

Chapter 15: Community Health, Safety and Security

Table of Contents

15	Community Health, Safety and Security	15-1
15.1	Introduction.....	15-1
15.2	Scoping	15-1
15.2.1	Issues and Population Groups Scoped In	15-2
15.2.2	Issues Scoped Out during the Assessment Stage.....	15-4
15.3	Spatial and Temporal Boundaries.....	15-6
15.3.1	Project Description	15-6
15.3.1.1	Construction and Pre-Commissioning Phase	15-6
15.3.1.2	Operational Phase.....	15-7
15.3.1.3	Decommissioning Phase	15-7
15.3.2	Project Location	15-7
15.3.2.1	Study Area	15-7
15.4	Methodology and Data.....	15-8
15.4.1	Primary Data and Surveys.....	15-8
15.4.2	Secondary Data.....	15-8
15.4.3	Stakeholder Engagement	15-11
15.4.4	Data Assumptions, Limitations and Gaps.....	15-11
15.5	Community Health, Safety and Security Baseline	15-12
15.5.1	Demographic Community Profile.....	15-12
15.5.2	Known Community Issues.....	15-13
15.5.2.1	Mortality by Disease.....	15-13
15.5.2.2	Morbidity, Incidence and Prevalence of Disease	15-14
15.5.2.3	Mental Health	15-21
15.5.2.4	Alcoholic Psychosis, Alcoholism, Drug Dependency	15-21
15.5.2.5	Traumatism	15-21
15.5.2.6	Invalidity and Temporary Disability.....	15-21
15.5.2.7	Road Safety.....	15-22
15.5.2.8	Crime and Security	15-27
15.5.3	Baseline Data by Determinant of Health	15-29
15.5.3.1	Individual Factors	15-29
15.5.3.2	Social Factors	15-29
15.5.3.3	Environmental Factors.....	15-30
15.5.3.4	Institutional Factors	15-31
15.5.4	Emergency and Disaster Response	15-36
15.6	Legal and Policy Context.....	15-36
15.6.1	IFC Performance Standards (PS)	15-36
15.6.2	National Legislation	15-37
15.6.3	Regional / Local Policy	15-38
15.7	Impact Assessment Methodology	15-39
15.7.1	Methodology	15-39
15.7.2	Determinants of Health	15-40

15.7.3	Receptor Sensitivity	15-41
15.7.4	Impact Magnitude	15-44
15.7.5	Impact Significance Criteria	15-44
15.7.6	Impact Mitigation	15-45
15.8	Assessment of Potential Impact: Community Health, Safety and Security	15-46
15.8.1	Impact Assessment: Construction and Pre-Commissioning Phase	15-49
15.8.1.1	Introduction	15-49
15.8.1.2	Assessment of Potential Impacts (Pre-mitigation)	15-50
15.8.1.3	Mitigation and Enhancement	15-64
15.8.1.4	Residual Impacts	15-68
15.8.1.5	Monitoring	15-75
15.8.2	Impact Assessment: Operational Phase	15-77
15.8.2.1	Introduction	15-77
15.8.2.2	Assessment of Potential Impacts (Pre-mitigation)	15-77
15.8.2.3	Mitigation and Enhancement	15-79
15.8.2.4	Residual Impacts	15-79
15.8.2.5	Monitoring	15-82
15.8.3	Impact Assessment: Decommissioning	15-82
15.9	Occupational Health and Safety	15-83
15.10	Unplanned Events	15-83
15.11	Cumulative Impacts	15-83
15.12	Conclusion	15-83

Tables

Table 15.1 Incidence and Prevalence of all diseases by age groups in Krasnodar Krai – Comparison between 2007 to 2011 per 1,000 individuals in the respective age groups (Ref. 15.10).....	15-14
Table 15.2 International Ranking for Road Traffic Fatalities per 100,000 Population for Countries Bordering the Black Sea	15-23
Table 15.3 Number of Road Traffic Deaths (to nearest hundred)	15-24
Table 15.4 Crimes by Type, Anapa Resort Town, 2006-2012 Crimes by Type, Anapa Resort Town, 2006-2012.....	15-28
Table 15.5 Health Workforce in Krasnodar Krai and ART municipal district in 2005 – 2011..	15-31
Table 15.6 Health Workforce in Krasnodar Krai and ART municipal district in 2005 – 2011..	15-32
Table 15.7 Determinants of Health (Ref. 15.29)	15-41
Table 15.8 Receptor Sensitivity Criteria for Community Health and Safety.....	15-41
Table 15.9 Impact Magnitude Criteria.....	15-44
Table 15.10 Significance Matrix.....	15-45
Table 15.11 Mitigation Hierarchy	15-45
Table 15.12 Potential impacts discussed in other ESIA Chapters and scoped out the of the community health, safety and security assessment	15-47
Table 15.13 Summary of Residual Impacts during Construction and Pre-Commissioning.....	15-69
Table 15.14 Summary of Residual Impacts during Operational Phase	15-81

Figures

Figure 15.1 National, Regional and Municipal District Context of the Project	15-9
Figure 15.2 Prevalence of Diseases by Main Types of Illness for Children Aged 1-14, per 1000 Population in Krasnodar Krai (Ref. 15.9)	15-15
Figure 15.3 Prevalence of Diseases by Main Types of Illness for Children Aged 1-14, per 1000 Population in Anapa Resort Town (Ref. 15.9)	15-16
Figure 15.4 Prevalence of Diseases by Main Types of Illness for Adolescents Aged 15-17 per 1000 Population in Krasnodar Krai (Ref. 15.9).....	15-16
Figure 15.5 Prevalence of Diseases by Main Types of Illness for Adolescents Aged 15-17 per 1000 Population in ART Municipal District (Ref. 15.9)	15-17

Figure 15.6 Prevalence of Disease by Main Types of Illness for Adults Aged 18 and Over per 1000 Population in Krasnodar Krai (Ref. 15.9).....	15-17
Figure 15.7 Prevalence of Disease By Main Types of Illness for Adults aged 18 and Over per 1000 Population in ART Municipal District (Ref. 15.9)	15-18
Figure 15.8 Prevalence of Infectious and Parasitic Diseases (including chickenpox) per 100,000 Population in Krasnodar Krai (Ref. 15.9)	15-18
Figure 15.9 Prevalence of Infectious and Parasitic Diseases per 100,000 Population in ART Municipal District (not including chickenpox) (Ref. 15.9).....	15-19
Figure 15.10 Construction Traffic Route (green) through Community of Rassvet from M25 (Ref. 15.30).....	15-25
Figure 15.11 Junction of M25 (foreground) and Rassvet (top right) (Ref. 15.40)	15-27
Figure 15.12 Construction Route Looking North towards Rassvet showing Cyclists (Ref. 15.39)	15-27
Figure 15.13 Healthcare Facilities in Krasnodar Krai (Ref 15.10).....	15-34
Figure 15.14 M25 Pedestrian Crossing just West of Rassvet Turning (Ref. 15.40)	15-57
Figure 15.15 Clockwise Current Sediment Plume Extending South to Sukko Beach (Ref. 15.41)	15-59
Figure 15.16 Counter-Clockwise Current Sediment Plume Extending North (Ref. 15.41)	15-60

15 Community Health, Safety and Security

15.1 Introduction

This chapter presents the potential community health and safety impacts arising from Project-related activities, as well as Project security as it pertains to communities. This chapter forms part of the Environmental and Social Impact Assessment (ESIA) Report of the South Stream Offshore Pipeline - Russian Sector ('the Project') that will form part of a system to deliver natural gas from Russia to the countries of central and south-eastern Europe.

This community health, safety and security chapter considers the potential health impacts to national, regional and local population groups, including particularly vulnerable groups who may be disproportionately affected. The approach has been guided by applicable legislative and policy requirements along with relevant guidance including the International Finance Corporation (IFC) guidance on Health Impact Assessment (HIA) (Ref. 15.1) and Good International Industry Practice (GIIP). For example, the approach addresses the two key characteristics required by the IFC guidance, namely: predicting the consequences of project-related actions; and providing information that can help decision makers prioritize prevention and control strategies throughout the project cycle. This has been achieved through: a scoping exercise examining the potential impacts of Project activities; a review of existing baseline health and safety conditions and key trends; evaluation of community views from stakeholder engagement and a health assessment to classify potential health risks before and after the application of mitigation measures.

This chapter has been prepared alongside other assessments that make up the ESIA Report. Where appropriate, this assessment has used relevant data or modelling from other ESIA chapters, as well as information from consultation findings as described in Section 15.4.3.

The consideration of the potential health impacts to the Project's workforce and the regulatory framework that governs safe working practices is assessed in Appendix 15.1 Occupational Health and Safety. An alternative approach has been taken for occupation health and safety which recognises that throughout the Project the workforce will be exposed to a number of different hazards and associated risks. The occupational health and safety issues identified in the scoping stage have been grouped against global accident data categorisations. The occupational health and safety assessment in Appendix 15.1 discusses these categories with Project-specific links where appropriate. Occupational health and safety mitigation considers the due diligence requirements that the Project will need to meet. This more strategic approach for occupational health and safety reflects that the detailed occupational health and safety regulatory regimes will properly be addressed through Project and contractor management plans and systems.

15.2 Scoping

A general Scoping Report for the international ESIA process for the Project was disclosed in Russia in November and December 2012. Disclosure of the report was followed by a series of meetings with a range of stakeholders in December 2012 including Local Communities, local

non-governmental organisations and local authorities. A number of comments regarding community health and safety were made during this period (see Section 15.4.3) and these informed the subsequent health studies and the content of this chapter.

An internal Health and Safety Scoping Assessment Report (Ref. 15.2) was prepared in 2013 to focus on community health, safety and security issues which, following IFC standards and guidance, more specifically identified sources of exposure and risk for communities and workers during the various phases of the Project. A discussion of the issues considered and the scoping rationale for including or excluding each issue from the main assessment are contained in the Health and Safety Scoping Assessment Report, which has informed this chapter, including Table 15.12. An outline of the issues which are referred to in other chapters is summarised in Section 15.7 and described in Table 15.12. The issues scoped in are discussed throughout the remainder of this chapter.

15.2.1 Issues and Population Groups Scoped In

The scoping stage examined the ways in which the construction, operation and decommissioning of the Project may affect community health, safety and security. Issues identified as having the potential to give rise to community - and population - level health impacts have been taken forward for further assessment. The scoping exercise included:

- Identifying legislative requirements;
- Gathering and reviewing relevant Project information;
- Evaluating health context, including consideration of: location; climate; endemic diseases; and in-migration;
- Reviewing Project design, including consideration of: water bodies; roadways; pipelines; operational facilities; sources of potential exposure; and transmission-line corridors;
- Identifying potentially impacted geographic areas and potentially affected communities;
- Identifying key stakeholders;
- Setting the geographical, time scale, and population boundaries of the assessment;
- Determining the assessment approach; and
- Collecting baseline data including:
 - Evaluation of existing Russian publication data;
 - Evaluation of data from key stakeholders; and
 - Evaluation of data from other ESIA Report chapters.

In determining the potential health impacts of the Project, the scoping exercise used the World Health Organization's (WHO) definition of health: *'Health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity'* (Ref. 15.3). Factors that affect health are called the 'determinants of health'. The IFC defines these as: *'individual; social and environmental; and institutional factors, which are directly, indirectly, or cumulatively affected by the proposed project'* (Ref. 15.1).

The scoping exercise uses the four 'determinants of health' themes (individual, social, environmental and institutional factors) (see Section 15.7.2 and Table 15.7 for further detail) to provide a practical framework in which to summarise the areas scoped in for further assessment. The issues scoped in for further assessment are listed below under the remaining headings. These are the issues that form the focus of the community health, safety and security assessment. The brackets after each issue identify whether the effect falls primarily during the Construction and Pre-Commissioning Phase [construction] or the Operational (including Commissioning) Phase [operation]. For information on the approach to the Decommissioning Phase [decommissioning] see Section 15.8.3.

Social factors

- Conduct of workforce in the community [construction];
- Spread of sexually transmitted infections (STIs) due to in-migration of non-local workers [construction];
- Employment opportunities for the local population [construction];
- Public anxiety over large volumes of gas close to Local Communities [operation]; and
- Benefits to the Russian economy from increased gas sales [operation].

Environmental factors

- Construction noise impacts from vehicles, plant and vessels [construction];
- Road transport impacts, particularly heavy goods vehicles (HGVs) [construction]; and
- Mobilisation of historic seabed pollutants during trenching and tunnelling [construction].

Institutional factors

- Local health and emergency service resources due to in-migration of non-local workers [construction].

Unplanned events

- Uncontrolled gas release from pipeline or onshore facilities [operation].

Cumulative impacts

- Russkaya CS construction impacts occurring in tandem with this development [construction]; and
- Future development plans in Varvarovka being affected by exclusion zone restrictions [operation].

The assessment uses the following population age categories when scoping potential health impacts:

- Children and infants < 5 years (childhood illnesses);
- Children ages 5-14 years (older childhood, adolescent health effects);

- Women of reproductive age;
- Adults ages 15-64 (working adults); and
- Elderly > 65 years.

15.2.2 Issues Scoped Out during the Assessment Stage

In addition to the issues which have been addressed in other chapters (Section 15.8), there are two issues (air quality and historic ground contamination) which were initially scoped in to the health assessment but were later scoped out on the basis that no significant impacts were expected at the pre-mitigation stage. The following paragraphs summarise the scoping rationale for this decision.

Air quality impacts from vehicles, plant and vessels

Chapter 9 Air Quality determined that the Pre-Commissioning and Construction Phase of the Project will result in the majority of the Project's emissions and therefore have the greatest potential to affect air quality. Air quality emissions from construction plant, vehicles and materials (including activities related to landfall construction) have potential health impacts. The baseline notes that in Krasnodar Krai, specifically Anapa, Varvarovka and Gostagaevskava, the issue of air pollution is a priority problem for public health, and thus onshore community receptors should be considered. In addition, the issue of dust from increased traffic due to Project activities was raised by stakeholders during EIA disclosure in May 2013 (Ref. 15.4) (see Section 15.4.3).

The air quality assessment modelling includes impacts at the closest two residential community receptors to the landfall section of the Project and concludes that road movements during construction will not give rise to significant impacts to nearby community dwellings. This includes the area of Rassvet and the M25 junction where the largest predicted change in annual mean pollutant concentrations are predicted to occur. Modelling assumptions indicate that health impacts from increased nitrogen dioxide or particulate matter in Rassvet are unlikely and this issue has not been discussed further in this chapter.

Chapter 9 Air Quality reports findings, based on detailed computer modelling provide a strong argument for concluding that the majority of emissions, including benzene, carbon monoxide and particulate matter, from the Construction and Pre-Commissioning Phase of the Project are **Not Significant** health impacts to Local Communities. The only emissions requiring further assessment are nitrogen dioxide and sulphur dioxide.

Chapter 9 Air Quality notes that modelled impact for nitrogen dioxide and sulphur dioxide uses a modelled scenario whereby worst case shipping emissions lasting no more than six days at the closest point to shore, have been combined with the most adverse one hour period of meteorological conditions over five complete years. As such, the impact reported is highly unlikely to occur in practice and this potential impact has not been discussed further in this chapter.

Nitrogen Dioxide

Health impacts associated with oxides of nitrogen may be delayed for one to five hours after inhalation and brief exposure to low concentrations can cause adverse health impacts. However, as determined by the air quality assessment (see **Chapter 9 Air Quality**) the total predicted maximum permissible nitrogen dioxide concentration, including baseline, at the worst affected sensitive receptor, is $158 \mu\text{g}/\text{m}^3$ ($0.158 \text{ mg}/\text{m}^3$). This value is well below the reported threshold for adverse health impacts. Furthermore, the modelling suggests a very low frequency of such events and a temporary duration. Based on these assessment findings impacts from nitrogen dioxide have been scoped out.

Sulphur dioxide

The air quality assessment concludes that for predicted change in 24 hour sulphur dioxide concentrations, under worst case scenarios and IFC guideline standard, there is a residual **Moderate** significance impact. The assessment notes that the scenario for this impact is highly unlikely to occur in practice and would be regarded as of **Low / Moderate** significance in the context of Russian national air quality legislation (**Chapter 9 Air Quality**).

From the air quality assessment the highest predicted sulphur dioxide concentration, including baseline, is a maximum 10 minute concentration of $78 \mu\text{g}/\text{m}^3$ ($0.078 \text{ mg}/\text{m}^3$). This is a third of the concentration required to elicit an adverse health impact (even for a vulnerable individual, such as someone with asthma). Furthermore, the modelling suggests a very low frequency of such events and a temporary duration. Based on these assessment findings, impacts from sulphur dioxide have been scoped out.

Mobilisation of historic ground contaminants during site clearance and trenching¹

Chapter 8 Soils, Groundwater and Surface Water reports potential impacts and mitigations for occupational exposure to ground contaminants during site clearance and ground works. This chapter considers the potential for community exposure to ground contaminants from these activities. The exposure dose will generally be less than that of the workforce due to increased distance from the site of contamination; however, population sensitivities may be higher. Two issues were assessed before being scoped out: background radiation levels and soil contamination. These are discussed in the following paragraphs.

Background radiation

Chapter 7 Physical and Geophysical Environment notes that background radiation levels associated with the terrestrial Survey Area (landfall section) were assessed during surveys carried out in 2010, 2011 and 2013. Results of the radiation surveys indicate that background radiation levels within the terrestrial Survey Area (landfall section) meet the requirements of the Russian Standards on radiation protection. Radiation levels measured in the soils do not pose a

¹ Mobilisation of historic seabed pollutants is discussed in Section 15.8.1.2

risk to human health in terms of radiation exposure. Based on these assessment findings, impacts on the community from radiation have been scoped out.

Soil contamination

There is the potential for onshore site clearance and ground works to mobilise existing pollutants. **Chapter 8 Soils, Groundwater and Surface Water** notes that elevated concentrations of contaminants that exceed published standards are known to occur in the soil within the soils Study Area (landfall section) albeit at comparatively low levels. The contaminants locally present in the soil may be harmful to human health under certain exposure scenarios. **Chapter 8 Soils, Groundwater and Surface Water** has concluded that with the following mitigation, which includes undertaking additional desk studies and intrusive investigations, residual impact on human health from soil-bound contamination is **Low**. The assessment includes the provision that:

- In the event that previously unidentified contamination is encountered during construction, works in the affected area will cease and appropriate steps will be taken in accordance with the Contractor's Contingency Plan, developed as part of the Contractor's Emergency Response Plan.

