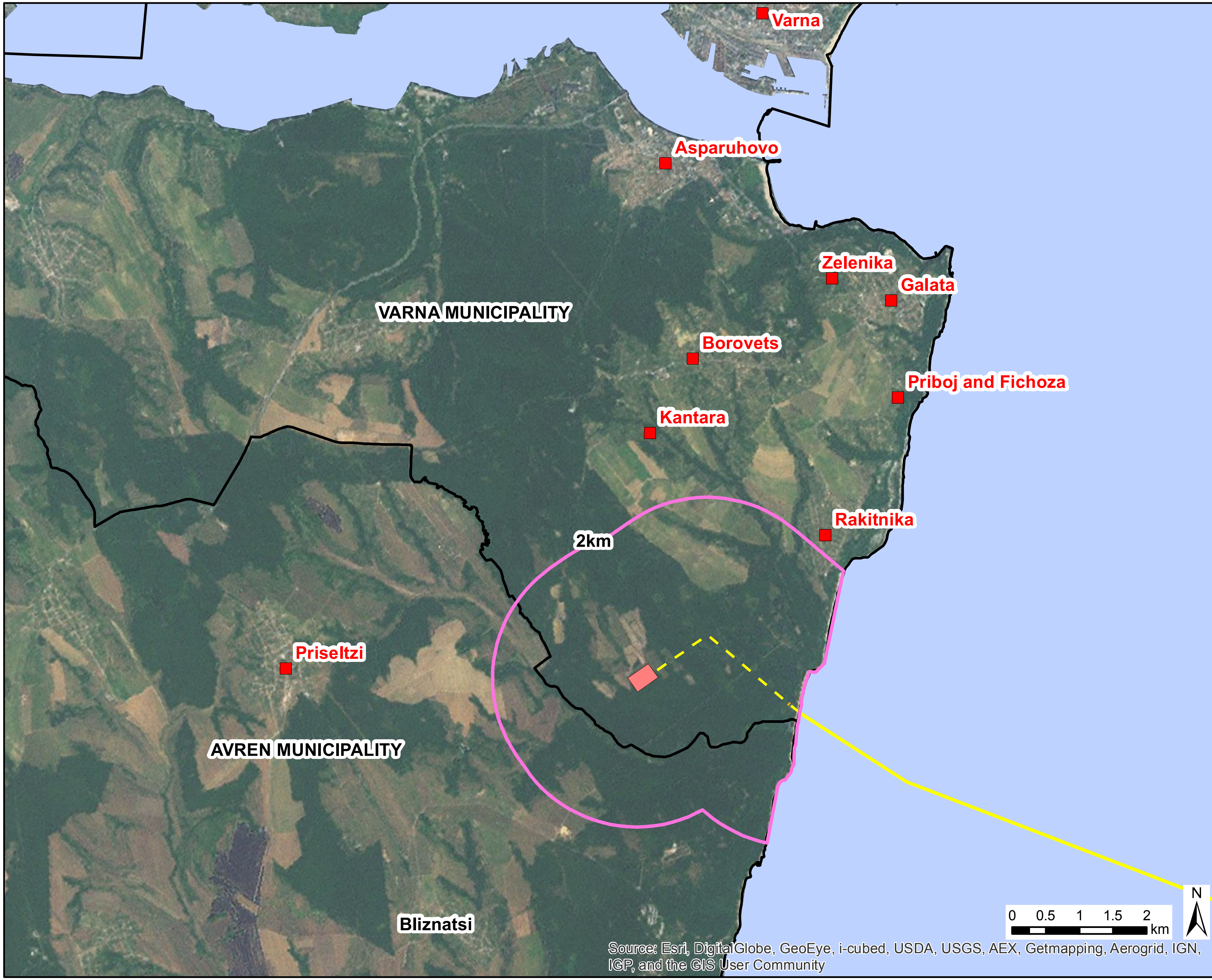
Drawing Number: Figure 5.5a | Rev

Plot Date: 07 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.5a Onshore Study Areas and Project-affected Communities (Option 1).mxd



LEGEND
Bulgarian Sector of South Stream Offshore Pipeline
- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station
- Municipality boundaries
- Socio-economic study area
- Project affected communities (PACs)

Projection: Lambert Conformal Conic

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Purpose of Issue: For Information

Client: South Stream Offshore Pipeline – ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: ONSHORE STUDY AREAS AND PROJECT-AFFECTED COMMUNITIES (OPTION 2)

Drawn	Checked	Approved	Date
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Drawing Number: Figure 5.5b
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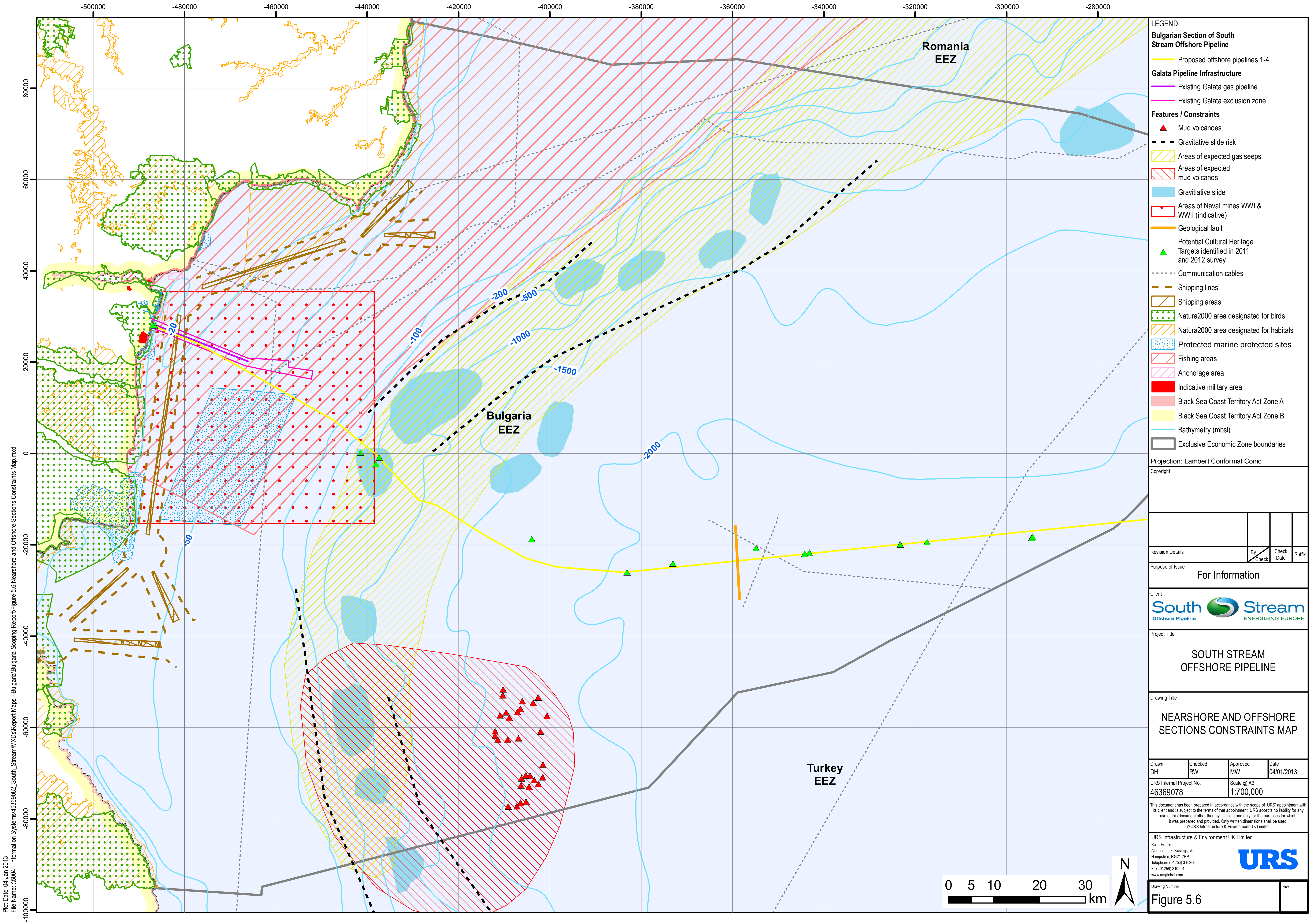
Plot Date: 07 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.5b Onshore Study Areas and Project-affected Communities (Option 2).mxd



Romania EEZ
Bulgaria EEZ
Turkey EEZ
-20
-50
-100
-200
-500
-1000
-1500
-2000
LEGEND
Bulgarian Section of South Stream Offshore Pipeline
Proposed offshore pipelines 1-4
Galata Pipeline Infrastructure
Existing Galata gas pipeline
Existing Galata exclusion zone
Features / Constraints
Mud volcanoes
Gravitative slide risk
Areas of expected gas seeps
Areas of expected mud volcanos
Gravitiative slide
Areas of Naval mines WWI & WWII (indicative)
Geological fault
Potential Cultural Heritage Targets identified in 2011 and 2012 survey
Communication cables
Shipping lines
Shipping areas
Natura2000 area designated for birds
Natura2000 area designated for habitats
Protected marine protected sites
Fishing areas
Anchorage area
Indicative military area
Black Sea Coast Territory Act Zone A
Black Sea Coast Territory Act Zone B
Bathymetry (mbsl)
Exclusive Economic Zone boundaries
Projection: Lambert Conformal Conic
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Check Date
Suffix
Purpose of Issue
For Information
Client
South Stream
Offshore Pipeline
ENERGISING EUROPE
Project Title
SOUTH STREAM OFFSHORE PIPELINE
Drawing Title
NEARSHORE AND OFFSHORE SECTIONS CONSTRAINTS MAP
Drawn DH
Checked RW
Approved MW
Date 04/01/2013
URS Internal Project No. 46369078
Scale @ A3 1:700,000
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Figure 5.6
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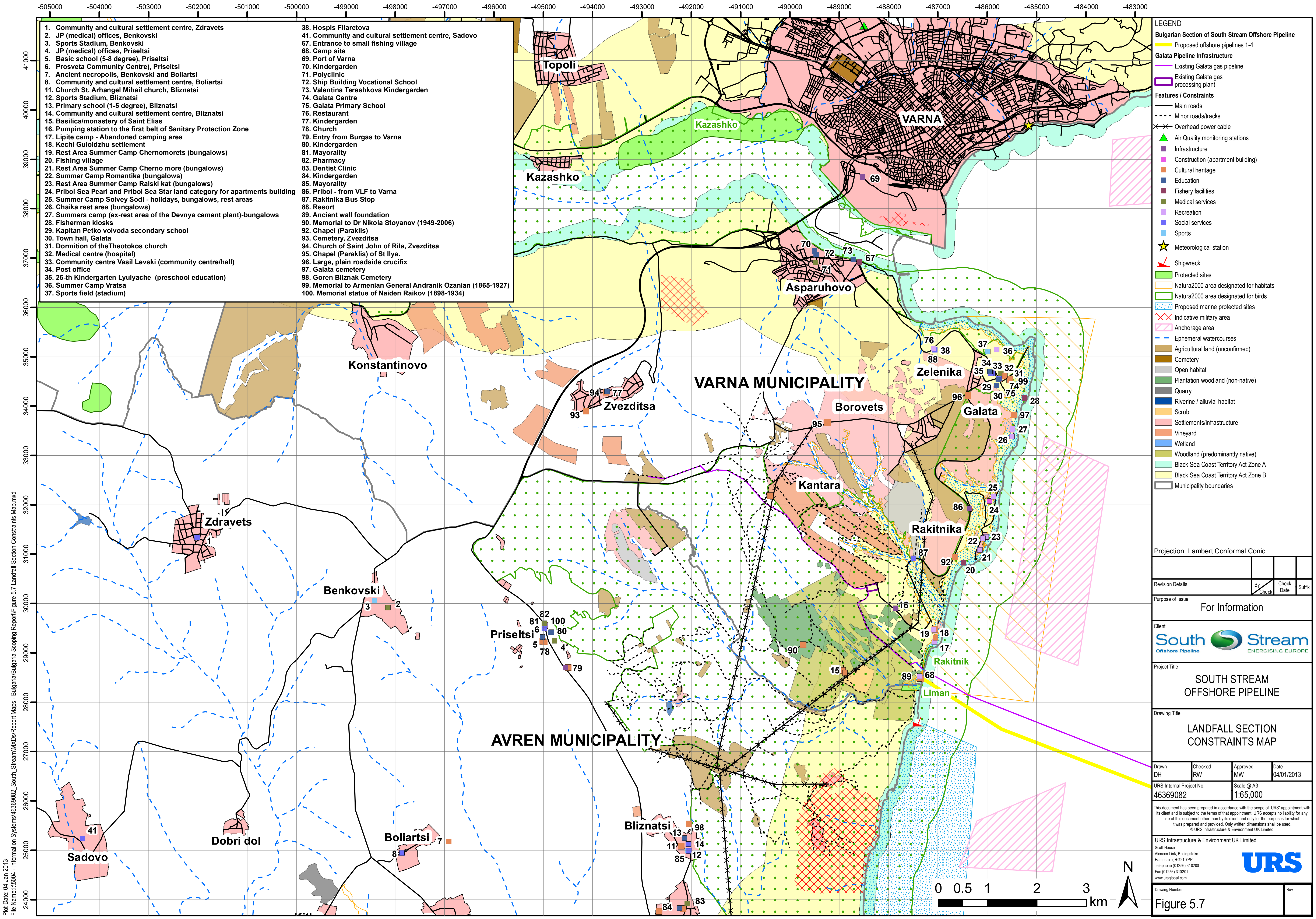
0 5 10 20 30 km
Plot Date: 04 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.6 Nearshore and Offshore Sections Constraints Map.mxd



1. Community and cultural settlement centre, Zdravets
2. JP (medical) offices, Benkovski
3. Sports Stadium, Benkovski
4. JP (medical) offices, Priseltsi
5. Basic school (5-8 degree), Priseltsi
6. Prosveta Community Centre), Priseltsi
7. Ancient necropolis, Benkovski and Boliartsi
8. Community and cultural settlement centre, Boliartsi
11. Church St. Arhangel Mihail church, Bliznatsi
12. Sports Stadium, Bliznatsi
13. Primary school (1-5 degree), Bliznatsi
14. Community and cultural settlement centre, Bliznatsi
15. Basilica/monastery of Saint Elias
16. Pumping station to the first belt of Sanitary Protection Zone
17. Lipite camp - Abandoned camping area
18. Kechi Guioldzhu settlement
19. Rest Area Summer Camp Chernomorets (bungalows)
20. Fishing village
21. Rest Area Summer Camp Cherno more (bungalows)
22. Summer Camp Romantika (bungalows)
23. Rest Area Summer Camp Raiski kat (bungalows)
24. Priboi Sea Pearl and Priboi Sea Star land category for apartments building
25. Summer Camp Solvey Sodi - holidays, bungalows, rest areas
26. Chaika rest area (bungalows)
27. Summers camp (ex-rest area of the Devnya cement plant)-bungalows
28. Fisherman kiosks
29. Kapitan Petko voivoda secondary school
30. Town hall, Galata
31. Dormition of theTheotokos church
32. Medical centre (hospital)
33. Community centre Vasil Levski (community centre/hall)
34. Post office
35. 25-th Kindergarten Lyulyache (preschool education)
36. Summer Camp Vratsa
37. Sports field (stadium)
38. Hospis Filaretova
41. Community and cultural settlement centre, Sadovo
67. Entrance to small fishing village
68. Camp site
69. Port of Varna
70. Kindergarden
71. Polyclinic
72. Ship Building Vocational School
73. Valentina Tereshkova Kindergarden
74. Galata Centre
75. Galata Primary School
76. Restaurant
77. Kindergarden
78. Church
79. Entry from Burgas to Varna
80. Kindergarden
81. Mayorality
82. Pharmacy
83. Dentist Clinic
84. Kindergarden
85. Mayorality
86. Priboi - from VLF to Varna
87. Rakitnika Bus Stop
88. Resort
89. Ancient wall foundation
90. Memorial to Dr Nikola Stoyanov (1949-2006)
92. Chapel (Paraklis)
93. Cemetery, Zvezditsa
94. Church of Saint John of Rila, Zvezditsa
95. Chapel (Paraklis) of St Ilya.
96. Large, plain roadside crucifix
97. Galata cemetery
98. Goren Bliznak Cemetery
99. Memorial to Armenian General Andranik Ozanian (1865-1927)
100. Memorial statue of Naiden Raikov (1898-1934)
VARNA
Topoli
Kazashko
Asparuhovo
Konstantinovo
Zvezditsa
VARNA MUNICIPALITY
Zelenika
Borovets
Galata
Kantara
Rakitnika
Rakitnik
Liman
Zdravets
Benkovski
Priseltsi
AVREN MUNICIPALITY
Bliznatsi
Boliartsi
Dobri dol
Sadovo
LEGEND
Bulgarian Section of South Stream Offshore Pipeline
Proposed offshore pipelines 1-4
Galata Pipeline Infrastructure
Existing Galata gas pipeline
Existing Galata gas processing plant
Features / Constraints
Main roads
Minor roads/tracks
Overhead power cable
Air Quality monitoring stations
Infrastructure
Construction (apartment building)
Cultural heritage
Education
Fishery facilities
Medical services
Recreation
Social services
Sports
Meteorological station
Shipwreck
Protected sites
Natura2000 area designated for habitats
Natura2000 area designated for birds
Proposed marine protected sites
Indicative military area
Anchorage area
Ephemeral watercourses
Agricultural land (unconfirmed)
Cemetery
Open habitat
Plantation woodland (non-native)
Quarry
Riverine / alluvial habitat
Scrub
Settlements/infrastructure
Vineyard
Wetland
Woodland (predominantly native)
Black Sea Coast Territory Act Zone A
Black Sea Coast Territory Act Zone B
Municipality boundaries
Projection: Lambert Conformal Conic
Revision Details
By Check
Check Date
Suffix
Purpose of Issue
For Information
Client
South Stream
Offshore Pipeline
ENERGISING EUROPE
Project Title
SOUTH STREAM OFFSHORE PIPELINE
Drawing Title
LANDFALL SECTION CONSTRAINTS MAP
Drawn DH
Checked RW
Approved MW
Date 04/01/2013
URS Internal Project No. 46369082
Scale @ A3 1:65,000
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Plot Date: 04 Jan 2013

5.2 Marine Environment

Figure 5.6 details the main socio-economic, environmental and cultural heritage characteristics of the offshore pipeline route.

5.2.1 Environment

Physical Environment

Oceanography

The Black Sea is a semi-enclosed sea connected to the shallow (10 to 20 m deep) Azov Sea through the Kerch Straits and to the Mediterranean Sea through the Bosporus Straits, the Marmara Sea and the Dardanelles Straits. The flat abyssal plain (at a depth of approximately 2,000 m) rises to the continental shelves along the surrounding coasts. The Bulgarian coastline stretches for 380 km along the western shore of the Black Sea.

The Bulgarian continental shelf is over 200 km wide and has a water depth ranging from 0 to 160 m with a mean depth of 50 m. Sedimentation rates in the continental shelf are relatively high as a result of fluvial sediment inflow. The continental slope is characterised by extensive instability of the sediment cover, where present, which causes gravity flows of sediment towards the abyssal plain (submarine slumps and associated “turbidite” flows). Instability of the sediment is triggered by seismic activity and, to a lesser extent, by the sedimentation process itself. Sedimentation on the continental slope is virtually absent.

The Abyssal Plain lies at the base of the continental slope and the seabed is typically characterised by fine-grained silt and/or clay sized sediment (Ref. 6). Sedimentation rates are extremely low with the exception of the rim of the continental slope where turbiditic fans of medium to fine grained sediments (fine sands to clays) accumulate as a result of gravitational failures on the continental slope. Hills (formed by mud volcanoes) and ravines can be encountered along the route of the pipeline corridor within the abyssal plain. The main natural hazards are associated with the presence of active fault lines and include seismic activity, gas eruptions, debris flows, subsidence and mud volcanoes. In addition, natural gas seepage associated with the degradation of organic rich material (including blow outs of shallow gas reservoirs and gas plumes) may also be encountered (Ref. 6).

Sea Level Variation

The Black Sea is practically non-tidal with a maximum range of no more than 10 cm. Long-term data collected (for approximately the last 90 years) along the Caucasian coast shows a slight yearly increase in mean sea level of about 0.23 cm per year. However, the water level of the Black Sea is subject to seasonal fluctuations averaging about 20 cm.

Short term sea level variations are also associated with varying meteorological conditions and can result in localised sea level surges of up to 1 m. Much more significant sea level variations have, however, occurred in pre-historic times, associated with the tectonic events that led to the opening of the Bosphorus Strait. It is now believed that up to 5000-6000 B.C. the Black Sea was a fresh water lake with a surface elevation approximately 30 m below the current levels.

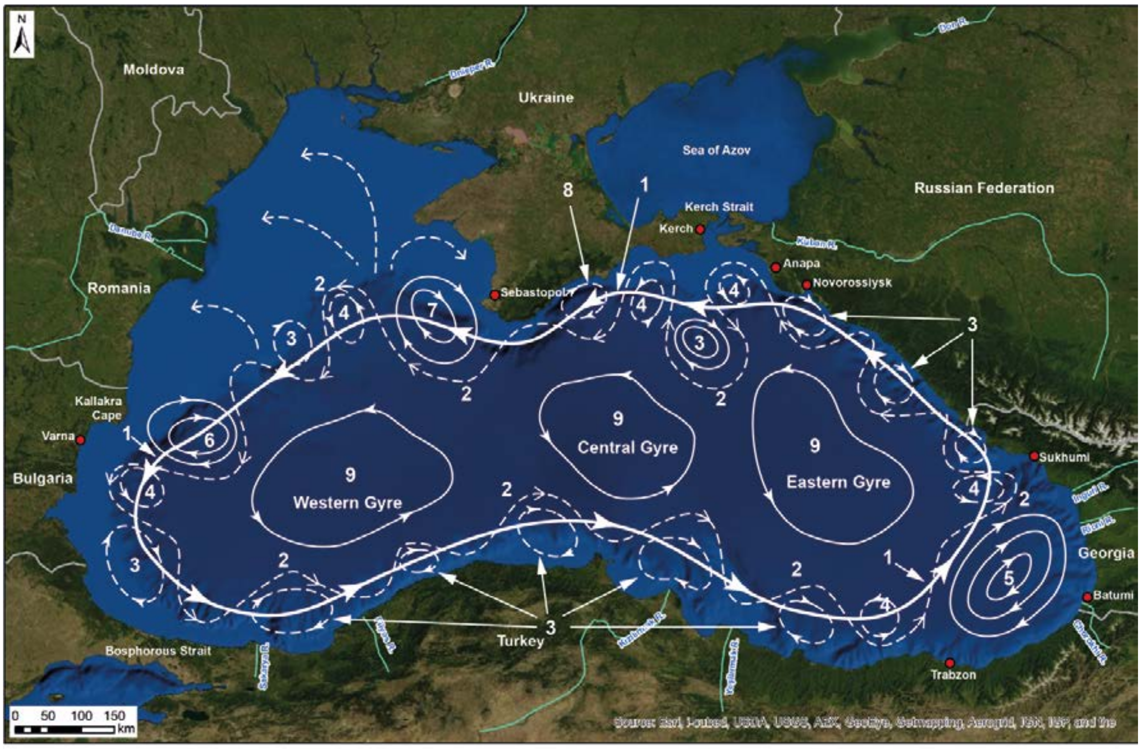
Flooding may have occurred as a sudden event associated with seismic activity in the Bosphorus area or gradually, as a result of oscillations in the elevation of the Bosphorus that may have started as early as 30,000 years ago.

Wave Climate and Currents

In coastal areas, especially adjacent to the Bulgarian and Romanian coastlines, wind causes waves up to 7 m high compared to waves along the south eastern shore that are reported to reach only around 2 m. This is due to the extensive stretch of sea (fetch) over which waves can build up during easterly gales, associated with the onset of low barometric conditions on the Anatolian landmass.

The Black Sea Main Rim Current is the dominant current within the Black Sea, creating a single cyclonic (counter clockwise) circular motion with a complex system of eddies. This upper layer current follows the rim of the continental slope at a distance of some 10 to 30 miles from the shore. A diagram of the MBSC is shown in Figure 5.8.

Figure 5.8: Main Black Sea Current



Key:
1: mean position of the cyclonic Rim Current jet current
2: Rim Current meanders
3: anticyclonic coastal eddies
4: cyclonic eddies
5: Batumi anticyclonic eddy
6: Kaliakra anticyclonic eddy
7: Sebastopol anticyclonic eddy
8: Crimea anticyclonic eddy
9: quasi-stationary cyclonic gyres

Source: Ref. 7

As shown in Figure 5.8, coastal currents are characterised by two diametrically opposite directions of water movement: north-western and south-eastern. The north-western flow direction is dominant over the south-eastern flow (approximate ratio is 85% and 15%, respectively). The maximum velocity of the north-western current is between 30 and 50 cm per second (cm/s) and 50 and 80 cm/s in the summer and winter respectively; whereas, in comparison, the south-eastern current is 30 to 50% less.

Sediment Dynamics

Nearshore sediment dynamics are influenced by the presence of a trough about 2.3 km offshore where water depths increase down to 25 m. Offshore from this trough water depths decrease to about 20 m again before falling to more than 50 m depth at 30 km offshore. Inshore from the trough the seabed slope rises gently to 20 m before the shore slope steepens exponentially towards the beach. Sediment accumulation and deposition, on the inshore side of this trough, is seen to be predominantly wave driven, with characteristic variable and migrating sand bar/sheet forms observable across the nearshore area. Storm surges in the winter months play a significant role in movement of sediment along the coastline.

Seabed Sediments

In the nearshore section, at approximately 1 km from the Bulgarian shore, sediment consists of coarse to medium grained sands that gradually change into fine grained sand. Seawards from this point to about 40 km from the Bulgarian shore the seabed is composed of dark grey to black silty to clayey-silty marine muds enriched with shell debris and intact shells of black mussel *Mytilus galloprovincialis*. The muds occupy the upper 10 to 15 cm interval and their thickness decreases to 2 to 5 cm in a seawards direction (approximately 25 to 40 km from the Bulgarian shore).

Sediment type beyond the 40 km point becomes more clayey and homogeneous. In some places, within the peripheral shelf zone of wedge-shaped accumulative bars development, these silty-clayey muds are underlain by Upper Pleistocene sediments consisting almost entirely of shelly fragments.

Sediment Quality

No regular monitoring is carried out in the Bulgarian Black Sea of organic pollutants and heavy metals contents in the seabed sediments. However, sporadic seabed sediment data that have been collected (Ref. 11) showed that sediments of Varna Bay contained arsenic (As), copper (Cu) and barium (Ba), in excess of international standards for contaminated soils.

A survey was undertaken in 2009 (Table 5.1) at 8 nearshore and 12 offshore sampling stations. The results showed heavy metal concentrations of As (57.0 mg/kg), chromium (Cr) (303.0 mg/kg), Cu (218.0 mg/kg), manganese (Mn) (28.0 mg/kg), nickel (Ni) (44.0 mg/kg), and zinc (Zn) (445.0 mg/kg). Typically, higher concentrations of heavy metals are observed in the sampling stations located in the areas with prevailing clayey sediments, which bind and retain metals more readily.

Water Temperature

There is a distinct seasonal variation in the vertical distribution of water temperature in winter and summer. During the winter months there is a persistent average surface layer (<100 m deep) temperature of 9°C. During the summer months a vertical distribution of water temperature is evident, ranging from about 25°C at the surface to about 9°C at the lower boundary layers (<1,300 m deep).