Based on these assessment findings, the mitigation related to soil contamination and as the Project includes appropriate dust control measures (see **Chapter 9 Air Quality**), it is unlikely that community impacts would arise. This issue has therefore been scoped out of further assessment in this chapter.

15.3 Spatial and Temporal Boundaries

15.3.1 Project Description

A detailed description of the Project is provided in **Chapter 5 Project Description**. A brief description of the elements of the Project relevant to this community health, safety and security impact assessment is provided here.

15.3.1.1 Construction and Pre-Commissioning Phase

This phase will involve construction and pre-commissioning activities, which will be undertaken after each of the four pipelines has been installed to ensure that the pipelines meet operational requirements. Key features and activities include:

- Increase in non-local labour (i.e. in-migration from outside the area);
- Temporary and permanent land take within the landfall section construction corridor;
- Construction plant and vehicles operating within the landfall section;
- Vessels in nearshore waters, including an exclusion zone; and
- Dredging and seabed disturbance in nearshore waters.

Works within the landfall section of the Project are expected to last 27 to 30 months, works within the nearshore section are also expected to last for approximately 15 months, and works within the offshore section are expected to last for approximately 3.5 years.

15.3.1.2 Operational Phase

The Project will have an operational design life of 50 years. Key features and activities include:

- Permanent, usually unstaffed, landfall facilities with the capacity for occasional gas venting;
- Permanent Right of Way (RoW) over the pipeline land route;
- Permanent access road to the landfall facilities;
- Reinstatement of other areas to their former uses, but with development restrictions based on the established safety exclusion zones; and
- At sea, the establishment of a safety exclusion zone 500 m either side of the pipeline will preclude fishing within that zone.

15.3.1.3 Decommissioning Phase

The approach to decommissioning, including whether the pipeline will be removed will be determined nearer to the time of decommissioning when more is known about the technologies available to undertake the works and any changes in the sensitivity of surrounding communities. See Section 15.8.3 for further discussion.

15.3.2 Project Location

The Project comprises three sections – landfall, nearshore and offshore. Further information explaining the extent and nature of each section is given in **Chapter 1 Introduction**. The Project phase timeframes are set out in **Chapter 5 Project Description**.

Figure 15.1 shows the Russian national level and the Krasnodar Krai boundaries. The Figure also shows boundary of the ART municipal district and location of Local Communities Varvarovka, Sukko, Supsekh, Rassvet and Gai Kodzor; and the town of Anapa.

15.3.2.1 Study Area

The Study Area, for the purposes of the community health, safety and security assessment, encompasses the areas described in **Chapter 14 Socio-Economics**. In summary, on land the Study Area included the area within 2 km of the landfall section of the Project and also within a 300 m zone either side of potential (existing) access routes. Offshore, the Study Area was based on a 1 km wide zone following the nearshore and offshore route of the pipeline, ending at the EEZ border between Russia and Turkey; this is the area in which the construction vessel spread will operate.

The exception is where the Study Area is extended to that adopted in other chapters of the ESIA Report where those assessments and their respective receptors are discussed.

15.4 Methodology and Data

The baseline has drawn on a variety of sources, including published scientific literature, international health and safety organizations, and general literature searches using Internet search engines and standard textbooks of public health. A variety of secondary health status data sources were used for the Russian Federation, Krasnodar Krai and ART municipal district.

15.4.1 Primary Data and Surveys

Primary baseline data collection was undertaken to inform the socio-economic impact assessment (see **Chapter 14 Socio-Economics**) and the information gathered was analysed to ensure that any health related issues were captured and included in this community health, safety and security impact assessment. In addition, specific health related information was sourced from the ART Municipal Administration in March 2013 and February 2014 to inform the community health, safety and security baseline (Refs 15.5 and 15.6) (see Section 15.4.3).

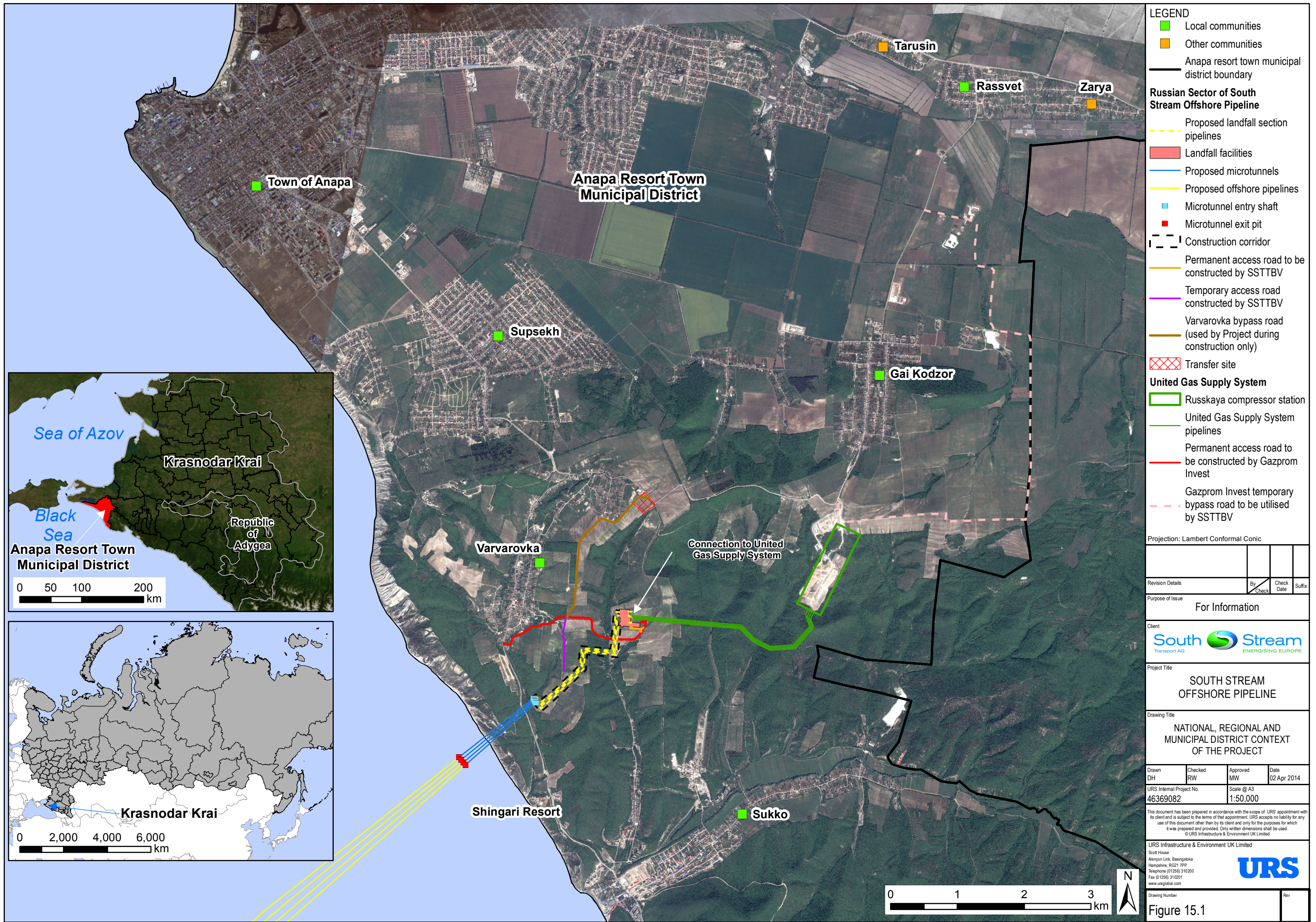
Local officials at the Anapa Resort Town Municipal District Administration (Ref 15.7) and the Gai-Kodzor Rural District Administration (Ref 15.8) provided information in February 2014 related to health facilities in Local Communities which helped inform the baseline (see Section 15.5.3.3). This included information on emergency services, the capacity of local health services and road traffic impacts and road safety issues, specifically in the communities of Rassvet and Gai-Kodzor (Ref 15.8). Information on traffic levels and road safety was also obtained from an interview with the Head of the local school in Rassvet (Ref 15.8).

Data on existing traffic levels was obtained through surveys of potential access roads. The traffic surveys focused on the two most likely approach routes to the landfall site, namely the main roads passing through the communities of Rassvet; Gai Kodzor; Supsekh and Varvarovka. An explanation of the survey methodology, access roads, locations of traffic surveys and the survey results are contained in Appendix 9.1 Traffic and Transport Study.

15.4.2 Secondary Data

The main sources of secondary information were:

- Request No. 543 of 01.02.2012 for morbidity and mortality of the adult, adolescent and juvenile population based on data of the State Public Healthcare Institution Medical Information-Analytical Centre of the Department of Public Health of the Krasnodar Krai (GUZ MIATs), during the period 2006-2010 (Ref. 15.9);
- Statistical guide Health and Healthcare in Krasnodar Krai 2012 of the Ministry of Health Krasnodar Krai (Ref. 15.10);
- Report on sanitary-epidemiological situation and consumer rights 2012 Krasnodarsli Krai Ministry of Health of Krasnodar Krai website (Ref. 15.11); and
- National Priority Project Health Implementation in Krasnodar Krai 2007-2011 (Ref. 15.12).



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15.4.3 Stakeholder Engagement

Stakeholders are individuals, groups or organisations potentially affected by a project, interested in, or with influence over, a project. Stakeholder engagement provides one part of the process for identifying a list of health issues for analysis.

During scoping consultations, stakeholders raised about the issue of noise and vibration from construction activities², and the potential impact on Local Communities. Stakeholders also raised the issue of increased traffic during construction and asked whether any additional roads will be constructed.

A meeting was held with ART Municipal District Administration in March 2013 (Ref. 15.13), including with the ART Municipal District Administration Deputy Chief for Health. At that meeting it was confirmed that during the peak season, extra resources including staff (doctors, paramedics, etc.) are mobilised and clinics operate longer opening hours to deal with increased demand arising from the increased number of tourists in the area. It was also confirmed that the local health services offer free medical services to Russian citizens whether or not they are based in the district.

Local officials at the Anapa Resort Town Municipal District Administration (Ref 15.5) and the Gai-Kodzor Rural District Administration (Ref 15.8) provided information in February 2014 related to local health facilities in Local Communities³. They reconfirmed that during the tourist season, the numbers of tourists visiting the area means that a range of extra staff and services are provided by the Administration during this time. Emergency facilities are available in Anapa. For more complex cases, patients are transferred to the city of Krasnodar.

The opinion of the Municipal District Administration is that the Project workforce would not unnecessarily strain the local health services as a result of planned Project activities. The needs of any Project related workforce are not expected to compromise the health service provided to tourists and residents during the holiday period (Ref 15.5). In addition, their view is that the services are adequate all year round to cope with the expected numbers of workers related to the landfall section of the Project that are likely to be housed in the area. Further details of the Project stakeholder engagement can be found in **Chapter 6 Stakeholder Engagement**.

15.4.4 Data Assumptions, Limitations and Gaps

The data used in the community health, safety and security baseline has not been assessed for bias or other limitations in its primary collection methodology.

² Stakeholders raised these issues also in relation to the construction of the Russkaya Compressor Station – see Appendix 20.1 Environmental Impacts of Associated Facilities: Russkaya CS.

³ In addition to the comments in the text, the Administration noted that although they did not have a concern regarding strain on local health facilities in relation to the Project workforce, they are investigating the purchase of mobile health units in order to better service some of the areas outside the town of Anapa.

For some indicators there are no exact definitions, which make the interpretation of the data difficult.

It is noted that in all countries (not just Russia) there is frequent underreporting and misreporting of disease burdens.

Very limited or no data was available for the Local Communities located near the landfall section of the Project. It has therefore been assumed for the purposes of this assessment that the health status in these communities is similar to the ART municipal district within which they are located. It is also assumed for the purposes of this assessment that the Project workforce will be housed in the town of Anapa. This is based on the consideration that it is the town of Anapa, rather than the Local Communities, that is most likely to have a sufficient supply of suitable accommodation options available for requirements.

Given the lack of available local data on health and the lack of specifics at the time of writing in relation to Project workforce accommodation options, the Project will require its contractor to undertake a Rapid Health Appraisal in the pre-construction phase to further understand health conditions (such as disease prevalence) in the Local Communities and including the quality and quantity of local health services. The appraisal will assess the preferred option for the landfall section workforce accommodation, once it is known, as well as potential health impacts relating to the offshore workforce interactions with the town of Anapa and the Local Communities during transit periods. The appraisal may include consultation with applicable local and regional authorities, including health and social service providers.

15.5 Community Health, Safety and Security Baseline

This section provides a summary of the baseline community health, safety and security characteristics of the Project Area.

15.5.1 Demographic Community Profile

The population of ART municipal district was 153,900 people in 2013 (Ref. 15.17). Of these, 40% are urban residents and 60% live in rural areas. Among the entire resident population, men account for 47% and women 53%. The female population of child bearing age accounts for 48.2% of the total female population. Children aged 0 to 17 years account for 19.1% of the total population. Adults (17+) account for 80.9% of the total population. In total, 60.5% of the population are working-age persons and 22.6% are retired (Ref. 15.9).

In the ART municipal district, the birth rate was consistently higher and the death rate was consistently lower than in Krasnodar Krai and the Russian Federation over the period from 2006 to 2010. As a result, and in contrast to the national and regional level indicators, the ART municipal district has had positive net natural population growth since 2007.

At the same time, the ART municipal district has experienced positive net migration at a rate two to three times that of Krasnodar Krai. The main factors contributing to migration growth are the in-migration of non-local labour for the construction, tourism and agricultural sectors as well as a relocation programme run by the Russian military to resettle service personnel to the area

on retirement. Together, these factors have contributed to the relatively strong population growth in ART.

In 2010, in Krasnodar Krai, the life expectancy for men was 65.8 years and the life expectancy for women was 76.5 years. Since 2003, there has been an increase in life expectancy in Krasnodar Krai, in particular in the period 2006 to 2010.

Life expectancy depends on the mortality rate and 60% of mortality rate in Krasnodar Krai is associated with social factors, healthcare, alcohol and smoking. Smoking accounts for a reduced life expectancy of 19 to 23 years and alcohol use for a reduction of 20 to 25 years, particularly for men (Ref. 15.9).

The infant mortality rate in Krasnodar Krai was reported to be 6.0 per 1,000 individuals in 2011. The infant mortality rate in ART municipal district was 3.4 per 1,000 individuals in 2011 and is lower than the comparable rate for Krasnodar Krai. The infant mortality indicator is considered to be a very sensitive indicator reflecting the socio-economic status of the population and the quality of health services provided (Ref. 15.10).

The perinatal mortality rate in the Krasnodar Krai region has decreased from 6.3 per 1,000 individuals in 2007 to 5.4 per 1,000 individuals in 2010. The maternal mortality rate has increased from 12.1 per 1,000 individuals in 2007 to 15.29 per 1,000 individuals in 2011 (Ref. 15.10).

The number of reported abortions before week 28 of pregnancy decreased in ART municipal district from 43.9 in 2007 to 27.8 in 2011. This was higher than the corresponding figure for Krasnodar Krai – respectively 34.0 in 2007 and 20.22 in 2011.

15.5.2 Known Community Issues

15.5.2.1 Mortality by Disease

Cardiovascular diseases were the leading cause of mortality in 2011 for Krasnodar Krai:

- 58.4% - cardiovascular diseases, (794.7 per 100,000 individuals);
- 15.3% - neoplasms, (20.5 per 100,000 individuals);
- 8.1% - injuries and poisoning, (109.7 per 100,000 individuals);
- 4.5% - a disease of the digestive system (61.3 per 100,000 individuals);
- 3.4% - respiratory diseases (46.3 per 100,000 individuals); and
- 1.7% - infectious and parasitic diseases (22.4 per 100,000 individuals).

Mortality from all causes declined in the Krasnodar region in 2010 by 0.7%, but remained high at 36% above the target of the national priority programme "Health", which aims to improve quality of healthcare through a focus on primary care, prevention and improved access to innovative technologies (Ref. 15.10).

Deaths from diseases of the circulatory system at 794.7 per 100,000 population in 2011 are two-fold higher than the target of 400 per 100,000 population.

Deaths from injury and poisoning were 109.7 per 100,000 population in 2011, which is 9.7% over the target of 100 per 100,000.

From data on implementation between 2007 and 2011 (Ref. 15.10), according to the ranking applied in the report on the Ministry of Health of Krasnodar Krai, ART municipal district is placed as follows for the indicators (some indicators are per 1,000 population, others per 100,000):

- Total mortality - in the lowest range between 11.5 to 13.4 per 1,000 population (the highest rate in the region is 17.6);
- Mortality by cardiovascular diseases - in the lowest range 539 to 740.6 per 100,000 population (highest 1059.3);
- Mortality by trauma and poisoning - in the middle level 106.6 to 133.5 per 100,000 (lowest 75.3 and highest 152.3);
- Mortality by suicide - in the lowest range 8.8 to 20.6 per 100,000 (highest 54);
- Mortality by murder - in the middle range 8 to 15 per 100,000 (highest 22.3);
- Mortality by alcoholism - in the middle range 41.5 to 75.4 per 100,000 (lowest 4.8, highest 113); and
- Mortality by tuberculosis - in the lowest range 9.8 to 20.3 per 100,000 (lowest 2.5, highest 40.7).

15.5.2.2 Morbidity, Incidence and Prevalence of Disease

The statistical data demonstrates an increase of incidence and prevalence of diseases among the total population respectively from 560.6 per 1,000 individuals in 2007 to 624.27 per 1,000 individual in 2011 and from 1,160.02 per 1,000 individuals in 2007 to 1242.81 per 1000 individuals in 2011.

Table 15.1 Incidence and Prevalence of all diseases by age groups in Krasnodar Krai – Comparison between 2007 to 2011 per 1,000 individuals in the respective age groups (Ref. 15.10)

	Incidence 2007	Incidence 2011	Prevalence 2007	Prevalence 2011
<i>Total population</i>	560.6	624.27	1160.02	1242.81
<i>Children (Age 0-14)</i>	1273.56	1427.19	1731.56	1827.34
<i>Adolescent (Age 15-17)</i>	831.24	1099.67	1469.06	1800.63
<i>Adults (Age 18+)</i>	415.32	466.30	1057.59	1131.64

Any changes in the incidence of a particular disease could be explained by a corresponding change in risk factors pertaining to that condition. It could also be explained by a change in diagnostic methods or changes to the ways on which the disease is registered.

Prevalence of diseases by main types of illness for children

In the structure of morbidity, the leading cause in both Krasnodar Krai and ART municipal district for children are respiratory diseases, followed by diseases of the digestive system. Eye diseases and infectious diseases in ART municipal district rank third and fourth. Diseases of the nervous systems, dermatologic diseases and musculoskeletal diseases are the next leading causes of morbidity in Krasnodar Krai.

For children the prevalence of all diseases in ART municipal district decreased from 2006 to 2008 and after a small increase, it remained at lower levels than the prevalence reported for the same period in Krasnodar Krai.

The prevalence of respiratory diseases has increased in ART municipal district since 2008 and in 2010 became higher than in Krasnodar Krai for children.

Figure 15.2 Prevalence of Diseases by Main Types of Illness for Children Aged 1-14, per 1000 Population in Krasnodar Krai (Ref. 15.9)

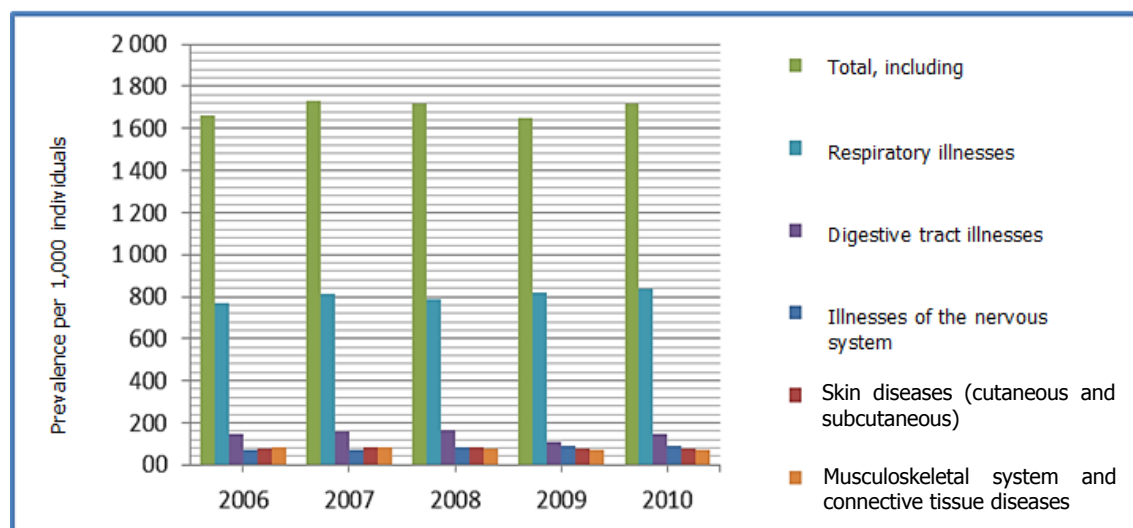
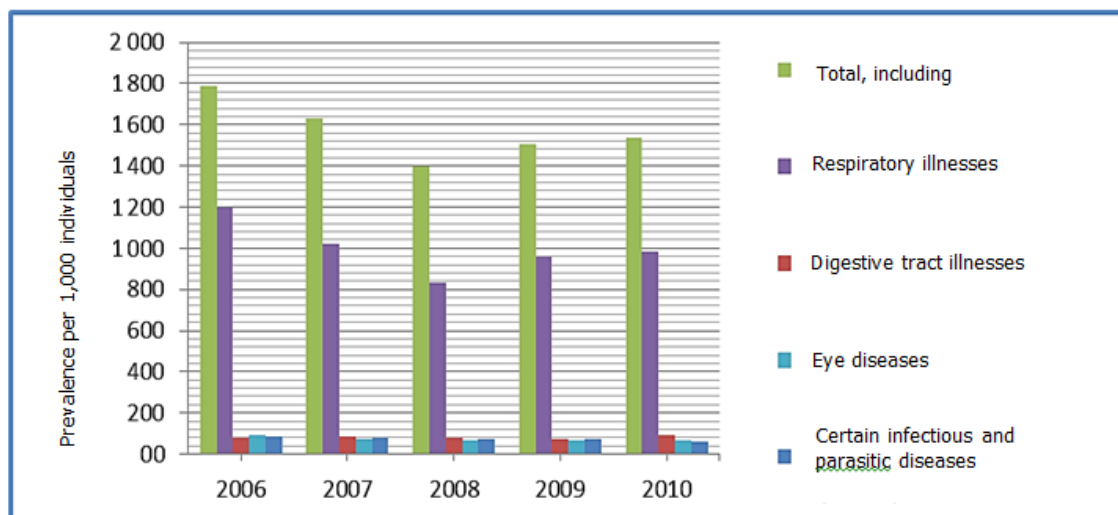


Figure 15.3 Prevalence of Diseases by Main Types of Illness for Children Aged 1-14, per 1000 Population in Anapa Resort Town (Ref. 15.9)



Prevalence of diseases by main types of illness for adolescents

For the age group 15 to 17 years, the prevalence of diseases increased during the period 2006 to 2010 in both Krasnodar Krai and in ART municipal district, but in ART municipal district levels are lower. As with the younger age group, the leading cause of morbidity in both Krasnodar Krai and ART municipal district is respiratory diseases.

Figure 15.4 Prevalence of Diseases by Main Types of Illness for Adolescents Aged 15-17 per 1000 Population in Krasnodar Krai (Ref. 15.9)

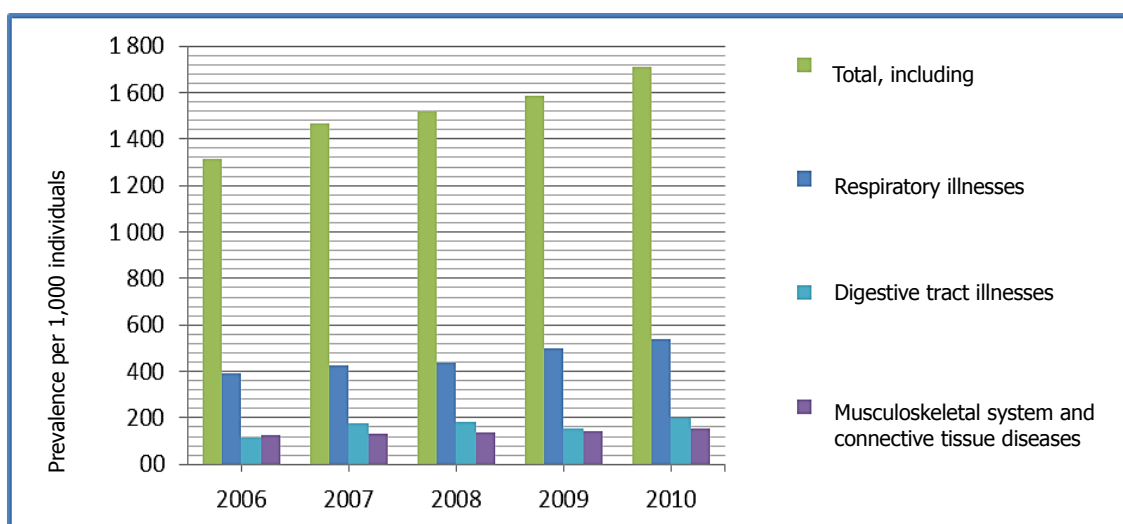
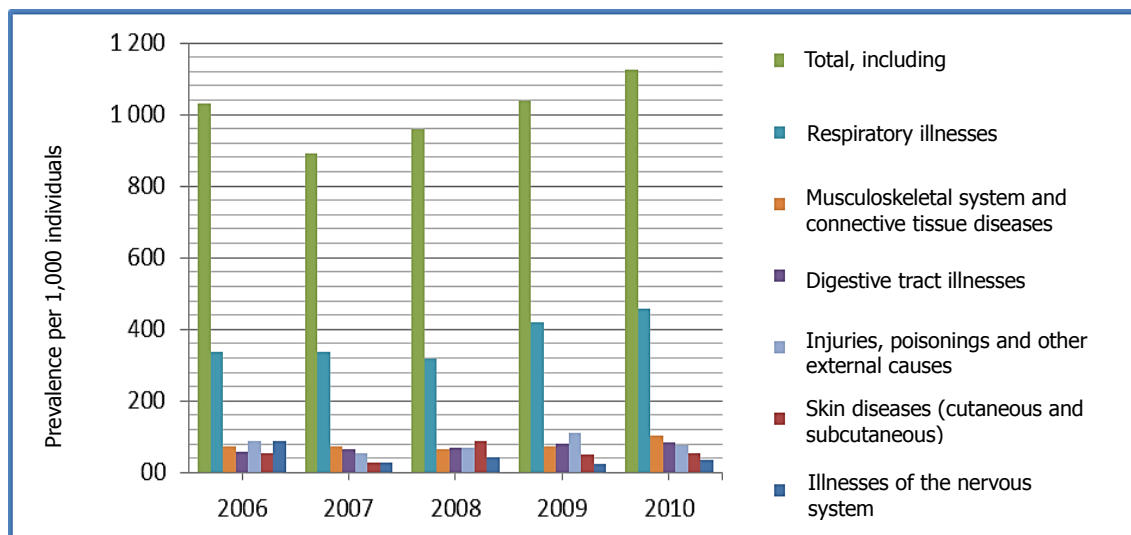


Figure 15.5 Prevalence of Diseases by Main Types of Illness for Adolescents Aged 15-17 per 1000 Population in ART Municipal District (Ref. 15.9)



Prevalence of disease by main types of illness for adults

In ART municipal district, there was an increase in prevalence of all diseases for the age group 18 years and over between 2006 and 2010, at which point the prevalence reached the same levels as Krasnodar Krai. In ART municipal district, respiratory diseases are the leading cause of morbidity in adults, while in Krasnodar Krai the leading cause is circulatory disease.

Figure 15.6 Prevalence of Disease by Main Types of Illness for Adults Aged 18 and Over per 1000 Population in Krasnodar Krai (Ref. 15.9)

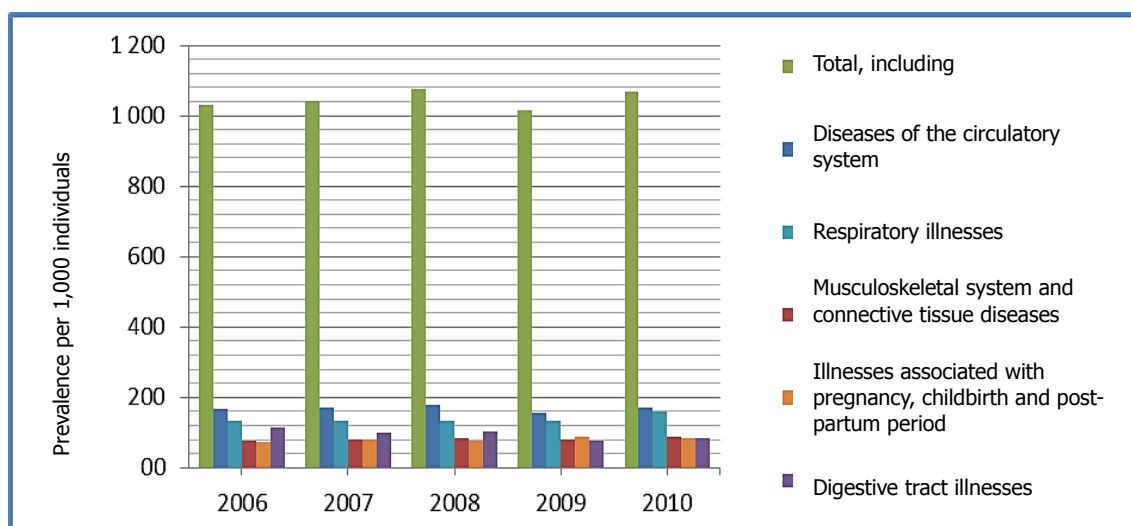
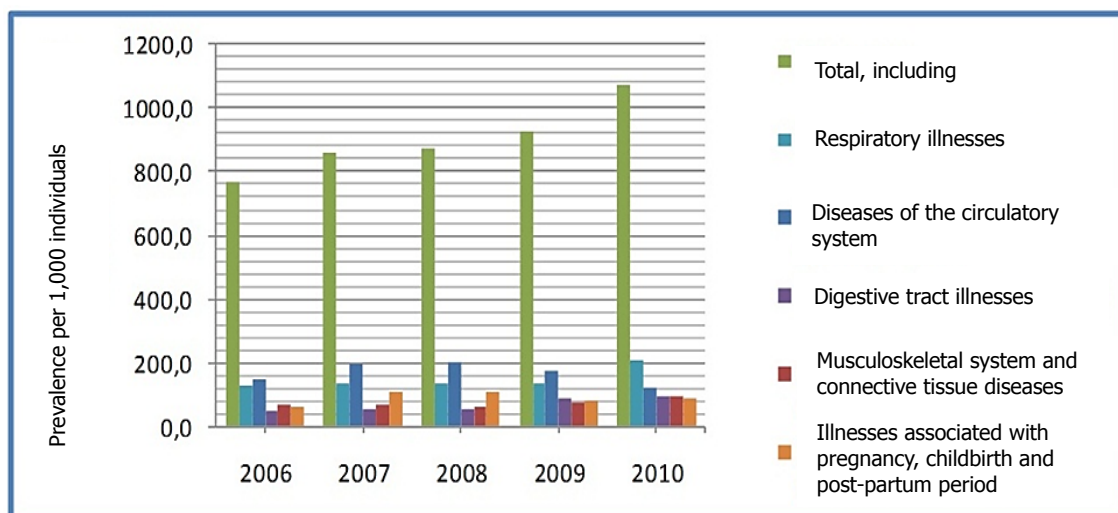


Figure 15.7 Prevalence of Disease By Main Types of Illness for Adults aged 18 and Over per 1000 Population in ART Municipal District (Ref. 15.9)



Prevalence of infectious and parasitic diseases

In ART municipal district, the leading cause for infectious and parasitic diseases is the acute intestinal diseases of unknown causes, while in Krasnodar Krai this is chickenpox. The incident rates of infectious diseases specific to Local Communities were not available for this assessment.

Figure 15.8 Prevalence of Infectious and Parasitic Diseases (including chickenpox) per 100,000 Population in Krasnodar Krai (Ref. 15.9)

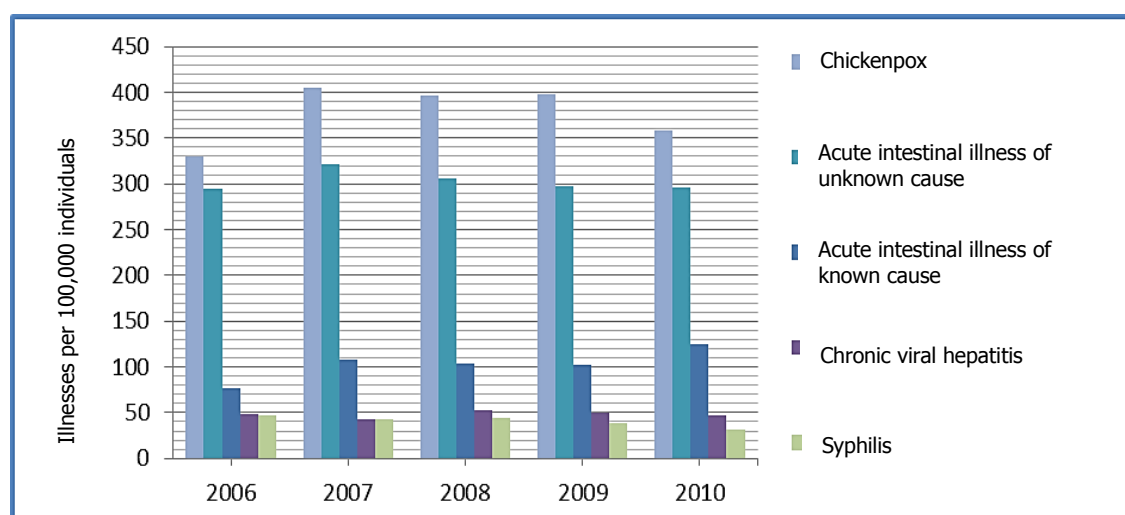
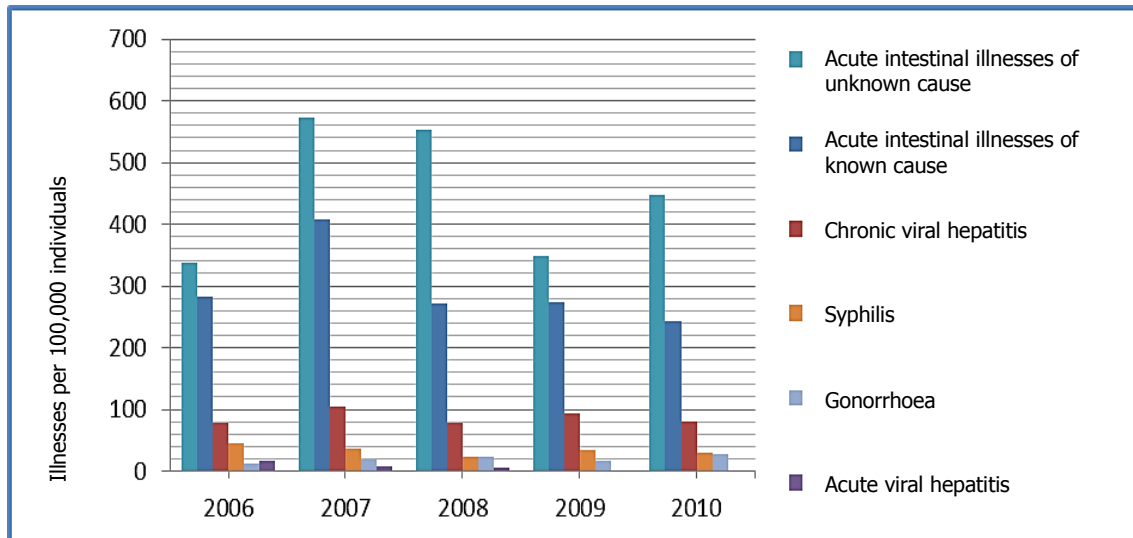


Figure 15.9 Prevalence of Infectious and Parasitic Diseases per 100,000 Population in ART Municipal District (not including chickenpox) (Ref. 15.9)



In 2011, Krasnodar Krai achieved a reduction in 40 types of infectious and parasitic diseases. The most significant reductions occurred in:

- Acute hepatitis A by 75% (compared to 33% reduction in Russian Federation);
- Acute viral hepatitis B by 49% (compared to 21.3% in Russian Federation);
- Viral hepatitis C by 45% (compared to an increase in the Russian Federation);
- Scarlet fever by 66% (compared to an increase in the Russian Federation);
- Bacterial dysentery by 31% (compared to 22.1% in the Russian Federation);
- Acute intestinal infections of unknown aetiology by 14% (the same level in the Russian Federation); and
- Newly diagnosed with syphilis by 19% (compared to 13.9% in the Russian Federation) (Ref. 15.9).