Water Salinity

The Black Sea experiences saline stratification through the significant fresh water influx (river run-off and precipitation) that is not compensated by evaporation. The average density of the surface layer of the Black Sea is 1.014 g/m^3, while the average salinity is just under 22 practical salinity units (PSU). The deep water has a higher salinity than the surface layer due to the inflow of saline waters from the Mediterranean entering through the Bosphorus Strait. The permanent halocline layer in the Black Sea is located between 120 and 200 m water depth. In shallower waters closer to the shore and near river mouths, the salinity typically decreases (e.g. around 17 PSU).

Water Chemistry

The western part of the Black Sea shows higher nutrient levels than the south or east, partly due to the influx of nutrients from the Danube River. Nitrate values along the Bulgarian coast may be in excess of 40 micrograms per cubic metre (mg/m^3) and phosphate in excess of 12 mg/m^3 (Ref. 9).

Recent survey results (Ref. 7) show that organic pollutants (e.g. total petroleum hydrocarbon (TPH), phenol and metal concentrations) are typically below detectable limits. There is no recent data for polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). Nutrients concentrations were found to be greater in shallower waters, when compared with the offshore locations. Survey locations are shown in Figures 5.1 and 5.3.

The EU Bathing Water Directive 2006/7/EC sets the microbial standards for water quality at popular beaches and inland bathing sites. Results of the 2011 Bulgarian bathing water quality survey has shown that the waters of the Pasha Dere Beach continue to meet the mandatory water quality standard (Ref. 10). Compliance with this directive and other relevant directives (e.g. the EU Water Framework Directive) will be considered as part of the ESIA.

The saline stratification of the Black Sea, in conjunction with its significant maximum depths, generates anoxic conditions such that the Black Sea is considered the world's largest anoxic basin. Waters with hypoxic or entirely anoxic conditions are typically incapable of sustaining permanent populations of species dependant on aerobic respiration. Consequently, the potential for significant marine life occurring at depths of greater than approximately 150 m within the Black Sea is limited, and likely to limited to those organisms capable of anaerobic respiration (e.g. chemosynthetic life). Anaerobic respiration typically produces H_2S and CH_4 as a by-product. Concentrations of H_2S are known to be elevated within the bottom waters of the Black Sea. Such conditions are prohibitive to many life forms whilst creating conditions conducive to the preservation of organic and inorganic materials (i.e. the potential for CHOs to be preserved is high).

Habitats and Species

This section primarily draws on data acquired from marine ecology surveys undertaken along the proposed offshore pipeline route. All survey locations are shown in Figures 5.2 and 5.4.

Plankton

Historical data shows that shifts in the planktonic community have occurred as a result of cold climatic conditions and eutrophication events, which have changed the classical seasonal phytoplankton succession (diatoms to dinoflagellates to phytoflagellates) (Ref. 6). However, plankton communities have shown considerable inter-annual variability over the last two decades and recovery is beginning to take place both in terms of species composition and abundance (Ref. 11). Variations in plankton composition can cause significant changes in benthic community abundance and diversity within the Black Sea (Ref. 11). Based on the results of plankton surveys conducted in the nearshore section, diatoms and dinoflagellates comprise the majority of the community in the spring and abundance of plankton during these months decreases with increasing water depth when compared to historical plankton data (Ref. 6).

Benthos

In the nearshore section rocky sediments are generally colonised by bivalve species, particularly mussels such as *Mytilus sp*. A patchy "Mytilus Belt" (found between 30-60 m deep) is present in the study area (Ref. 6), but it is not known if it extends around the entire Black Sea basin (Ref. 12). Sandy nearshore sediments are dominated by molluscs and polychaete species in the study area (Ref. 6). In a recent survey (see Table 5.1), a significant prevalence of polychaetes, crustaceans and molluscs was observed although the abundance of gastropod (mollusc) species has reduced significantly since previous surveys in 2009 (Ref. 6). Abundance of benthic species in deeper waters decreases below the haloocline (approximately 150 m water depth); influenced by the increase in hydrogen sulphide concentrations and anoxic conditions (Ref. 11).

Macroalgae and Sea-Grasses

In the absence of the seagrass *Posidonia* (protected under the EU Habitats Directive), eelgrass (*Zostera sp*) fulfils the same ecological role along the Bulgarian coast. Recent surveys (see Table 5.1) (Ref. 6) confirmed the presence of *Zostera sp*. in the vicinity of the study area. Over the last two decades *Zostera sp*. coverage has decreased tenfold in shallow waters (Ref. 11).

Historically, there has been an extensive community of perennial algae (*phyllophora*) on the north-western shelf of the Black Sea (Ref. 6). Between the 1950s and 1980s there was a decline in this community attributed to natural and man-made factors, but observations made in the last 10 years have indicated its re-establishment (Ref. 6). *Phyllophora nervosa* has been observed along the Bulgarian coast and while it is not protected under EU Directives, it is considered endangered locally and is of local importance (Ref. 6).

Fish

The fish community within the western Black Sea includes similar but reduced numbers of Mediterranean species, with a brackish water component influenced by the Danube River outflow. The fish stock in the Black Sea has been drastically reduced as a consequence of eutrophication, overfishing and plankton reduction associated with the population boom of an invasive species of ctenophore (*Mnemiopsis lidyi*), which feeds on plankton and fish larvae. The number of fish species sharply decreases with the increase in water depth as waters become anoxic (Ref. 6).

During a survey undertaken in 2011 (Table 5.1) 14 fish species were recorded (Ref. 6) of which eight were protected and three were of high commercial importance (sprat (*Sprattus sprattus*), turbot (*Scophthalmus maximus)* and whiting (*Merlangius merlangus*). Two of the protected species, thornback ray (*Raja clavata*) and round goby (*Neogobius melanostomus*), are cited in the International Union for the Conservation of Nature (IUCN) Red List of Endangered Species. The other six protected species (black scorpionfish (*Scorpaena porcus*), red mullet (*Mullus surmuletus),* greater weever (*Trachinus draco*), stargazer (*Uranoscopus scaber)*, Risso's dragonet (*Calionymus risso)* and the goby (*Pomatoschistus minutus)*) are listed in the Black Sea Red Data Book (Ref. 12).

Seabirds

The Black Sea acts as a main migration route for a number of birds that overwinter, nest and roost in coastal locations (Ref. 11). The most significant seabird habitats are found on the north coast from the Danube Delta in Romania to the Kerch Strait, approximately 230 km to the north of the offshore section (Ref. 11). Fourteen seabird species were recorded in the study area during surveys in 2011 (Ref. 6); most of these species were gulls. Some of these gulls are protected (e.g. black-throated diver (*Gavia arctica*) and black-headed gull (*Larus ridibundus*)). The Galata SPA has been established for a number of migratory seabirds nesting around the coast (Ref. 6).

Marine mammals

Three cetacean species are found off the Bulgarian coast; harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*) and common dolphin (*Delphinus delphis*) (Ref. 14). All species are included in the Bulgarian Red Data Book (2011) (Ref. 14). They are all also listed in the IUCN Red List and are listed as Least Concern[4] (Ref. 15). Cetacean species are more abundant within the coastal waters of the Black Sea where their food source is more abundant. There are marked seasonal variations in the presence of cetaceans in the study area, with harbour porpoises migrating from the north in summer and bottlenose dolphins being more common in spring (February to March) (Ref. 6). No pinniped species (e.g. seals) are known to occur on the Bulgarian coast of the Black Sea.

5.2.2 Socio-Economic

Fishing

Most of the commercial fishing fleets in Bulgaria are based at the ports of Baltchik, Burgas, Varna, Sozopol and Nessebar. Fishing activity is generally undertaken in Bulgarian territorial waters and mainly concentrated along the coastline. Mollusc (predominantly mussels) harvesting is concentrated in the central and northern regions of the Bulgarian coastline. Of the approximately 125 fish species known to be present in Bulgarian waters, 26 of them are considered to have economic value. The most frequent species caught in the Black Sea are

[4] Plant and animal species that have been evaluated to have a low risk of extinction are classified as Least Concern (http://www.iucnredlist.org/about).

small finfish: sprat (*Sprattus sprattus*), anchovy (*Engraulis spp*), horse mackerel (*Trachurus mediterraneus*) and whiting (*Merlangius merlangus*) (Ref. 16).

Fishing activities, together with the processing industry, comprise 16.6% of jobs in the Primorsko and Burgas Regions and 11.9% of jobs in the Byala and Varna Regions (Ref. 16).

Subsea Infrastructure

Several international and regional fibre-optic cables run through the Bulgarian EEZ. The offshore route will cross four existing cables:

- The Italy-Turkey-Ukraine-Russia (ITUR) cable system, operated by Rostelecom;
- The Karadeniz Fiber Optik Sistemi (KAFOS) cable system, operated by Vivacom;
- The Caucasus Cable System, operated by Caucasas Online; and
- The Kilia-Ordessa Telegraph cable, which is no longer in service.

There are also plans to develop a High Voltage Direct Current (HVDC) cable between Constanta in Romania and Istanbul in Turkey although the timetable for construction is yet to be confirmed.

Shipping and Navigation

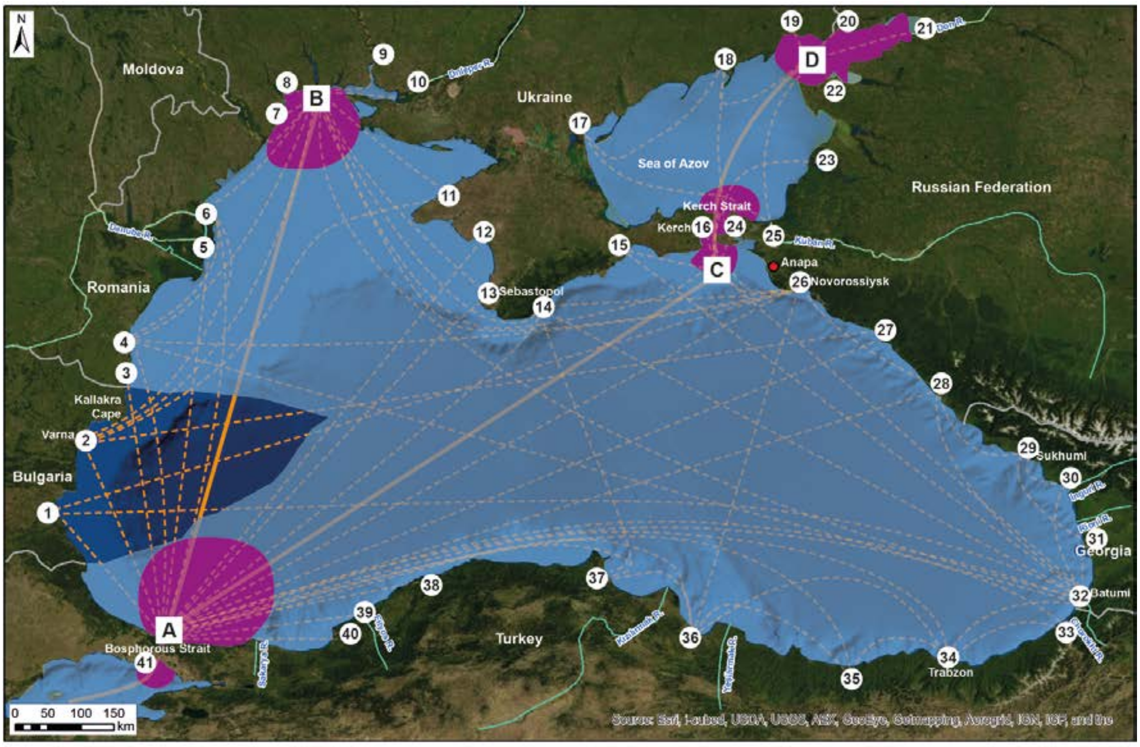
The Black Sea is a major transport route for many of the Black Sea countries as shown in Figure 5.9. The majority of shipping traffic occurs between the following shipping hotspots:

- Bosphorus shipping junction (Istanbul);
- North-western harbour agglomeration (Odessa);
- Kerch Strait shipping junction; and
- North-eastern harbour agglomeration.

There are two main ports in Bulgaria: Varna and Burgas. Together they account for 60% of the national import and export volumes. In the last 10 years the total freight transport through these ports has increased at an average rate of 1.8% per year. Approximately one third of the freight is handled in Varna and the remaining two thirds in Burgas (Ref. 17).

The closest port to the Project is Varna Port, a major national and international shipping hub. It handles over eight million tonnes of cargo per year and is the main gateway for the export of industrial and agricultural goods from northern Bulgaria. The Port has transport links to Europe, Russia, Ukraine, Caucasus, Central and South-eastern Asia. There are also two container terminals and a ferry boat terminal at the Port.

Figure 5.9: Shipping and Navigation Routes in the Black Sea



Key:

A: Bosporus shipping junction (Istanbul)
B: North western harbour agglomeration (Odessa)
C: Kerch Strait shipping junction
D: North eastern harbour agglomeration

1: Burgas	**12:** Evpatoria	**23:** Primorsko-Akhtarsk	**34:** Trabzon
2: Varna	**13:** Sevastopol	**24:** Port Kavkaz	**35:** Giresun
3: Mangala	**14:** Yalta	**25:** Temryuk	**36:** Samsun
4: Constantza	**15:** Feodosia	**26:** Novorossiysk	**37:** Sinop
5: Sulina	**16:** Kerch	**27:** Tuapse	**38:** Amasra (Bartin)
6: Ust'-dunayski	**17:** Genichesk	**28:** Sochi	**39:** Zonguldak
7: Illichivsk	**18:** Berdyansk	**29:** Sukhumi	**40:** Eregli
8: Odessa	**19:** Mariupol	**30:** Ochamchire	**41:** Istanbul
9: Nikolayev	**20:** Taganrog	**31:** Poti	
10: Kherson	**21:** Rostov-na-Donu	**32:** Batumi	
11: Chemomorskoye	**22:** Yeysk	**33:** Hopa	

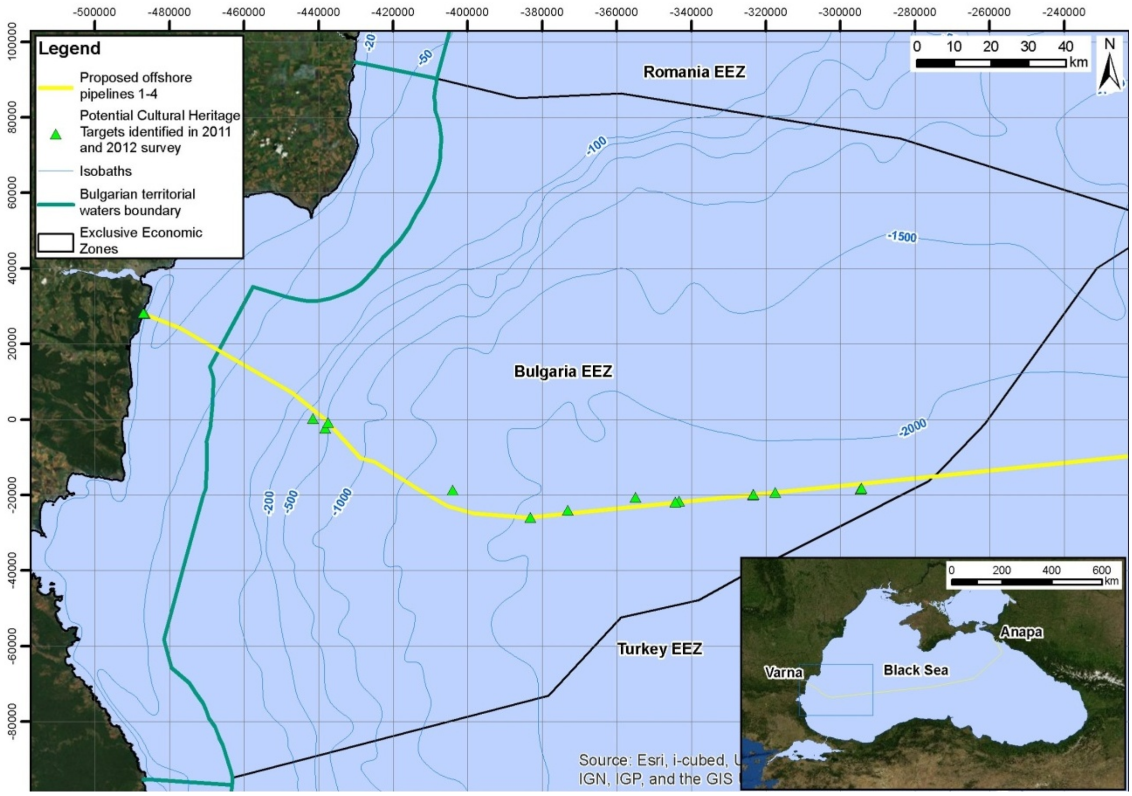
Source: Ref. 18

5.2.3 Maritime Cultural Heritage

There is the potential to encounter cultural heritage objects (CHOs) within and around the proposed offshore pipeline corridor. In particular, the variable marine conditions along the Bulgarian Black Sea Coast have proven fatal to many mariners who sailed along the Bulgarian shores to benefit from the currents. This has resulted in a high potential for encountering shipwrecks on the seabed of the Bulgarian continental shelf.

Desktop-based studies, undertaken in 2011, revealed one cultural heritage object (an unidentified shipwreck) located within the Bulgarian EEZ. The CHO is not within the study area. Marine remote-sensing surveys were carried out in 2011 and 2012 along the proposed pipeline corridor (Table 5.1). The surveys recorded a total of 16 CHOs or potential CHOs within 150 m of the pipelines (Figure 5.10). Further assessment of these objects in 2012 has confirmed that six are shipwrecks. Due to the anoxic conditions found in water depths greater than approximately 150 m, corrosion and microbial degradation is inhibited beyond this depth, resulting in potentially well preserved objects.

Figure 5.10: The Location of Potential Shipwrecks in the Project Area



5.3 Terrestrial Environment

5.3.1 Environmental

Geomorphology

The pipeline will cross the shore at Pasha Dere Beach and proceed up the gently sloping Pasha Dere valley to the proposed Receiving Terminal location. The immediate shore crossing littoral area is comprised of a sandy beach, surrounded by coastal cliffs (up to approximately 30 m high). The coastal cliffs are subject to wave action during heavy storms, resulting in the erosion of the relatively soft bedrock deposits, forming an apron of talus debris at the base of the cliffs.

The cliff-line at Pasha Dere is interrupted by the discharge of the ephemeral Pasha Dere River and its associated wetland (i.e. the Liman protected site).

The dominant geomorphological process within the valley is linear erosion, whereby surface water run-off causes erosion of weak soils at or near the surface. This has resulted in the formation of ravines and gullies (ditches and/or small valleys) that the pipeline route may cross. The erosion of soils in the area is seen to have been exacerbated by anthropogenic activities (i.e. removal of vegetation and soil cover associated with the construction of the Galata gas processing plant and maintenance of the associated RoW). The depth of erosion gullies is variable, with records of gullies up to approximately 0.5 m deep near the Galata gas processing plant and up to 1.7 m deep near the Pasha Dere Beach area. A number of these ravines and gullies act as ephemeral channels and waterways that only conduct flows following intense rainfall events. These channels ultimately discharge into the Pasha Dere River.

Hydrology and hydrogeology

The Pasha Dere River catchment is located between the catchments of the Kamchia River (to the south) and Provadiyska River (to the north). The flow regime in the Pasha Dere catchment, including the main river, several tributaries and gullies, fluctuates throughout the year (Ref. 19). There is currently no hydrometric or flow gauge data available for the Pasha Dere catchment and hydrological conditions will be assessed using data from comparable catchments.

The Pasha Dere catchment size (approximately 40 km^2) and precipitation characteristics (see the Meteorological Conditions section below) has led to long-term river course migration of the ephemeral Pasha Dere River and the formation of a depositional wetland area south of the shore crossing (i.e. the Liman protected site). Surface waters are also a source of recharge of the local groundwater aquifer, which is unconfined and consists of sandstone and limestone units. The aquifer is connected to the Black Sea as well as being recharged from both precipitation and losses from watercourses. Outflows from the aquifer are via springs, typically emerging along the steep coastal slope or in deeply cut gullies.

Results of groundwater quality surveys undertaken in 2011 for the Pasha Dere catchment (Table 5.1), confirmed that with the exception of iron, magnesium, hydrocarbons, permanganate oxidation and chemical oxygen demand (COD) index all other chemical indicators were within the Bulgarian Groundwater Quality Standards. In terms of water quality the area is considered representative of a partially disturbed environment in relatively good condition.

Soils

Landslide and flooding events are known to periodically occur within the Pasha Dere catchment. In particular, land-sliding is prevalent in the region along the marine coastal slopes and is often associated with saturation of soils following intense rainfall events or seismic activity.

As a whole the Project Area is located within the Danube-Carpathian soils region of the East Balkan province. Bedrock encountered within the area includes limestone, calcareous sandstones and marls. Sediment cover overlying the bedrock is typically formed through the degradation of the underlying geology to form various carbonate soil deposits (i.e. Phaeozems, Fluvisol, Anrthrosol, Arenosols and Regosols) (Ref. 6). In particular, the Phaeozem deposits form the dominant soil cover and are characterised by a rich topsoil layer, a dark brown humic layer and medium to dense sandy clay sub-layers. Such soils have a high water absorption capacity and low permeability.

Land Use

The proposed pipeline corridor crosses the Pasha Dere Beach, a sandy beach that is frequented by both residents and tourists. The immediate vicinity is sparsely populated. The closest communities to the landfall section are Rakitnika, Priboj-Fichoza (approximately 2 km to the north and north-west of the shore crossing), Bliznatsi to the south west (6 km), and Priseltzi to the west (7.5 km) (see Figures 5.5a and 5.5b). The city of Varna is approximately 10 km to the north across Varna Bay. Pasha Dere Beach is used as a recreational site by residents of these surrounding communities, as well as from other locations within Bulgaria. Immediately adjacent to the beach, the coastal woodland is used for parking cars, camping-sites and picnic areas.

The proposed onshore pipeline route follows the alignment of the existing RoW of the Galata gas pipeline. Development within this RoW is prohibited for safety and maintenance purposes. Similarly, re-vegetation of the RoW is limited to establishment of shrubs and small trees. Where practicable, the Project will utilise this RoW during construction to minimise impacts on undisturbed environments.

Land use in the study area is a combination of agriculture and forestry (both native plantation woodland and non-native plantation forestry) (see Figure 3.1). The agriculture of the area is predominantly associated with viticulture, with some cereal production areas in the upper Pasha Dere catchment. Vineyards present are a mixture of young and mature plantations, with a large number of abandoned plantations that tend to be dominated by wild grape species. A large number of the vineyards in closest proximity to the landfall facilities (i.e. in Kantara) are currently abandoned. Maintenance of active vineyards appears to be limited to ploughing and tilling between the rows.

Areas of native plantation woodland represent the dominant land use in the study area. The majority of the Pasha Dere valley has been classified as a Natura 2000 protected area (see Protected Areas below) to help preserve the restored native woodland habitat (predominantly 40 to 60 year old oak woodland). Within this restored woodland area, there are pockets of non-native plantation woodlands.

In addition to crossing the Natura 2000 protected areas, the landfall section is in close proximity to the protected sites of Liman and Rakitnik. Approximately 1 km to the north of the shore crossing along the coast there are a number of recreational and cultural heritage resources including the Lipite camping area (abandoned), the Kechi Guioldzhu settlement, and the Chernomorets Summer Camp (bungalows). Other sites of social interest within 2 km of the shore crossing include the basilica/monastery St Elias to the west.

In addition to the identified local communities, other significant land uses in or near the landfall section include:

- A water protection area (500 m to the east of the proposed Receiving Terminal);
- A military facility (Fort Rodni Balkani) 2 km to the south of the shore crossing;
- Borovets Radio Transmitter (3 km northwest of the shore crossing);

- The summer cottage area of Krushkite (3 km to the west of the proposed Receiving Terminal); and
- A military facility near Borovets (3 km to the north of the shore crossing).

Landscape

The landscape of the study area is characterised by gently rolling hills with a combination of agricultural fields (vineyards) and forest (see Figure 5.11a) sloping down towards the Black Sea coast. The landfall section includes a beach and a coastal cliff in the littoral area, with the Liman wetland, which is associated with the Pasha Dere River, present approximately 100 m to the south of the shore crossing.

The most significant anthropogenic feature in the area is the Galata gas processing plant, located at the edge of the forest and Kantara vineyard area (see Figures 5.11b and 5.11c).

From most locations within the study area, views across the Pasha Dere valley are restricted by dense forest consisting of ash, oak, hornbeam, beech and non-native trees between 10 to 15 m tall. The forest is largely deciduous and would therefore offer different views at different times of the year. During winter months, when the majority of the trees lose their leaves and the forest understory dries out, views across large expanses of the forest are possible from the limited tracks that are present in the study area.

Figure 5.11a: View (looking east) from the upper Pasha Dere valley towards the Galata Gas Processing Plant

Figure 5.11b: Galata Gas Processing Plant

Figure 5.11c: Community of Borovets (left) and Galata Gas Processing Plant (right)

Panoramic views within the lower reaches of the Pasha Dere valley are limited. Cleared areas in the upper catchment do have line-of-sight across the valley. In particular, the existing Galata gas processing plant is readily visible to residents on the southern side of the Rakitnika and Borovets communities.

Geology

The landfall section is located along the coastline of the eastern slopes of the Momino Plateau, in the southern section of the Danube Plain. This coastline is located within the Cape Galata - Cape Paletsa sub-region of the Dolnokamchiyski geomorphological region.

The landfall section is located in the southern section of the Varna monocline, also known as the Varna depression. The Varna monocline is a structure within the eastern section of the Moesian platform. To the west, the Varna monocline is bound by the Venelin-Tolbuhin fault zone, and to the south by the Dolna Kamchiya decrease (separated by faults located approximately adjacent to the Kamchia River Valley). A map of the geology and tectonic structure of Bulgaria is presented in Figure 5.12.

Deposits encountered at or near the surface in the study area include the Neogene age Galata suite and Quaternary deposits. Deposits of the Galata suite comprise yellowish and whitish sands with clay layers, sandy clay, detritus limestones and conglomerates. These deposits are exposed at the surface on the sea coast and are locally covered by deposits of the Quaternary formation (e.g. shales and sandstones) to the west of the coast. Hazardous physical and geological processes and phenomena in the study area include gravitational processes (talus, caving, collapsing, landslide), linear erosion, flooding, bogging and abrasion. No processes and phenomena classified as very hazardous or extremely (catastrophic) hazardous have been identified along the proposed onshore pipeline route.