Prevalence of Sexually Transmitted Infections

Syphilis

Syphilis is recorded in the whole of the Krasnodar region. The incidence of syphilis in the past ten years has tended to decline. In 2012, the Krasnodar region recorded 1,474 cases, (28.32 per 100,000 population), including 32 cases of children up to 17 years (3.21 per 100,000 population). The new cases were recorded among all age groups of the population. The incidence of syphilis in urban population is 63.7% of the total (Ref. 15.9).

There is an inconsistent declining trend of incidence of this disease from 45.6 per 100,000 population in 2007 to 34.3 per 100,000 in 2011.

Gonorrhea

In 2012, in Krasnodar Krai the incidence of gonorrhoea decreased by 13% compared to 2009, including among children by 24.5%. During the reporting year 2012, 868 cases were registered, which corresponds to an incidence rate of 16.68 per 100,000 population compared to 14.89 per 100,000 population in 2011 and 17.78 per 100,000 population in 2010 (Ref. 15.9).

There is no stable trend in the incidence of this disease in ART municipal district. The incidence varies during the years from 12.1 per 100,000 population in 2007 to 14.9 per 100,000 in 2011.

HIV / AIDS

Currently, in the Russian Federation and in the Krasnodar region, human immunodeficiency virus (HIV) is spreading among the population. In 2012, there were 12,149 registered HIV-infected citizens of the Russian Federation, of which three were children under 17 years. In 2012, there were 1,469 cases of HIV-infected persons in the Krasnodar region (of which 52 cases were in ART municipal district). This is 23% higher than in 2011 (1,131 cases in 2011 and 1,031 cases in 2010) (Ref. 15.14).

In ART municipal district, an increase in incidence of HIV / AIDS (acquired immunodeficiency virus) was observed from 32 per 100,000 in 2010 to 35 in 2011, as well as in prevalence rates from 22.9 per 100,000 individuals in 2010 to 23.7 per 100,000 in 2011. There were three registered cases of pregnant women with HIV / AIDS both in 2010 and in 2011. The prevalence of the disease both in 2010 and in 2011 among women of fertile age is 8.2 per 100,000 individuals.

The main cause of HIV infection in the Krasnodar region, as well as in Russia, continues to be injected drug use and use of non-sterile equipment, accounting for 54.6% of all new infections in 2012. Sexual transmission of HIV continues to increase. Heterosexual intercourse is the main mode of sexual transmission in 2012, accounting for 40.3%. By the end of 2012, the cumulative number of HIV-infected women had doubled compared to 2005 and amounted to 576 (38.6% of all reported cases of HIV infection).

Closely related to AIDS diseases in Russia is tuberculosis (see 15.5.2.3). This disease is the leading cause of death for more than 45% of all HIV cases (due to being immune suppressed by AIDS).

Tuberculosis (TB)

The incidence of tuberculosis shows decreasing prevalence in Krasnodar Krai, as well as in the Russian Federation. The incidence of active tuberculosis in Krasnodar Krai decreased from 62.2 per 100,000 population in 2007 to 52.2 per 100,000 population in 2011. The prevalence also decreased from 183.8 per 100,000 population in 2007 to 147.8 per 100,000 population in 2011. According to a statistical observation in 2012, the Krasnodar region recorded 3,350 cases of newly diagnosed active TB (Ref. 15.10).

The incidence and the prevalence of tuberculosis in ART Municipal District decreased from 2010 to 2011, respectively from 78.7 per 100,000 individuals in 2010 to 50.3 per 100,000 individuals for incidence; and from 173.6 per 100,000 in 2010 to 149.6 per 100,000 for prevalence. With

regard to prevalence of tuberculosis, ART Municipal District falls in the middle range 136.1 to 184.4 per 100,000 (lowest 96.7 to highest 317.0) for Krasnodar Krai.

The mortality from tuberculosis in Krasnodar Krai decreased from 2007 to 2011 from 16.3 per 100,000 population to 10.6 per 100,000 population in 2011. The mortality from tuberculosis in ART Municipal District is 8.9 per 100,000 individuals in 2011 and it is lower than in Krasnodar Krai (10.6 per 100,000 population), but it shows an increase in comparison to mortality levels in 2010 (7.8 per 100,000 individuals).

15.5.2.3 Mental Health

The incidence of psychiatric disorders in ART municipal district increased from 79.2 per 100,000 population in 2010 to 85.3 per 100,000 population in 2011. Psychiatric disorders in ART municipal district are more than threefold lower than in Krasnodar Krai for the same period, respectively 291.7 per 100,000 population in 2010 and 270.7 per 100,000 population in 2011.

The prevalence of mental health disorders in ART municipal district has decreased from 2,415.0 per 100,000 population in 2010 to 2,048.7 per 100,000 population in 2011 and is lower than the reported for Krasnodar Krai which was 3478.2 per 100,000 population 2010 and 3388.6 per 100,000 population in 2011 (Ref. 15.10).

15.5.2.4 Alcoholic Psychosis, Alcoholism, Drug Dependency

There is a decreasing trend in incidence and prevalence of all alcohol and drug related dependency and psychosis in Krasnodar Krai. The available data for ART municipal district for 2011 shows that the levels of alcohol and drug related mental diseases are very close to those in Krasnodar Krai (Ref. 15.10).

15.5.2.5 Traumatism

Traumatism covers injuries caused by external factors. The total traumatism rate in Krasnodar Krai in 2011 per 1,000 population was 78.72 (men 96.98 per 1,000 population; women 64.88 per 1,000 population). In ART municipal district the total traumatism rate in 2011 was 43.54 per 1,000 population (51.46 for men, 36.59 for women) and was significantly lower than for Krasnodar Krai (Ref. 15.10).

15.5.2.6 Invalidity and Temporary Disability

There was a declining trend in primary invalidity in the adult population and in adults of working age in Krasnodar region in the period 2005 to 2010. In 2011, the respective indicators for Krasnodar Krai were: 65.0 per 10,000 people and 47.0 per 10,000 people. In 2011, the primary invalidity in ART municipal district was 76.18 per 10,000 people. It increased from 2010 levels of 75.75 per 10,000 individuals and is higher than the average in Krasnodar Krai.

The invalidity in children (0 to 17 years) in Krasnodar Krai was 19.03 per 10,000 and in ART municipal district 18.85 per 10,000 in 2011. Child invalidity in ART municipal district increased from 127.66 per 10,000 in 2010 to 139.75 per 10,000 in 2011, but remains lower than that in Krasnodar Krai (178.61 per 10,000 population) (Ref. 15.10).

Summary of children's disabilities (in percentage):

- 37.9% psychiatric diseases;
- 22% neurological disorder;
- 14.2% congenital disorders; and
- 25.9% others.

In 2011, in ART municipal district temporary disability was slightly lower than in 2010. In 2011, the number of lost working days was 259,929 and the total number of cases of disability was 23,280.

Temporary disability in ART municipal district by cause per 100 workers in 2011:

- 19.09 respiratory system;
- 11.29 acute respiratory illness;
- 7.25 musculoskeletal disorders;
- 5.84 cardiovascular;
- 5.37 trauma; and
- 3.7 digestive system illness.

15.5.2.7 Road Safety

National Overview

In 2009, the World Bank issued an analysis of road safety in a number of countries of Europe and Central Asia including the Russian Federation (Ref. 15.44). The key findings, with some recent updates (Ref. 15.50), are still likely to be pertinent in 2013, despite considerable efforts made by Russian authorities to improve road traffic safety.

The key findings for the Russian Federation are summarized here and in Table 15.2. About 72% of all car crashes occur in urban areas. Data for 2008 show that the majority of traffic deaths are among car occupants (52%), followed by pedestrians (36%), motorcycle drivers and passengers (5%), truck and bus drivers and passengers (4%), and cyclists and others (4%). The high percentage of pedestrian deaths in the Russian Federation contrasts sharply with other European countries (in France and Germany, for example, pedestrian deaths account for only 12% of total road fatalities). More than 50% of all road traffic deaths are among people aged 15 to 44, the most economically productive age group. Children and the elderly are also particularly vulnerable, especially as pedestrians.

One-third of car crashes in Russia are caused by speeding vehicles. Head-on collisions due to driving into oncoming lanes are a major cause of road crashes. Drunk driving accounts for 10% of all road crashes in Russia; poor road conditions and traffic management also contribute to road traffic injuries and deaths. The use of cell phones and texting devices while driving is another growing risk factor.

In 2010, the governments of the world declared 2011–2020 as the Decade of Action for Road Safety. They invited the World Health Organization to prepare a report (Ref. 15.45) that provided a baseline to assess the state of global road safety at the onset of the Decade, and to be able to monitor progress over the period of the Decade. The report included a Statistical Annex that provided information that included estimated road traffic death rate per 100,000 population for 182 countries. In terms of the death rate, Russia was ranked 115th. A comparison with other countries that border the Black Sea is set out in Table 15.2.

Table 15.2 International Ranking for Road Traffic Fatalities per 100,000 Population for Countries Bordering the Black Sea

Country	Fatalities per 100,000 Population	International Ranking
Bulgaria	10.4	48
Romania	11.1	54
Turkey	12.0	63
Ukraine	13.5	75
Georgia	15.7	94
Russian Federation	18.8	115

Regional and Local Road Safety

According to the ranking applied in the report on the Ministry of Health of Krasnodar Krai (Ref 15.10), mortality by transport incidents in the ART municipal district is in the middle range at 19.9 to 29.3 per 100,000 (the lowest in the region is 10.3 and the highest 50.1).

In Krasnodar Krai, since 2006, the number of traffic accidents has fallen; in 2011 there were 6,728 accidents, down 5% on 2006 (Ref. 15.46). In the ART municipal district, in 2011, there were 4,655 traffic accidents and 39 traffic-related deaths (Ref. 15.53).

Table 15.3 shows the number of road traffic deaths in the Russian Federation, Krasnodar Krai and the ART municipal district. For both the Russian Federation and Krasnodar Krai, there was a reduction in road traffic deaths over the period 2007 to 2009, but since then an increase has occurred.

Table 15.3 Number of Road Traffic Deaths (to nearest hundred)

Location	2007	2008	2009	2010	2011	2012
Russian Federation	32,700	29,900	26,100	27,900	27,900	28,000
Krasnodar Krai	1,193	1,143	1,155	1,175	Not available	Not available
ART Municipal District	Not available	Not available	Not available	Not available	39	Not available

Source: Ref. 14.54; Ref. 14.55; Ref. 14.56; and Ref. 14.57.

Stakeholder engagement (Ref. 15.49) has identified that road traffic and road safety are issues for the Local Community of Rassvet (Ref. 15.48 and 15.49) which is spread either side of a main north-south road. The adjoining small community of Zarya lies immediately to the east. To the west, separated by a thin strip of open land, is the much smaller community of Tarusin. This layout suggests that high traffic volumes could cause community severance. Site visits to Rassvet indicate that there do not appear to be footpaths, cycle lanes, controlled crossing points or other traffic management, as illustrated in Figure 15.10 on the main road through Rassvet which runs from the junction with the M25 (Figure 15.11) towards the community of Gai-Kodzor. It is reported that speeding vehicles are an issue on the road with vehicles travelling at speed on the downhill slope of the road as it runs north from Gai Kodzor into Rassvet (Ref. 15.48) (Figure 15.12). It has also been reported that the community has experienced an increase in road traffic connected to the construction of the Russkaya CS.

Information contained in Appendix 9.1: Traffic and Transport Study and site visits confirm that Rassvet has sensitive receptors that could be affected by traffic increases. Figure 15.10 indicates that there are approximately thirty residential properties lining the road, with additional properties accessed from side roads. Site visits have confirmed that there is a kindergarten, a number of shops and businesses, a post office and a local community centre on the main road through Rassvet. The local school is nearby. Pedestrians walk along the edge of the road. A number of school children cross the main road each day on their way to and from school. All children at the school are regularly trained regarding traffic safety issues (Ref 15.49).

In 2012, the community of Gai-Kodzor was experiencing an increase in traffic related to the construction of the Russkaya CS (Ref 15.51) (Appendix 20.1 Environmental Impacts of Associated Facilities: Russkaya CS). In 2013, a bypass was constructed by Gazprom Invest to allow traffic related to the Russkaya CS construction activities to avoid the community of Gai-Kodzor. In February 2014, the Gai-Kodzor Administration confirmed that the bypass has been effective and road traffic issues related to construction traffic have been resolved (Ref 15.50). The bypass constructed around Gai-Kodzor will also be used by the Project construction traffic in order to avoid road traffic impacts on the town of Gai-Kodzor (Ref 15.56). A similar bypass to avoid passing through the centre of the community of Varvarovka will be constructed and used by Project related construction traffic (see **Chapter 14 Socio-Economics**).

Plot Date: 22 Apr 2014
File Name: I:\5004 - Information Systems\46369082_South_Stream\MXDs\Report Maps - Russia\Russian ESIA v2\Appendix - Health Assessment\Figure 15-10 Construction Traffic Route Rassvet.mxd



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Figure 15.11 Junction of M25 (foreground) and Rassvet (top right) (Ref. 15.40)



Figure 15.12 Construction Route Looking North towards Rassvet showing Cyclists (Ref. 15.39)



15.5.2.8 Crime and Security

Table 15.4 shows that over the period from 2006 to 2009, the crime rate in Anapa Resort Town decreased by approximately one quarter. Since 2009, through to 2012, the rate has remained relatively constant. In 2012 a total 1,959 crimes were reported within the ART municipal district, representing an increase compared to the preceding three years (2009 to 2011) but still lower than the annual numbers from 2006 to 2008).

In 2011 and 2012, theft accounted for almost half of total crimes. The second highest ranking type of crime, accounting for approximately one third of crimes in 2012, is crime committed in public (the definition of which includes vandalism, amongst other things).

The highest crime levels are registered during the tourist season (June to September), when the population swells with tourists and seasonal workers. The number of crimes can increase by up to three times during this period compared with the remainder of the year with a focus on theft and other petty crimes; however, there are no incidences of serious disorder. Additional police are brought in from Krasnodar Krai during the summer high season (Ref 15.68).

Although data are not available, interviews with local officials indicated that Local Communities experience relatively lower levels of crime compared with ART as a whole and that crime tends to be concentrated within the town of Anapa rather than within the more rurally located Local Communities (Ref. 15.58).

Table 15.4 Crimes by Type, Anapa Resort Town, 2006-2012 Crimes by Type, Anapa Resort Town, 2006-2012

Indicator / Location	2006	2007	2008	2009	2010	2011	2012
Total crimes per 1,000 people	16.7	15.4	14.6	12.6	12.4	12.8	12.7
<i>Total crimes including:</i>	<i>2,200</i>	<i>2,101</i>	<i>2,032</i>	<i>1,790</i>	<i>1,827</i>	<i>1,907</i>	<i>1,959</i>
Homicide	27	12	15	16	23	13	14
Actual / grievous bodily harm	35	36	45	36	32	34	39
Theft	989	974	893	616	723	905	921
Robbery with violence	28	24	20	21	16	27	20
Robbery	129	104	91	78	62	74	80
Fraud	194	211	217	198	159	108	137
Crimes involving a firearm	0	0	0	3	1	4	3
Crimes committed in public places	439	479	452	373	452	605	668

Source: (Ref. 15.68)

15.5.3 Baseline Data by Determinant of Health

15.5.3.1 Individual Factors

Alcoholism reflects social disadvantage and brings considerable damage to health. On average in Krasnodar Krai, alcohol accounts for 10% of mortality. In some districts this impact can be significantly higher and range from 20 to 30%. In Krasnodar Krai, 50% of mortality is due to interrelated socio-economic factors and alcohol (Ref. 15.9).

For most districts of Krasnodar Krai, the main reason for elevated mortality is alcohol use, together with smoking, low salary and unsatisfactory capacity of the health systems (Ref. 15.9). Health system capacity is an institutional factor which is discussed further in Section 15.5.3.4.

In 2011, the 'health without smoking' programme (Ref. 15.15) was implemented in Krasnodar Krai aimed at banning smoking in public places.

15.5.3.2 Social Factors

In the ranking applied by a State Report on Sanitary Epidemiological and Consumer Protection in the Krasnodar region (Ref. 15.9), in 2010 ART municipal district was ranked as follows:

- Salary – in the middle range 13,399 to 17,683 Rubli per person (lowest 11,530, highest 23,144);
- Investment – in the middle range 32,325 to 71,212 Rubli per person (lowest 5,115, highest 264,853);
- Healthcare expenditure – in the middle range 4,339.1 to 5,846.6 Rubli per person (lowest 3,478.8 - highest 9485.8);
- Coverage with physicians per 10,000 population – in the highest range 25.7 per 10,000 – 49.7 per 10,000 (lowest 15.2 per 10,000); and
- Unemployment – in the highest range 1.2 to 1.9% of working population (lowest 0.3%).

Social factors and individual way of life determined more than 50% of the mortality rate (socio - economic more than 20%, healthcare 10%, alcohol 10% and smoking 10%) while the influence of environmental factors is estimated at 10%. This gives a ratio of 5 to 1 for social factors prevailing over environmental factors.

Comparison of socio-economic indicators of well-off and disadvantaged mortality in Krasnodar Krai in 2010 revealed that there is a very high association between the levels of investment in the area and the wellbeing of the population. Coverage by physicians, salary, and healthcare expenditures also play a key role in population wellbeing.

15.5.3.3 Environmental Factors

Air quality

There has been an increase of air pollution between 2000 and 2011 in Krasnodar Krai. ART Municipal District is among the sites with a concentration of air pollutants higher than the permissible levels (Ref. 15.9) (see **Chapter 9 Air Quality**).

The deterioration is likely linked to the increase in the number of cars in Krasnodar Krai (300 cars per 1000 population or more than 1.5 million cars), which accounts for about 80% of the total emissions from both transport and stationary sources of emission (Ref. 15.9).

The main emission substances measured and controlled on a quantitative basis on the territory of Krasnodar Krai between 2007 and 2011 are nitrogen dioxide, carbon monoxide, sulphur dioxide, hydrocarbons, and formaldehyde (Ref. 15.9).

The results of health risk assessments in Krasnodar Krai indicate the issue of air pollution as a priority problem for public health (Section 15.2). The combined effects of air pollution pose a risk to the body's systems, including: respiratory, immune, central nervous system, blood, eyes, systemic exposure, development, carcinogenic, nervous system, cardiovascular system (Ref. 15.9). However, as discussed in **Chapter 9 Air Quality**, the baseline reported concentrations of nitrogen dioxide, carbon monoxide and sulphur dioxide in the Project Area are below the long term and short term Russian limit value and adopted Project Standards. Concentrations of total particulate matter reported for Anapa and Gostagaevskaya are in excess of the long term Russian limit value but below the maximum peak maximum permissible concentrations (MPC) value.

Quality of the Water in the Black Sea

Analysis of the laboratory tests for recreational waters of the Black Sea over the last five years has shown that the sea water quality has improved. The proportion of samples taken to monitor bathing water standards that do not meet regulatory requirements, decreased (Ref. 15.9):

- Chemical indicators from 2.2% in 2007 to 0.2% in 2011; and
- Microbiological indicators from 4.0% in 2007 to 1.8% in 2011.

ART municipal district is one of the cleanest areas with full compliance with Russian water quality standards in 2011 (Ref. 15.9).

Drinking Water Quality

The drinking water supply source for ART municipal district is the Kuban River. The river runs through virtually all of the major population centres of the Krasnodar Krai. The largest share of the contaminants in the river comes from Krasnodar (66%), Armavir (8.6%) and Kropotkin (2.3%). Kuban river waters coming to Anapa are contaminated by micro-organisms, eggs and larvae of worms and protozoa, chemicals (iron, copper compounds, petroleum hydrocarbons, nitrites, nitrogen, organic compounds, chlorine and phosphorus-containing pesticides) (Ref. 15.9).

The quality of drinking water supplied to the distribution networks of the town of Anapa and 13 surrounding communities is monitored by Anapa water utility. Water samples are taken monthly in accordance with the timetable agreed with ART municipal district in accordance with SanPin 2.1.4.1074-01 "Drinking Water. Hygienic requirements for water quality of centralized drinking water supply. Quality Control" (Ref. 15.18).

15.5.3.4 Institutional Factors

As noted in Section 15.5.3.1, for most districts of Krasnodar Krai, one of the contributing factors to elevated mortality is said to be unsatisfactory capacity of the health systems (Ref. 15.9). The consultation feedback from the ART Municipal District Administration Deputy Chief for Health (Ref. 15.13) suggests that the unsatisfactory capacity issues do not extend to ART Municipal District, a conclusion which is supported by the figures reported for healthcare expenditure and coverage with physicians in Section 15.5.3.2.

Health Workforce Capacity

In 2011 the number of doctors per 10,000 individuals in ART municipal district was 34.5. There was a 20% rise in this indicator in ART municipal district in seven years, while in the Krasnodar Krai this indicator fell by 1.6% (Ref. 15.10).

The number of hospital beds in ART municipal district during this period fluctuated slightly and in 2011 was 1,055 units or 68.5 units per 10,000 individuals. The number of hospital beds in the Krasnodar Krai in 2011 was 90.8 for 10,000 individuals (Ref. 15.10).

Based on 2011 data, seven hospitals were operating in ART municipal district (as in 2006), as well as 18 outpatient clinics (the number of these institutions gradually increased between 2006 and 2011) (Ref. 15.10).

Table 15.5 Health Workforce in Krasnodar Krai and ART municipal district in 2005 – 2011

Subject	2005	2006	2007	2008	2009	2010	2011
<i>Number of physicians, individual</i>							
ART municipal district	383	393	420	470	500	510	531
Krasnodar Krai	21,700	22,000	21,800	22,000	22,300	22,000	22,200
<i>Number of physicians per 1,000 individuals</i>							
ART municipal district	28.7	29.1	30.5	33.6	35.1	34.5	34.5
Krasnodar Krai	42.6	43.1	42.6	42.9	43.3	41.9	41.9

Continued...

Subject	2005	2006	2007	2008	2009	2010	2011
<i>Number of secondary medical personnel, individual</i>							
ART municipal district	836	813	884	1,024	1,060	1,107	1,096
Krasnodar Krai	47,300	47,200	47,100	47,600	47,700	47,500	47,000

Complete.

There was a considerable increase in the number of physicians and secondary medical personnel in ART municipal district in 2006 to 2011; whilst there has not been a significant change in the number of physicians in the Krasnodar Krai region as a whole: it fluctuated within 21,700 to 22,300 individuals. The number of physicians for 10,000 individuals in 2011 is 41.9, which is higher than in ART municipal district (34.5).

The number of physicians in the Russian Federation rises every year with a higher number (51.2 for 10,000 population) compared to ART municipal district and the Krasnodar Krai.

The number of secondary medical personnel has been falling since 2009 in the Russian Federation. In the Krasnodar Krai there are 89 for 10,000 individuals, which is higher than in ART municipal district. In regards to the number of secondary medical personnel in the Russian Federation, there is no general pattern of increase or decrease in this category of individuals and the figure changes every year (Ref. 15.10).

Healthcare Services

According to the data published on the Ministry of Health of Krasnodar Krai website (Ref. 15.17), primary care stations, dental and emergency healthcare facilities ensure access to healthcare for the residents of ART municipal district.

Primary Care

The 17 primary care stations with assistant physicians to provide obstetrics care are listed in Table 15.6.

Table 15.6 Health Workforce in Krasnodar Krai and ART municipal district in 2005 – 2011

Outpatient medical practices	Specialized Centres	Hospitals (with polyclinics)
Anapskas station, 230 visits per shift	Trauma center in Anapa Resort Town	Central City Hospital with 580 beds (with a polyclinic for 500 visits per shift);

Continued...

Outpatient medical practices	Specialized Centres	Hospitals (with polyclinics)
Varvarovka, 20 visits per shift	Oncological, cardiovascular and perinatal centres in Novorossiysk town	Children City Hospital with 150 beds (with a polyclinic for 580 visits per shift);
Gaykodzor, 65 visits per shift		Maternity Hospital 140 beds (with a polyclinic for 200 visits per shift);
Tsybanobalka, 60 per shift		UHospital number 1 in Grape for 40 patients (with a polyclinic for 190 visits per shift);
Sioux Pseh, 150 visits per shift		UHospital number 2 in Gostagaevskaya for 40 patients (with a polyclinic for 120 visits per shift); and
Vitjazevo, 175 visits per shift		UHospital B number 3 Day for 40 patients (with a polyclinic for 205 visits per shift).
Medical and Prevention Centre (and Polyclinic), 35 per shift		

Complete.

The number of hospital beds, including day care beds in hospitals in the district was 990 in 2013. ART municipal district has a lower number of hospital beds per 10,000 population (61.6) than Krasnodar Krai (average 80.8 per 10,000 population).

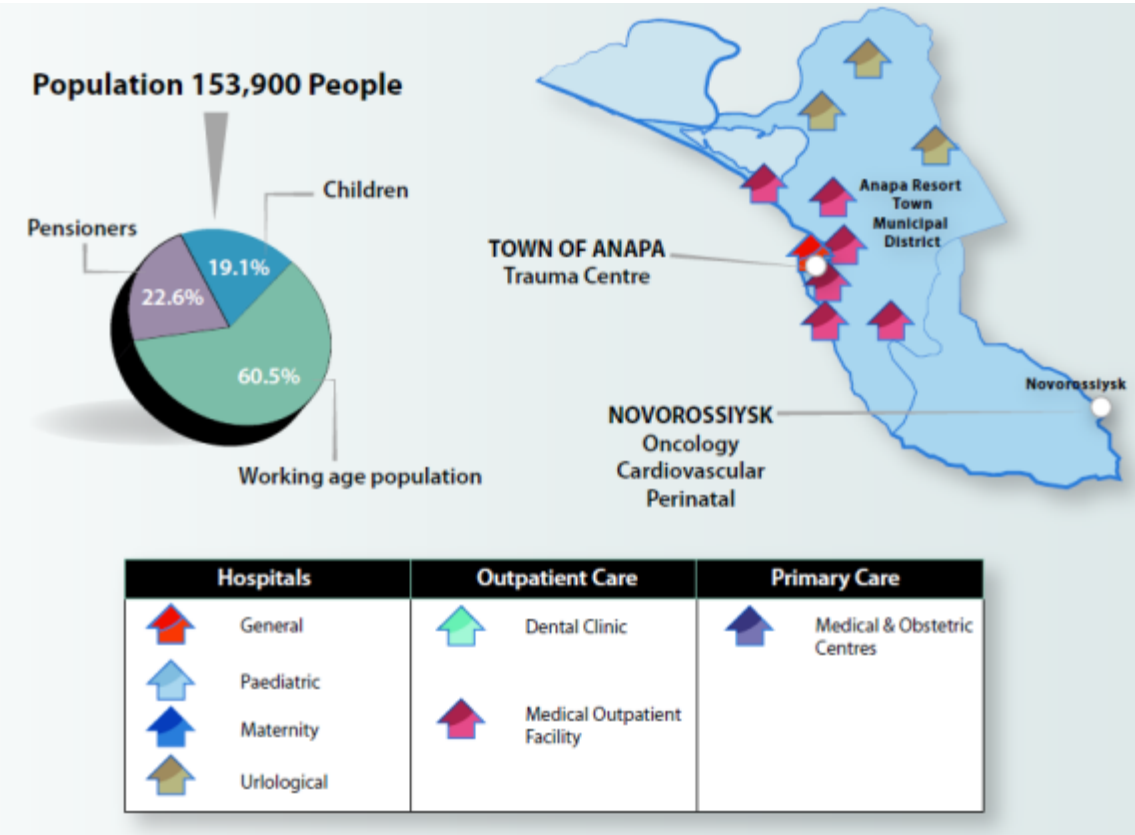
Dental Care

The Ministry of Health of Krasnodar Krai lists one dental clinic which has 350 visits per shift; no further information on the clinic is provided.

Emergency Care

The average of visits per shift for outpatient clinics in the district is 2,880. The average time required for an ambulance to arrive in Krasnodar Krai to the patient in 93.2% of cases was under 20 min.

Figure 15.13 Healthcare Facilities in Krasnodar Krai (Ref 15.10)



The total hospital mortality in ART municipal district is 1.21%, which is lower than in Krasnodar Krai (1.38%). The leading causes of hospital mortality are: cardiovascular diseases 55.13%; diseases of digestive system 12.81%; cancer 7.91%; trauma 7.88%; respiratory diseases 4.72%; and infectious diseases 11.55%.

Indicative Health Performance of ART Municipal District

The indicative health performance in Krasnodar region includes indicators of medical and social performance, of resource use, and satisfaction from the delivery of health care (Ref. 15.9).

The most problematic indicators reflecting the medico-social performance are the incidence of alcohol psychosis, acute hepatitis and exacerbation of chronic diseases. Other unfavourable indicators are those relating to child and adolescent mortality. These indicators will be influenced by access to health services and also by wider social and economic factors (Ref. 15.12). Despite good coverage with doctors and nurses, the high number of emergency care calls suggests that access to primary healthcare remains a challenge.

To receive specialized high technological medical care the residents of Krasnodar Krai (including ART municipal district) are referred to federal clinics in Moscow, St. Petersburg, Obninsk and Ufa. As a result of the investment made by the national priority project “Health” in Krasnodar

Krai (Ref. 15.10), the number of residents of the region, who have received high-tech medical services in 2011 increased by 4 times compared with 2006.

The integrated rating for medico-social performance, 'effective use of resource and satisfaction with medical services' ranks ART municipal district 17 out of 44 districts. Although ART municipal district is showing a good effective use of resources (10 out of 44) and relatively good medico-social performance (22 out of 44), the population of ART municipal district does not appear to be satisfied by the quality of medical services provided (Ref 15.9).

Capacity and Type of Local Medical Facilities

Local officials at the Anapa Resort Town Municipal District Administration (Ref 15.5) provided information in February 2014 related to local health facilities in the Local Communities and in the town of Anapa. The Anapa hospital has over 700 doctors and nurses and 720 patient beds. The ART municipal administration officials stated that mobile health units are needed in order to service the local population outside the town of Anapa.

Due to the Anapa Resort Town area being a tourist destination, provision is made for extra capacity in the summer months to accommodate increasing demand. In each resort area, at least three additional ambulance cars are added during peak season in Anapa. There is an estimated 30 percent increase of staff – including up to 12 doctors working in 3 shifts. At local hospitals, including in the town of Anapa, there are 2 to 4 additional doctors in the peak season. There is a sufficient number of nurses and, if required, medical staff numbers can be supplemented with senior graduates of the local medical college and commercial clinic personnel. Some doctors have medical posts on the beaches which are affiliated with the health sanatoriums in the area. It is viewed by health professionals as prestigious to work in the town of Anapa area due to the high quality facilities, and level of education of personnel.

The hospital in the town of Anapa (which is classified as a trauma two hospital) has specialised units for trauma, cardiology, neurology, blood vessels, infections, general paediatrician, psychiatry, and has x-ray, CAT scanners and other similar level equipment. If the hospital cannot assist patients requiring more specialized treatment, they are sent to Krasnodar, or to the blood vessel centre in Novorossiysk. For eye emergencies, the town of Anapa hospital can provide treatment but eye surgery is deferred to Krasnodar. In Krasnodar, the hospital has helicopter capability (the trip from Anapa to Krasnodar is 40 to 45 minutes), a burn unit and full surgery capabilities (including for heart and joints). There is also a hyperbaric centre in Krasnodar.

During the high season, the most common ailments treated in the town of Anapa hospital include trauma, food poisoning, and head colds. For children, the most common diagnosis is digestion and related food issues, and trauma from a fall or other accident.

In the community of Gai Kodzor there is a laboratory and a physiotherapy room. In the community of Rassvet, there is a medical point with a doctor and nurse on duty although there is no ambulance or emergency facility. The municipal district administration is planning in 2015 to build a general practice in Rassvet for both adults and children.

Ambulances originate from the Anapa emergency facilities or from emergency sub-stations located in the surrounding communities, including Supsekh which is the closest emergency sub-

station to the Local Communities. Patients requiring emergency service are taken to health facilities in the town of Anapa.

15.5.4 Emergency and Disaster Response

Emergency and Disaster Response is discussed in **Chapter 19 Unplanned Events**. Specifically, South Stream Transport will ensure that contractor Emergency Response Plans appropriately integrate with the Disaster Management Plan for Anapa municipality and the National Disaster Management Plan with regard to command and control systems, points of first contact during emergencies, local capabilities and capacity.

15.6 Legal and Policy Context

The community health, safety and security assessment has considered relevant Russian federal (national) and regional legislation, applicable standards and guidelines for international finance, and international agreements to which the Russian Federation is a signatory. All applicable standards relevant to the ESIA are presented in **Chapter 2 Policy, Regulatory, and Administrative Framework**, with those of particular relevance to health, safety and security summarised below.

15.6.1 IFC Performance Standards (PS)

Performance Standard 1

PS 1 is addressed across the entire ESIA (see **Chapter 2 Policy, Regulatory, and Administrative Framework**); however the following points are noted with regard to the community health, safety and security impact assessment. Climate change is included in the consideration of cumulative impacts. The methodology includes stakeholder engagement and assessment of vulnerable groups who may be disproportionately affected (Section 15.4.2). In adopting mitigation measures the mitigation hierarchy has been used (Section 15.10). Emergency response planning is discussed as part of the assessment of resource demands on health and other emergency services.

Performance Standard 2

PS 2 (Ref. 15.18) recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers.

The aspects of PS 2 most relevant to occupational health are linked to discussions in the socio-economic assessment which can be found in **Chapter 14 Socio-Economics**. **Chapter 22 Environmental and Social Management** also discusses the Grievance Procedure, an important aspect of the management of occupational health and safety issues. Appendix 15.1 assesses the requirements for a safe and healthy work environment and occupational health issues are discussed further within that Appendix and are not addressed further within this chapter.

Performance Standard 3

PS 3 (Ref. 15.20) recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.

The following points in relation to PS 3 are noted with regard to the health, safety and security assessment. The assessment takes into consideration the current baseline conditions of affected areas and populations such that impact significance and mitigation measures are sensitive to the level of current environmental degradation. The assessment sections review the potential for pollution, disturbance and resource use to impact human health and where appropriate include technically and financially feasible mitigation measures which aim to avoid (and where this is not possible, minimize) such adverse impacts.

Performance Standard 4

PS 4 (Ref. 15.21) recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts and recognizes the responsibility of the project to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.

The following points are noted with regard to the health, safety and security assessment in relation to PS 4. The assessment evaluates risks and impacts to the health and safety of Local Communities throughout the Project life-cycle and where appropriate outlines control and mitigation measures consistent with GIIP. The mitigation measures specified in this chapter are commensurate with the nature and magnitude of the impacts that they aim to avoid (or where this is not possible, minimize). The assessments and **Chapter 19 Unplanned Events** consider community exposure to hazards. Mitigation measures have been included to minimize exposure. The assessment has included consideration of disease associated with water and communicable diseases (including the potential for impacts on vulnerable groups) (See Ref. 15.2 and Section 15.10). Vector-borne diseases were considered but scoped out (see Section 15.8 and Appendix 15.2: Potential impacts discussed in other ESIA chapters and scoped out of the community health, safety and security assessment).