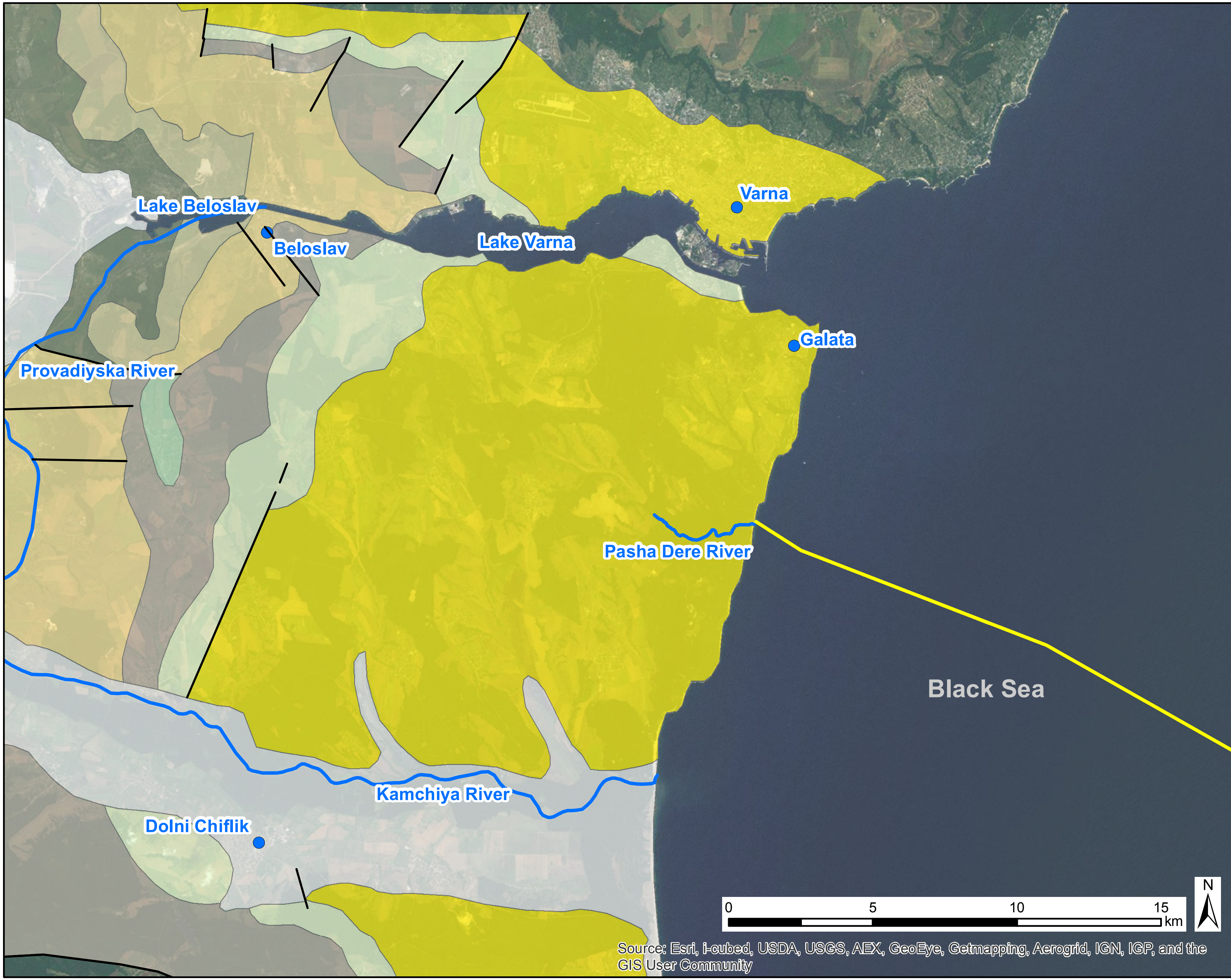
The potential for large seismic activity within Bulgaria is recognised, including a zone to the north of Varna known as the Shablensko Seismic Zone. The most significant earthquake in this zone in the last 120 years occurred on the 31 March 1901 with a magnitude M (Moment Magnitude Scale) of 7.2 (Richter Scale c.7.0).

No known fault lines cross the proposed onshore pipeline route (Ref. 6).

Meteorological Conditions

Meteorological conditions in the Varna region are representative of a humid sub-tropical climate. Due to its proximity to the Black Sea coast, the region is strongly influenced by the seasonal cycles of the Black Sea. The annual average daily maximum air temperature in Varna is 13.25° C. On average the warmest months are June to September (a maximum monthly average temperature of 27.2° C) and the coolest are December to February (a minimum monthly average temperature of 0.5° C). The average maximum daily temperature is 17.4° C whilst the average minimum daily temperature is 9.1° C.

The annual average precipitation is 540 mm (an average of 45 mm per month), mainly in the form of rain. The maximum recorded daily precipitation is 300 mm. There is relatively little seasonal variation in precipitation, with the greatest amount occurring during the months of September, October and November.



LEGEND

Proposed offshore pipelines 1-4
Fault Lines
Bulgarian Settlements
Surface Water

Geology

Alluvial sediments, pebbles and sands of floodplain and higher terraces, beach terraces and beach sands, swamp deposits
Galata Formation: sands with clay interbeds
Ruslar Formation: clays, marls, tuffs, manganese ores
Avren Formation: marls, locally within interbedded layers of detrital sandstone
Clayey sands, sandstones and sands, nummulitic limestones
Detrital sandstone formation
Terrigenous carbonate rocks
Gorna Orjatovica formation: marls and clayey marls with sandstone interbeds and possible orbitoline sandstone of the Pavlikeni Formation

Projection: Lambert Conformal Conic

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: For Information

Client: South Stream Offshore Pipeline ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: GEOLOGICAL MAP OF THE PROJECT AREA

Drawn	Checked	Approved	Date
DH	RW	MW	04/01/2013

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Drawing Number: Figure 5.12

Rev

Terrestrial Ecology - Flora

The habitats present include both natural habitats[5] and modified habitats[6].

Twenty-eight vegetation types were defined. Of these, the following communities are provisionally identified as being of conservation importance:

- Turkey oak (*Quercus cerris*) and Hungarian oak (*Q. Frainetto*) woodland – listed in Directive 92/43 (91M0), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act;
- White willow (*Salix alba*) dominated wet woodland - listed in Directive 92/43 (92A0), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act;
- Meadows dominated with the sedge *Carex ligerica* - listed in Directive 92/43 (2130*), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act;
- Communities of yellow flag iris (*Iris pseudacorus*) - listed in Directive 92/43 (3150), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act;
- Psamophyte communities dominated with mammoth wild rye (*Leymus racemosus*) - listed in Directive 92/43 (2110), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act;
- Psamophyte communities dominated with sea kale (*Crambe maritima* ssp. Pontica) - listed in Directive 92/43 (2110), Red Data Book of Bulgaria, Volume 3 (endangered), Annex 1 to the Biological Diversity Act; and
- Shrubs on rocks and steep slopes on the coastline dominated with field elm (*Ulmus minor*) – listed in Red Data Book of Bulgaria, Volume 3 (vulnerable).

The results of the surveys to date indicate that the main habitat types present in the study area are:

- Plantation woodland, *c*. 40 to 60 years old in general, predominantly Turkey oak and Hungarian oak with some conifers and other species. Some important plant species are present within the woodlands including the protected species star hyacinth (*Scilla bithynica*) and snowdrop (*Galanthus nivalis*). The woodlands are generally managed for forestry purposes;
- Coastal beach and low dunes, which are recognised as a fragile habitat, and support protected species of plants including sea holly (*Eryngium maritimum*) and blue lettuce (*Lactuca tartarica*);
- Open grassland/herbaceous vegetation along the easement of the existing Galata pipeline, which supports habitats which are typical of colonised disturbed ground, with a range of

[5] Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

[6] Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

common and widespread herbaceous species and some scrub growth (which is regularly cleared); and

- Grey dunes, which occur inland from the wetlands of the Liman protected site, with sand from riverine deposits being colonised by typical coastal species. Protected species present were a knapweed (*Centaurea arenaria*), a campion (*Silene friwaldskiana*), an alyssum (*Aurinia uechtritziana*), and a mullein (*Verbascum glanduliferum*).

Figure 5.13a (Option 1) and 5.13b (Option 2) show the key broad habitat categories present within the study area.

Terrestrial Ecology - Fauna

The landscape and flora features described in the previous sections provide a variety of habitats for different species groups for foraging, breeding and refuge purposes. Protected species surveys undertaken include terrestrial mammal, amphibian, reptile, terrestrial invertebrate and bird (breeding, migratory and crepuscular) surveys.

Herpetofauna

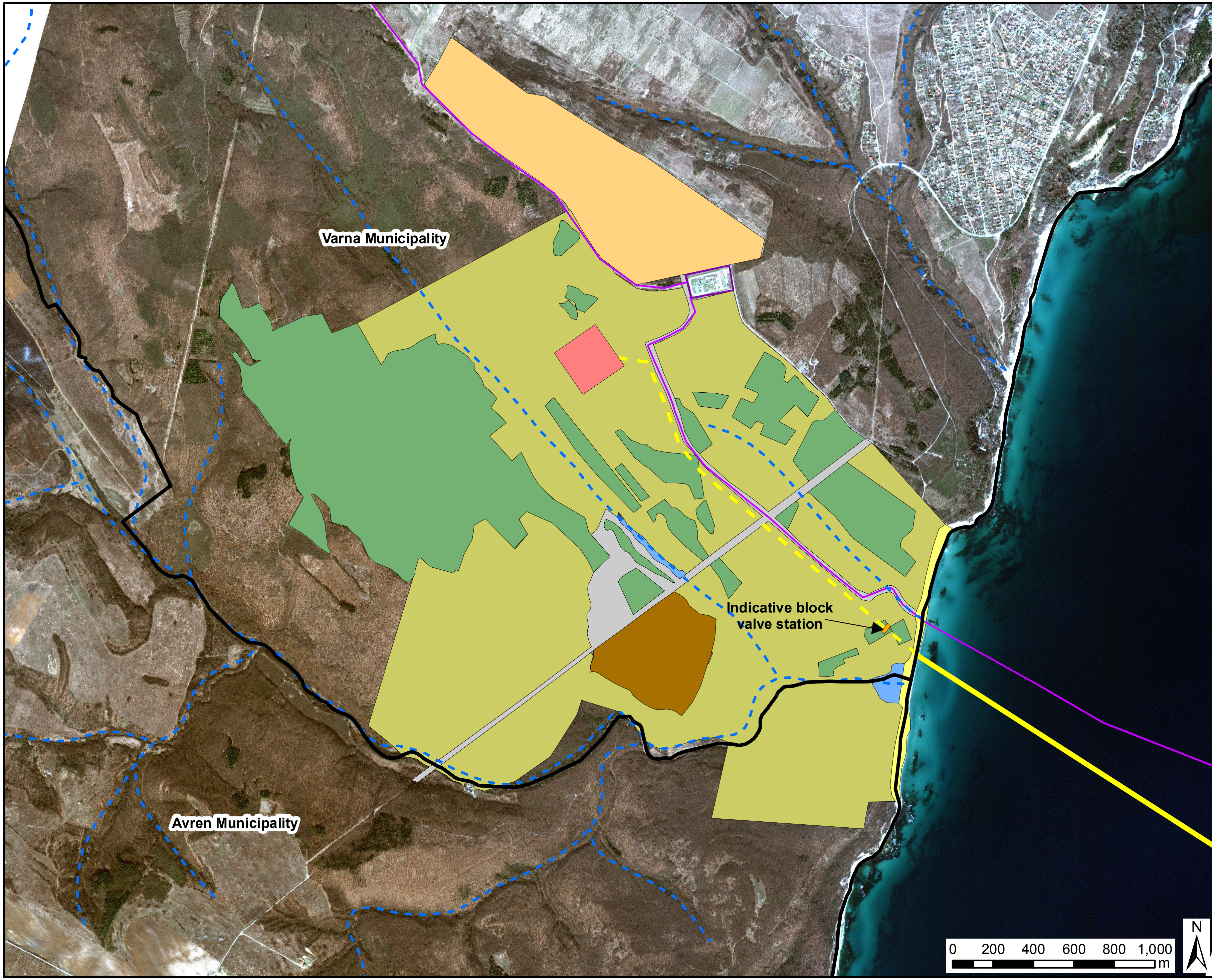
Species recorded within the study area include two newt species and three frog species. The newts are a species of conservation importance, and as such it is also considered important to conserve the hydrological regime of the wetland habitats on which they depend.

A number of reptile species are known or considered likely to occur within the study area including the European copper skink (*Ablepharus kitaibelii*), and two protected species of terrestrial tortoise, the spur-thighed tortoise (*Testudo graeca*) and Hermann's tortoise (*T. hermanni*), both of which have been recorded as breeding within the study area and are protected under Article 38 of the Biological Diversity Act 2002 through their inclusion on Annex 3 of the Act. Both species are also internationally protected under Annex 2 of the EC Habitats Directive.

The European pond turtle (*Emys orbicularis*) is numerous in the region and occurs in aquatic habitats (including the Liman nature reserve) including the study area. This species is protected under the Biological Diversity Act 2002.

Mammals

Surveys undertaken in 2011 and 2012 found individuals and tracks of 12 species of terrestrial mammals including jackal (*Canis aureus*) and stone marten (*Martes foina)*. The European otter (*Lutra lutra*) has been recorded as present at the wetland within the Liman protected site and suitable habitat was also observed for edible dormouse (*Glis glis*) and forest dormouse (*Dryomys nitedula*) towards the coast. The presence of the edible dormouse was confirmed during the surveys. Of these, otter and forest dormouse are protected under Article 38 of the Biological Diversity Act 2002 through their inclusion in Annex 3 of the Act, and are internationally protected under the EC Habitats Directive.



LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station
- Existing Galata gas pipeline

Existing Galata gas processing plant

- Existing Galata gas processing plant
- Municipality boundaries
- Coastal and inland dunes
- Open Habitat
- Plantation Woodland (non-native)
- Scrub
- Vineyard
- Wetland
- Woodland (predominantly native)
- Ephemeral watercourses

Projection: Lambert Conformal Conic

Revision Details | By Check | Check Date | Suffix

Purpose of Issue: For Information

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Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: ONSHORE HABITAT CATEGORIES (OPTION 1)

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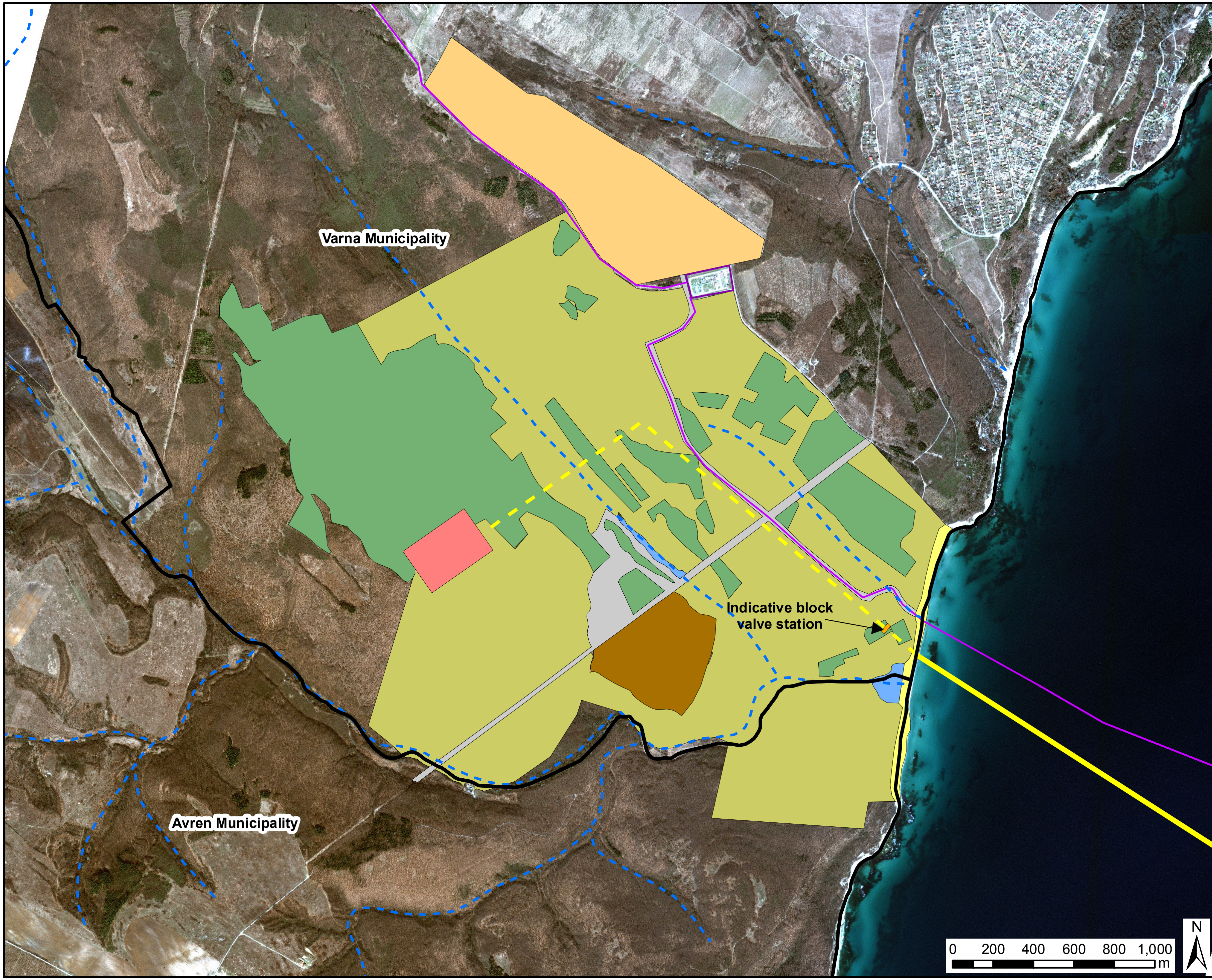
Plot Date: 09 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.13a Onshore Habitat Categories (Option 1).mxd



LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Indicative landfall facilities (metering, PIG trap & ESD valves)
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- Scrub
- Vineyard
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- Woodland (predominantly native)
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Project Title: SOUTH STREAM OFFSHORE PIPELINE

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Plot Date: 09 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.13b Onshore Habitat Categories (Option 2).mxd

A total of eight bat species have been identified in the study area. The bat surveys undertaken revealed that most bat activity recorded in the study area was along the existing Galata pipeline RoW and in the coastal area around the Liman swamp. Common pipistrelle (*Pipistrellus pipistrellus*) was the most frequently recorded species, with Nathusius' pipistrelle (*Pipsitrelle nathusii*) also commonly recorded in the woodland areas. Large bat species of genus *Nyctalus, Myotis, Barbastella, Eptesicus* were also recorded.

All bat species native to Bulgaria are protected under Article 38 of the Biological Diversity Act 2002 through their inclusion in Annex 3 of the Act. Several of these bat species are also listed on Annex 2 of the EC Habitats Directive and are therefore protected at an international level. Bulgaria is also a member party of the Eurobats agreement (Agreement on the Conservation of Populations of European Bats), which requires the adoption and enforcement of legislation to protect and conserve bat populations.

No confirmed tree roosts are known to occur along the proposed onshore pipeline route; however, a small number of trees with the potential to support roosts were recorded in the study area. The low levels of recorded bat activity indicate that no significant roosts (i.e. maternity) are located in the local area.

Terrestrial Invertebrates

Existing information on insects is limited to the localities of Galata in the north and Kamchia River Valley in the south. Eight species of Odonata (dragonflies) are known from the Liman protected area; however, these data were collected more than 50 years ago. General data on butterfly and dragonfly species, as well as on grasshoppers and crickets and their typical areas of distribution are available in scientific publications.

Surveys in 2012 have recorded that open habitats in the study area have a wide range of butterfly species and are known to support populations of stag beetle (*Lucanus cervus*), a European protected species (EC Habitats Directive) which is associated with standing and fallen dead wood. This species is also protected under the Biological Diversity Act 2002.

Avifauna

The Varna Region is recognised as of importance to many bird species and the Galata SPA has been primarily designated to protect these species. The SPA designation lists a number of bird species of concern for the area, including the Syrian woodpecker (*Dendrocopus syriacus*), woodlark (*Lullula arborea*), honey buzzard (*Pernis apivorus*) and red-backed shrike (*Lanius collurio*).

The Black Sea coast is a major migration corridor where birds move in a north-west direction in the spring, and in a south-east direction in the autumn. The majority of migrants follow estuarine valleys of rivers flowing into the Black Sea, where they stop to feed. Specific surveys for migratory birds were undertaken in mid-August 2012 following an initial survey in April 2012 that identified the potential for migratory birds to use habitat within the study area as a 'rest-stop' on their migration routes.

A total of 16 species were recorded within the study area. The majority of the species were observed flying over the study area, and were not recorded to land anywhere within the woodland areas. The surveys have demonstrated that woodland in the study area does not have a high significance for migrating birds at the beginning of the migration season.

The habitats present in the study area support a diverse range of breeding species. A total of 37 bird species are known to breed within the study area, the majority of which are common woodland nesting species. Nesting birds of prey including European honey buzzard (*Pernis apivorus*), European hobby (*Falco subbuteo*), sparrowhawk (*Accipiter nisus*) and buzzard (*Buteo buteo*) are also considered likely to be nesting species in the study area.

Of the 37 species identified as breeding (or likely to be breeding), four are listed in Annex I of the EC Birds Directive and Annex 2 of the Biological Diversity Act 2002; Syrian woodpecker (*Dendrocopus syriacus*), woodlark (*Lullula arborea*), honey buzzard (*Pernis apivorus*) and red-backed shrike (*Lanius collurio*).

Freshwater Ecology

The Pasha Dere River is ephemeral; however, the Liman wetland is a more permanent water body. The Liman Wetland is covered with submerged vascular aquatic plants, with a thick layer of benthic silt. The European protected narrow-mouthed whorl snail (*Vertigo angustior*) is known to occur within the Liman wetland.

Protected Areas

The Project is located near to/within the following protected areas:

- Special Protection Area (SPA) 'Galata' (Natura 2000 code BG0002060) under Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds;
- Site of Community Importance (SCI) 'Galata' (Natura 2000 code BG0000103) under Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
- Protected Site 'Rakitnik', designated by ordinance no. PD 818/23.08.2002, with the purpose of conserving the habitat of sea-buckthorn (*Hippophae rhamnoides*); and
- Protected Site 'Liman', designated by ordinance no. PD 821/23.08.2002, with the purpose of conserving a creek and its flora and fauna.

In addition to the above, two proposed new Natura 2000 areas are found in, or in the proximity of, the offshore and nearshore sections of the Project (Figure 5.6):

- An offshore SCI that will be part of the expansion and modifications of the Galata SCI. The area will be located approximately 500 m south of the pipeline route; and
- An offshore marine SCI called Emona. The pipeline will cross the north-eastern corner of the proposed SCI.

Impacts upon these proposed protected areas will be assessed within the EIA and ESIA. Furthermore, an Appropriate Assessment will be performed to assess the impacts of the Project on the species and habitats of the Natura 2000 sites affected or potentially affected by the Project.

Noise and Vibration

Ambient noise levels within the study area are low due to its relatively isolated location. The major sources of anthropogenic noise within the study area are the Galata gas processing plant and distant road traffic.

The sensitive receptors and communities in proximity to the landfall section are shown in Figure 5.14a and 5.14b. The nearest receptor, the Chernomorets Tourist Resort, is located approximately 700 m north of the shore crossing. The community of Rakitnika is a further 1.3 km to the north of the shore crossing. The communities of Kantara, Fichoza (both approximately at 2.5 km from the landfall section) and Borovets (approximately 3 km from the landfall section) represent the next closest communities potentially affected by noise associated with the Project. The land between the landfall section and the sensitive receptors is a mix of rural and forested terrain.

Air Quality

The air quality within the study area is relatively high as a result of the lack of significant industrial development. The closest automatic air quality monitoring stations (AS) to the study area are:

- Staro Oryahovo EC3 located 10 km south of the shore crossing;
- AS Batak located 14 km north of the shore crossing; and
- AS Yan Palach located 16 km north of the shore crossing.

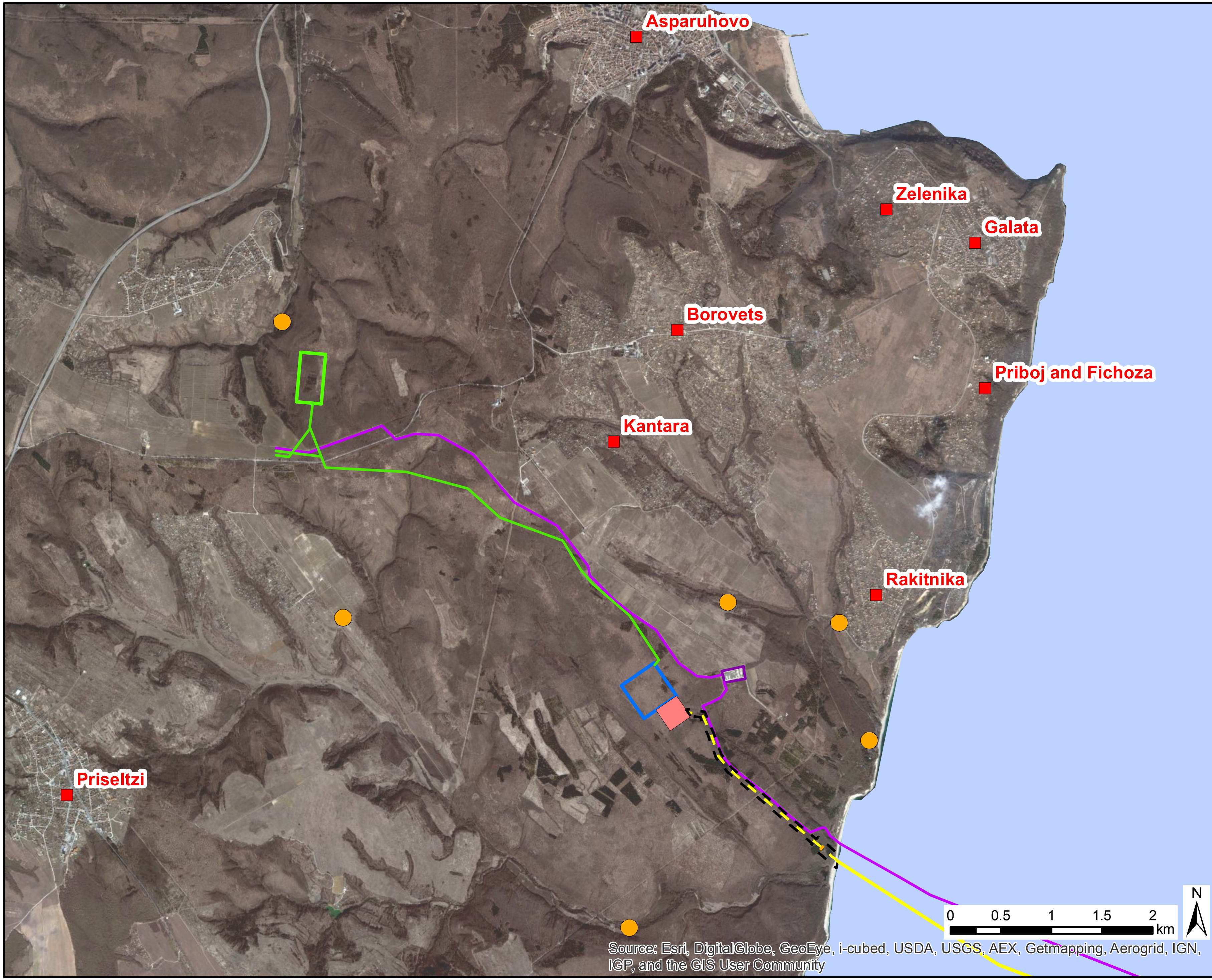
The NASEM[7] quarter bulletins on the Executive Environment Agency (ExEA) webpage[8] provide measurement data from these stations for 2010 and 2011.

The measured concentrations at Staro Oryahovo monitoring station comply with the EU and IFC ambient air quality limits. Pollutant concentrations at Batak and Yan Palah also generally comply with these limits, with the exception of the short term PM_{10} and $PM_{2.5}$ concentrations at both stations, and annual average PM_{10} concentrations at Batak. All three monitoring stations are located within urban settlements and are therefore expected to be experience higher concentrations of emissions than within the study area due to elevated traffic emissions and industrial sources. Based on the available data, it is considered likely that the existing air quality within the study area complies with the EU and IFC ambient air quality limits.

The sensitive receptors potentially affected by Project emissions are shown in Figures 5.14a and 5.14b.