15.6.2 National Legislation

Public Health Policies

National Priority Programme “Health” (Ref. 15.10) is the overall strategic document at the federal level in Russia until 2020. Its main priorities have been implemented also at the regional level in Krasnodar Krai and include:

- Promoting Healthy Lifestyles – decrease smoking, alcohol use, prevent infectious diseases;
- Strengthening primary healthcare and disease prevention;
- Improving access and quality to specialized and high technology healthcare; and
- Improving maternity and paediatric health care.

Communal Infrastructure

The concept of health risk has been reflected in a number of laws (Ref. 15.22) and regulations (Ref. 15.23 and Ref. 15.24). These include resolutions by the Chief State Sanitary Doctor of the Russian Federation (Ref. 15.25, Ref. 15.26 and Ref. 15.27), which concern sanitary protection zones and classifications.

Risk assessment methodology currently represents the best analytical tool for the characterization of the influence of environmental factors on the health status of the population and is based on criteria that reflects the direct impact of chemicals on the human body. Currently, a health risk is defined as the probability of the threat to life or human health due to exposure to environmental factors. These types of exposures are considered in the assessment.

15.6.3 Regional / Local Policy

Specially Protected Natural Area and Sanitary Control Zones of ART Municipal District

The ART municipal district was designated a health resort town in 1957 (Ref. 15.52) and is designated at a Russian federal level as a specially protected natural area⁴ (SPNA) (Ref. 15.53), under the category of 'health improving (spa) resort area' known as the Anapa Sanitary Protection Area (SPA) (Ref. 15.54). The Anapa SPA designation entails a series of development control regimes that apply to three different sanitary protection zones (SPZs) within the SPA, the general purpose of which is to protect the area from any activities that may adversely affect the natural therapeutic resources and sanitary conditions of the resort town area (Ref. 15.55).

The three SPZs within the Anapa SPA are:

- Exclusion zone (the first zone of the SPZ);
- Limitation zone (the second zone of the SPZ); and
- Monitored zone (the third zone of the SPZ).

The regime of commercial use and zoning of the territory is determined by the laws of the Krasnodar Krai General Assembly (Ref. 15.28).

The exclusion zone covers territories of mineral waters occurrence on the surface, their withdrawal from wells, locations of therapeutic mud deposits, mineral lakes and coastal salt lakes, which water is used for medical purposes, beaches, and near-shore areas at the distance of 2 nautical miles (3.7 km) from the coast and over 100 m wide territories adjacent to beaches. The territory of the exclusion zone is excluded from any commercial activities not connected directly with studying, use of the natural therapeutic resources of the resort, permanent and temporary residence of citizens, construction of facilities, mining and

⁴ SPNA zones can also be designated for a number of other purposes such as wetlands, protected natural landscape, traditional nature use, national parks, natural moments, etc.

earthmoving operations and other activities that may cause adverse impact on the natural therapeutic resources and sanitary conditions of the resort.

Within the limitation zone it is prohibited to construct facilities and structures, perform earthmoving and mining operations other than directly related to development and improvement of the resort, construct drain wells, arrange irrigation fields and subsurface filtration, cemeteries, cattle breeding complexes and farms, burial grounds for animal refuses, landfills (dumps) for production and domestic wastes' disposal, green plants' felling (except of sanitary felling); use land plots, forest lands and water bodies for any purposes, which may bring to quality and quantity loss of the natural therapeutic resources of the resort.

Within the monitored zone it is permitted to perform all works, which cannot impact adversely on the natural therapeutic resources and the sanitary conditions of the resort.

The territory of ART municipal district also includes the State Natural Sanctuary "Utrish" (SPNA of the federal level) and four SPNAs of the regional level.

- Monument of nature 'Karabetova Gora (hill) with mud volcanos';
- The State Natural Sanctuary 'Krasnaya Gorka';
- Monument of nature 'Zheleznyi Rog Cape';
- Monument of nature 'Panagiya Cape'; and

These SPNA also have a special regime of use.

15.7 Impact Assessment Methodology

The following sections set out the methodology for the community health, safety and security impact assessment. Information within **Chapter 5 Project Description** (along with other chapters as relevant) and the baseline characteristics provided above have been used to assist the evaluation of the potential impacts and their significance.

15.7.1 Methodology

The impact assessment methodology follows the International Finance Corporation (IFC) guidance on Health Impact Assessment (Ref. 15.1). The IFC guidance stresses that *'the level of effort to assess health impacts should be proportional to the potential health impacts and risks. It is vital to get a good balance that allows health issues to be integrated into project planning and implementation in a timely and cost-effective manner'*.

Most of the guidance provided by IFC is applicable and consistent with GIIP. The main exception is the categorization of environmental health areas which were designed for developing, non-OECD countries. For example, it emphasizes vector borne diseases which have a prevalence rate in Africa but do not have a high prevalence rate in Russia. The categories of environmental health areas mix health outcomes and health determinants. However, the revised guidance does offer an alternative to distinguish environmental, social and institutional determinants of health. This preferred method of categorization has been adopted for this assessment.

The method of prioritization proposed by IFC and which follows GIIP is based on combining probability and severity to assess significance. By contrast, the methodology utilized for this ESIA combines sensitivity and magnitude to determine significance. In practice, neither method is entirely suitable for assigning significance to health impacts and both are difficult to use consistently across all health issues. In many cases, significance is a judgement made explicitly by the assessor and justified with supporting text. It highlights the issues which are priorities for mitigation. The choice of prioritization method does not change that judgement. The use of sensitivity and magnitude to determine significance is therefore seen as an acceptable departure from the IFC guidance on health impact assessment (Ref. 15.1).

The health, safety and security assessment forms part of a prospective process, which means that it is undertaken in advance of the implementation of the Project, thereby providing sufficient opportunity to enable 'constructive modifications' to be made to the Project should negative potential effects be identified and mitigations required. The presumption has been to draw up a wide scope of the potential health issues and potentially affected population groups. This wide scope was then narrowed to those health issues and population groups that are most affected by the Project. These issues and population groups have been assessed, including a classification of the significance of the potential impacts.

The health, safety and security assessment has included consideration of direct, indirect, and cumulative changes in community exposures to environment-based health risks, such as communicable diseases, equipment incidents, and exposure to hazardous materials or conditions.

The health, safety and security assessment has been framed and informed by work undertaken for other parts of the overall Project impact assessment (e.g. air quality and noise modelling) and has taken into account the findings of other chapters to inform the assessment of impacts on human receptors; including but not limited to **Chapter 14 Socio-Economics, Chapter 9 Air Quality, Chapter 10 Noise and Vibration** and **Chapter 13 Landscape and Visual**.

The findings of this chapter are also supported by several appendices including Appendix 9.1 and Appendix 14.1 South Stream Offshore Pipeline Fisheries Study. Additionally, this chapter has also referred to Appendix 12.2 Sediment Dispersion Study.

15.7.2 Determinants of Health

As described in Section 15.2, the Project has the potential to affect a broad range of environmental, social and institutional determinants of health either positively or negatively; examples are illustrated in Table 15.7.

Table 15.7 Determinants of Health (Ref. 15.29)

Categories of determinants of health	Examples of specific health determinants
Individual factors: genetic, biological, lifestyle / behavioural and / or circumstantial. Some of these factors can be influenced by proposals and plans, others cannot.	Gender; age; dietary intake; level of physical activity; tobacco use; alcohol intake; personal safety; sense of control over own life; employment status; educational attainment; self-esteem; life skills; stress levels; etc.
Social factors: community and / or economic / financial conditions.	Access to services and community (health, shopping, support, etc.); social support or isolation; housing; income; distribution of wealth; sexual customs and tolerance; racism; attitudes to disability; trust; sites of cultural and spiritual significance; local transport options available; etc.
Environmental factors: physical.	Quality of air, water and soil; access to safe drinking water and adequate sanitation; disease vector breeding places; land use; urban design
Institutional factors: the capacity, capabilities and jurisdiction of public sector services.	Availability of services, including health, transport and communication networks; educational and employment; environmental and public health legislation; environmental and health monitoring systems; laboratory facilities; etc.

15.7.3 Receptor Sensitivity

Table 15.8 describes the criteria used to assess the sensitivity of community receptors.

Table 15.8 Receptor Sensitivity Criteria for Community Health and Safety

Sensitivity	Description
High	<p>Community groups who are very vulnerable because they have high sensitivity to the impacts of the Project and very limited coping strategies.</p> <p>Groups who are very young, very old or disabled may have high sensitivity to changes in environmental health determinants, such as air quality and noise levels.</p> <p>Groups who are poorer or who have lower social status have high sensitivity to changes in social health determinants because they have less access to medical care, complaint procedures or political representatives. They may be marginalised.</p>

Continued...

Sensitivity	Description
High	<p>Groups who share resources constantly with the Project may be more sensitive to its impact. This could include users of roads, tracks, wild foods and marine resources. It could also include those who live adjacent to a Project component such as a busy road. It could include cyclists and pedestrians sharing roads with construction vehicles more than twice per day.</p> <p>Some groups may normally engage in high risk behaviours which make them more sensitive to changes in risk. For example, members of the community who drive dangerously along roads used by construction traffic; those who purchase or provide unprotected sex.</p> <p>Some receptors may anticipate risks to their health and wellbeing and express high levels of anxiety. They are likely to be very aware of actual changes.</p> <p>The technical hazards of a project component may be unfamiliar and poorly understood by a community; and this could increase sensitivity.</p>
Moderate	<p>Communities with some coping strategies and some vulnerabilities, who are classed as less sensitive than the high sensitivity group. They are likely to experience temporary inconvenience as a result of changes in environmental or social determinants of health. They may share resources occasionally with the project, such as two peak uses of roads each day. They express some concerns and anxieties regarding the impact of the project on their wellbeing. They have some, but not complete, understanding of the technical hazards associated with project components.</p>
Low	<p>Communities with sufficient coping strategies who feel little or no challenge to their wellbeing as a result of project activities. They may share resources with the project occasionally and broadly understand the hazards associated with project components. Most drivers of private vehicles are in this category.</p>
Negligible	<p>Communities who do not share resources used by the project and have not raised concerns about potential impacts. They are generally not inconvenienced by project activities or exposed to project-related hazards.</p>

Complete.

As health impacts may or may not be evenly distributed across the population, the assessment has considered the equity of impacts. Vulnerability is a key consideration within the general discussion of social, environmental, and institutional determinants of health. In many cases, certain subgroups (for example, children, women and the elderly) may be disproportionately affected.

There is also some geographical variation in community sensitivity. The Project is located within an area that is mainly agricultural in nature; the nearest Local Community is Varvarovka, the centre of which is located approximately 2 km northwest of the landfall section of the Project. The other Local Communities are Gai Kodzor, Supsekh, Rassvet and Sukko. The town of Anapa (estimated population 59,000) is the nearest large urban settlement, approximately 10 km to the north of the landfall section of the project. The town of Anapa has been given the status of

a health resort town since 1957 and is a specially protected natural area (SPNA) at the federal level (see Section 15.6.3).

The noise, air quality and socio-economic assessments identified a number of specific residential receptors close to the landfall section of the Project or close to proposed construction access routes that may also be affected by impacts related to community health, safety and security (see **Chapter 10 Noise and Vibration**).

Not all of the residences are likely to be occupied during the Project Construction and Pre-Commissioning Phase:

- 'Chateau Club Village' is a proposed residential development covering an area of approximately 69 ha located on the north-eastern edge of Varvarovka, just outside of the officially designated boundary or urban limit of the community. The proposed Varvarovka bypass road for the Project passes partly along the edge of and partly through the middle of the proposed development. This development has been placed on hold as an agreement has been concluded with the developer to use the road through the site as a temporary access road (i.e. for the Varvarovka bypass road) (Ref 15.57).
- Receptor 5: The closest residential receptor to the landfall facilities (excluding the access roads) is the Clearing in the Woods ("Lesnaya Polyana") development which is just beyond the outermost exclusion zone (Exclusion Zone 3 / A-class). Lesnaya Polyana is divided into approximately 160 plots, varying in size from 600 m² to 1,700 m² (Ref. 15.39). Some internal infrastructure has been completed, however, the date when dwellings will first be occupied is not clear and it has been assumed, for the purposes of this assessment, that the development will not be occupied prior to the completion of the construction of the landfall section of the Project.

As the noise and air quality assessments have also found that all impacts during the Operational Phase are Not Significant, the above, currently unoccupied receptors, are not considered further in this assessment. They have been included in the discussion on mitigation and monitoring measures (Sections 15.8.1.3 and 15.8.2.3).

The remaining occupied specific residential receptors considered in the health, safety and security assessment are:

- Receptor 1: A group of residential dwellings situated in the southern extremity of the nearby town of Varvarovka, approximately 800 m north of the microtunnel entry points;
- Receptor 2: A group of dwellings on the coast, which include the Shingari holiday complex and the Don holiday complex, approximately 1.3 km south of the microtunnel entry points;
- Receptor 4: A residential dwelling situated in the north-eastern part of Varvarovka, approximately 1.5 km north of the landfall facilities, and 50 m to the north of the Varvarovka bypass road. The dwelling is representative of properties that may be impacted by construction traffic;
- Receptor 8: Two log cabins that have recently been built on cleared land, approximately 1.1 km south of the landfall facilities. These have been considered in the noise assessment;

- Receptor 13: Varvarovka village cemetery located to the northwest of the pipeline corridor at a closest approach of approximately 530 m. The temporary microtunnel access road will run near the cemetery at a distance of 100 m to the east; and
- Receptor 16: Residential properties within Rassvet, which are representative of the properties closest to the proposed construction route and which may be impacted by construction traffic.

15.7.4 Impact Magnitude

Project activities can have impacts on the health of receptor groups.

In the case of community health, it is assumed that a wide range of illnesses and disabilities are already present in the population and this is the baseline prevalence rate. There is a risk that the Project causes, or is attributed to cause, an increase in the incidence and hence prevalence rate of some of the existing conditions. As people value their health, even a small increase in the prevalence rate of a disease or disability that is attributable to the Project is classed as a high magnitude event.

Table 15.9 classifies impact magnitude for the community health, safety and security assessment.

Table 15.9 Impact Magnitude Criteria

Magnitude Characteristic	Magnitude Examples			
	<i>Negligible</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
<i>Extent (within a defined community)</i>	No additional illness attributable to project	<1% additional cases of morbidity	<10% additional morbidity	>10% additional morbidity
<i>Duration</i>	No time lost to illness or injury	Cannot work for <24 hours	Acute illness <1 month	Chronic disease > 1 month or death
<i>Reversibility</i>	No illness or injury	Minor illness for which full recovery is expected	There is a risk of long term disability	Irreversible / Permanent
<i>Frequency</i>	Never	Very rare	Rare	Occasional

15.7.5 Impact Significance Criteria

In accordance with the methodology adopted for this impact assessment, receptor sensitivity and impact magnitude are combined to assess significance using the matrix shown in Table 15.10. There is no global consensus on the criteria that should be defined and used in community health impact assessments and Good International Industry Practice consists of seeking consistency and transparency. In some cases, professional judgement of significance

has to be made without strict adherence to the magnitude and sensitivity criteria, because the criteria do not apply or need to be adjusted to the health issue under consideration.

Table 15.10 shows a significance assessment matrix regarding the relationship between Receptor Sensitivity and the Event Magnitude of Project impact on the receptors in terms of area and time of impact.

Table 15.10 Significance Matrix

		Receptor Sensitivity (vulnerability and value)			
		Negligible	Low	Moderate	High
Impact Magnitude (extent, frequency, reversibility, duration)	Negligible	Not significant	Not significant	Not significant	Not significant / Low*
	Low	Not significant	Low	Low / Moderate†	Moderate
	Moderate	Not significant	Low / Moderate	Moderate	High
	High	Low	Moderate	High	High

* Allows technical discipline author to decide if impact significance is Not Significant or Low.

† Allows technical discipline author to decide if impact significance is Low or Moderate.

15.7.6 Impact Mitigation

The ESIA Report uses the impact mitigation hierarchy (**Chapter 3 Impact Assessment Methodology**). The terminology includes avoid, abate, attenuate, remedy and compensate. These terms may not have obvious meanings in a health context. Table 15.11 provides additional clarification and alternative terminology for community health, safety and security. When advocating mitigation, the highest possible level in the hierarchy should be chosen. For example, there should generally be no obligation for the community to change their own behaviour as a result of the Project in order to remain safe and healthy.

Table 15.11 Mitigation Hierarchy

Hierarchy	Examples
Legislation	Standards for noise, air and water quality
Avoid or eliminate	Design out, e.g. reduce risk of sexual transmitted infections by employing local rather than foreign workers
Reduce through engineering controls	Design in, e.g. provide double glazing to receptor, build bypass
Reduce through management controls	Prevent night time driving of project vehicles, condom distribution, grievance mechanisms

Continued...

Hierarchy	Examples
Change community behaviour	Apply evidence based health and safety promotion techniques
Repair	Medical care
Compensate	Financial compensation, rehabilitation

Complete.

In the Section 15.8, impacts are assessed and discussed. Mitigation measures are identified to address these impacts following the application of which, the significance of any residual impact (i.e. impact remaining after mitigation measures have been implemented) is stated.

South Stream Transport has developed a Grievance Procedure for the Project, which will guide the management of grievances throughout the Project lifecycle (**Chapter 6 Stakeholder Engagement**.) The Grievance Mechanism will be implemented by South Stream Transport in partnership with its contractors and will ensure that grievances are brought to the attention of the appropriate Project staff and addressed in an appropriate and timely way. The Grievance Procedure describes the process by which a grievance is documented, investigated, and resolved in coordination with the affected stakeholders.

Monitoring measures and the Grievance Procedure have not been listed individually against impacts in the following sections but can be assumed to apply to all potential Project health, safety and security impacts per the HSSE-IMS (**Chapter 22 Environmental and Social Management**).