[7] National Automated System for Environmental Monitoring

[8] The quarter bulletins are available at: http://eea.government.bg/bg/output/threemonth/43/air/index.html



LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

- Proposed offshore pipelines 1-4
- Proposed onshore pipelines 1-4
- Construction corridor
- Indicative landfall facilities (metering, PIG trap & ESD valves)
- Indicative block valve station

Galata Pipeline Infrastructure

- Existing Galata gas pipeline
- Existing Galata gas processing plant

South Stream Pipeline System on the territory of the Republic of Bulgaria

- SSB compressor station (indicative)
- SSB receiving terminal (indicative)
- SSB pipelines
- Nearest noise and air quality sensitive receptor
- Project affected communities (PACs)

Projection: Lambert Conformal Conic

Revision Details	By Check	Check Date	Suffix

Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — Stream ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: SENSITIVE RECEPTORS AROUND THE ONSHORE STUDY AREA (OPTION 1)

Drawn	Checked	Approved	Date
DH	RW	MW	07/01/2013

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Drawing Number: Figure 5.14a

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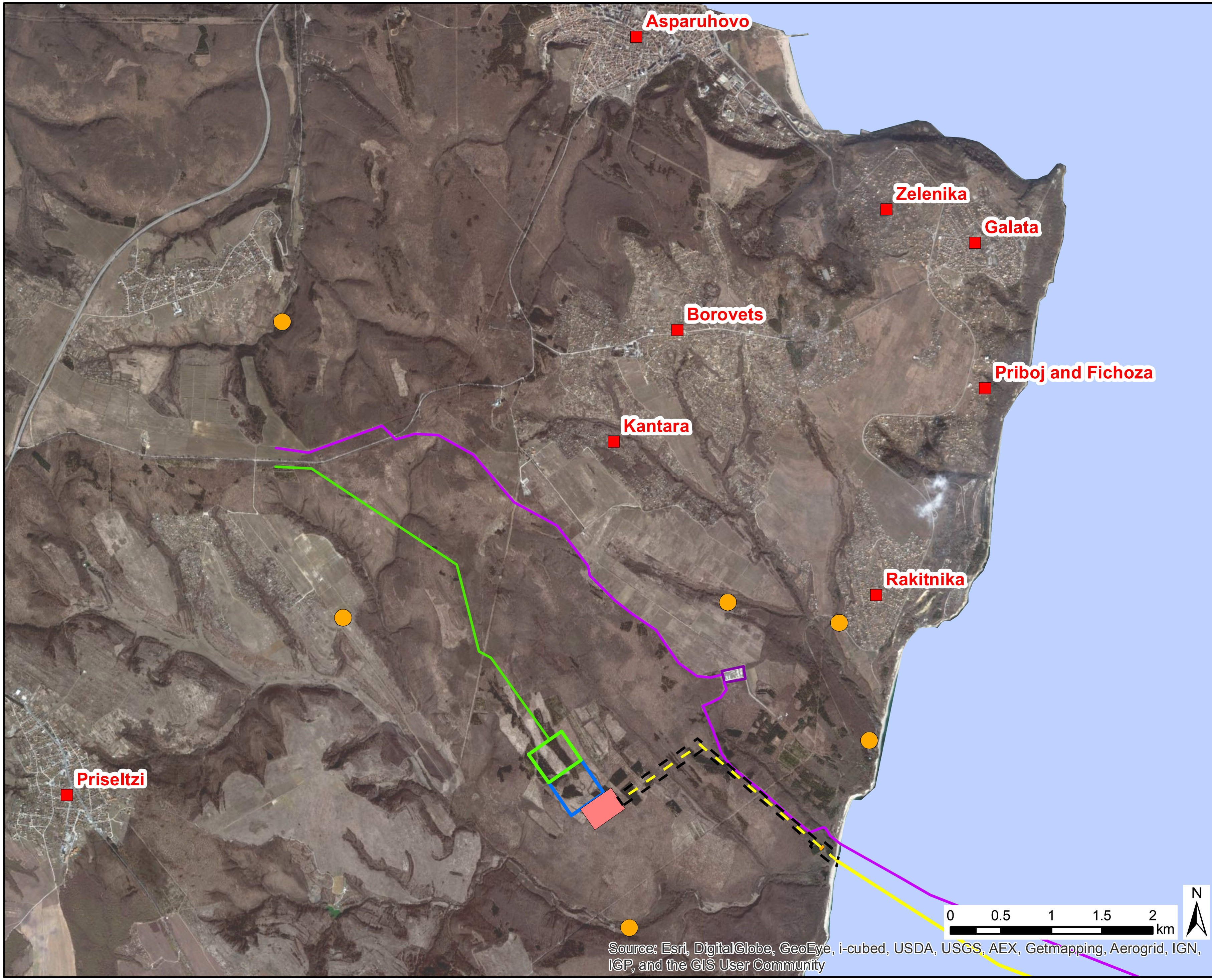
Plot Date: 09 Jan 2013
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.14a Sensitive Receptors around the Onshore Study Area (Option 1).mxd



LEGEND

Bulgarian Sector of South Stream Offshore Pipeline

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- Project affected communities (PACs)

Projection: Lambert Conformal Conic

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Purpose of Issue: For Information

Client: South Stream Offshore Pipeline — Stream ENERGISING EUROPE

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: SENSITIVE RECEPTORS AROUND THE ONSHORE STUDY AREA (OPTION 2)

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5.3.2 Socio-economic

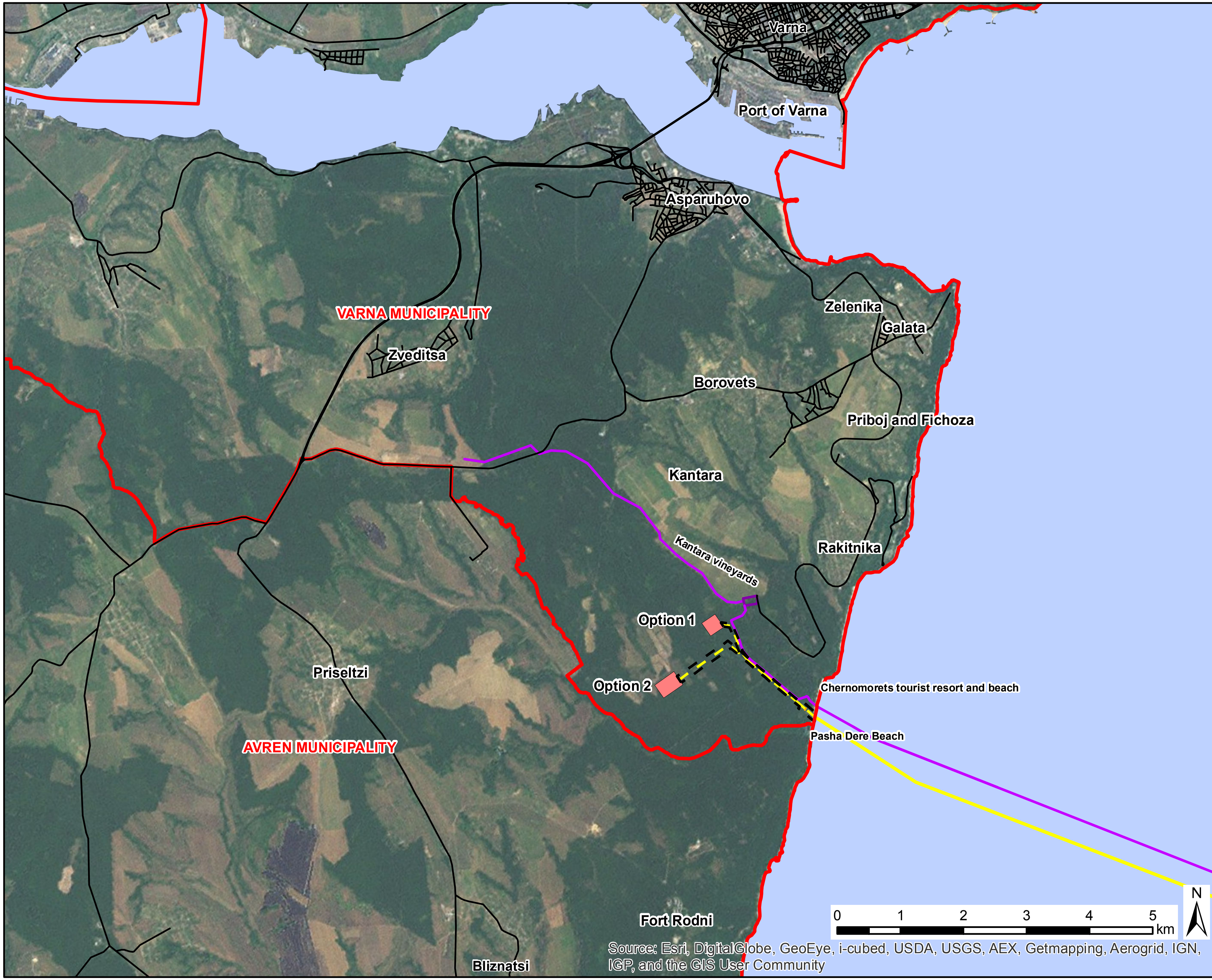
The landfall section is located in the Varna Region, which covers approximately 3,820 km^2; approximately 3.4% of the total area of Bulgaria. The Region is largely rural with a number of communities near the landfall section. The city of Varna is located approximately 11 km to the north of the landfall section and represents the largest urban centre in the Region.

The Varna Region is divided up into a number of municipalities, including the municipalities of Varna and Avren. The landfall section is within the Varna Municipality. The Avren Municipality is located approximately 1 km to the south of the landfall section. The potential Project-Affected Communities (PACs) are shown in Figure 5.15.

Project-affected Communities

As a result of the field visit undertaken in 2012, the individual communities potentially affected by the Project (PACs) were identified. The communities in close proximity to the landfall section have relatively small populations – between 500 and 3,000 people in each community. The selection of final marshalling yard locations and transport routes will influence which communities are affected (primarily through construction associated traffic). However, based on proximity to the landfall section and likely regional transport routes, the following communities are considered to be potential PACs All of these communities fall within the Municipality of Varna with the exception of Priseltzi, which falls within the Municipality of Avren:

- *Asparuhovo***:** a medium-density urban area with population informally estimated at 3,000, located immediately south and east of the Asparuhovo Bridge, on a potential access road for the Project. This area contains some high-rise apartment and office blocks. Social facilities include a kindergarten, primary school, technical school (shipbuilding), supermarket, shopping mall, polyclinic, hospice and public park.
- *Borovets (including Kantara agricultural area):* A large suburban area south of Asparuhovo, Borovets is within 2 km of the landfall section. Construction traffic may pass through the rural southern suburbs of Borovets, an area known as Kantara. Population is informally estimated at 3,000. Some residences on the southern fringe of Borovets have open views over the study area and the existing Galata gas processing plant is also visible. Vineyards within Kantara extend to within 1 km of the potential landfall facility area options. However, the majority of these vineyards currently appear to be unmaintained (Figure 5.16).
- *Galata (with adjoining Zelenika):* A small suburban area east of Asparuhovo, Galata and Zelenika are located on a potential access road for the Project. The combined population for these communities is informally estimated to be 2,500. Galata has moderate density housing, while Zelenika is of lower density. Social facilities include a primary school, old people's home and mayor's office.
- *Rakitnika:* The closest residential area located approximately 2 km from the landfall section. Rakitnika is a small residential settlement with an informally estimated population of 1,500. Agriculture and viticulture are practiced in the immediate area, and many residences have either on-site horticultural areas or independent allotments. Rakitnika's proximity to the beach and elevated aspect make it an attractive tourist area. Roads within the community are typically unsealed. The main sealed road that serves the local community runs along its



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Client: South Stream Offshore Pipeline — Energising Europe

Project Title: SOUTH STREAM OFFSHORE PIPELINE

Drawing Title: COMMUNITIES AND OTHER AREAS IN THE VARNA AND AVREN MUNICIPALITIES

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File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Bulgaria\Bulgaria Scoping Report\Figure 5.15 Communities and other areas in the Varna and Avren Municipalities.mxd

eastern boundary. Many residences appear to be seasonally occupied. Some residences on the southern fringe of Rakitnika have views over the study area.

Figure 5.16: Unmaintained vineyards in Kantara

- *Priboj and Fichoza:* These two small communities are located to the north and east of Rakitnika. The main road connecting these communities to the city of Varna (passing along the western boundary of the communities) is considered to be a potential access road for the Project. The combined informally estimated population for these communities is 1,000 individuals. Housing infrastructure generally appears to be in good condition and generously sized (most houses have at least two storeys). Both communities are considered to be valuable tourism areas with significant seasonal fluctuations in populations and economic activity. In particular, Fichoza, located directly on the coast, maintains locally important tourism and fishing activities. Priboj has a small number of amenities, including a supermarket. The surrounding land is dominated by agriculture and viticulture.
- *Varna:* the Port of Varna is expected to be used to import goods and services for the Project and is a busy industrial and commercial port. Residential areas of the city are located mainly to the north and west of the Port. Social facilities in the industrial area of the Port include yacht clubs and marinas, a post office, hospital and maritime administration centre. Varna Beach is located immediately north of the eastern limit of the Port. Varna Lake and Varna Bay are popular recreational areas and also serve as the base for several small-scale fishing enterprises.

- *Priseltzi:* A small residential community in Avren Municipality approximately 7.5 km to the south-west of the landfall section (4.5 km west of the proposed landfall facilities). A major road between Burgas and Varna passes through the community and may be utilised as a Project access route. Priseltzi VZ, located approximately 2 km north of the main residential area, is a summer tourism and residential community, which may have views over the study area.

In addition to the permanent communities described above there are other areas of interest from a socio-economic perspective. These are listed below:

- *Pasha Dere Beach* (see Land Use, above). The beach is used for recreation, including swimming, sailing, fishing and camping (Figure 5.17a). The beach is also popular with naturist groups.
- *Chernomorets Tourist Resort and other beach-front accommodation:* approximately 700 m north of the proposed shore crossing, south-east of Rakitnika. The buildings appear to be in good condition and used as tourist accommodation. Chernomorets Tourist Resort (Figure 5.17b) includes bungalows, a restaurant and a snack shop. It is bounded to the east by the Rakitnika Protected Area; and
- *Chernomorets Beach:* Further north of the Chernomorets Tourist Resort, with a number of bungalows and a boat ramp.

Economy and Labour Market

From 2000 to 2009 the economy of the Varna Region grew faster than the national average. Similarly, as economic activity has contracted since 2009 following the global economic downturn, Varna's economic activity has declined at a slower rate in comparison to the national average (Ref. 20). It is considered that the significance of the national and regional tourism industry has made the Varna Region more economically resilient than other parts of Bulgaria. This is evidenced in that 49.4% of the hotels along the Bulgarian coast are located in the Varna Region. Viticulture and cereal agriculture are the dominant farming practices in the Varna region, along with some plantation forestry.

Figure 5.17: (a) (left) Pasha Dere Beach, (b) (right) Chernomorets Tourist Resort

Many of the potential PACs identified are known to be seasonal communities, with strong summer tourism industries. Avren Municipality is increasingly promoting the development of tourism, particularly along the Black Sea coast and the Kamchiya reserve area. The communities of Priboj-Fichoza and Rakitnika, near the landfall section, have a number of residences that are offered as holiday homes for rent or are operated as bed and-breakfast accommodation for tourists. In particular, the Chernomorets Tourist Resort (comprising single-storey bungalows, a restaurant, and a snack shop) is the closest structure to the proposed shore crossing. Due to the seasonality of the tourism industry, associated industries activity (e.g. restaurants and shops) also fluctuate over the annual cycle.

Traffic, Transport and Social Infrastructure

In general, the Varna Region is well equipped with social, transport and other physical infrastructure and represents one of the most developed regions in Bulgaria. Important transportation arteries are the Northern and West-East routes, which link Sofia and its surroundings with Varna, and Corridor VIII, a pan-European corridor beginning at Durrës on the Albanian coast and linking Tirana, Sofia, Dimitrovgrad and Burgas with the city of Varna.

The major roads in the proximity of the study area are:

- A4 Expressway – a separated dual carriageway running south from Varna. The expressway by-passes Zvezditsa, and potentially provides a non-urban access route to the landfall section of the Project; and
- Narodni Buditeli Boulevard / Ulitsa 1-va – the major sealed coastal road connecting Asparuhovo, Zelenika, Galata, Priboj-Fichoza, Rakitnika and Borovets.

Roads surrounding the landfall section consist of a mixture of medium to high quality sealed roads and unsealed gravel roads. Sealed roads typically form the main streets of local communities, with side-streets tending to be unsealed. Formal footpaths separating pedestrian and vehicle traffic are uncommon.

Traffic flows on important local roads can be high during peak times. Public bus services run semi-regularly along Ulitsa 1-va (for example, two to three times a day) in local communities. Traffic in the area as a whole varies according to the tourist influx in the area during the summer months.

Observations from the initial field work indicate that the PACs typically have relatively good-quality housing and are connected to mains water and electricity. The larger towns also appear to have piped gas. Schools, health infrastructure and other community facilities appear to be well maintained.

5.3.3 Cultural Heritage

The Varna region has a rich archaeological background. Epipaleolithic and Mesolithic (circa 10000 to 7000 BC) flint tools have been identified west of Varna at Pobiti Kamani. More locally, the level of the Black Sea is believed to have risen circa 7000 to 6000 BC, flooding Mesolithic and early Neolithic settlements. Subsequently, the sea level has further fluctuated over time as a result of climatic and tectonic forces, and a number of Chalcolithic, Early Bronze Age, Antique and late Antique settlements and cemeteries are now submerged at a water depth of between 4 and 8 m (Ref. 6).

Bronze Age (circa 4000 to 2000 BC) settlements and artefacts include six lake settlements in Varna Lake and a number of mound (barrow) cemeteries. Odessos (now Varna) became a wealthy and powerful Greek and Roman Black Sea colony, and was a key port for trade between the Black Sea and the Mediterranean (circa 600 BC to 600 AD). During this time, the hinterland of Odessos, including the study area, was relatively densely populated. This hinterland contains numerous burial mounds, settlements, villas, fortresses, churches and monasteries.

Areas of known archaeological and cultural heritage interest in the study area include:

- Buried ruins of the late antique basilica/monastery St Elias, located approximately 300 m west south west of the proposed onshore pipeline route (Varna region listed monument no. 33, Archaeological Map of Bulgaria, land use class A);
- Buried ruins of the Antique settlement of Kechi Gioldzhu (Hellenistic, Roman and Early Byzantine), located on the cliff top, approximately 700 m north of the shore crossing (listed on the Archaeological Map of Bulgaria). The location of its cemetery and harbour have not yet been identified.
- The foundations of an undated limestone, coursed and mortared wall located approximately 50 m south of the shore crossing.

In addition, site visits also noted 16 churches, chapels, cemeteries or memorials in the surrounding villages of Galata, Borovets, Dolen Bliznak, Goren Bliznak, Priseltsi and Zvezditsa.

All sites identified are of Antique/Hellenistic/Roman and early medieval/Byzantine origins. Due to the archaeological potential of the area it is possible that remains of other periods are present, such as early Prehistoric, Neolithic, Bronze Age/Thracian, Iron Age, medieval and post-medieval. The study area has potential for additional archaeological remains, including early prehistoric tool scatters, hunting and occupation debris; evidence of settlement, farming, land divisions and burials.

The study area does not lie near any World Heritage sites. No intangible cultural heritage (such as specific notable or listed cultural traditions) related to the study area, and that could be exploited for commercial purposes, has been identified.

6 Identification of Potential Impacts and Possible Mitigation Measures

6.1 Introduction

This Chapter presents the results of the identification and preliminary assessment of the potential environmental, socio-economic and cultural heritage impacts of the Project and identifies possible mitigation and management measures. The impacts that have been identified include both potentially adverse and beneficial impacts that may arise as a result of the Project's construction, pre-commissioning, operation, and decommissioning.

The early identification of potential impacts is an important part of the scoping process, and provides a foundation for the EIA and ESIA process. As outlined in Section 1.5.1, the scoping of potential impacts serves a number of purposes, among them:

- Identifying potential risks and impacts at an early stage in project development, thus maximising the potential for avoidance and minimisation;
- Engaging stakeholders in discussions about the potential impacts that have been identified to date, including whether anything has been overlooked or misrepresented;
- Refining the list of potential impacts through further study, expert review, and stakeholder engagement, so that issues of greater concern are afforded the appropriate level of attention;
- Establishing a framework for the continued development of the EIA and ESIA, and supporting baseline studies; and
- Providing a thorough, transparent, and rational process by which potential impacts are identified and assessed.

Deciding whether impacts are within or outside of the scope of the EIA and ESIA is an important step towards ensuring that the impact assessment is relevant and properly tailored to the Project. Due to site-specific environmental and socio-economic factors, the nature and scale of impacts can vary substantially between projects, even when developments appear similar.

Section 6.2 summarises the preliminary identification of environmental, socio-economic and cultural heritage receptors and their potential sensitivity, based on the vulnerability and/or value of the receptors. Section 6.3 describes the impact prediction methodology used to make a preliminary assessment of potential Project impacts. Section 6.4 outlines how mitigation measures will be managed, while Section 6.5 summarises each category of assessment and Appendix C describes the potential impacts that have been identified to date and the possible mitigation measures which are being considered.

6.2 Identification of Sensitive Receptors

The collection and review of environmental, socio-economic and cultural heritage characteristics of the Project Area (Chapter 5 of this document), has enabled the preliminary identification of the most sensitive receptors that may be affected by the Project. Sensitive receptors include those which are highly valued (e.g. having a critical role in broader ecosystem or community functions) and those which are particularly vulnerable to change (e.g. lacking the ability to absorb or adapt to change). A summary of the most sensitive environmental, socio-economic and cultural heritage receptors identified to date in the Project Area is provided in Sections 6.2.1 to 6.2.3.

In some cases, as noted in Chapter 5, the early stages of EIA and ESIA baseline characterisation have identified the need for additional research on specific topics, or validation of constraints that are not accurately defined or up-to-date. Additional data gathering and validation processes that will take place as part of the EIA and ESIA are described in Chapter 8.

6.2.1 Environmental Receptors

The landfall section of the Project is located in both the Natura 2000 Galata SPA (designated primarily for migratory birds) and the Galata SCI (designated primarily for the habitats present), as well as two proposed further/modified SCI areas (Emona and the existing Galata SCI) as described in Section 2.2.3 and shown in Figure 5.6. The area likely to be impacted by the Project forms a small part of much larger Natura 2000 designated areas both regionally and nationally.

Based on the visual quality of the natural and agricultural landscape, the local landscape has a high amenity value for both residents and the tourists that visit the region. As the landfall facilities will be visible from some inland locations, the landscape itself is also identified as a sensitive receptor.

Marine and coastal habitats have been identified as being potentially valuable and thus sensitive. The ecological value of the marine habitats will be investigated in more detail during the development of the EIA and ESIA to ascertain if protected species are present and to assess the value of the habitats. The coastal environment is a sensitive receptor because of the high amenity value and its current and proposed designation as Natura 2000 SPA and SCI sites. Marine and coastal habitats are dependent on water quality, including both chemical quality and turbidity, and on this basis water has also been identified as a sensitive receptor. Marine habitats have also been potentially highlighted as being of significant value, however, the protected species that have been identified in the Black Sea (predominantly fish and mammal species) are typically mobile and considered less vulnerable to impacts associated with construction activities at fixed locations.

6.2.2 Socio-economic Receptors

The landfall section begins on Pasha Dere Beach, approximately 2 km south of Rakitnika. Pasha Dere beach is frequented in the summer by tourists and local residents and the users of this beach are considered socio-economic receptors.

A number of communities have been identified as potential PACs as they may be impacted by construction activities (e.g. construction traffic), depending on the routes chosen to access the landfall section.

Landowners and land users may also be receptors, affected through disturbance, land-take and land use restrictions. Similarly, marine users (e.g. transport, fishermen, pleasure-craft, shipping and scuba-diving operations) may be receptors through temporary or permanent changes to marine navigation routes and anchoring locations as a result of offshore and nearshore construction activities. Other socio-economic receptors may include local businesses and tourist reception facilities that may experience some limited and temporary impacts related to marine water quality and visual amenity impacts. These receptors are not, however, considered to be as directly affected by the Project as the PACs.

The PACs may also receive some limited positive impacts through economic stimulus associated with local and regional employment and business opportunities.

6.2.3 Cultural Heritage Receptors

A number of confirmed or potential CHOs have been identified offshore through marine surveys. In particular, six shipwrecks have been confirmed as occurring in the study area within 150 m of the pipelines at water depths ranging between 482 m and 2140 m.

Onshore, the most sensitive cultural heritage receptors known to be present are the buried ruins of the Antique settlement of Kechi Gioldzhu and the foundations of an undated limestone wall located approximately 50 m south of the shore crossing. Because of the relative abundance of archaeological remains in the region, there is a possibility that further objects of archaeological significance may be unearthed during onshore construction activities. Due to historic sea level rise of the Black Sea, it is possible that items of cultural heritage significance associated with previous terrestrial settlements may also be unearthed during construction activities in the offshore and nearshore sections and at the shore crossing.

6.3 Impact Prediction Methodology

The prediction of impacts is an objective attempt to determine the potential effects of a proposed project, and its associated activities, on the natural and human environment. For the Project, potential impacts have been identified through a systematic process whereby each individual Project activity is considered with respect to its potential to affect an environmental, socio-economic or cultural heritage receptor. Activities, receptors, impacts and categories are defined in Appendix C.

The impact prediction process to date has included the following steps:

- Identification of Project components and activities;
- Identification of environmental, socio-economic and cultural heritage receptors based on existing knowledge of the environmental and social baseline conditions and professional expertise;
- Examination of relevant national and international legislative requirements, lender requirements, and knowledge of the community values and uses associated with the receptors; and

- Development of an initial Screening Matrix to illustrate the identified interactions of activities and environmental, socio-economic and cultural heritage receptors.[9]

This initial process of assessment of potential Project interactions with receptors is summarised in Table 6.1. The Screening Matrix then formed the basis for an Environmental Impact Identification (ENVIID) process which, supported by interdisciplinary workshops (attended by Project engineers, environmental, social and cultural heritage scientists), enabled a comprehensive identification of the Project's potential interferences (positive and negative) with environmental, socio-economic and cultural heritage receptors. The outcome of this process is detailed in Appendix C (Tables C.1 to C.3).

Table 6.1: Screening Matrix[10]

Project Activities / Impact Receptors	Construction Activities (Onshore)	Construction Activities (Offshore)	Pre-Commissioning Activities (including hydrotesting)	Operational Activities
Physical				
Water (Surface & Groundwater)	☐	☐		
Water (Marine)	☐	☐	☐	
Soils and Sediments	☐	☐		
Landscape	☐	☐	☐	☐
Climate / Air Quality	☐	☐	☐	
Marine Ecology				
Marine Habitat (including plankton and benthic flora and fauna)		☐	☐	
Marine Mammals		☐	☐	
Shorebirds & Seabirds	☐	☐	☐	

Continued...

[9] Screening is the first step in the ESIA process enabling the initial identification of key issues – see ESIA process outlined in Section 1.5.1. The Screening Matrix is shown in Table 6.1.

[10] The Decommissioning Phase of the Project was not included in the development of the Screening Matrix. This Phase of the Project will be assessed as part of the ESIA process.

Impact Receptors / Project Activities	Construction Activities (Onshore)	Construction Activities (Offshore)	Pre-Commissioning Activities (including hydrotesting)	Operational Activities
Marine Fish		☐	☐	
Terrestrial Ecology				
Birds	☐	☐	☐	☐
Terrestrial Fauna	☐		☐	
Terrestrial Habitats (vegetation and ecosystems)	☐		☐	
Human				
Local Communities	☐		☐	☐
Local / Regional Economy (including workers and businesses)	☐	☐		☐
Land Users and Owners	☐			☐
Onshore Archaeological/ Cultural Assets	☐			
Offshore Archaeological Assets		☐		
Marine Users		☐	☐	☐

* The Screening Matrix assumes hydrotesting involving discharges into Bulgarian waters. The hydrotesting approach has not yet been confirmed and this assessment may change as the FEED process progresses.

Completed.

The EIA and ESIA will assess the potential impacts with regards to receptor sensitivity, magnitude and significance. In addition to the preliminary impacts identified in Appendix C (Tables C.1 to C.3), other issues will be considered within the EIA and ESIA, including new and revised impacts resulting from the continuing evolution of the Project.

6.4 Possible Mitigation Measures

Based on the impacts that will be identified in the EIA and ESIA, mitigation, management and monitoring measures will be developed to avoid or minimise potential adverse impacts; enhancement strategies may also be developed to enhance potential benefits. These measures will be captured in an Environmental and Social Management Plan (ESMP) under the overarching HSSE-IMS (see Section 1.5.2). The ESMP will include various individual management plans, covering issues such as waste management, traffic, air quality and construction site management in order to ensure that mitigation measures are fully captured and implemented. While the ESMP will contain components covering many of the GIIP mitigation, management and monitoring measures to be implemented for a range of potential impacts, the ESMP is not itself a mitigation measure and therefore has not been separately listed under the possible mitigation measures. However, it should be understood that the ESMP will be the key tool for implementation of these measures for the Project.

The possible mitigation measures outlined in Appendix C are preliminary and will be further refined during the EIA and ESIA process, including through discussions with stakeholders and in response to the continuing evolution of the Project design.

6.5 Environmental, Socio-economic and Cultural Heritage Categories

6.5.1 Air Quality and Climate

Construction and pre-commissioning activities will result in emissions to the air from the operation of construction vehicles, vessels, machinery (both stationary and non-stationary), generators and other equipment. Dust generation is also likely to occur from excavation activities and the movement of vehicles across unpaved roads. During operations, activities will be limited to the operation of landfall facilities, periodic use of equipment to clean the pipelines and the use of maintenance and repair vehicles and vessels.

6.5.2 Noise and Vibration

The operation of construction vehicles and machinery, both onshore (including construction traffic along transport routes and access roads used by the Project) and offshore, will generate noise and vibration impacts. Noise and vibration impacts will be particularly related to piling activities which will be carried out to construct a cofferdam at the shore crossing on Pasha Dere Beach. The pipe-laying and dredging spreads (areas for vessels and equipment), which will include up to a dozen vessels at any given time, will generate underwater noise, which may extend to the wider marine environment. The significance of underwater noise impacts will primarily depend on the occurrence of fish and marine mammals in this wider area. It is anticipated that operational noise and vibration impacts will be limited to noise emissions associated with operation of maintenance and repair vessels. The potential for noise arising as a result of gas flowing through the pipeline will also be assessed as part of the EIA and ESIA.

6.5.3 Soils and Sediments

The Construction Phase will include earthworks that will result in disturbance to, and loss of, soil resources. This impact will be restricted to the pipeline construction corridor and the footprint of the temporary and permanent landfall facilities. There is a potential for erosion processes to be triggered as a result of the removal of vegetation. There will also be a risk of accidental leaks and spills (e.g. fuel) associated with the operation of construction vehicles and equipment during the Construction Phase that may impact soil quality. In the offshore and nearshore sections there will be potential alterations to the seabed and the potential mobilisation of sediments resulting from activities such as dredging and anchoring. Impacts will be local and limited to areas of shallow water. The potential effects of the low temperature (-5° C) of the gas flowing through the pipeline on soils and sediment, during the Operational Phase of the Project, will be assessed as part of the EIA and ESIA. No other impacts on soils or sediments are anticipated as a result of planned activities during this Phase.

6.5.4 Waste and Wastewater

The generation, treatment and disposal of waste (hazardous and non-hazardous) expected to arise during the Construction Phase, includes general onshore construction waste and wastewater, as well as sewage and solid waste from marine vessels. The treatment and disposal of waste is expected to take place within Bulgaria with the exception of waste generated on seagoing vessels that may be disposed of in other countries. Waste generation during the Operational Phase is likely to be minimal, limited to wastes (such as sewage) associated with maintenance operations. Wastewater associated with hydrotesting of the pipeline is discussed in Section 6.5.7.

6.5.5 Natural Resources

Natural resources will be used throughout the Construction Phase of the Project, including construction materials (for example, steel pipe sections), water for construction activities and cleaning, and fuel for vessels and machinery. Resources will come from a number of different locations and may include international sources. Resource use during the Operational Phase is likely to be limited to materials for repairs and fuel for vessels and machinery to undertake maintenance works.

6.5.6 Surface and Groundwater

The Construction Phase has the potential to affect surface and ground water quality in a number of ways. There is the risk of contamination from leaks and minor spills as a result of refuelling vehicles, vessels and machinery, the storage of fuels and chemicals and potential damage to fuel containers. There is also the potential to affect water quality from the release of sediment into surface water courses as a result of land clearance, excavation works and erosional processes. Alterations to surface and groundwater flows may occur temporarily as a result of trenching activities. No impacts on surface or groundwater quality are anticipated as a result of planned activities during the Operational Phase of the Project.

6.5.7 Marine Water Quality

Dredging and trenching activities associated with the burial of pipes in the nearshore section may generate sediment plumes affecting local marine water quality both from an amenity and a biological standpoint. Depending on the meteorological conditions during the burial works, sediment plumes could disperse offshore or may affect water quality at the beach, creating a temporary disturbance to beach users. Regardless of the direction of dispersion, increased turbidity could affect pelagic and benthic habitats over the short-term. No impacts on marine water quality are anticipated as a result of planned activities during the Operational Phase of the Project. The approach to hydrotesting during pre-commissioning is currently under development (See Chapter 4). No detail is available at this stage regarding the quantity and quality of water that may be discharged as a result of hydrotesting.

6.5.8 Terrestrial Ecology and Nature Conservation

The Construction Phase will result in the temporary loss of habitat (including loss of feeding, nesting and breeding grounds) resulting from vegetation clearance during soil stripping and land clearance for the pipeline route, landfall facilities and construction corridor. Physical disturbance may also arise from the operation of construction machinery and vehicles, and may affect protected species of flora and fauna. To ensure the integrity of the pipeline during the Operational Phase it will be necessary to make sure that the permanent RoW remains clear of deep rooted vegetation. Consequently, the pre-existing vegetative habitat may not be fully re-established. This maintenance of a cleared or partially cleared RoW will partially fragment the local habitat during both construction and operation.

6.5.9 Marine Ecology and Nature Conservation

Construction activities such as dredging and burial of the pipeline, anchoring of the pipe-laying vessel and pipe-laying activities may result in the temporary displacement and loss of marine flora and fauna and impact the marine environment. Secondary impacts such as smothering of benthic flora and fauna may also occur. Marine vessels entering the Black Sea have the potential to carry alien species of algae or other marine organisms that could pose a threat to the marine habitats of the Black Sea. During the Operational Phase, having laid the pipeline on the seafloor, the hydrodynamics of the marine environment may be modified. This may result in changes to the abundance and distribution of benthic communities.

6.5.10 Landscape and Visual Amenity

General construction activities and associated habitat removal, site grading and, ultimately, the erection of permanent landfall facilities will generate permanent modifications of the landscape. Temporary impacts to the landscape will also occur, as a result of construction activities, which will include the excavation of a large section of the Pasha Dere Beach, operation of large mechanical equipment, power generators, soil stockpiles, parking of large construction machinery, and the generation of dust from construction activities. The above-ground landfall facilities will be operated throughout the Project lifecycle and they will cause a permanent impact on the existing landscape. No further impacts are anticipated over the Operational Phase of the Project.

6.5.11 Land Use and Ownership

Both temporary and permanent land-take will be required for the Project. This will include permanent land-take for landfall facilities and temporary land-take for construction, including access roads and the pipeline construction corridor and temporary facilities. During construction there will be a temporary restriction on access to parts of the landfall section, including the

Pasha Dere Beach, for reasons of safety and security. No additional land-take is anticipated during the Operational Phase of the Project, although a permanent RoW and Safety Exclusion Zones that will limit the development potential of the land around the pipelines, will be established.

6.5.12 Communities

It is expected that the main potential impacts to PACs will be associated with the temporary influx of construction workers to local communities and an increase in local traffic during the Construction Phase.

It is envisaged that the construction workforce will be housed in existing facilities within the local area (rather than in temporary construction camps). Although details of worker housing are not yet finalised, the most likely location will be the city of Varna due its size and community facilities. Varna is considered to be of sufficient size to be able to absorb the incoming workforce without experiencing significant social impacts. However, the potential for socio-economic impacts on Varna to occur will be further investigated as part of the ESIA. Potential impacts on individuals or groups within the population as a result of construction worker interactions will also be assessed.

Although the construction workforce is expected to be housed in Varna, the remaining PACs are still likely to be affected (e.g. by workers visiting the PACs for recreation, beach use, construction traffic etc.).

As noted in Section 6.5.2, traffic noise, related to both traffic travelling to and from the construction site and the movement of vehicles on and around the site, may affect a number of the potential PACs. Final confirmation of the PACs affected will not be known until access routes have been finalised.

Some of the potential PACs identified are sufficiently close to the landfall section to be potentially affected by both traffic noise on access routes and/or noise from construction activities.

6.5.13 Local Economy

The economy of the settlements in closest proximity to the landfall section (i.e. Rakitnika, Borovets, Priboj, Fichoza, Galata) as well as the city of Varna, may be positively impacted to a limited extent by recreation and living expenditure associated with the construction workforce. All PACs may also benefit from limited employment and business opportunities. Any such impacts and opportunities are likely to be limited and short-term. Local tourism accommodation in the vicinity of Pasha Dere Beach, as well as fishing and other water based businesses (e.g. recreational yachting, scuba diving, etc.) could also be adversely impacted as a result of temporary access restrictions to coastal areas and may experience some temporary impacts associated with marine water quality issues (See Section 6.5.7). As the operational workforce will be minimal, no significant impacts on the local economy as a result of Project employment are expected during the Operational Phase of the Project.

6.5.14 Traffic

Impacts on the local road network are likely to come from increased traffic flows associated with construction traffic. These could include junction issues; adjustment of road geometry to accommodate long construction vehicles; changes in road quality (degradation or improvement) and road safety. Other temporary construction impacts include emissions from construction vehicles; noise and vibration from construction vehicles; generation of dust and mud deposition. In the nearshore and offshore sections, increases in vessel traffic relating to the Project may impact upon shipping routes and commercial fishing, as well as boat movements associated with tourism. During the Operational Phase of the Project, traffic will be limited to maintenance vehicles and occasional heavy vehicles required for maintenance or supply operations.

6.5.15 Cultural Heritage

Impacts on onshore cultural heritage and archaeological objects may arise as a result of direct physical disturbance from construction activities such as landtake, vegetation clearance and excavation works. In addition to this, underwater objects may be directly or indirectly impacted by activities such as anchoring, dredging, trenching and laying pipeline. No impacts are expected in relation to cultural heritage during the Operational Phase of the Project.

6.5.16 Intangible Cultural Heritage

It is not anticipated that the Project will have an impact on intangible cultural heritage, due to the location of the pipeline landfall section in areas with no specific notable or listed cultural traditions that could be affected by the Project. However, potential impacts on the living cultural heritage and religious practices of communities will be considered as part of the EIA and ESIA. These practices are related to churches and cemeteries, religious monuments and commemorative memorials and war memorials, as these are the focus of intangible memories and ceremonies.

6.5.17 Ecosystem Services

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. The Project will affect a small number of communities which may currently receive some well-being benefits through ecosystem services. However, the socio-economic development of these communities is such that the dependency upon these ecosystem services, and the vulnerability of these communities to changes in ecosystem services, is considered to be low. All affected communities have relatively well established infrastructure and public services; are in relatively close proximity to urban areas and are considered integrated into a wider socio-economic context. The communities do not typically directly rely upon ecosystem services for well-being. As a consequence, the sensitivity of these communities to changes in ecosystem services is likely to be low. Further, the nature of the Project is such that, based on the scoping process to date, the potential for long term impacts upon local or regional ecosystem functioning is likely to be low.

6.6 Preliminary Conclusions

The preliminary identification of impacts is presented in Tables C.1 to C.3 in Appendix C. This has been based on the Project information currently available, the baseline information collected to date and the experience gained in similar projects constructed in similar environmental, socio-economic and cultural heritage contexts.

The preliminary identification of impacts concludes that impacts generated during the Construction and Pre-commissioning Phase of the Project will typically be temporary in nature and localised in extent.

Temporary impacts will include temporary access restrictions to the Pasha Dere Beach, noise and air emissions generated by construction equipment, disturbance of seabed sediments and alteration of marine water quality during dredging and pipelaying activities. Water quality may also be affected by the discharge of hydrotest water into the marine environment (depending on the hydrotesting approach selected (see Section 4.3). There will be limited restriction to fishing activities as a result of the exclusion zone around the pipeline construction activities. Impacts to known cultural heritage objects as a result of construction activities will be minimised through the routing of the pipelines away from such objects. However, the Project Area (both terrestrial and marine) has a high archaeological potential and construction activities may interfere with currently unidentified cultural heritage items. Construction impacts will be minimised as far as practicable with the application of mitigation measures and management practices (see Appendix C, Tables C.1 and C.2).

The construction corridor will require clearance of vegetation and permanent crops within a 60 m wide and 2.2 km (Option 1) or 2.8 km (Option 2) long corridor. A wider construction corridor of up to 120 m wide may be required at certain locations such as the beach area and the crossing of the steep gully in Option 2. Upon completion of the construction of the onshore pipelines, the ground and soil conditions of the construction corridor will be reinstated. The Pasha Dere Beach cliff face shall be restored in a manner that offers a stable and visually acceptable profile compatible with the adjacent undisturbed sections. Vegetation and permanent crops may be replanted within the corridor with the exception of the 40 m wide RoW within which deep rooting vegetation and permanent crops will not be permitted.

The clearance of vegetation from the construction corridor will result in the loss of natural habitat and disturb local flora and fauna. These impacts will be predominantly temporary and localised in nature and partially mitigated through re-vegetation (enhanced by the reinstatement of the original topsoil). A longer term impact will result from the restrictions within the RoW, which require regular clearance of deep rooting vegetation. The significance of both temporary and longer term impacts on habitats, flora, fauna and permanent crops/agriculture will be assessed in the EIA and ESIA.

During the Operational Phase of the Project there will be permanent limitations on land use surrounding the onshore pipelines such as the restrictions within the RoW (as above) or further developmental restrictions as a result of the adoption of Safety Exclusion Zones (see Section 4.4). Impacts on the landscape will be partially mitigated through the restoration of the original landscape along the pipeline route. Limited restriction to fishing activities will also occur as a result of the exclusion zone over the offshore section of the pipeline.

6.7 Cumulative Impacts

As part of the EIA and ESIA process, the cumulative impacts associated with the Project will be addressed. Cumulative impacts may occur as a result of interactions between any residual (i.e. post-mitigation) Project impacts, and the impacts of other activities or developments in the area. In other words, the cumulative impact assessment will identify the combined effects of the South Stream Offshore Pipeline with other projects and activities that may, individually or together (i.e. cumulatively), have a significant impact.

7 Prelimary Transboundary Impact Assessment

7.1 Introduction

In the EIA and ESIA scoping processes undertaken to date, a preliminary assessment of potential environmental, socio-economic and cultural heritage impacts of the Project was completed, including a preliminary assessment of the likely geographic range of each impact. This preliminary assessment of potential impacts concluded that impacts generated from planned activities during the Construction & Pre-commissioning Phase of the Project will typically be temporary in nature and localised in extent (Section 6.6).

Impacts generated from planned activities during the Operational Phase are also localised in extent and related to the restrictions in land use/vegetation within the Right of Way (in the landfall section) and marine activities (e.g. fishing, anchoring) within the exclusion zone (nearshore and offshore sections) of the pipelines.

Impacts generated by unplanned events, such as the accidental release of hydrocarbons to the marine environment during the Construction Phase or the accidental release of natural gas to the atmosphere during the Operational Phase, are rare and strict management measures will be in place to ensure that such impacts will be minimised and contained. Further assessment of the significance of impacts generated by planned activities and unplanned events will be performed as part of the EIA and ESIA.

This Chapter further analyses the potential for significant adverse transboundary environmental impacts resulting from the construction, pre-commissioning, operation and decommissioning activities of the South Stream Offshore Pipeline – Bulgarian Sector.

The countries that are closest to the Project Area are Turkey, Romania and Ukraine. Figure 7.1 presents the closest point of the Project to these countries, with consideration to territorial waters, EEZ waters and land territories. For ease of reference these distances are summarised in Table 7.1.

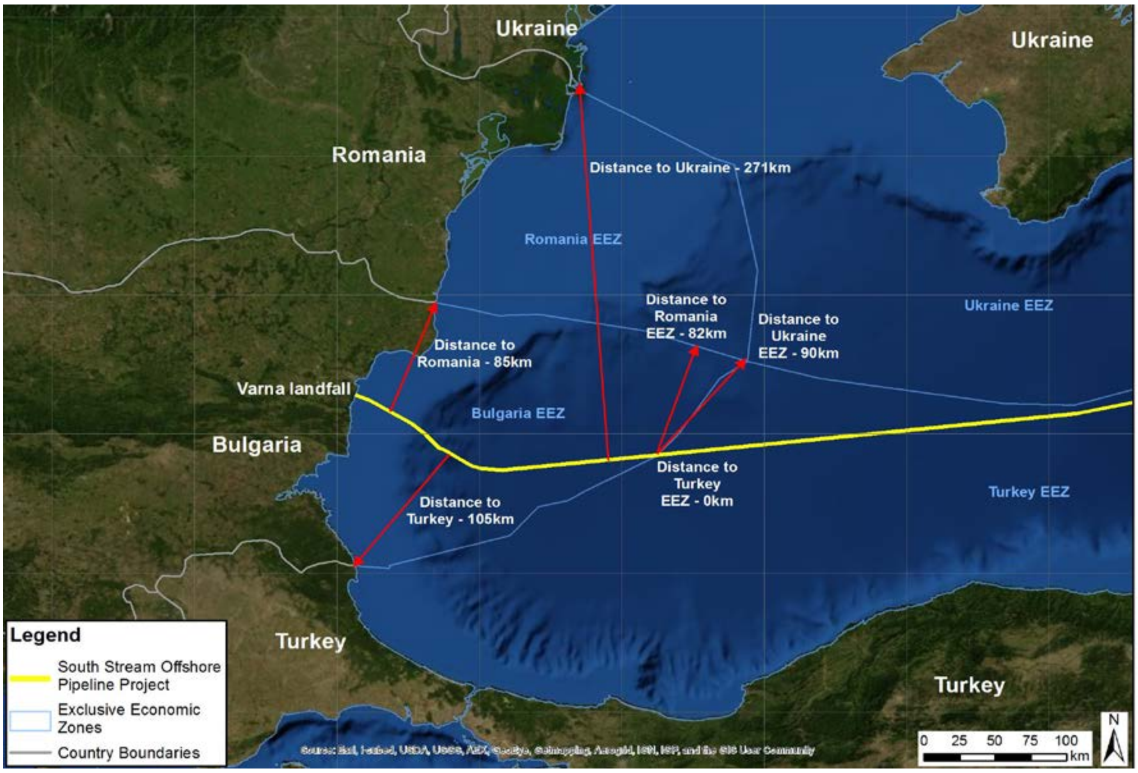
Table 7.1: Closest Point of the Project to Turkey, Romania and Ukraine

Country	Closest Distance of Project to Land Territory (km)	Closest Distance of Project to Territorial Waters (km)	Closest Distance of Project to EEZ Waters (km)
Turkey	100	93	Located directly adjacent to the EEZ boundary.
Romania	80	82	82
Ukraine	240	240	90

While the distance of the Project from neighbouring countries is a key consideration for the assessment of transboundary impacts, it is also important to consider the source and the pathway of any potential impact; the source-pathway-receptor concept. This concept considers the linkage between the source of the impact and how the receptor could be impacted i.e. pathway.

For the purposes of this preliminary assessment of potential transboundary environmental impacts, the receptors are considered to be the territories and resources of Turkey, Romania and Ukraine, including EEZ and territorial waters at their closest points to the Project.

Figure 7.1: Distances from the Project to Turkey, Romania and Ukraine



The potential geographical range of an impact is largely controlled by the pathway to the receptor; other factors include the magnitude and duration of an impact. With respect to the Project, the marine and terrestrial environments are considered to have different geographic ranges. Pathways in the terrestrial environment include soils, groundwater and surface waters (i.e. rivers) and air. The main pathways in the marine environment are water and air. Water and air (in both the terrestrial and marine environments) have the ability to result in a larger geographic range for an impact given their fluid and dynamic nature.

Impacts occurring on land are typically restricted to the terrestrial environment and occur on a local scale. For example, if a spill of fuel was to occur in the landfall section of the Project, it is likely that this would be confined to the immediate area as the spill would be of a finite volume, most likely involving fuel from a container of finite size.

Impacts occurring offshore are less easily restricted and localised due to the fluid nature of the main receiving environment, water. Although measures can be implemented to confine and contain spills, there is still the potential for impacts to spread across a much larger geographic area. For example, the dispersion of a spill occurring in the marine environment from a loss of containment of a finite quantity of fuel, would be influenced by the water body and the met-ocean conditions, such as winds and currents.

The same can be said for air as a pathway which would have the same unrestricted and dynamic quality offshore as on land.

The findings of this assessment are preliminary only and will be further investigated and assessed through the EIA and ESIA process.

7.2 Terrestrial Transboundary Impacts

Taking into account both the distances of the land territories of Turkey, Romania and Ukraine from the Project, and the potential pathways between the source of the impact and the receptor, it can be concluded that Project impacts that occur on land from planned activities are not considered to result in significant adverse transboundary environmental impacts. This conclusion is based on the preliminary assessment presented in Chapter 6.[11]

Impacts from unplanned events are unlikely to result in significant adverse transboundary environmental impacts as the only pathway for potential transboundary impacts is air. The release of natural gas to the atmosphere could result from an accidental rupture of the pipelines/system or an emergency depressurisation of the system during the Operational Phase. Although the likelihood of a pipeline rupture or an emergency depressurization of the system is very low, the significance of the impact will be further assessed as part of the EIA and ESIA.

7.3 Marine Transboundary Impacts

In the marine environment transboundary impacts from both planned activities and unplanned events are more likely to occur than in the landfall section of the Project due to the pathways of both water and air. As such, the focus of transboundary impacts is on the marine environment – the nearshore and offshore sections of the Project. This section presents a preliminary assessment of the likelihood of significant adverse transboundary environmental impacts within the marine environment.

7.3.1 Planned Activities

It is anticipated that some planned activities will have the potential to result in transboundary environmental impacts. Such planned activities are expected to involve the following:

- Natural resources;

[11] Although impacts from the use of natural resources and their transport on land can extend across borders, impacts to the environment from land based transport are not considered to be significant.

- Waste generation;
- Maritime traffic;
- Air quality;
- Migratory birds;
- Introduction of invasive species; and
- Fish and fisheries.

Natural Resources

During the Construction Phase it may be necessary to source materials and fuel from outside Bulgaria for use within Bulgaria and Bulgarian waters. The sources for these materials have not yet been confirmed however, there is the potential for transboundary environmental impacts during transportation. Materials are likely to be transported by road and rail to the marshalling yards in Bulgaria and Russia for loading onto vessels before being transported to the nearshore and offshore sections of the Project. Vessel movements across the EEZ boundaries as a result of the transport of materials and fuel are not expected to result in significant environmental impacts.

On this basis, resource use is not expected to result in significant adverse transboundary environmental impacts, particularly in relation to Turkey, Romania and Ukraine.

Waste Generation

Waste material will be generated on board the pipe-laying and other vessels throughout the Construction Phase. It is anticipated that Project vessels will be at sea for the duration of the Construction Phase. Materials will be transported to the pipe-laying vessel by supply vessel, which will also be responsible for the removal of any waste material and its transportation to the shore. Supply vessels are likely to originate from several countries, including Bulgaria. In some circumstances waste may be stored on board vessels and only disposed of when the vessel docks, regardless of the docking location which may not be in Bulgaria. Similarly, a support or supply vessel may come from one country, collect waste material from the vessels in another country and return to the home port.

The Project will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL), which includes waste management requirements, as well as the national requirements of the recipient country and, in addition, will ensure that all hazardous waste is disposed of at licenced facilities.

With the implementation of these measures there are not expected to be any significant adverse transboundary environmental impacts associated with waste.

Maritime Traffic

Project construction activities may be associated with an increased risk of collision of vessels as a result of Project related maritime traffic and navigation restrictions. Vessel collisions may result in spills of fuel and other materials into the marine environment.

The pipe-laying spreads (pipe-laying and supporting vessels) will move at very low speeds, (i.e., around two nautical miles a day). This means that they can be considered stationary objects rather than ordinary vessels and other vessels can be notified of their daily position to minimise the risk of vessel collisions.

The Project will comply with all international mandatory requirements (e.g. MARPOL), including the following measures:

- Prior to and during construction liaise with the appropriate marine authorities and ports to ensure suitable navigational warnings are issued; and
- Use of lights, radio communications and other safety devices to communicate the location and extent of the restriction zone around the Project construction activities.

No significant adverse impact to the environment from maritime traffic is expected as a result of planned activities of the Project.

Air Quality

During the Construction Phase, greenhouse and non-greenhouse gas emissions will occur at sea. Power generation from the pipe-laying vessel, supply and support vessels and on-board generators will result in emissions of pollutant gases (NO_x, PM_{10} SO_2). Emissions from vessel movements will however, occur across a relatively large geographic area and are therefore expected to disperse rapidly without resulting in significant increases in concentrations of pollutant gases on land or offshore in Turkey, Romania or Ukraine.

Greenhouse and non-greenhouse gas emissions, as a result of planned activities, are therefore unlikely to result in significant adverse transboundary impacts.

Migratory Birds

As stated in Section 5.3.1, the Black Sea coastline is a major migratory route for birds; the key migratory months are August and September. The pipeline construction corridor in the nearshore and offshore sections, approximately up to 3 km wide (see Section 4.2.3), will cross the migratory route at an angle close to perpendicular thereby minimising impacts to the corridor. In the context of the wider migratory route along the Black Sea coastline, the scale of the construction corridor is very small and will not result in the formation of any barriers. The Construction Phase will be temporary in nature and will not result in long term levels of disturbance to migratory birds or the ecological features on which they depend.

No significant adverse impacts to the activities of migratory birds are expected as a result of planned activities.

Introduction of Invasive Species

Depending on the previous location of the vessels, including the pipe-laying vessel and support and supply vessels, there is a risk that the vessels could introduce invasive species to the Black Sea via ballast water. To mitigate against this risk, the Project will comply with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM).

With this compliance, no significant adverse environmental impacts are expected as a result of planned activities of the Project.

Fish and Fisheries

The fish stock in the Black Sea has been drastically reduced as a consequence of eutrophication, overfishing and plankton reduction (see Section 5.2.1). Nevertheless fishing is still a substantial source of revenue for Black Sea countries. Most of the fishing activity in Bulgaria is generally undertaken in Bulgarian territorial waters and is mainly concentrated in coastal waters (see Section 5.2.2).

The majority of Project activities will take place in areas where only pelagic fishing can take place, because of the absence of any species at depths in excess of approximately 150 m, below which the Black Sea is anoxic.

Pelagic fishing involves commercial species such as anchovy (*Engraulis encrasicolus*), Black Sea sprat (*Sprattus sprattus phalericus*), and Black Sea mackerel (*Trachurus mediterraneus ponticus*).

Given this distribution, it is the activities in the shallower parts of the offshore section and in the nearshore section of the Project that are more likely to interact with both fish populations and commercial fishing in Bulgarian waters.

Impacts to migratory species, such as Anchovy, have the potential to influence fisheries in other Black Sea countries. These potential impacts could occur as a result of construction activities such as pipe-laying, dredging and post lay trenching which result in underwater noise, generation of suspended sediments and the loss of habitat.

Commercial fish species (Sprat, Anchovy, Horse mackerel and Whiting) are likely to be sensitive to underwater noise. It is considered however, that sound levels generated during activities associated with construction are insufficient to cause mortality or hearing damage. Temporary hearing damage has the potential to occur only at very close range.