15.8 Assessment of Potential Impact: Community Health, Safety and Security

The assessment takes as its starting point the 'residual' impacts and mitigation measures already included in other ESIA chapters. This allows the community health, safety and security assessment to focus on any outstanding issues that have a bearing on community and population health, safety and security and avoids duplication and restatement.

The assessment assumes the successful implementation of mitigation measures described in other ESIA chapters. The mitigations proposed in other ESIA chapters are therefore important to minimising potential impacts and a range of potential impacts have been scoped out on the basis that those mitigations adequately address any potential impact to community health, safety and security. A summary of these potential impacts and the chapters of this ESIA Report where they are discussed is presented in Table 15.12. A fuller explanation of these potential impacts, how they relate to community health, safety and security, along with mitigation measures proposed in the relevant chapters of this ESIA Report and the basis on which these potential impacts have been scoped out of the following assessment is presented in Appendix 15.2.

Table 15.12 Potential impacts discussed in other ESIA Chapters and scoped out the of the community health, safety and security assessment

Potential impact	Relevant ESIA Chapter
<i>Construction phase – onshore, nearshore and offshore</i>	
Disruption of community third party utilities as a result of accidental damage during construction.	Chapter 5 Project Description
Use of radioactive sources for weld inspection. Integrity testing of the pipes and their welds may include x-ray tests.	
Pre-construction pipeline route surveys causing temporary land loss or disturbance. Construction land take causing permanent change of land use or restriction on land use activities.	Chapter 14 Socio-Economics
Risk of house price and food price inflation due to in-migration of non-local workers during Construction Phase. Risk of house price devaluation due to proximity of the development. Adverse impact on local tourism due to disruption and reduced visual appeal and local amenity of the area due to industrial nature of project.	
Release of dust from excavation and construction traffic movements.	Chapter 9 Air Quality
Deposition of mud on the local roads from construction vehicles. Fuel and oil leaks and spills from construction vehicles / plant from activities related to the main onshore facility. Waste generation, storage and disposal, including drilling lubricants and waste fluids from construction.	Chapter 8 Soils, Groundwater and Surface Water
Light pollution from construction works from activities related to the main onshore facility.	Chapter 13 Landscape and Visual
Restriction of access / fragmentation of access due to construction works.	Appendix 9.1
Ground excavations, including foundations, trenching and tunnelling.	Chapter 22 Environmental and Social Management
Air quality emissions from marine vessels engaged in nearshore and offshore survey, dredging, pipe-laying and support activities.	Chapter 9 Air Quality
Noise and vibration emissions (airborne and underwater) from nearshore and offshore survey, dredging, pipe laying and support activity engines and on-board plant.	Chapter 10 Noise and Vibration

Continued...

Potential impact	Relevant ESIA Chapter
Physical presence of construction vessels in nearshore area (within sight from shore).	Chapter 13 Landscape and Visual
Increase in vessel traffic restricting recreational / commercial uses of nearshore and offshore zone, including ports and any exclusion zones. Local job creation for nearshore and offshore activities. Unemployment for nearshore and offshore workforce at the end of the Construction Phase.	Chapter 14 Socio-Economics
Dredging and pipe laying activities causing the release of sediments to water column (altering water chemistry and increasing turbidity).	Appendix 14.1
Risk to community and public safety from unauthorised access to construction worksite.	Chapter 22 Environmental and Social Management
<i>Operational Phase – onshore, nearshore and offshore</i>	
Fuel and oil leaks and spills from vehicles / plant engaged in maintenance and repair activities.	Chapter 8 Soils, Groundwater and Surface Water
Air quality emissions from operational plant, vehicles and materials, including commissioning heaters. Controlled venting of natural gas from dispersion stack as part of emergency shutdown procedures.	Chapter 9 Air Quality
Noise and vibration emissions from operational plant.	Chapter 10 Noise and Vibration
Visual impact of industrial complex replacing rural setting. Operational land use change including proposed safety exclusion zones.	Chapter 13 Landscape and Visual
Local job creation.	Chapter 14 Socio-Economics
Site security enforcement.	Chapter 22 Environmental and Social Management
Air quality emissions from marine vessels engaged in nearshore and offshore pipeline surveys and repairs.	Chapter 9 Air Quality

Continued...

Potential impact	Relevant ESIA Chapter
Noise and vibration emissions from nearshore and offshore marine vessels.	Chapter 10 Noise and Vibration
ROV and RTV nearshore survey activity and pipeline maintenance activities causing the release of sediments to water column (altering water chemistry and increasing turbidity).	Chapter 12 Marine Ecology
Physical presence of survey and maintenance vessels in nearshore area (within sight from shore).	Chapter 13 Landscape and Visual
Increase in vessel traffic restricting recreational / commercial uses of nearshore and offshore zone, including ports and any exclusion zones during surveys and repairs. Local job creation for nearshore and offshore activities has the potential for positive physical and mental health outcomes. Unemployment for nearshore and offshore workforce at the end of the Construction Phase.	Chapter 14 Socio- Economics
<i>Construction and Operational Phases – nearshore and offshore</i>	
Waste generation, storage and disposal on-board vessels.	Chapter 18 Waste Management
Collision with other vessels during nearshore and offshore activities resulting in personal injury or fatalities. Fuel and oil leaks and spills from vessels / plant engaged in nearshore and offshore activities.	Chapter 19 Unplanned Events

Complete.

It is important to note that the mitigation measures presented in the community health, safety and security assessment in the remaining sections below are in addition to, and not alternatives to, the measures presented in other chapters and all measures work together in order to achieve the impact rankings presented for residual impacts.

15.8.1 Impact Assessment: Construction and Pre-Commissioning Phase

15.8.1.1 Introduction

This section identifies the potential impacts and risks to community health receptors which require further assessment using the community health, safety and security impact assessment methodology. For those effects where potentially significant pre-mitigation impacts are assessed in Section 15.8.1.2, potential mitigation measures have been identified in Section 15.8.1.3. This is followed by a residual impact assessment, the results of which are set out in Section 15.8.1.4.

15.8.1.2 Assessment of Potential Impacts (Pre-mitigation)

Social Factors

There will be an incoming, temporary workforce required for Project construction (it is not yet known what proportion of this workforce will originate from within the EU). The majority of onshore and offshore workers are likely to be adult males.

The Construction Phase will generate approximately 330 temporary jobs onshore during the peak of construction. It is anticipated that the onshore construction workforce will be accommodated in the local area and that they will interact with local communities. The extent of this interaction will depend on the living, working and recreational conditions for the workforce. Some may originate from the local area having taken up employment opportunities from the Project and so will reside in their own homes.

Offshore construction activities are expected to create 1,185 temporary jobs during the peak of construction. The offshore workforce is anticipated to be specialised teams brought in by the construction contractor and is unlikely to be recruited locally. The offshore workforce will live aboard the vessels on which they work.

The following social factors with community, economic and financial outcomes were identified as potentially giving rise to community and population level health, safety and security impacts:

- Conduct of workforce in the community;
- Spread of sexually transmitted infections; and
- Employment opportunities for the local population.

Each of these is discussed in turn in the sections below.

Conduct of workforce in the community

This issue is relevant to the landfall, nearshore and offshore sections of the Project.

Potential for conflict between the local community and the workforce depends on the living, working and recreational conditions for the workforce. For the purposes of this assessment, it has been assumed that the onshore construction workforce will be housed in their own homes (if local to the area) or in the town of Anapa. In this situation, interactions with the local community are likely to be normalized and they are likely to be regarded as community members. Risks of antisocial behaviour and injury are reduced if normal codes of conduct are followed. During the tourist season the workforce is small compared to the number of tourist visitors. Outside the tourist season the numbers of the workforce may be more apparent.

The baseline suggests that alcohol use may be a problem in the region accounting for 10% of the mortality. In general, excessive alcohol use is associated with increased crime, including assault and criminal damage. However, the baseline further indicates that there are generally no incidences of serious disorder in Anapa Resort Town area, even during the summer tourist season (Section 15.5.2.8).

Although it is not yet known if the offshore workforce will interact with the community during transit, the potential for community impacts relating to the offshore workforce is greatest during periods of leave, such as shift changes, when vessel crews can come ashore for short periods of time.

There is also the potential for conflict between communities and direct or contracted workers who will provide security to safeguard the Project's personnel and property.

The existing mitigation measures to be implemented by the Project include:

- The intention of South Stream Transport is to require its contractors where practicable to provide the opportunity for local people to seek employment opportunities on the Project, which will assist in mitigating the potential for tensions related to unmet employment opportunities.
- To mitigate further these risks, South Stream Transport will keep communities informed about Project activities through on-going stakeholder engagement, and implement the grievance procedure to communicate and resolve any grievances arising from Project activities (see **Chapter 6 Stakeholder Engagement** for further information).

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be moderate. If the workforce is housed in smaller communities then it would be harder for the host community to limit proximity to the workforce or to avoid particular venues that are visited by the workforce. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be moderate. This is because any altercation, however unlikely, has the potential for serious injury. Applying the scoring of the Significance Matrix the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is **Moderate**.

Spread of sexually transmitted infections (STIs) due to in-migration of non-local workers

This issue is relevant to the landfall, nearshore and offshore sections of the Project.

It is noted that the size of the workforce will be small relative to the large numbers of tourist visitors that ART municipal district receives each year. However, as the majority of workers are expected to be adult males, and as there is scope for a diverse range of countries of origin (particularly for vessel crews), this poses potential risks in terms of transmission of infectious disease. The only specific risk that has been identified is the potential for an increase in the local incidence of sexually transmitted infections (STIs). The sexual activity of the Project workforce during leave and outside of work hours has potential to introduce or spread infectious diseases, including sexually transmitted infections (STIs). The likelihood of this occurring depends on the living, working and recreational conditions for the workforce.

It is noted in the baseline that in 2011, Krasnodar Krai achieved a reduction in newly diagnosed cases of syphilis (Ref. 15.9). These positive results are attributed, in part, to target health promotion and diseases prevention programmes, including "Stop Infections" and National Priority Project "Health", which are being implemented throughout the region (Ref. 15.10). However, sexual transmission of HIV continues to increase in both the Russian Federation and in the Krasnodar Krai and Injected drug use and heterosexual intercourse are two of the lead

causes of the transmission of the infection (Section 15.5.2.2). There is a stable trend in the incidence of gonorrhoea in ART municipal district.

Commercial sex workers (CSW) can be vulnerable to STIs and can also contribute to the transmission of such infections. The number of CSWs in the Project area is unknown; information from local authorities has indicated that prostitution is not an issue in this family-focused resort area (Ref. 15.5) but the presence of CSWs would not be unexpected, particularly in communities spanning or close to major roads, tourist centres or port towns. People who are deprived, addicted to drugs and / or suffer from mental illness are particularly susceptible to sexual exploitation. The high prevalence of HIV among the drug users population makes this group vulnerable to further spread of the disease and increases the risk of sexual transmission to the general population through commercial sex workers.

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be moderate. This is because of the potential presence of commercial sex workers (particularly around major haul roads and the town of Anapa) who could become infected themselves, and also spread infections. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be high. This is because the infection impacts may go beyond the Construction and Pre-commissioning Phase with wider prevalence implications for local communities and health resources. Applying the scoring of the Significance Matrix the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is **High**.

Employment opportunities for the local population

This issue is relevant to the landfall section.

Due to the highly specialised nature of sub-sea pipeline construction, the marine pipe-laying contractor will provide their own workforce and few, if any, local people will be employed for this work. Given this, the potential for the contractor to employ local labour to fulfil unskilled and semi-skilled jobs is largely related to the construction activities for the landfall section of the Project. **Chapter 14 Socio-economics** estimates that construction accounts for approximately 9% to 10% of the local economy, suggesting that there is likely to be a pool of people interested in taking up construction employment opportunities. There is also potential for indirect employment in other sectors.

Employment is associated with positive physical and mental health outcomes: the quality of the employment is associated with the health effect (Ref. 15.30), for example the terms and conditions of the contract and the working conditions. Appropriate training has also been found important (Ref. 15.31). Unemployment is associated with increased mortality rates (Ref. 15.32) (Ref. 15.33).

During consultation undertaken as part of the scoping process, creation of local employment was perceived as an anticipated positive benefit of the Project for local communities (Ref. 15.34). This will include sub-contractors and secondary industries providing goods and services. Population groups likely to disproportionately benefit from job opportunities created by construction activities include the unemployed and people with high levels of deprivation, particularly those on low incomes.

The existing enhancement measures in the ESIA Report include:

- South Stream Transport will encourage the use of local labour for the Project including by requiring its contractors to advertise suitable available positions in local and regional media, use local recruitment agencies and engage in other similar activities, so as to provide the opportunity for local people to access employment opportunities created by the Project; and
- South Stream Transport will require its contractors to advertise suitable available contracts in local and regional media, establish contacts with the local Chamber of Commerce and business associations and engage in other similar activities, so as to provide the opportunity for local suppliers and contractors to seek sub-contractor roles and / or supply materials and equipment to the Project.

Whilst the Project will provide opportunities for local labour to access employment and for local firms to secure contracts for the supply of goods and services; the effects of direct employment are expected to be relatively modest as the majority of the construction work force required will be highly skilled and is anticipated to come from outside the local area.

For those individual workers that do benefit from employment and service provision opportunities, the impact on the general health of workers and their families is likely to be beneficial, as wealth and status are important social determinants of health.

Positive impacts are not scored using the significance matrix; however the following points are noted. The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be high. This reflects the potential for the employment benefits to include vulnerable groups, e.g. families with low incomes. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be beneficial and limited.

Environmental factors

The following environmental factors that affect the physical environment were identified as potentially giving rise to community and population level health, safety and security impacts:

- Construction noise impacts from vehicles, plant and vessels;
- Impacts on road safety due to construction traffic; and
- Mobilisation of historic seabed pollutants.

Each of these is discussed in turn in the sections below.

Construction noise impacts from vehicles, plant and vessels

This issue is relevant to the landfall and nearshore sections.

The ESIA assessment of noise and vibration impacts arising during the Construction and Pre-Commissioning Phase in the nearshore and landfall sections has been combined into a single modelling scenario. As such the nearshore and onshore impact are assessed as a single impact to onshore community receptors.

Noise and vibration emissions from construction plant and vehicles, including: piling; excavation; tunnelling; HGVs; loading; and unloading activities; and construction road traffic have the potential to adversely affect health by disturbance to residential dwellings, local workforce (notably shift workers) and visitors.

A source of night-time noise impacts is the microtunneling operation. This will be undertaken on a 24-hour per day, seven day per week basis and the average rate of tunnel excavation will be approximately 10 m to 15 m per day. It is anticipated that each microtunnel will take approximately four months to excavate.

Excessive or persistent noise exposure can have a detrimental effect on health including on cardio vascular disease and on sleep, work or leisure activities. The baseline notes that circulatory illnesses are the second highest class of adult illness in ART municipal district (Ref. 15.9). High noise levels could potentially exacerbate this situation. During consultation, stakeholders raised concerns about noise and vibration that might adversely affect communities, particularly during the Construction and Pre-Commissioning Phase of the Project (Ref. 15.34).

The existing mitigation measures to be implemented by the Project include (see **Chapter 10 Noise and Vibration**):

- Equipment will be throttled to a minimum or switched off when not in use;
- Internal access roads will be kept well-maintained to prevent noise impacts generated by vehicles dealing with difficult terrain;
- Drop heights of materials will be minimised which will reduce the noise levels generated by the collision of materials with the ground or other materials;
- As far as reasonably practicable, sources of significant noise will be enclosed;
- Plant and equipment will be used and maintained regularly in accordance with manufacturers' instructions;
- Where possible, equipment will be located away from noise-sensitive areas. Also, loading and unloading will be carried out away from such areas;
- In consideration of the potential impacts arising from several noisy activities occurring at the same time, activities will be scheduled, where possible, to minimise overall noise levels;
- In order to reduce these noise levels generated by the compressor booster (see below), it is expected that a combination of measures will need to be employed. These include the selection of inherently quiet plant with far lower sound power levels than used in the assessment; careful siting and orientation of the plant to minimise noise emissions at receptor locations; and the use of acoustic berms or barriers close to the pre-commissioning compound; and
- An acoustic screen along the boundary of the properties and Varvarovka bypass road will be installed to mitigate the noise impact. Typically this can be constructed from a timber fence, wall or earth bund, or any combination of the two. For fencing, example design principles to ensure effective mitigation include two layers of staggered boards, giving a minimum superficial mass of 10 kg/m², and ensuring that no air gaps exist at the base of the

structure. The specification will be determined based on the number of vehicle movements on the road along with consultation with the owners of adjacent properties.

The noise assessment undertaken for the Project (**Chapter 10 Noise and Vibration**) assesses noise impacts for a range of noise scenarios. The residual impact significance of both noise and ground borne vibration at sensitive receptors during the Construction and Pre-Commissioning Phases is predicted to be Not Significant with the exception of two scenarios:

- During periods of the highest traffic flows there is predicted to be an impact of **Low** impact significance at Receptor 4, the residential dwellings in the north-eastern part of Varvarovka adjacent to the Varvarovka bypass road, following the inclusion of a noise barrier to mitigate noise levels; and
- The activities associated with the use of the compressor booster spread for the cleaning, gauging and drying of the pipelines between the Russian and Bulgarian landfall facilities during Pre-Commissioning, will result in a **Low** impact significance at a number of neighbouring receptors. It is noted in **Chapter 10 Noise and Vibration** that the degree of mitigation feasible for this impact cannot be directly quantified at this point in time.

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be moderate. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be low. This is due to the fact that, for the traffic noise impacts, these will occur only during the periods of greatest vehicle movements. For the noise impacts generated by the compressor booster, these will be of short term and temporary duration (less than 4 months). Applying the scoring of the Significance Matrix the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is **Low**.

Impacts on road safety due to construction traffic, particularly heavy goods vehicles

This issue is relevant to the landfall section.

Potential health impacts arise from the increase in traffic flows and increase of heavy and oversize vehicles on local roads due to construction.

Increases in construction road traffic (movement of materials and personnel) through community areas can result in a number of effects for other road users, such as:

- Reduction in real or perceived road safety;
- Overload of junction capacity;
- Driver delay;
- Community severance;
- Intimidation and fear;
- Reduction in pedestrian amenity; and
- Increase in hazardous loads.