Anchoring, pipe-laying, dredging and post-lay trenching will generate sediment plumes, which will be of limited duration and dimension. These plumes will not occupy a significant proportion of the local water column and it is anticipated that fish will avoid them. The loss of habitat from pipe-laying is considered insignificant in the context of the wider Black Sea environment and is not expected to result in an impact on either migratory or non-migratory fish.

The significance of pelagic fishing in both the offshore and nearshore sections of the Project will be further assessed as part of the EIA. However, given the limited area the offshore and nearshore sections of the Project will occupy, and the temporary nature of the Construction Phase, no significant adverse impacts to fish and fisheries are expected.

7.3.2 Unplanned Events

Unplanned events are considered separately from planned 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. Unplanned events can include:

- Disruption/damage to subsea infrastructure;
- Hydrocarbon spills; and
- Large scale release of gas.

The section below presents an overview of possible unplanned events.

Disruption to Subsea Infrastructure

As stated in Section 5.2.2 and shown in Figure 5.7, existing subsea infrastructure cables cross the Black Sea, including through the Bulgarian EEZ. There is a risk that during pipe-laying activities a cable could be damaged. To mitigate this possibility it will be necessary to install structures above the existing cables to ensure their protection. Such protective structures could include concrete or rock mattresses.

South Stream Transport will contact known cable owners prior to pipe laying and agree technical and commercial aspects of any crossings.

Hydrocarbon Spill

Hydrocarbon (oil) spills can range from minor spills (e.g. less than 50 litres) to major spills, associated, for example, with loss of containment of a vessels fuel tank.

A full assessment will be undertaken to assess the probable consequences of an offshore spill of hydrocarbons (including lube oil, hydraulic oil and diesel fuel), taking into account aspects such as persistence of the spilled material and the prevailing environmental conditions. This will be modelled as part of the EIA and will use the available met-ocean data.

For the purposes of this Document a preliminary review has been undertaken to understand the likely transboundary impacts of a diesel fuel spill. Lube oil and hydraulic oil are stored in drums or small size tanks, located in the middle of the vessels, whereas fuel tanks (diesel) are located on the sides and are part of the vessel structure. On this basis it is less likely that the release of a large volume of lube oil and hydraulic oil could realistically take place. Spills of lube oil and hydraulic oil generally occur on the deck of the vessel and, in the event of a spill, only limited quantities of product are likely to be discharged at sea.

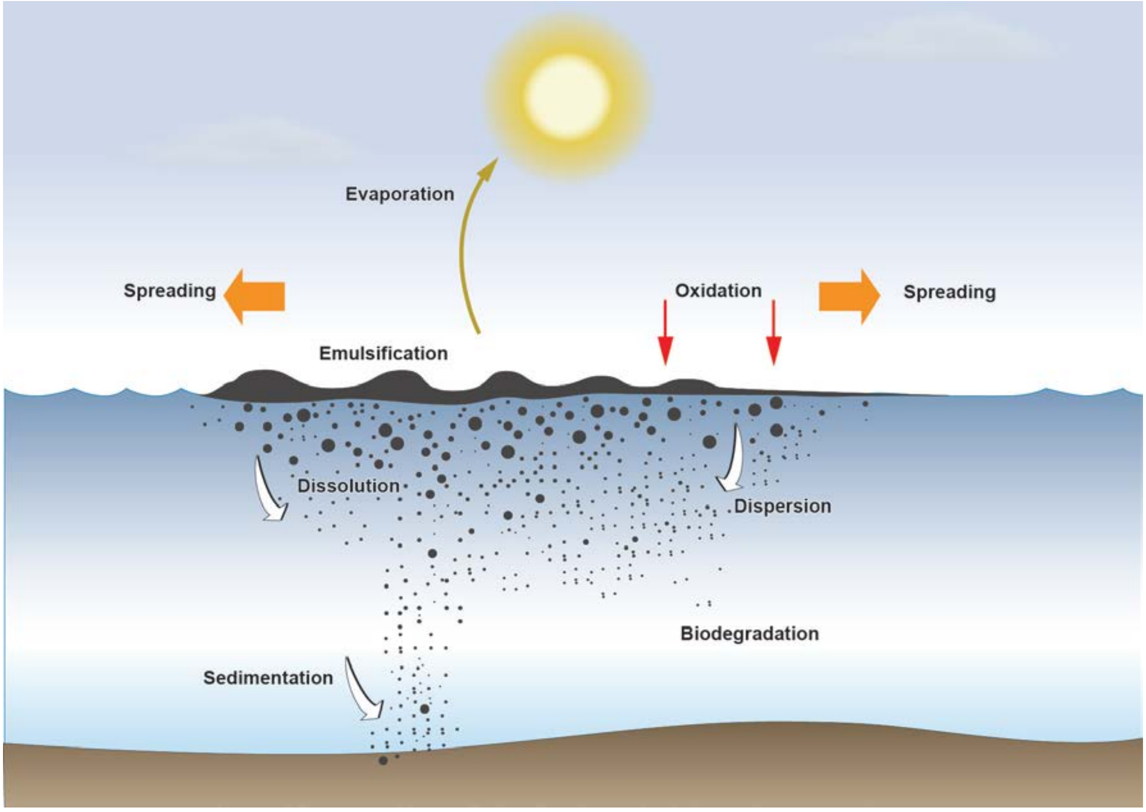
A 2,000 tonne diesel fuel spill represents a reasonable worst case scenario of hydrocarbon spills associated with an offshore pipeline construction project based on the volumes typically stored on board vessels. The scenario is associated with the loss of containment of a vessel’s fuel tank and is the only scenario that could lead to the release of large quantities of hydrocarbon to the sea.

A release of 2,000 tonnes represents the fuel capacity of a typical medium size vessel that may be used for construction activities associated with the Project such as a supply vessel. The spill scenario was simulated at the closest points of the Project to the EEZ borders of Turkey, Romania and Ukraine and considered the persistence (length of time diesel fuel is detectable from background levels) and extent (distance and destination of the spill material). It was assumed that the oceanographic characteristics (winds and currents) at the release site and diesel fuel behaviour can be considered constant in time.

Properties of Diesel Fuel

Diesel fuel is classified as a non-persistent oil that does not contain a considerable proportion of heavy fractions; it would be expected to evaporate and disperse very quickly. It is a refined petroleum product with a relatively narrow boiling range, which means when spilled on water, most of the diesel fuel will evaporate or naturally disperse within a few days or less, even in cold water. The key processes that govern the dispersion of diesel fuel are shown in Figure 7.2.

Figure 7.2: Processes Acting on Spilled Oil



Diesel fuel has a very low viscosity and is readily dispersed into the water column when wind speeds reach 5 to 7 knots or the sea state is approximately Force 2 Beaufort scale or higher. It is much lighter than water with a specific gravity of 0.85, compared to 1.03 for seawater. Therefore, it is not possible for the diesel fuel to sink and accumulate on the seafloor as pooled or free oil. However, it is possible for the diesel fuel to be physically mixed into the water column by wave action, forming small droplets that are carried and kept in suspension by the currents.

Diesel fuel dispersed in the water column can adhere to fine-grained suspended sediments, which then settle out and are deposited on the seafloor. This process is more likely to occur near the mouths of rivers and estuaries where fine-grained sediments are carried downstream. It is less likely to occur in open marine settings.

Compared to unrefined crude oils, diesel fuel is not very sticky or viscous. When spills of diesel fuel do strand on the shoreline, the fuel tends to penetrate porous sediments quickly and degrade over time, but also to be quickly washed off hard surfaces by waves. Thus, shoreline clean-up may not be needed. In these situations, diesel fuel is readily and completely degraded by naturally occurring microbes within one to two months

In terms of toxicity to water-column organisms, diesel fuel is considered to be one of the most acutely toxic oil types. There is a risk of mortality to fish, invertebrates and seaweed that come in direct contact with diesel fuel, but as spills in open water are so rapidly diluted fish are rarely killed. The impact of the diesel fuel spill on sea birds and mammals can occur in different ways. Firstly, the spilled diesel fuel can penetrate into the plumage of sea birds and the fur of mammals, reducing its insulating ability, and making them more vulnerable to temperature fluctuations and much less buoyant in the water. Secondary impacts result from ingesting the diesel fuel or inhaling at high concentrations both of which can be fatal. As described above, the short lived nature of the spill means that the exposure time to the diesel fuel is minimal.

Diesel Fuel Spill Scenario

Assuming that the main currents at the spill location are represented by the well-established counter clockwise “Rim current” system (Figure 5.8), the residual transport direction of the diesel fuel spill in the Bulgarian EEZ or Bulgarian territorial waters would be in a south/south-easterly direction.

Maximum current speeds greater than 1 m/s have been recorded within the MBSC, however, a more typical value would be far less, around 0.2 m/s. It should be noted that these values are only an estimate and that calibrated model or measured current speeds taken at the surface will be used to validate this assumption within the EIA.

Based on the assumption that 2,000 tonnes of diesel fuel is released on the surface water and that the persistence of the diesel fuel spill is no longer than 72 hours, after which the diesel fuel would have naturally dispersed and weathered (Figure 7.1), the spill is likely to travel to a maximum distance of about 50 km (72 hours x 0.2 m/s).

Diesel Fuel Spill Summary

Although a diesel fuel spill may travel within the EEZ waters of Turkey, Romania and Ukraine, this non-persistent oil is likely to rapidly evaporate and naturally disperse. The diesel fuel is not predicted to remain within the marine environment either within the sediment or as a surface condensate, with much of the diesel fuel naturally dispersing after a period of 72 hrs. Any diesel fuel dispersed within the water column is likely to be entrained within the Western Gyre current system and rapidly broken down (within 2 weeks) by natural degradation.

Based on the Oil Spill Tier Definition (Table 7.2), this diesel fuel spill scenario is classified as being Tier 2 due to the highly flammable nature and volume of the spill. Given the high rate of evaporation and dispersion, it is unlikely that any appreciable quantities of diesel fuel would be recovered after a period of about 48 hours (Ref. 22).

Table 7.2: Spill Tier Definitions

Tier	Description
Tier 1	Tier 1 spills are defined as small oil spills that can be quickly or easily cleaned up using on-site resources.
Tier 2	Tier 2 spills are defined as events which have caused, or which have the potential to cause, a larger oil spill with any one of the following consequences: • Significant pollution or safety risk for local inhabitants or nearby operations; • Possible intervention by local authorities and assistance from other nearby companies & experts; • Danger of fire or explosion; • Attracts national media attention; and • Spill impacts coastlines, vulnerable areas, offshore installations or other operators.
Tier 3	Tier 3 spills are defined as an event which has caused, or has the potential to cause an oil spill with any one of the following consequences: • International specialists, equipment and expertise required to manage clean-up; • Impact on oil and gas operators activity or reputation, future business or staff morale; • Criticism by national or international media; • Serious effects on a national inhabitants or economy; and • Highly visible impact on the environment.

Source: Ref. 7

Diesel Fuel Spill Conclusions

Based on the environmental parameters described above, the key conclusions that can be drawn from a preliminary assessment of a diesel fuel spill are:

- A diesel fuel spill is not likely to persist in the marine environment beyond 72 hours under typical environmental conditions, after which the concentration of diesel fuel will have fallen below natural background levels;
- For a flow speed of 0.2 m/s the diesel fuel is not predicted to travel beyond approximately 50 km before falling below natural background levels and therefore unlikely to reach the shores of the neighbouring countries regardless of the location of the spill; and
- Under extreme weather conditions (high winds/waves) the persistence of the diesel fuel will be significantly reduced.

Large scale release of gas

Increases in anthropogenic emissions of greenhouse gases (GHG), including carbon dioxide and methane, are thought to be potentially contributing to changes in the energy balance of the world's climate system, creating an overall increase in average global temperatures (Ref. 22).

The framework for international efforts to address the challenge of climate change due to anthropogenic GHG emissions is the UN Framework Convention on Climate Change (UNFCCC), signed in 1992. In 1997, the Third Conference of the Parties to the UNFCCC adopted the Kyoto Protocol to the Convention. This Protocol, which entered into force on 16 February 2005, commits industrialised nations (Annex 1 countries) to reduce their GHG emissions by an average of 5.2% of 1990 levels by the 5-year commitment period 2008-2012. In 2012, the Parties to the Protocol agreed to a further commitment period for emissions reductions running from 2013 to 2020.

The only possible sources of large scale releases of gas into the atmosphere would be the result of a pipeline rupture (or blowout) or an unplanned need to vent gas from the pipeline (depressurise) to ensure overall system safety. Statistically a pipeline rupture is a very rare event and the probability of such an extreme situation is very low. Such events have been too infrequent for a meaningful analysis of frequency based on historic data.

In the unlikely event of rupture of one of the Project pipelines during operation a shutdown sequence would be initiated from the pipelines control room. This would lead to shutting down the compressor facilities and all valves distributed along the pipeline system between the Russkaya compressor station and the Varna receiving facilities. The shutdown sequence is part of the detailed process design of the pipeline system and is currently under development.

After shut down, various pipeline sections may require depressurisation and gas may be vented to the atmosphere at the compressor station and/or the Bulgarian landfall facilities. The volume of gas that may be vented will be calculated as part of the detailed process design and the impacts associated with the emissions to atmosphere will be assessed in the EIA and ESIA studies.

Gas will be trapped within the isolated pipeline with the exception of the point of rupture from which gas could escape. In case of rupture, the pressure within the pipeline will tend to equalise the external ambient pressure, which will vary depending on the water depth of the pipeline. In the abyssal plain the ambient pressure will be in excess of 200bar and therefore it will exceed the internal pressure of the pipeline. If a rupture were to occur in the abyssal plain gas will not escape and water will ingress the pipeline. On the continental slope there will a point where the internal pressure will exceed the external ambient pressure and from that location upward gas will escape the pipeline until the pressure within the pipeline will be equal to the ambient pressure (approx. 100 bar at 1000 m water depth, 50 bar at 500 m water depth etc.)

Gas escaping the pipeline will partially dissolve in the water column and mainly flow to the surface, expanding during the ascent towards the surface of the sea. On contact with the water surface gas will vent to the atmosphere.

Depending on the volume of gas escaping the pipeline, adverse effects to fish and marine life in general could occur. All impacts would however be localised within the area of rupture of the pipeline because of the vertical route that any escaping gas would take after being released from the pipeline.

Given the global nature of GHGs, the Project contribution will be considered within a global context in the EIA. It is likely that the contribution of the Project to GHG levels will be insignificant on a global scale.

7.4 Conclusion

7.4.1 Planned Activities

In view of the localised and temporary nature of the impacts associated with the construction and pre-commissioning activities of the Project, and the distance between the Project Area and the land and sea borders of neighbouring countries, it is unlikely that there will be significant transboundary environmental impacts resulting from planned activities for the Project.

7.4.2 Unplanned Events

Unplanned events do have the potential to result in transboundary environmental impacts, such as a hydrocarbon spill or a pipeline rupture, however, the likelihood of an unplanned event is low. A Spill Response Plan will be developed and implemented to ensure that impacts will be minimised, should a spill occur during construction. In the case of a pipeline rupture, design control will minimise any risk (which is already very low) and management procedures will be implemented to further reduce any potential impacts from such an event.

Further assessment of the significance of planned and unplanned transboundary impacts will be performed as part of the EIA and ESIA processes.

7.5 Decommissioning Impacts

In most circumstances current GIIP is to decommission pipelines in place, with few resultant impacts. However, should a decision be made to remove the pipeline, and associated infrastructure, it is expected that the potential impacts and mitigation measures will be similar in nature to those described for the Construction Phase of the Project.

8 ESIA and EIA Implementation Plan and Schedule

This Section describes the tasks associated with the implementation of the EIA and ESIA processes. These include continued stakeholder engagement, additional baseline data collection, regular consideration of the evolving Project design, modelling and quantitative analysis of impacts and a focused assessment of impacts based on the key issues identified through the EIA and ESIA scoping process. An ESMP will be developed as a result of the EIA and ESIA processes. It will capture all measures for mitigation of potential impacts and aid the monitoring of the implementation and ongoing effects of such measures.

The sections below describe the elements of the EIA and ESIA process that are still outstanding. The ongoing stakeholder engagement process is discussed in Chapter 9 of this report.

8.1 Baseline Data Collection

As stated in the introduction of Chapter 5, a large amount of information has already been gathered from previous studies carried out for the Project (see Table 5.1 and Section 5.1). This information will inform both the EIA and ESIA processes.

In order to fully address the likelihood, magnitude and significance of the impacts as part of these processes, further baseline data collection is required. The data collection activities, at the time of writing, are detailed in Table 8.1.

Table 8.1: Planned Baseline Data Collection for the ESIA

Survey Required	Overview	Date
Socio-economic baseline survey	Collection and analysis of social statistics data available at the National level, Varna region, Varna and Avren Municipalities and Project-Affected Community levels. If required, meetings will be held with key government officials to help verify and interpret the data. Data will be obtained on the current situation and trends for the following topics: population and demographics (including in-migration), economy (tourism / beach use, agriculture, fishing), employment / livelihoods, education and skills, community infrastructure and services, transport and traffic (onshore and offshore), and health and safety.	Baseline data collected from public sources, interviews and meetings with local authorities in July & August 2012, and written requests for data in October 2012. Further baseline data collection will be undertaken, if needed, after feedback from scoping consultations to take place in early 2013.
Terrestrial ecology surveys	A survey will be undertaken to verify the existing data on biodiversity and habitats present.	Surveys undertaken in July & August 2012. Further wintering bird surveys to be undertaken in early 2013.

8.2 Modelling and Impacts Quantification

Numerical models will be required to determine the spatial occurrence of some impacts associated with Project activities, such as the propagation of noise, the diffusion of airborne pollutants and the dispersion of hydrocarbon or marine sediments as a result of oil spills and dredging activities.

The sections below provide an overview of the anticipated modelling that is likely to be needed. The final list of modelling and calculations required will be contained in the ESIA and EIA along with the details of the methodologies used and the modelling results.

Table 8.2 provides an overview of the modelling which will be performed in the ESIA.

Table 8.2: Modelling and Calculation Required for the EIA and ESIA

Modelling / Calculation	Overview
Unplanned Events Study and Environmental Consequences Modelling	A quantitative study of the potential accidental events associated with construction and operation of the Project and the associated potential environmental impacts.
Oil Spill Dispersion Modelling	An assessment of the effects associated with the accidental release of hydrocarbon to the offshore environment.
Wastewater Release Calculations	Calculation of volumes of wastewater to be generated during the construction and operational phases of the Project.
Sediment Dispersion Modelling	A quantitative study of the impacts of dredging operations on water quality to enable the assessment of any temporary detrimental effects (for instance on the quality of the recreational coastal areas affected by the Project).
Air Emissions Modelling and Quantification of Air Emissions	Calculation of the volumes of pollutants that will be released to the atmosphere during the Construction Phase of the Project. Statistical determination of the potential plumes of dispersion and impacts on the affected receptors. This will be undertaken for onshore and nearshore air emissions. Calculation of the volumes of pollutants that will be released to the atmosphere during the construction and operational phases of the Project. Statistical determination of the potential plumes of dispersion and impacts on the sensitive receptors.
Noise Dispersion Modelling	Calculation of the noise propagation envelope associated with the construction and operation of the Project and assessment of potentially affected receptors.
Land Restoration Project	Detailed design of any land restoration that may be required after completion of the construction activities e.g. restoration of the pipeline ROW, reinstatement of temporary construction sites etc.
Waste Generation Calculations	Calculation of the volumes of hazardous and non-hazardous waste that will be generated during the construction and operation of the Project.

8.2.1 EIA and ESIA Assessment Methodology

The scope of the impacts identification process adopted in the EIA and ESIA will be consistent with GIIP. The process will consider relevant environmental, socio-economic and cultural heritage impacts of the Project that have not been scoped out and will include the issues identified in the standards and guidelines of IFIs. The impacts identification process will include consideration of the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities and potential transboundary effects, such as pollution of air and use or pollution of international waterways.

Assessment of impacts will be undertaken using a matrix approach to determine what could potentially happen to receptors as a consequence of the Project impacts, in terms of significance: the definition of significance will factor in the duration, areal extent and reversibility of the impacts. The diverse range of potential impacts being considered in the EIA and ESIA process will result in a range of assessment methods being used, including quantitative, semi-quantitative and qualitative methods.

8.2.2 Planned EIA and ESIA Schedule

The planned EIA and ESIA schedule is provided in Tables 8.3 and 8.4 below.

Table 8.3: Planned EIA Schedule, 2012 onwards

Activity	Period
Submission of Notification document for Bulgarian EIA	June 2012
Terms of Reference/Scoping Report Disclosure	January 2013
Submission of Espoo Notification Form	January 2013
National EIA Report Disclosure	Second Quarter 2013
National EIA Consultation Period	Second Quarter 2013
National EIA Review Period	Second Quarter 2013 to Third Quarter 2013

Table 8.4: Planned ESIA Schedule, 2012 onwards

Activity	Period
Scoping Report/Terms of Reference Disclosure	January 2013
Additional Technical Field Surveys	Second Quarter 2012 to Second Quarter 2013
Draft ESIA Consultation Period	Second Quarter 2013
Final ESIA Report Disclosure	Second Quarter 2013 to Third Quarter 2013

8.2.3 EIA and ESIA Content

A high level proposed Table of Contents for the EIA and ESIA has been developed and is included in the Scoping Report for the South Stream Offshore Pipeline Project – Bulgarian Sector. The same structure will be adopted for both documents as far a possible. As baseline surveys continue and the impact assessment progresses, details of the sections to be included within each of the chapters will be identified and additional sections may be added as required to fully assess the potential impacts associated with the Project.

9 Stakeholder Engagement

9.1 Introduction

Stakeholder engagement (including dialogue, consultation and the disclosure of information) is a key element of project planning, development and implementation. Effective stakeholder engagement assists good design, builds relationships with local communities, and reduces the potential for delays through the early identification of issues. South Stream Transport is committed to a transparent and respectful dialogue with stakeholders throughout the life of the Project.

Disclosure and consultation for the Project includes a range of activities designed to engage a variety of stakeholders using methods which take into account the nature of their likely interest in the Project as well as their location, language, culture, access to information and other opportunities to participate (e.g. through statutory consultation processes). The Project's approach to stakeholder engagement includes making best efforts to ensure stakeholders are informed about the consultation process; have access to understandable (i.e. non-technical) information about the Project and the EIA and ESIA process; and are able to ask questions, receive informed responses and provide meaningful comments on the Project.

South Stream Transport has developed a Stakeholder Engagement Plan (SEP) based on the principles and guidance presented in the IFC's PS1: Assessment and Management of Environmental and Social Risks and Impacts. The SEP also includes engagement activities necessary to meet Republic of Bulgaria requirements for the national EIA process. The SEP will be updated regularly as the Project progresses.

9.2 Stakeholder Engagement by Project Phase

Stakeholder engagement activities are an integral part of the Project lifecycle: from the initial notification when the Project is proposed, to the scoping of potential impacts and the EIA and ESIA studies, and throughout the construction, operation and decommissioning of the Project.

The different Phases of the Project will each require stakeholder engagement that is tailored in terms of the objectives, intensity and form of engagement (see Table 9.1). A brief summary of completed and planned engagement activities for the Project is provided below with a primary focus on the first three Project Phases: Feasibility, Development and Construction & Pre-Commissioning.

9.3 Phase 1: Feasibility Phase

Project Notification was made to the competent authorities on 27th June 2012, by submission of the Notification of Investment Proposal document to the Bulgarian MoEW (see Section 2.3.2). At this meeting South Stream Transport presented information on the Project and the ESIA process.

Table 9.1: Stakeholder Engagement by Project Phase

Project Phase	Engagement Activities	Engagement Outcomes
Phase 1 Feasibility Phase	Project Notification *Notification for Investment Proposal (Bul.)*	The official Notification of the Project to the Bulgarian Ministry of Environment and Water (MoEW), whereby regulatory authorities and the public are made aware of the proposed Project. This process included a public announcement in the media to inform the public of the Project.
Phase 2 Development Phase	Project Notification *Espoo Notification Form* Project Scoping *Terms of Reference of the EIA and Scoping Report (Bul. and Int.)*[1] Project EIA/ESIA *Draft and Final EIA Report (Bul.)* *Draft and Final ESIA Report (Int.)* *Appropriate Assessment (AA) study (Bul.)*	Submit information on the potential transboundary impacts of the Project to support the Bulgarian government in addressing the requirements of the Espoo Convention. Receive comments on the scope and contents of the ToR of the EIA and Bulgarian Scoping Report, including comments related to the EIA and/or ESIA processes. Engage with key stakeholders to provide them with information about the Project and anticipated impacts and to receive their feedback on key issues to be considered during the EIA/ESIA. Build on and maintain relationships with stakeholders. Understand the views, concerns, and perceptions of stakeholders about the Project and its impacts. Source and validate baseline data for the Draft and Final EIA/ESIA Reports. Listen to stakeholders' suggestions for the scope of and approach to the assessment studies, including baseline information, potential impacts, possible mitigation measures, and gather any additional information from them to further inform the EIA/ESIA and Project design. Ensure that stakeholder priorities, views and concerns are considered in the Project decision-making processes, reflected in the EIA and ESIA and, where considered appropriate, incorporated into the Project design. Integrate stakeholder engagement related to the Espoo Convention, as required.
Phase 3 Construction and Pre-Commissioning	Project Construction and Pre-Commissioning activities	Ensure stakeholders are informed of construction activities and progress. Ensure appropriate Grievance Mechanism is implemented and available to stakeholders.

Continued...

Project Phase	Engagement Activities	Engagement Outcomes
Phase 4 Full Operational Phase	Project Operation activities	Ensure stakeholders are informed of operational activities and any land use and access restrictions. Ensure appropriate Grievance Mechanism is implemented and available to stakeholders
Phase 5 Decommissioning	Project Decommissioning activities	Stakeholders will be engaged as appropriate throughout the Decommissioning Phase.

Bul.: Requirement of the Republic of Bulgaria. *Int.:* Requirement of international financial institutions. *Completed.*

[1] Due to the similarities in content, the same document will be submitted as both the draft Terms of Reference for the Bulgarian EIA process, and the Scoping Report for the international ESIA process.

9.4 Phase 2: Development Phase

9.4.1 Project EIA and ESIA Engagement Overview

In terms of stakeholder engagement, the Project Development Phase encompasses the preparation of the Terms of Reference/Scoping Report, consultation on that Report, preparation of the Draft EIA and ESIA reports, consultation on those reports, and the finalisation of the EIA and ESIA Reports. This Phase also includes stakeholder engagement related to the Espoo Convention process (see Section 2.4.1), which will be integrated with the stakeholder engagement for the EIA and ESIA.

Engagement during this Phase will aim to:

- Source and validate relevant environmental, socio-economic and cultural heritage data;
- Further understand the views and concerns of stakeholders about the Project, its impacts and possible mitigation, management and monitoring measures; and
- Discuss the outcomes of the EIA and ESIA processes, including anticipated impacts and their significance, and mitigation and management measures.

Project Scoping

In order to align the EIA and ESIA processes, the Project scoping process includes both:

- Preparation of the Terms of Reference (ToR) for the national EIA and associated consultation; and
- Preparation of the Scoping Report for the international ESIA, and associated consultation.

Under the Bulgarian regulatory process, a draft Terms of Reference must be developed and consulted upon, to guide the structure and content of the EIA report to be submitted as part of the Bulgarian national requirements. As the requirements for the content of the Terms of Reference document in Bulgaria are similar to the nature and content of the Scoping Report which is developed to meet the standards and guidelines of IFIs, one report was developed to meet the needs of both the national and international processes. This report is referred to as the 'Scoping Report' and can be found on the South Stream Offshore Pipeline website.

The Scoping Report will be used to support both Bulgarian and international scoping processes, including consultation programmes related to the national EIA (January 2013) and international ESIA (February 2013). The planned consultation activities are described further in Section 9.4.3.

Project EIA/ESIA

Consultation programmes associated with the EIA and ESIA will be implemented and details of consultation activities will be made publicly available once the consultation programmes have been finalised.

9.4.2 Completed Activities

As outlined in Section 8.1, a number of meetings have been undertaken to date with local authorities to source and validate baseline data to assist with the assessment of potential impacts. These meetings took place in 2012 and are detailed in Table 9.2. Consultation is ongoing and planned activities are outlined in Section 9.4.3.

Table 9.2: Baseline Data Consultations and Collections

Stakeholder	Date	Location
Ministry of Environment and Water	7th June 2012	Sofia
Mayor of Varna, Varna Municipality	23rd July 2012	Varna
Regional Administration, Varna	23rd July 2012	Varna
Regional Inspectorate of Environment and Water, Varna	23rd July 2012	Varna
Bulgarian Navy	26th July 2012	Varna
Maritime Administration	26th July 2012	Varna
State Enterprise "Port Infrastructure", Regional Substructure "Port Varna"	26th July 2012	Varna
Institute of Fisheries	26th July 2012	Varna
Ministry of Culture	23rd August 2012	Sofia
Ministry of Environment and Water	13th September 2012	Sofia

Continued...

Stakeholder	Date	Location
Regional Historic Museum Varna	17th September 2012	Varna
Mayor of Asparuhovo, Varna Municipality	24th September 2012	Asparuhovo
Mayor of Avren, Avren Municipality	10th October 2012	Avren
Centre for Underwater Archaeology	16th November 2012	Sofia
Executive Agency for Fisheries and Aquaculture, and local fishing associations	29th November 2012	Varna
Institute of Oceanology	30th November 2012	Varna
Basin Directorate for Water Management in the Black Sea Region	30th November 2012	Varna

Completed.

9.4.3 Planned Activities

Scoping Overview

The scoping process helps to frame the issues to be addressed within the EIA and ESIA processes, ensuring that issues and concerns are appropriately identified and addressed in the impact assessments. The scoping process is supported by engagement with stakeholders, enabling interested people and groups to express their opinions, interests, and concerns, and to ask questions of the Project and about the EIA and ESIA processes. The scoping process will be centred on the disclosure of the Scoping Report, which serves as both of the following:

- The Terms of Reference (ToR) for the national EIA which will accompany the submission of the Draft EIA report to the MoEW; and
- A Scoping Report as part of the ESIA meeting the standards and guidelines of IFIs.

Upon disclosure of the Scoping Report, two programmes of engagement with stakeholders in Bulgaria will be undertaken; these are described below under *EIA Scoping* and *ESIA Scoping*. A joint comment period will also encompass both engagement programmes. The focus of engagement activities during the Project scoping process is to ensure that PACs and other key stakeholders are provided with the opportunity to:

- Access clear and appropriate information (i.e. non-technical, local language) information on the Project and its potential impacts;
- Provide feedback on the scope of, and approach to, the EIA and ESIA including the key issues that will be addressed as part of the EIA and ESIA process, and the possible mitigation, management and monitoring measures; and
- Provide input regarding plans for future engagement activities, including preferences for methods, materials and schedule.

Comment Period

The Scoping Report and non-technical summary (NTS) prepared will be disclosed in advance of the EIA and ESIA meetings described above. Disclosure will include publication on the South Stream Transport website and announcements in local papers. Comments received will be taken into consideration for the EIA and ESIA; comments will be documented and responses will be provided.

The Scoping Report will be publicly available for review and comment for a period of at least 30 days; the precise dates will be announced upon disclosure of document with notices on the South Stream Transport website and in local papers. During this period, stakeholders will have the opportunity to review and comment on the Report. Comments may be submitted by post or email, or in person.

EIA Scoping

In accordance with the Bulgarian EIA process, meetings will be held in January 2013 with organisations specified by the MoEW in their response to the Project Notification, including:

- the Ministry of Health;
- the Regional Inspectorate of Environment and Water (RIEW) in Varna;
- the Water Supply and Sanitation (WSS) company in Varna; and
- the Basin Directorate for Water Management in the Black Sea Region.

These meetings will be held in January, prior to the broader programme of ESIA scoping consultations, in order to provide the MoEW with the timely feedback required for their consideration of the draft Terms of Reference.

Comments will also be accepted in writing from other organisations, local residents, and the general public. Both comments, and feedback gained from the ESIA scoping consultations (see below), will also be considered with respect to the EIA report and will be shared with the MoEW.

ESIA Scoping

Under the international ESIA process, a broader series of meetings is planned for February 2013, including meetings with the following stakeholder groups:

- National authorities;
- Municipal and local authorities;
- Project-affected communities;
- Marine area users;
- Businesses; and
- Non-governmental organisations (NGOs).

Further detail on the ESIA scoping engagement activities, including planned dates and meetings, is provided in Table 9.3 below. As stated above, these meetings will also provide input into the EIA report, and will be based on the same Scoping Report document. These meetings will also provide an opportunity to present stakeholders with information about the Project and EIA/ESIA and offer an opportunity for stakeholders to ask questions and to comment on the Project.

In order to consult with potential Project-affected communities (PACs), 'open house'-style community meetings will be held. These meetings will provide an opportunity for interested residents of the local area to learn about the Project and EIA/ESIA, and ask questions of and provide comments directly to South Stream Transport.

Table 9.3: ESIA Scoping Consultation Activities

Meeting Type	Stakeholder Group	Date	Location
Roundtable Meeting	Local Authorities	Feb 2013	Varna
Open houses in Potential Project-Affected Communities	Project-Affected Communities	Feb 2013	Galata, Priesltsi
Roundtable Meeting	Regional and National NGOs	Feb 2013	Varna
Roundtable Meeting	Marine Authorities	Feb 2013	Varna
Roundtable Meeting	Marine users / Business associations	Feb 2013	Varna

Republic of Bulgaria Authorities

The Bulgarian governmental and administrative authorities with jurisdiction over the Project and the EIA approvals process will be invited to comment on the Scoping Report. Meetings will be arranged with these authorities if they wish to discuss the Report directly with the Project team.

Project-Affected Communities

South Stream Transport is committed to engaging effectively with PACs to ensure they are informed about the Project, the ESIA process and schedule, and have the opportunity to comment and provide feedback.

Chapter 5 outlines communities most likely to be considered as PACs, however, a final determination will be made as the EIA/ESIA process progresses.

Representatives of all confirmed PACs will be invited to attend a meeting to discuss the Project and the Scoping Report. At these meetings South Stream Transport will present the Project, introduce the ESIA process and summarise the contents of the Scoping Report. The meetings will allow the Project team to listen to stakeholder views and concerns along with ideas on the scope and approach to the assessment studies and possible mitigation measures, and to gather any additional information to assist the ESIA process and Project design. Visual and printed materials will be available to support the presentations and discussion.

Following each meeting an ”open house” exhibition will be held, to provide a forum for interested members of the public to learn more about the Project. Printed and display materials on the Project and the Scoping Report will be available at the open house events, and Project staff will be present to discuss the Project, answer questions, and record comments and concerns from stakeholders.

Invitation letters to the meetings (accompanied by the meeting agenda, the Scoping Report, and the Project and ESIA flyers) will be sent to invited representatives (at least two weeks before the dates of the events, so that stakeholders have time to read the Project information). Provision has been made to involve any disadvantaged and/or vulnerable individuals and groups and to ensure that the meetings are held at convenient times and locations.

The comment period and open house events will also be advertised in local community centres and other public spaces, and in local newspapers. Both the meetings and 'open house' events are open to all interested attendees.

Local Businesses and Marine Space Users

Local businesses in the Varna area (including users of the local marine area and facilities) will be invited to participate in a meeting on the Scoping Report. Invitations and the associated documentation will be sent at least two weeks before the date of the meeting.

Local, Regional and National NGOs

Local and national non-governmental organisations (NGOs) will be invited to a meeting to discuss the Project and the Scoping Report. A round table meeting will be held in Varna. Invitations and the associated documentation will be sent at least two weeks before the date of the meeting.

Project EIA/ESIA

The Draft EIA and Draft ESIA Reports will be publicly disclosed for comment and Public Hearings on the Draft EIA will be held according to Republic of Bulgaria requirements. Engagement activities for the Draft ESIA will be finalised following the conclusion of the scoping consultations held as part of the disclosure of the Scoping Report. This will allow South Stream Transport to take into account stakeholder views on future engagement activities.

9.5 Phases 3-5: Construction and Pre-Commissioning, Operations and Decommissioning

Stakeholder engagement will continue over the life of the Project i.e. throughout the Construction and Pre-commissioning, Operational and Decommissioning Phases of the Project.

Engagement approaches for these later Phases have not yet been finalised but are expected to include:

- Disclosure of final EIA/ESIA and ESMP on the Project website;

- Updates and progress information for PACs, particularly with respect to construction activities and schedules; and
- Establishment and publication of a Grievance Mechanism which will be maintained on an ongoing basis.

9.6 Stakeholder Comments and Suggestions

A key objective of the EIA and ESIA Scoping consultation process is to enable South Stream Transport to understand and consider stakeholder priorities, views and concerns. Stakeholders have been invited to submit their comments on the Scoping Report in writing, or in person at consultation meetings.

Glossary

Abyssal Plain

The deep, flat sea floor that lies between continental margins i.e. the continental shelves and slopes (and other significant features such as mid-ocean ridges and deep ocean trenches).

Acceptance or Approval

The instruments of "acceptance" or "approval" of a treaty have the same legal effect as ratification and consequently express the consent of a state to be bound by a treaty[12].

Accession

"Accession" is the act whereby a state accepts the offer or the opportunity to become a party to a treaty already negotiated and signed by other states. It has the same legal effect as ratification. Accession usually occurs after the treaty has entered into force.

Alien Species / Invasive Species

A species not native to the environment it inhabits.

Ambient Levels

Sharing the same physical and/or chemical properties as the immediate surroundings.

Anoxic

Absence of oxygen.

Anthropogenic

Relating to, or resulting from, the influence of human activity on the environment.

Autonomous Underwater Vehicle (AUV)

A robot which travels underwater without requiring input from an operator. AUVs constitute part of a larger group of undersea systems known as unmanned underwater vehicles.

Backfill

Material used to refill an excavated area.

Backhoe Dredger

A mechanical excavator mounted on a flat barge. The barge is kept in position by poles that penetrate into the seabed below the barge itself.

Bar

Metric unit of atmospheric pressure.

Baseline Data

Data gathered during the Environmental and Social Impact Assessment used to describe the relevant existing conditions in the Project Area, such as physical, biological, socio-economic, and cultural heritage conditions.

Base Case Design

The base case design is the default Project design, and is reached following the consideration of alternative designs in relation to technical, environmental and socio-economic factors.

Bathymetry

The measurement of the depth of water bodies, particularly of oceans and seas.

Benthos

Flora and fauna organisms that live on or in sediment.

Biodiversity

A term used to describe aspects of biological diversity, especially including species richness, ecosystem complexity and genetic variation.

Biological Communities

An ecological unit composed of various populations of different organisms found living together in a particular environment

[12]http://treaties.un.org/Pages/Overview.aspx?path=overview/glossary/page1_en.xml

Biomass

The total mass of living matter present in an ecosystem or at a particular trophic level in a food chain and usually expressed as dry weight or more accurately, as the carbon, nitrogen, or calorific content per unit area.

Biota

The plant and animal life occupying a place together.

Biotope

An area that is uniform in environmental conditions and in its distribution of animal and plant life.

Bivalve

A marine or freshwater mollusc having a laterally compressed body and a shell consisting of two hinged valves.

Block Valve

A valve installed at various strategic locations along a pipeline to enable a segment of the pipeline to be isolated for maintenance work or in case of a rupture or leak.

Bronze Age

The prehistoric period following the Stone Age and preceding the Iron Age characterized by the use of weapons and implements made of bronze and by intense trading activity. It is generally dated from around 3000 BC.

Bund

Containment around a storage tank to contain the contents in case of rupture or spillage.

Byzantine

Of or relating to the Byrantine Empire that ended in 1453, the empire in southeastern Europe and Asia Minor formed from the eastern part of the Roman Empire.

Cathodic Protection System

A method of neutralising the corrosive static electric charges in a submerged steel structure.

Cetacea

Whales, dolphins and porpoises.

Cofferdam

A temporary structure designed to keep water and/or soil out of the excavation in which a structure is built. Commonly made of wood, steel, or concrete sheet piling.

Compression

The raising of pressure within a substance.

Compressor Station

To ensure that the natural gas flowing through a pipeline remains pressurised, its compression is required periodically along the pipeline. This is accomplished by compressor stations. Compressor stations increase or raise the pressure of the natural gas using gas compression facilities and equipment.

Consultation

The process of formally consulting or discussing a subject. For the purposes of this document, consultation involves two-way communication between the project developers and affected or interested stakeholders.

Continental Shelf

A shallow submarine plain of varying width forming a border to a continent and typically ending in a comparatively steep slope to the deep ocean floor.

Continental Slope

The comparatively steep slope from a continental shelf to the abyssal plain.

Corrosion

The eating away of metal by chemical or electrochemical action.

Corrosion inhibitors

Chemicals that reduce the rate of corrosion on metal.

Ctenophore

Any of a phylum (Ctenophora) of marine animals superficially resembling jellyfishes but having biradial symmetry and swimming by means of eight bands of transverse ciliated plates —called also comb jelly.

Cumulative Impact

The combination of multiple impacts from existing projects, the proposed project, and/or anticipated future projects that may result in significant adverse and/or beneficial impacts that would not be expected in case of a stand-alone project.

Decommissioning

Planned shut-down of a building, equipment, plant, etc., from operation or usage.

Dewatering

The process of dewatering is to remove the test water from the pipeline, after hydrotesting. This is usually carried out using dewatering PIGs.

Dewatering and Pre-commissioning Spread

The space and equipment needed for the dewatering and pre-commissioning activities.

Diatoms

Planktonic algae possessing a silicaceous cell called a frustule. Globally, diatoms are the most abundant group within the phytoplankton.

Dinoflagellates

A group of single celled organisms possessing a flagellum (whip like locomotory structure). Many are photosynthetic organisms and form a major component of marine phytoplankton.

Disadvantaged and/or Vulnerable Individuals and Groups

Individuals or groups within the project area of influence who could experience adverse impacts from the proposed project more severely than others based on their vulnerable or disadvantaged status. This status may stem from an individual's or group's race, colour, sex, language, religion, political, or other opinion, national or social origin, property, birth or other status. In addition other factors should be considered such as gender, ethnicity, culture, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources[13].

Disclosure

Release of information into the public domain. For the purposes of this document, disclosure refers to the release of the project and EIA/ESIA information to affected and interested stakeholders.

Dredging

Process of excavating materials (seabed sediments or rock) underwater.

Dry Natural Gas

Natural gas is called ‘dry’ when it has had most hydrocarbons removed and is therefore almost pure methane. It is also known as ‘consumer grade’ natural gas.

Ecosystem

A biological community of interacting organisms and their physical environment.

Emergency Shut Down Valve

A valve designed to stop the flow of gas in the pipeline upon the detection of a dangerous event. This provides protection against possible harm to people, equipment or the environment.

Environmental/Social Aspect

An element of an organisation or project’s activities, products or services that can interact with the environment or a social receptor that affects or can affect the environment.

Environmental/Social Impact

Any change to the environment or social status, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities, products or services.

Environmental and Social Impact Assessment (ESIA)

Systematic review of the environmental or socio-economic changes a proposed project may have on its surrounding environment.

13 Definition as per the IFC Policy & Performance Standards and Guidance Notes. Glossary of Terms. Available from www.IFC.org

Environmental and Social Management System

A system established to plan, manage, document and monitor an organisation's activities and processes and resultant environmental and social impacts in accordance with requirements of ISO 14001:2004 and IFC Performance Standard 1.

Environmental Statement / Environmental Impact Statement

Formal document required to present the findings of an ESIA process for a proposed project.

Equator Principles

The Equator Principles (EPs) are a credit risk management framework for determining, assessing and managing environmental and social risk in project finance transactions. The EPs are designed to help financial institutions overcome the challenges of incorporating risks associated with biodiversity and ecosystem services into their lending decisions[14].

Espoo Convention

The Espoo (EIA) Convention sets out the obligations of Parties to assess the transboundary environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. The Convention was adopted in 1991 and entered into force on 10 September 1997[15].

Eutrophication

Excessive nutrient enrichment of a body of water, often leading to detrimental ecological changes.

14 Definition as per the EP website available from www.equator-principles.com

15 Further information available from http://www.unece.org/env/eia/eia.html

Exclusive Economic Zone

An exclusive economic zone (EEZ) is a seazone for which a state has special rights over the exploration and use of marine resources, including production of energy from water and wind. It stretches from the seaward edge of the state's territorial sea out to 200 nautical miles from its coast (or to a neighbouring EEZ).

Feasibility Study

An analysis and evaluation of a proposed project to determine if it is technically feasible, is feasible within the estimated cost, and will be profitable.

Footprint

The spatial impact / impression on the seabed or land from a project.

Front End Engineering Design (FEED)

Engineering that is conducted after completion of Feasibility Study (also known as Conceptual Design).

Gauging

Gauging is undertaken to detect geometric anomalies in pipelines such as obstructions, dents and ovalities (out-of-roundness) that may have occurred during construction activities. This requires passage of a gauging tool (typically an aluminium gauge plate) which is attached to a PIG and passed through the pipeline.

Geohazard

Geological or geomorphological situation that represents, or has the potential to develop further into, a situation leading to damage or uncontrolled risk. It includes landslides, seismic faults and volcanic activities, among other situations.

Good International Industry Practice (GIIP)

Good International Industry Practice is the exercise of professional skill, diligence, prudence and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally[16].

Greenhouse Gases (GHG)

Atmospheric gases considered to contribute to the greenhouse effect by absorbing and emitting radiation, including carbon dioxide, water vapour and methane.

Habitat

The natural home or environment of an animal, plant, or other organism.

Halocline

A vertical zone in the water column in which salinity changes rapidly with depth.

Harmful Substances

Harmful substances are natural or man made substances that adversely effect the functioning capability of organisms. In relation to the Convention on the Protection of the Black Sea against pollution, harmful substances are those substances that are identified as marine pollutants in the International Maritime Dangerous Goods (IMDG) Code.

Hazard

The potential to cause harm, including ill health or injury; damage to property, plant, products or the environment; production losses or increased liabilities.

Hellenistic

Relating to postclassical Greek history and culture.

Heavy Metals

A subset of elements that exhibit metallic properties and that includes the transition metals and a number of metalloids, lanthanoids, and actinides.

Hydrocarbon

Organic chemical compounds of hydrogen and carbon atoms that form the basis of all petroleum products. They may exist as gases, liquids or solids, examples being methane, hexane and paraffin.

Hydrotesting

Process of checking the integrity of a pipeline by filling it with water under pressure and testing for any loss of pressure (e.g. from leaks).

Impressed Current System

Impressed current cathodic protection (ICCP) systems are installed to prevent corrosion of underground metal pipeline systems. Corrosion of underground metal pipelines is a normal, natural process that is the result of an electrochemical reaction in which current flows from areas where corrosion is occurring (anodic areas) to areas where it is not (cathodic areas). A cathodic protection system reverses the process. With an impressed current system, current is discharged from special anodes placed in the same electrolyte (soil) in which the pipelines to be protected are buried.

International Financial Institutions (IFIs)

Financial institutions established or chartered by more than on country and subject to international laws. In the context of this report, this refers primarily to multilateral development banks such as the IFC, World Bank, and European Bank for Reconstruction and Development.

International Finance Corporation (IFC)

Organisation that is a member of the World Bank, and promotes sustainable private sector investment in developing countries[17].

International Finance Corporation Performance Standards

The Performance Standards provide guidance on how to identify environmental and social risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way. There are eight Performance Standards that clients must meet throughout the life of an investment by IFC.

16 Definition as per the IFC Policy & Performance Standards and Guidance Notes. Glossary of Terms. Available from www.IFC.org

17 Definition as per the IFC website. Taken from www.IFC.org

Invertebrates

Any animal lacking a backbone, including all species not classified as vertebrates, such as an arthropod, mollusc, annelid, coelenterate, etc.

International Union for Conservation of Nature (IUCN) Red List

The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (those listed as Critically Endangered and Vulnerable. The Red List website is http://www.iucnredlist.org

Likelihood

The probability that an activity or effect will occur.

Macroalgae

Large algae including seaweeds.

Mammal

A class of warm-blooded vertebrates, Mammalia, having mammary glands in the female.

Marshalling Yard

Area where materials and equipment are temporarily stored. For the purposes of this document, marshalling yards are areas within ports.

Microplankton

Planktonic organisms typically 20-200 µm in size.

Migration

Any regular animal journeys along well-defined routes, particularly those involving a return to breeding grounds.

Mitigation Measures

Management measures put forward to prevent, reduce and where possible, offset any adverse environmental or socio-economic impacts. For the purposes of this document, these measures also include enhancement strategies aimed at increasing beneficial impacts.

Non-destructive Testing (NDT)

Methods of inspecting and testing the quality or integrity of infrastructure or equipment which do not involve the removal or

OECD Common Approaches

The mission of the Organisation for Economic Co-operation and Development (OECD) is to promote policies that will improve the economic and social well-being of people around the world. The OECD provides a forum in which governments can work together to share experiences and seek solutions to common problems. The OECD Common Approaches are Recommendations of the Council on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence adopted by the OECD Council on 28 June 2012[18].

Oligochaete

Any of various annelid worms of the class Oligochaeta, including the earthworms and a few small freshwater forms.

Particulates

Matter in the form of minute separate particles.

Pelagic

Freely swimming in the upper water column.

Permanent Halocline Layer

Layer of maximal salinity gradient in the water column.

Pipelaying Vessel

A vessel designed for welding together pipelines and laying them on the seabed.

Phytoflagellates

All photosynthetic flagellates, including dinoflagellates, some planktonic green algae and others.

Phytoplankton

The plant component of the plankton comprising a variety of organisms. The most common

18 Definition as per the OECD website. Taken from www.oecd.org

components of marine phytoplankton are the diatoms and dinoflagellates.

Pipeline Inspection Gauge (PIG)

A bullet shaped, cylindrical or spherical capsule which is inserted into a pipeline and travels along with the fluid in the pipeline. PIGs have a variety of purposes during pre-commissioning, commissioning and operations, including scraping the pipeline clean from rust, wax or other deposits. More sophisticated PIGs, called intelligent PIGs, carry instrumentation used in pipeline inspection.

Pigging

Pigging is passing a solid plug (PIG) through a pipeline. See above.

Pig Launcher

The practice of using pipeline inspection gauges or 'pigs' to perform various maintenance operations on a pipeline. This is done without stopping the flow of the product in the pipeline.

Pig Receiver Facility

A terminal to receive pipeline inspection and cleaning tools without interrupting gas flow. There will be one Pipeline Inspection Gauge (PIG) receiver per pipeline

Pig Trap Facility

Pig traps are used for inserting PIGs into a pipeline then launching, receiving, and finally removing them without flow interruption.

Plankton

Minute plants (phytoplankton) and animals (zooplankton) that drift in the surface waters of seas and lakes.

Pollution

The introduction by man, directly or indirectly, of substances or energy to the environment resulting in deleterious effects such as harm to living resources.

Polychaete

An important group of segmented marine worms that can be either free-living or tube-dwelling. A major component of the benthos in many areas, polychaete tubes may also form biogenic reefs.

Polypropylene

A thermoplastic polymer used in a wide variety of applications.

Pre-commissioning

Pre-commissioning is the process of proving the ability of a pipeline and piping systems to meet operational requirements prior to putting the pipeline into service.

Project-Affected Community

Communities that are affected by the activities of a project. For the purposes of this document, PACs are defined as communities that lie (at least in part) within a 2 km wide zone around the landfall section of the Project and within a 300 m zone either side of potential Project access roads.

Ramp-up

For the purposes of this document, ramp up refers to an increase in the amount of gas being transported through the pipeline(s).

The period after completion of construction of a project during which production begins to increase towards operational / design capacity. In terms of this Project, ramp-up refers to the gradual increase in gas transport rates until operational capacity is met.

Ratified

When a state makes a final approval and formal expression of its consent; for example, to be bound by a treaty or convention. This usually occurs after signature.

Receptor

The aspect of the environment (air, water, ecosystem, human, fauna, etc.) that is affected by/interacts with an environmental or socio-economic impact.

Recycling/Recovery

The conversion of wastes into usable materials and/or extraction of energy or materials from wastes.

Red List / Red Book

For the purposes of this document, this refers the IUCN Red list (see definition below), the Red Data Book of the Republic of Bulgaria or the Black Sea Red Data Book. These books contain animal and plant species that are considered of 'critical' importance under categories such as extinct, endangered and vulnerable. They also list species that are of lower importance under headings such as rare or lower risk. Species are also categorised under data deficient or not evaluated.

Remotely Operated Vehicle / Remotely Operated Towed Vehicle

Remotely Operated Vehicle (ROV) and Remotely Operated Towed Vehicle (ROTV), both of which are used for underwater surveys, are submarine survey robots controlled and powered from the surface by an operator/pilot via an umbilical link.

Residual Impacts

Residual impacts are impacts that remain after mitigation measures, including those incorporated into the project's Base Case design and those developed in addition to the Base Case design, have been applied.

Reuse

To use a material or product again after it has been used. Reuse may be for the same function or a new function.

Right of Way

An area of land above each pipeline on which the Project proponent/owner will have the rights of access to maintain and inspect the pipeline throughout its operational life (50 yrs). Some plants and crops will be allowed in this area, but deep-rooting vegetation will not be permitted.

Risk

The probability that a specified event will occur and the severity of the consequences of the event.

Routine Activity

An activity that occurs during routine operations when plant, / vessels or equipment is operating as specified within the design base case.

Sacrificial Anode

A metal (usually zinc, aluminium or magnesium) that is placed on offshore steel pipelines to corrode and prevent corrosion of the pipeline by providing cathodic protection (exchange of electrons) of its steel surface.

Salinity

Total amount of salt dissolved in aqueous solution. Salinity is measured in parts per thousand.

Scoping

Early stage in the ESIA process that appraises the likely key issues requiring detailed assessment. A scoping process (in relation to IFC PS1) is the establishment and maintenance of a process for identifying the initial environmental and social risks and impacts of a project. The aspects of the project (i.e., type, scale and location) along with available baseline data is used to guide the scope and level of effort devoted to the risk and impacts identification in the ESIA. The scoping process is to be consistent with Good International Industry Practice (GIIP) and will determine the appropriate / relevant methods and assessment procedures. The process also involves a mechanism for the collection of comments made by different stakeholders[19].

Sediment

Sediment is any particular matter that is broken down by processes of weathering and erosion, and is subsequently transported by the action of wind, water, or ice, and/or by the force of gravity acting on the particle itself.

Sensitivity (of ecological resource)

The recovery rate of flora or fauna from significant disturbance or degradation. Greater levels of sensitivity result in an ecological resource that can more easily be affected or harmed.

19 Definition as per the IFC website. Taken from www.IFC.org

Sideboom

A track-type or wheel-type tractor having a boom mounted on the side of the tractor, used for lifting, lowering, or transporting.

Sheet Pile

Structural units which when connected one to another, will form a continuous wall, generally for retaining earth or excluding water. Individual pieces or pre-interlocked pairs, are installed by driving them into the ground using impact hammers, vibrators or by water jetting.

Signed

When a State expresses its consent to be bound by a treaty.

South Stream Bulgaria AD (SSB)

South Stream Bulgaria AD is a Joint Project Company (JPC) of two major energy companies responsible for the development. The two JPCs are Russian company OAO Gazprom (50% stake) and Bulgarian company Bulgarian Energy Holding EAD (50% stake).

Stakeholder

Any individual, group or organisation potentially affected by a project, or which has an interest in, or influence over, a project.

Stakeholder Engagement Plan

A Stakeholder Engagement Plan (SEP) forms part of the ESIA documentation and is intended to provide a plan and implementation strategy to guide stakeholder engagement throughout the project lifecycle.

Stinger

A long heavy horizontal structural piece of framework used as a support for the pipeline during offshore pipelaying.

Stratification

A layered configuration of materials. Often used in the context of sediment stratification that describes the vertical changes in sediment characteristics in an active sedimentary basin, like the Black Sea, or in a rock formation.

Taxon

Plural-Taxa. A group of organisms of any taxonomic rank.

Terms of Reference

The Terms of Reference (ToR) describe the purpose of and structure for a report or project (such as an Environmental Impact Assessment study and report).

Thermocline

Generally a gradient of temperature change, but applied more particularly to the zone of rapid temperature change between the warm surface waters and cooler deep waters in a thermally stratified water column.

Toxicity

Inherent potential or capacity of a substance to cause adverse effects on living organisms.

Trailing Suction Hopper Dredger

A vessel that removes sediment from the seabed. A trailing suction hopper dredger (TSHD) trails its suction pipe when working, and loads the dredged material into one or more compartments (hoppers) in the vessel.

Trenching

Process by which excavation or dredging equipment is used to excavate a trench.

Turbidity (of water)

Water that is cloudy or hazy as a result of a density difference created by dispersed sediment within the body of the water. It is used as a test of water quality.

Viticulture/Viniculture

Viticulture is the cultivation of grapevines and viniculture is the cultivation of grapevines for winemaking.

Wastewater

Water contaminated with sanitary, commercial, industrial, agricultural or surface runoff wastes.

Zooplankton

The animal component of the plankton, including holoplankton (animals that are permanently planktonic) and meroplankton (larval and juvenile stages of non-planktonic animals).

Definitions, Abbreviations & Acronyms

Abbreviation / Term	Description
µm	Micrometre,(0.000001 m)
3LPP	Three-layer-polypropylene
ALARP	As Low As Reasonably Practicable
API	American Petroleum Institute
ASNT	American Society for Non-destructive Testing
ASTM	American Society for Testing Materials
bcm	Billion Standard Cubic Metres
CHO	Cultural Heritage Object
DDT	Dichlorodiphenyltrichloroethane
DNV	Det Norske Veritas
EEZ	Exclusive Economic Zone
EN	European Standards
ENVIID	Environmental and Socio-economic Issues Identification
ESD	Emergency Shut Down
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FEED	Front End Engineering and Design
g	Grams
GIIP	Good International Industry Practice
ha	Hectare
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HCH	Hexachlorocyclohexane

HDD	Horizontal Directional Drilling
IFC	International Finance Corporation
ISO	International Organization for Standardization
km	Kilometres
LNG	Liquefied Natural Gas
MAC	Maximum Allowable Concentrations
m	Metre
mg	milligram (0.001 g)
MARPOL	International Convention for the Prevention of Pollution From Ships
mm	Millimetres
MPC	Maximum Permissible Concentrations
NACE	National Association of Corrosion Engineers
NGO	Non-Governmental Organisation
ng	Nanogram (0.000 000 001 g)
OECD	The Organisation for Economic Co-operation and Development
PAC	Project-affected Community
PIG	Pipeline Inspection Gauge
PLONOR	Pose Little or No Risk to the Environment
PSU	Practical Salinity Units
PS	Performance Standards of the International Finance Corporation
RB	Republic of Bulgaria
ROTV	Remotely Operated Towed Vehicle
ROV	Remotely Operated Vehicle
ROW	Right of Way
SEP	Stakeholder Engagement Plan

SIMOPS	Simultaneous Operations
Sp	Species
SPNA	Special Protected Natural Area
ToR	Terms of Reference
TPH	Total Petroleum Hydrocarbons
TSHD	Trailing Suction Hopper Dredger
UNECE	United Nations Economic Commission for Europe
URS	URS Infrastructure and Environment UK Limited
UXO	Unexploded Ordnance

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Appendices

Appendix A – Bulgarian Environmental Legislation

Appendix B – International Conventions and Agreements

Appendix C – Potential Impacts and Possible Mitigation Measures

Appendix A:

Bulgarian Environmental Legislation

The following table identifies relevant legislation to be considered by the Project as part of the EIA and ESIA development.

Legislation
Environmental Protection Act (Promulgated SG no. 91 dated from 25 September 2002, amended and supplemented July 2012)
Regulation for conditions and order for implementation of Environmental Impact Assessment (approved by Decree of the Ministers № 59 on 7.03.2003, promulgated no. 25 dated on 18.03.2003, amended and supplemented no. 3 on 11.01.2011)
Access to public information act (Promulgated, SG No.55 on 7 July 2000, amended, SG. No.77 on 1 October 2010)Environmental protection Act (SG. 91/25.9.2002) regarding environmental information
Convention for environmental impact assessment in transboundary context /Espoo 1991, signed by Bulgaria on 25.02.1991 and ratified by Decree 87/23.03.95
Territory Structure Act (Promulgated SG. No.1 of 2.01.2001, amended SG. No.19 of 8.03.2011)
Black Sea Coast Act (SG. No. 48/15.06.2007 amended SG. No. 92/20.11.2009)
Law on the maritime spaces, inland waterways and ports of the Republic of Bulgaria (SG. No. 12 from 11.02.2000, .amended SG.No.23/22.03.2011)
Road Act (Promulgated SG. No.26 of 29.03.2000, amended SG. No.19 of 8.03. 2011)
Water Act (In force since 28.01.2000 published SG. No.67 from 27 July 1999, amended SG. No 81 from 6 October 2000, amended SGp No19 from 8 March 2011)
Waste management act (Promulgated, SG, No.86 of 30 September 2003, amended SG, No. 87of 25 January 2011)
Clean air act (Enforced on 29.06.1996, Prom. SG. 45/28 May 1996, amend. SG. 88/9 November 2010)
Subsurface resources act (Promulgated SG. No. 23 of 12.03 1999, amend. SG. No. 19 of 08.04.2011)
Law on soil (Promulgated SG. No. 89 of 06.11.2007, amended SG. No. 80 of 09.10.2009, amended SG. No. 98 of 14.12.2010)

Agricultural land conservation act

(Promulgated SG. No.35 of 24.04.1996, amended SG. No.19 of 8.03.2011)

Agricultural land ownership and use act

(Promulgated SG. No 17 of 01.03.1991, amended SG. No.8 of 25.01.2011)

Biological Diversity Act

(Promulgated, SG No. 77/9.08.2002,...... amended SG No 19 of 08.03.2011)

Protected areas act

(Promulgated SG. No.133 of 11.11.1998,…amended SG. No. 19/8.03.2011)

Hunting and game protection act

(SG No 78/2000 of 26.09.2000 ....amended SG. No.8 of 25.01.2011 ....amended SG. No. 19 of 08.03.2011)

Law on fishing and aquacultures

(Promulgated SG.No.41 of 24.04. 2001, amended SG.No.8 of 25.01. 2011., amended SG. No.19 of 8 Март 2011)

Medicinal plants act

(Promulgated, SG No. 29/7.04.2000, ...amended 91/25.09.2002)

Forestry Act

(Promulgated SG. No.125 of 29.12.1997, amended SG., No.103 of 29.12.2009, in force of 04.9.2011, promulgated SG. No. 19/8.03 2011)

Law of ratification of European landscape convention

(Promulgated SG., no 94/22.10.2004)

Cultural heritage act promulgated

(SG. 19/13.03.2009, amended SG. No.80/09.10.2009, amended SG. No.92/20.11.2009, amended SG. No.93/24.11.2009, amended SG. No.101/28.12.2010)

Protection from Environmental Noise Act

(Promulgated SG No. 74/13.09.2005 in force of 1.01.2006,.....amended No. 98/14.12.2010, in force of 1.01.2011)

Health Act

(Promulgated SG. No.70/10.08.2004, amended SG. No.9/28.01.2011)

Law on health and safety at work act

(Promulgated SG. No.124/23.12.1997, amended and supplemented No. 108/19.12.2008)

Energy efficiency act

(Promulgated SG. No.98 of 14.11.2008, amended SG. No.97 since 10.12.2010)

Appendix B:

International Conventions and Agreements

Convention	Purpose	Current Status in Bulgaria
Aarhus Convention on Access to Information, to Public Participation in the Decision Making Process and the Administration of Justice concerning Environmental Matters	To guarantee the rights of access to information, public participation in decision-making, and access to justice in environmental matters, in order to protect people's rights to a healthy environment.	Ratified
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	To regulate the transboundary movements of hazardous wastes and provides obligations to its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.	Accession
Berne Convention on the Conservation of European Wildlife and Natural Habitats	To ensure conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices.	Accession
Bonn Convention on the Conservation of Migratory Species of Wild Animals	To promote national policies for the conservation of wild flora, fauna and habitat and their inclusion in planning policies.	Signed
Bucharest Convention on the Protection of the Black Sea Against Pollution	To provide a basic framework of agreement and three specific Protocols, which are: (1) the control of land-based sources of pollution; (2) dumping of waste; and (3) joint action in the case of accidents (such as oil spills).	Ratified
Convention Concerning the Protection of the World Cultural and Natural Heritage	To safeguard the cultural and natural heritage of outstanding universal value at national level as a part of worldwide heritage.	Acceptance
Convention on Biological Diversity	To promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: the conservation of the biological diversity, the sustainable use of its components, fair and equitable sharing of the benefits. Requires parties to have national strategies, plans or programmes for the conservation and sustainable use of biological diversity.	Ratified

Convention	Purpose	Current Status in Bulgaria
Convention on Protection of Underwater Cultural Heritage Objects	To pledge to preserve underwater cultural heritage for the benefit of humanity, and take action. To preserve artefacts in situ and protect from commercial exploitation.	Ratified
Convention on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)	A cooperative tool for the conservation of marine biodiversity in the Mediterranean and Black Seas. Its purpose is to reduce threats to cetaceans in Mediterranean and Black Sea waters and improve our knowledge of these animals.	Ratified
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)	To control pollution of the sea by dumping, and to encourage regional agreements supplementary to the Convention. Annexes I and II list matter prohibited or restricted to be dumped.	Signed
Convention on the Protection and Use of Transboundary Watercourses and International Lakes	To oblige Parties to prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way and ensure their sustainable management. Parties bordering the same transboundary waters shall cooperate by entering into specific agreements and establishing joint bodies.	Ratified
Convention on the Transboundary Effects of Industrial Accidents (Helsinki Convention)	To lay down a set of measures to protect human beings and the environment against the effects of industrial accidents, and to promote active international cooperation between the contracting parties before, during and after such accidents.	Ratified
Espoo Convention on Environmental Impact Assessment in Transboundary Context	To promote protection of the environment and sustainable development, through the application of transboundary EIA (including consultation and public participation) considering potential transboundary environmental effects.	Ratified
European Convention for Protection of Archaeological Heritage (Valletta Treaty)	States that government legal system is required for the protection of archaeological heritage.	Signed
Geneva Convention on Long-Range Transboundary Air Pollution	To provide a framework for controlling and reducing transboundary air pollution.	Ratified

Convention	Purpose	Current Status in Bulgaria
Kyiv Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context	The Kyiv (SEA) Protocol, requires its Parties to evaluate the environmental consequences of their official draft plans and programmes. Strategic environmental assessment (SEA) is undertaken much earlier in the decision-making process than project environmental impact assessment (EIA), and it is therefore seen as a key tool for sustainable development.	Ratified
International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) Annex I - V	The MARPOL Convention covers the prevention of pollution of the marine environment by ships from operational or accidental causes. Annex I includes regulations for the Prevention of Pollution by Oil and is mandatory. Annex II includes regulations for the Control of Pollution by Noxious Liquid Substances in Bulk. Annex III includes regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packed Form. Annex IV includes regulations for the Prevention of Pollution by Sewage from Ships. Annex V includes regulations for the Prevention of Pollution by Garbage from Ships.	Accession
International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) Annex VI	The MARPOL Convention covers the prevention of pollution of the marine environment by ships from operational or accidental causes. Annex VI includes regulations for the Prevention of Air Pollution from Ships.	Acceptance
International Convention for the Protection of Birds	To protect birds in the wild state, considering that in the interests of science, the protection of nature and the economy of each nation, all birds should as a matter of principle be protected.	Signed
International Convention for the Safety of Life at Sea (SOLAS)	To specify minimum standards for the construction, equipment and operation of ships, compatible with their safety. Flag States are responsible for ensuring that ships under their flag comply with its requirements, and a number of certificates are prescribed in the Convention as proof that this has been done.	Approval
International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER)	To ensure that adequate, prompt, and effective compensation is available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers. The Convention applies to damage caused on the territory, including the territorial sea, and in exclusive economic zones of States Parties.	Accession

Convention	Purpose	Current Status in Bulgaria
International Convention on Maritime Search and Rescue (SAR)	To develop an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea will be co-ordinated by a SAR organisation and, when necessary, by co-operation between neighbouring SAR organisations.	Accession
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)	To set requirements for all ships to carry a shipboard oil pollution emergency plan and to report incidents of pollution to coastal authorities and the convention details the actions that are then to be taken. The convention calls for the establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercises and the development of detailed plans for dealing with pollution incidents.	Accession
International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW)	To establish basic requirements on training, certification and watch keeping for seafarers on an international level. The Convention prescribes minimum standards relating to training, certification and watch keeping for seafarers which countries are obliged to meet or exceed.	Accession
Stockholm Convention on Persistent Organic Pollutants	To ensure the limitation of pollution by persistent organic pollutants (POPs). It defines the substances in question, while leaving open the possibility of adding new ones, and also defines the rules governing the production, importing and exporting of those substances.	Ratified
The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar)	To promote conservation of wetlands and waterfowl. In addition, certain wetlands are designated as Wetlands of International Importance and receive additional protection.	Accession
United Nations Convention on the Law of the Sea (UNCLOS)	To define the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.	Ratified
United Nations Framework Convention on Climate Change (UNFCC)	To provide a framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.	Ratified
Vienna Convention for the Protection of the Ozone Layer	To ensure global co-operation for the protection of the Ozone Layer. Aims to reduce and eventually eliminate the emissions of manmade ozone depleting substances.	Accession

Appendix C:

Potential Impacts and Possible Mitigation Measures

Identification of Environmental, Socio-economic and Cultural Heritage Impacts

This section presents the approach and the outcomes of the preliminary identification and assessment of Project impacts. Impacts were identified and assessed through a systematic process. The following criteria were taken into consideration: impact category, Project activity, geographic extent of the impact, potential receptors to the impact and possible mitigation measures. A definition of each criterion is presented below:

Categories: List of environmental, socio-economic and cultural heritage categories that may be potentially affected by the Project's activities:

- Air Quality and Climate;
- Noise and Vibration;
- Surface and Groundwater;
- Marine Water Quality;
- Terrestrial Ecology and Nature Conservation;
- Marine Ecology and Nature Conservation;
- Soils and Sediments;
- Waste;
- Natural Resources;
- Landscape and Visual Amenity;
- Land Use and Ownership;
- Communities;
- Local Economy;
- Traffic;
- Cultural Heritage;
- Intangible Cultural Heritage; and
- Ecosystem Services.

Impact: list of impacts generated by Project activities;

Geographic Extent: The geographical area that could potentially be affected by an impact. Four sub-categories were adopted to capture the potential geographic range of impacts, including:

- Local: Impacts that affect local environmental, socio-economic, cultural heritage resources or are restricted to a single habitat/biotope, a single (local) administrative area or a single community. Although considered local, the geographical extent of each impact within this category can be variable, depending on the impact type and location.

- Regional/Provincial: Impacts that affect regional environmental, socio-economic or cultural heritage resources or are felt at a regional scale as determined by habitat type, administrative boundaries or community. Tentatively the geographical extent of regional impacts will be up to tens of kilometres. Regional impacts are often associated with activities that are not located at a single location, such as vehicles movements.

- National: Impacts that affect national environmental, socio-economic or cultural heritage resources or affect an area that is nationally protected/ important. The geographical extent of national impacts will be up to hundreds of kilometres.

- International: Impacts that are experienced in more than one country as a result of the Project (e.g. global warming or transboundary waste disposal).

Potential Receptors: List of the potential environmental, socio-economic and cultural heritage receptors that may be affected by the potential activities/events.

Possible Mitigation Measures: List of existing control measures and possible mitigation measures that may be considered to reduce significant impacts identified during the EIA and ESIA process. This list is intended to be indicative.

The preliminary assessment of the impacts was carried out for the following phases of the Project:

- Construction and Pre-Commissioning; and
- Operational Phases.

The outcomes of the assessment are reported in Tables C.1 to C.3. The initial assessment was carried out for routine events only. Unplanned events will be assessed as part of the EIA and ESIA. The nearshore and offshore sections of the Project are covered under marine impacts whilst the landfall section of the Project is covered under terrestrial impacts.

Construction and Pre-Commissioning Phase

This section identifies potential impacts associated with the Construction and Pre-commissioning Phases of the Project. The preliminary identification of impacts shows that the construction and pre-commissioning impacts for both the marine (Table C.1) and terrestrial (Table C.2) elements of the Project will typically be temporary in nature and localised in extent. Where impacts are expected to be minimal, no information has been included in the table for that category.

Operational Phase

This section identifies potential impacts associated with the routine operation of the Project (including routine maintenance) and with periodic or one-off activities that may be associated with repairs. This is expected to include the operation of landfall facilities, the periodic cleaning of the pipelines, and the use of maintenance vehicles and vessels. Both terrestrial and marine impacts are summarised in Table C.3). Where impacts are expected to be minimal, no information has been included in the table for that category.

Table C.1: Potential Impacts and Possible Mitigation Measures – *Terrestrial Impacts, Construction and Pre-Commissioning Phase*

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Environmental Categories				
Air Quality and Climate	Emissions to atmosphere from the operation of vehicles, machinery and power generation equipment; Dust generation from excavation activities and the movement of vehicles across un-surfaced roads.	Local, Regional Local	Communities; Terrestrial habitats.	Regular maintenance of machinery and engines; Traffic management plan to minimise impacts from vehicle emissions; Construction site management practices.
Noise and Vibration	Noise and vibrations emissions from vehicles, machinery and power generation equipment.	Local	Communities; Terrestrial habitats (fauna)	Use of acoustic shielding for noisy equipment; Timing of works; Locating noisy equipment away from noise sensitive receptors.
Soils	Earthworks will result in disturbance to and loss of soil resources; Erosional processes as a result of the removal of vegetation.	Local	Soils; Terrestrial habitats; Surface water.	Preservation of topsoil; Reinstatement of topsoil following completion of construction activities; Erosion control measures.
Groundwater and Surface Water	Contamination as a result of leaks and minor spills of fuels; Release of sediment into surface water courses; Alterations to surface and groundwater flows as a result of trenching activities.	Local	Surface and groundwater; Terrestrial ecology.	Fuelling/bunkering procedure for machinery, generators, etc.; Bunded or contained oil/fuel storages; Chemical handling procedures; Erosion control measures.
Waste and Wastewater	Generation, treatment and disposal of waste and wastewater (hazardous and non-hazardous).	Local, Regional	Soils; Surface and groundwater; Terrestrial habitats; Communities.	Maximise recycling, including of items such as construction spoil; Waste Management in accordance with local and federal regulations.
Terrestrial Ecology and Nature Conservation	Loss/ disturbance/ fragmentation of habitat (including nesting, feeding and breeding grounds) resulting from vegetation clearance during soil stripping and land clearance (pipeline route, landfall facilities and construction sites).	Local	Terrestrial habitats and fauna species	Appropriate management of terrestrial habitats focusing on issues such as vegetation and landscape restoration and biodiversity.

Continued...

Table C.1 (Continued)

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Natural Resources	Import of construction materials; Use of water for construction activities and cleaning; Use of fuel for vehicles and machinery.	Local, Regional, National and possibly International, depending on sources of raw materials and fuel	Soils; Surface and groundwater; Terrestrial habitats; Communities.	Sustainable water management; Maintenance and monitoring of machinery and engines for fuel consumption and fuel efficiency.
Landscape and Visual Amenity	Permanent modifications of the landscape as a result of habitat removal, site grading and the erection of industrial structures. Temporary modifications as a result of construction activities (operation of large mechanical equipment, power generators, soil stockpiles, parking of large construction machinery, and the generation of dust from construction activities); Pipe laying vessels increasing the number of vessels in the line of sight.	Local	Communities; Local Tourism.	Design of the appearance of the permanent facilities; Erection of temporary and permanent plant screens; Planting and restoration of temporary construction sites.
Socio-Economic Categories				
Land Use and Ownership	Temporary land-take for construction (access roads, construction corridor and laydown areas), including on Pasha Dere Beach; Restriction on access and land use activities to parts of the landfall section for safety and security, including Pasha Dere Beach.	Local	Communities; Local economy;	
Communities	Nuisance associated with temporary incoming workforces. Temporary access restrictions to the beach could adversely impact recreational activities.	Local	Project-affected Communities	Training of workforce; Housing of workforce in large urban areas.

Continued...

Table C.1 (Continued)

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Local Economy	Limited beneficial impacts from employment and business opportunities; Tourism and accommodation businesses near Pasha Dere Beach adversely affected by a decline in local amenity.	Local	Project-affected Communities ; Local economy.	Local hiring and procurement strategies.
Traffic	Nuisance and risks associated with increased traffic flows, in particular, Heavy Goods Vehicles; Adjustment of road geometry to accommodate long construction vehicles; Changes in road quality (degradation or improvement); Road safety; Mud deposition on public roads.	Local	Project-affected Communities; Local tourism.	Ensuring that construction related transports are carried out safely and in an environmentally responsible manner; Provision for training and testing drivers involved in construction activities; Roads maintenance plan to carry out repairs to access routes; Traffic management plan to minimise impacts from traffic.
Cultural Heritage Categories				
Terrestrial Cultural Objects	Direct physical disturbance from construction activities such as landtake, vegetation clearance and excavation works.	Local	Cultural heritage.	Chance find procedures; Trail pits; Watching briefs.

Completed.

Table C.2: Potential Impacts and Possible Mitigation Measures – *Marine Impacts, Construction and Pre-Commissioning Phase*

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Environmental Categories				
Air Quality and Climate	Emissions to atmosphere from vessels engines, on-board cranes and power generation equipment.	Local, Regional, Trans-boundary	Global climate.	Regular maintenance of machinery and engines.
Noise and Vibration	Noise and vibration emissions from vessels' machinery and power generation equipment, piling of sheet piles for cofferdam	Local, Regional	Communities Fish and marine mammals.	Regular maintenance of machinery and engines.
Sediments	Potential alterations to the seabed and the potential mobilisation of sediments resulting from activities such as dredging and anchoring. Temporary changes in local dynamics of sedimentation in the nearshore area due to local changes in bathymetry.	Local	Sediments; Marine habitats.	Minimisation of dredged sections.
Marine Water Quality	Generation of sediment plumes as a result of dredging activities; could affect marine water quality both from an amenity and biological standpoint; Increased turbidity would adversely affect pelagic and benthic habitats; Discharges from hydrotesting and from vessels could result in water pollution.	Local	Marine Habitats; Local Tourism.	Operation of all vessels in accordance with MARPOL; Project control measure – selection of most suitable offshore trenching technique;
Marine Ecology and Nature Conservation	Loss of habitat resulting from dredging, temporary stockpiling of dredged materials and pipe-laying; Disturbance from physical presence, underwater noise sources; Introduction of alien marine species.	Local	Benthic and planktonic habitats; Marine fish; Seabirds; Marine mammals.	Minimisation of dredged sections; Operation of all vessels in accordance with MARPOL; Development of project specific measures to prevent the import of alien species into the Black Sea.

Continued...

Table C.2 (Continued)

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Waste and Wastewater	Generation, treatment and disposal of waste (hazardous and non-hazardous).	Local, Regional, Trans-boundary	Soils; Surface and Groundwater; Terrestrial habitats; Communities.	Maximise recycling; Waste management in accordance with MARPOL.
Natural Resources	Use of seawater for pre-commissioning activities; Use of fuel for vessels and machinery.	Local, Regional, National and possibly International depending on sources of fuel	Soils; Surface and Groundwater; Terrestrial habitats; Communities.	Sustainable Procurement Policy;
Landscape and Visual Amenity	Temporary modifications of seascape as a result of construction activities (operation of large vessels in the proximity of the shore).	Local	Local tourism; PACs.	Not applicable.
Socio-Economic Categories				
Communities	Temporary increase in water turbidity and temporary access restrictions to coastal areas could adversely impact recreational activities.	Local	PACs; Local tourism.	
Local Economy	Temporary increase in water turbidity and temporary access restrictions to coastal areas could adversely impact fishing activities. Temporary deterioration of the water quality may adversely impact users of the local beaches and tourism business.	Local	Local Economy, including tourism and fishing;	
Traffic	Increase in vessel traffic may impact upon shipping routes and commercial fishing, as well as boat movements associated with tourism.	Local and Regional	Local communities; Local Economy, including tourism and fishing; Marine users.	Close liaison with the Coastguard and the Bulgarian Navy regarding all marine operations in Bulgarian waters; Stakeholder engagement including providing information to mariners and those involved in fishing; Development of a Marine Operations Plan.

Continued...

Table C.2 (Continued)

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Cultural Heritage Categories				
Marine Cultural Objects	Underwater cultural objects may be directly or indirectly impacted by construction activities such as dredging, trenching and pipe-laying.	Local	Cultural heritage.	Identification of underwater cultural objects through surveys; Avoidance of cultural objects

Completed.

Table C.3: Potential Impacts and Possible Mitigation Measures – *Terrestrial and Marine Impacts, Operational Phase*

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Environmental Categories				
Air Quality and Climate	Emissions to atmosphere from maintenance vehicles and vessels and operational equipment.	Local	Global climate.	Regular maintenance of service machinery and engines
Noise and Vibration	Noise and vibrations emissions from maintenance vessels and vehicles. Potential noise as a result of gas flowing through the pipeline.	Local	Local communities; Terrestrial fauna; Fish and marine mammals.	Mitigation measures not applicable given low potential for impact.
Marine Ecology and Nature Conservation	Introduction of the pipeline to the seafloor.	Local	Marine habitat, particularly benthic communities.	Not applicable.
Terrestrial Ecology and Nature Conservation	Maintenance of RoW (clear of deep rooted vegetation) so no re-establishing of pre-existing habitat leading to fragmentation of habitat.	Local	Terrestrial habitat and associated species of flora and fauna.	Preservation of the integrity of surrounding habitats.
Waste and Wastewater	Generation, treatment and disposal of waste produced (such as sewage) during maintenance operations	Local	Soils; Surface and Groundwater; Terrestrial habitats; Communities.	Maximise recycling; Waste Management in accordance with MARPOL.
Natural Resources	Use of materials for repairs Use of fuel for vessels and machinery to undertake maintenance works.	Local, Regional, National and possibly International, depending on sources of fuel	Soils; Surface and Groundwater; Terrestrial habitats; Communities.	Sustainable Procurement Policy.
Landscape and Visual Amenity	Above ground permanent landfall facilities.	Local	Local tourism.	Maintenance of landfall facilities and planted screening.

Continued...

Table C.3 (Continued)

Category	Impacts	Geographic Extent of Impacts	Receptors	Possible Mitigation Measures
Socio-Economic Categories				
Local Communities	Beneficial impact from maintenance of access roads.	Local	Project-affected Communities.	Mitigation measures not applicable given low potential for impact.
Land Use and Ownership	Maintenance of permanent RoW and Safety Exclusion Zones onshore.	Local	Local communities; Local tourism.	Not applicable.
Local Economy	Some limited beneficial impact from minimal local employment; Impacts to fishing activities related to restrictions over the four pipelines.	Local	Project-affected Communities; Local tourism.	Local hiring and procurement strategies; No applicable mitigation measures.
Traffic	Personnel vehicles and occasional heavy vehicles required for maintenance or supply operations.	Local	Local communities; Marine users.	Construction mitigation measures apply.

Completed.