If access routes are poorly conceived, difficult to access, poorly maintained or perceived as unsafe, construction traffic can act as barriers to encouraging the use of active transport modes such as walking and cycling (Ref. 15.37). The density of motorised transport can also negatively affect social cohesion within a community either through direct community severance due to road construction or through the impact of high levels of traffic (Ref. 15.37). As discussed in the baseline, compared with other countries bordering the Black Sea there is a high percentage of pedestrian deaths in the Russian Federation and 72% of deaths occur in urban areas indicating that road traffic and road safety are important considerations for Local Communities. Furthermore, increased risk of road traffic collisions from high traffic density can contribute towards the development of long-term mental health problems in drivers, passengers and victims (Ref. 15.37).

For road safety issues children, the elderly, pedestrians and cyclists are considered to be vulnerable population groups.

During consultation in 2012, stakeholders raised the issue of increased traffic, the impact this could have on Local Communities, and asked whether additional roads would be constructed for the Project (Ref. 15.34). In early 2014, interviews with the local administration for the community of Rassvet, and the local schoolteacher, indicated that increased traffic is an issue in Rassvet, particularly in relation to the children attending the local school and in summer when there is more tourist traffic in the area (Ref. 15.49).

The total construction traffic proposed for the Project comprises a maximum of 531 HGV and 27 light vehicle movements per day; this peak will last from August to November 2014. During June and July 2014, there will be 498 HGV and 14 light vehicle movements per day. The existing mitigation measures and design control measures to reduce traffic impacts presented elsewhere in this ESIA Report include:

- Preparation and implementation of a Traffic Management component of the Russian Landfall CMP to manage and coordinate the transport and logistics requirements of the Project. The Logistics Plan will identify agreed access routes, as well as measures and safeguards to minimise interference with local transportation and routes; and
- Two temporary bypass roads will prevent construction traffic from passing through Local Communities. The first bypass road has been constructed by Gazprom Invest as part of the Expansion of the United Gas Supply System. This road bypasses the town of Gai Kodzor and will be used by Project construction traffic as agreed with Gazprom Invest. The second temporary bypass will be constructed for the Project to bypass the town of Varvarovka when accessing the landfall section during construction of the Project.

Appendix 9.1 concludes that with the provision of the two construction traffic bypasses, the highway network is capable of accommodating the additional traffic without there being any perceptible impact on other road users. Based on this, the majority of transport impacts do not require further assessment from a health, safety and security perspective.

However, the Study notes that the exception is the route through Rassvet, a community on the junction of the M25 where the construction traffic arriving from east and west on the M25 will turn south towards the landfall section of the Project.

During the period when construction traffic is at its highest, the increase in the traffic flow on the road through Rassvet immediately south of the junction with the M25 (Point A on Figure A9.1.2) could be approximately 23% with the increase in terms of heavy vehicles being 154%. To the south of Rassvet and north of the start of the temporary bypass to Gai Kodzor (Point B on Figure A9.1.2) the increase in the number of heavy vehicles could approach 200% because of the lower flow of existing traffic. For the majority of the construction period the increases will be much lower over the section of road between these two points, with the increase in total traffic being around 2% and the increase in heavy vehicles between 11% and 13%.

The HGV traffic through Rassvet will be in addition to that of the HGVs associated with the construction of the Russkaya compressor station (CS) so the actual increase will depend on the level of construction traffic being generated at that time by the Russkaya CS construction (see Appendix 20.1 for further consideration of the cumulative traffic effects expected in conjunction with the construction of the Russkaya CS).

Increased vehicular traffic leads to increased likelihood of road traffic incidents and injuries. There is a direct link between number of kilometres driven and the number of incidents, injuries and fatalities caused. The baseline statistics indicate that alcohol consumption, poor road conditions, and bad traffic management contribute most in Russia to road traffic injuries and deaths. The use of cell phones and texting devices while driving is another growing risk factor. Due to the proximity to residential, commercial and community properties lining the road in Rassvet (see Section 15.5.2.7), the number of pedestrians or cyclists encountered by construction traffic is expected to be higher in the community of Rassvet compared to on the M25. Figure 15.14 shows the side of the road through Rassvet being used by cyclists, demonstrating their potential vulnerability to high volumes of HGVs.

Figure 15.14 M25 Pedestrian Crossing just West of Rassvet Turning (Ref. 15.40)



For road safety, the sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be high. This is due to certain vulnerable sub-populations (e.g. children and the elderly) being present among the general population of road users, including pedestrians, motorists and vehicle passengers. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be high. This is because

although temporary, there is a period of intense activity lasting six months during construction when large numbers of HGV and other vehicle movements will occur. Applying the scoring of the Significance Matrix the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is **High**.

Mobilisation of historic seabed pollutants during trenching and tunnelling

This issue is relevant to the nearshore section.

There is potential for nearshore dredging and pipe-laying activities to disturb and mobilize existing toxins or pollutants (including chemicals from unexploded munitions (UXO)) within the seabed. Toxins from these activities have the potential to enter the human food chain either directly if consumed whilst engaging in marine leisure activities; or if consumed following assimilation (and potentially accumulation) in fish, mollusc or crustacean intermediates. Children and young people's developmental processes are particularly sensitive to exposure to contaminants. As well as the potential illness, there could also be economic loss for businesses reliant on coastal waters. People with high levels of deprivation, particularly those on low incomes would be more sensitive to loss of income due to reduced tourism or commercial marine activity.

ART municipal district has been given the status of a health resort town since 1957 and is a specially protected natural area (SPNA) of the federal level. The SPNA is categorized as "health improving (spa) resort area". Linked to this status there are recreational uses of the beach at Sukko, Shingari and Don holiday complexes and other nearby waters, including swimming, fishing, paragliding, jet skiing and diving. During consultation stakeholders raised the issue of potential environmental damage that may affect fishing and recreation (Ref. 15.34).

An indication of the likely extent of sediment plumes due to seabed disturbance is provided by Sediment Dispersion Modelling (Ref. 15.41). The model shows that a plume will persist throughout the construction dredging activities, gradually dissipating following their completion. The sediment plume travels in the direction of the current along the Russian coastline. The modelling shows the extent of sediment plumes associated with different underwater seabed disturbance activities and how the effect varies with depth and direction of current. For the purposes of this discussion the only activity that is likely to result in an impact to bathing waters is pre-lay dredging at the pipeline exit points from the microtunnel. Under this scenario there is the potential for the sediment plume to affect beaches and bathing waters over a long stretch of coastline to the south, particularly the first 5.5 km including Sukko beach. The greatest effect occurs when seabed disturbance is undertaken during clockwise currents (Scenario 1 of that report).

Figure 15.15 is an illustrative example from the technical report (Ref. 15.41) showing the point with the greatest potential impact on bathing waters during a clockwise current. At the exit points, the proposed dredging and disposal operation lasts for 1.3 days for one pipeline operation. The sediment plume dissipates within 120 hours or approximately 5 days. The situation is considerably improved if seabed disturbance occurs under counter-clockwise current conditions. When this scenario is modelled the sediment plume is greatly reduced and extends to the north away from popular bathing waters. Under these conditions (Scenario 2 of that report) the plume disperses within 60 hours or less than three days. Figure 15.16 is an

illustrative example from the technical report (Ref. 15.41) showing the greatly reduced potential impact on bathing waters during a counter-clockwise current.

The modelling suggests that the impact on bathing waters, if any contaminants are mobilized and transported with the plume, would be greatly reduced if dredging at the microtunnel exit points was undertaken under counter-clockwise current conditions. The presence of inert sediment in the water is not anticipated to result in any direct health impacts, but could cause anxiety and reductions in leisure activities including those undertaken by guests of the local tourism businesses.

Figure 15.15 Clockwise Current Sediment Plume Extending South to Sukko Beach (Ref. 15.41)

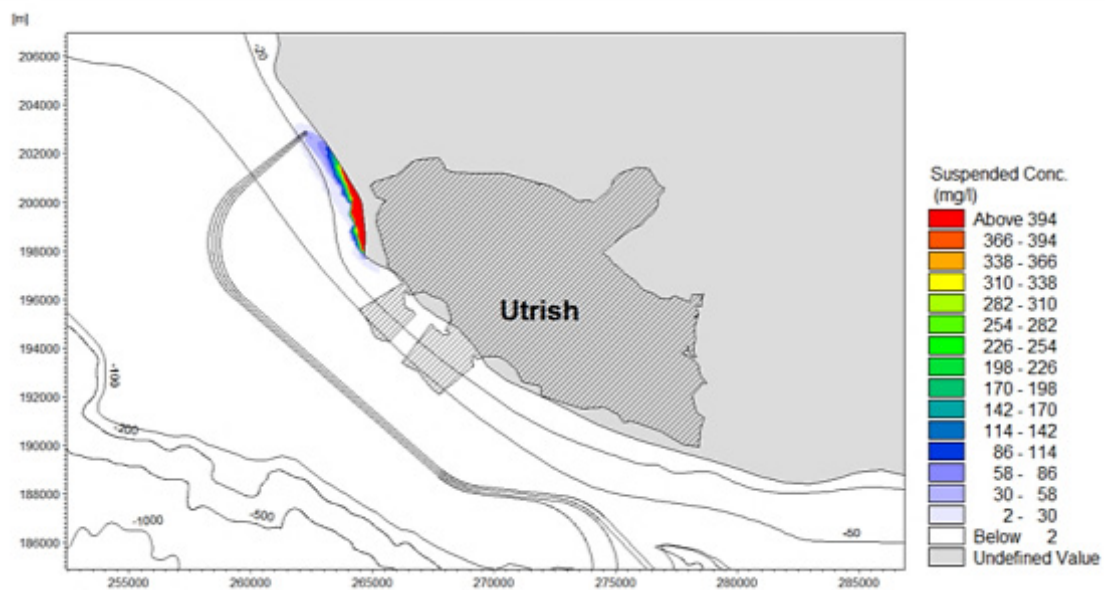
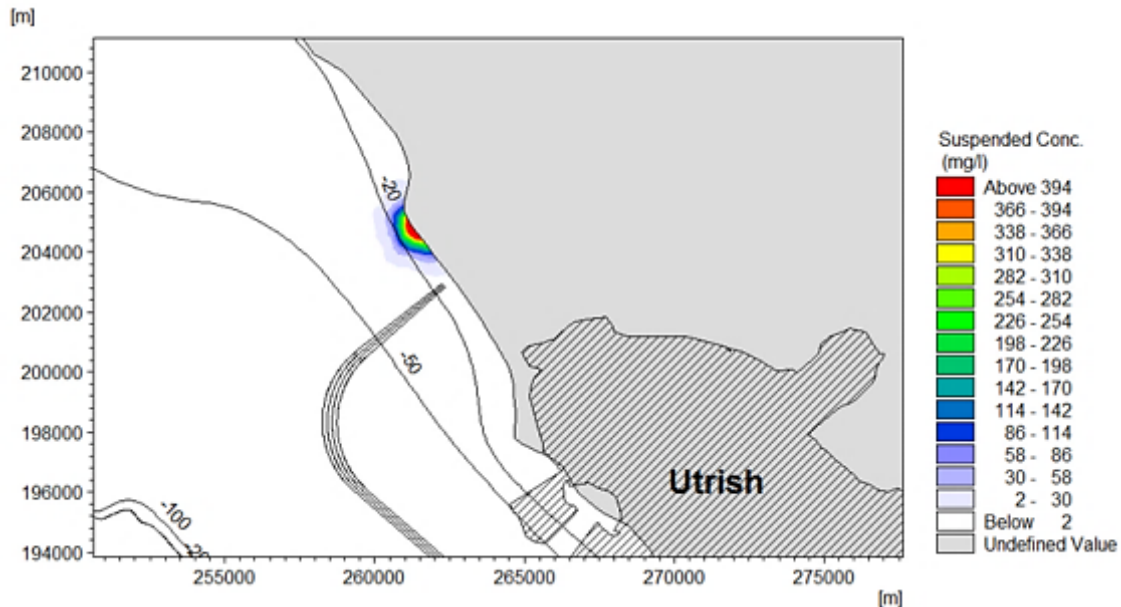


Figure 15.16 Counter-Clockwise Current Sediment Plume Extending North (Ref. 15.41)



The ESIA reports that previous surveys in the area have identified the presence of contaminants in the marine sediments. Contaminants previously identified include petroleum hydrocarbons, phenols, anionic surfactants and heavy metals. Concentrations were typically highest near the coast, particularly in the vicinity of the main towns (**Chapter 7 Physical and Geophysical Environment**). Previous surveys in the Russian Sector of the Black Sea have also identified the presence of contaminants in the sea water itself, including several organochlorine pesticides, petroleum hydrocarbons, phenols, and anionic surfactants. Additionally, elevated concentrations of heavy metals were locally detected, including copper, cadmium, lead, mercury and zinc. Contaminant concentrations varied spatially, but were typically higher near the coast.

As part of surveys for this Project, bacteriological testing was undertaken on two coastal samples collected in summer 2011. The results are consistent with relatively low levels of faecal contamination. Based on the limited testing, the waters meet the microbiological requirements of SanPiN 2.1.5.2582-10 (**Chapter 7 Physical and Geophysical Environment**). Marine water quality surveys were also undertaken in autumn 2010 and spring 2011; and marine sediment sampling from the seabed was undertaken between 2010 and 2011 and in July 2013. The 2013 survey included coring within the area to be dredged and areas of seabed intervention to establish levels of potential contamination within the sediment in these. The sediment samples were visually described before undergoing chemical analysis and grain size distribution analysis.

The existing mitigation measures in the ESIA Report include:

- Undertake UXO survey. If required, a UXO specialist will provide watching brief during excavation;

- Dredged spoil in the nearshore zone (i.e. from microtunnelling activities) will be temporarily stored in designated offshore storage areas. This material will be subsequently re-dredged and used for trench backfill following pipe installation;
- Offshore dredged material will be disposed of at an existing underwater disposal site (no. 923, located on the Russian continental slope);
- In the event that any dredge spoil is identified as contaminated or requires disposal on land, the spoil will be treated as construction waste and appropriately stored, transported and disposed of;
- Implement a Dredging Management Plan to ensure careful spoil handling and minimise release of material to the water column;
- Where dredging is required, the choice of dredger will be made to minimise sediment re-suspension (within engineering constraints). Additional turbidity reduction measures such as silt curtains if feasible, particularly where sediment is to be temporarily re-deposited in nearshore storage areas;
- Spill kits shall be kept in accessible locations at all times during the Construction and Pre-Commissioning, Operational and Decommissioning Phases, and employees will be trained in their use and disposal;
- Avoid use of additives containing hazardous chemicals in slurry as far as is practicable; and
- After completion of the microtunnel works, any remaining slurry will be transported from the used slurry storage tank to a licensed waste facility approved local waste water treatment plants, where it is typically handled as normal soil waste. By undertaking careful calculations of slurry requirements and using efficient slurry recycling systems, the amount of surplus slurry will be kept to a minimum.

The results of the marine water and sediment surveys showed that in the Shallow Water Coastal Area phenol concentrations in excess of Adopted Marine Sediment Standard (AMSS) were identified in 14 of the 15 marine sediment samples. One of six marine core samples also exceeded AMSS for petroleum products. **Chapter 7 Physical and Geophysical Environment** presents information on levels of contamination, but does not conclude on potential impacts. Based on these findings, the only potential concerns to community and population health are from phenol and petroleum product contaminants in marine sediment and these are considered in the following sections.

Phenol

Acute effects of phenol exposure are only expected from contact or ingestion (or inhalation) of concentrated quantities of phenol. Such exposure would only be expected in an occupational setting and is not discussed further in this section.

Non-occupational exposure to phenol may occur by drinking contaminated water. The threshold for exposure via ingestion is 1 to 32g. Phenol in marine sediments samples for 2010 to 2011 in Shallow Water Coastal Areas occurred in the range of 0.05 to 0.40 mg/kg. Phenol in sea water samples for 2010 to 2011 occurred in the range of <0.1 to 6.1 µg/L. As phenol readily dissolves in water, the dilution effect makes it very unlikely that disturbance of recorded concentrations of phenol in the seabed and seawater will affect bathing water quality to the extent required to

produce a detectable human health effect. It is very unlikely therefore that the general population will be exposed to a level of phenol high enough to cause adverse health effects (Ref. 15.42).

Petroleum Products

Total petroleum hydrocarbons (TPH) is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. Crude oil is used to make petroleum products, which can contaminate the environment. Because there are so many different chemicals in crude oil and in other petroleum products, it is not practical to measure each one separately. The collective term of TPH is therefore applied.

The extent of absorption of TPH by dermal routes varies because of the wide range of physical and chemical properties observed for these chemicals. The extent of absorption depends on the volatility, solubility, lipophilicity, and other properties of the specific chemical or mixture. (Ref. 15.43).

It would generally be expected that dermal exposure (e.g. skin contact when swimming) would produce less severe symptoms or toxicity than ingestion. As the contamination would be in seawater, ingestion in any significant quantity can be ruled out. Where petroleum products are dissolved or in suspension within the seawater the potential for high exposure concentrations is considerably reduced by dilution. However where Project activities disturb concentrations of seabed petroleum products, TPHs may congregate as a film on the water's surface, resulting in higher exposure doses to recreational marine users.

Due to the diversity of potential chemical components it is not practical to consider particular exposure concentration thresholds. However the concentrations detected by marine sediment samples do not give rise to obvious concerns, with the highest detected concentration being 407 mg/kg.

Overall historic seabed pollutant impact

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be high. This reflects a precautionary approach since certain vulnerable sub-populations may occur e.g. children during some periods when sediment disturbing activities are occurring. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be low. Although the sample concentration levels indicate a low level that could be considered to be negligible, there is the potential for more extensive or concentrated contamination to be encountered (e.g. petroleum products) which could either concentrate at the surface or be transported in sediment plumes. Applying the scoring of the Significance Matrix and professional judgement, the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is **Low/Moderate**.

Institutional factors

The quality and quantity of local health and emergency service resources is an institutional factor identified as potentially giving rise to community and population level health, safety and security impacts.

Local health and emergency service resources due to in-migration of non-local workers

This issue is relevant to the landfall section.

The Construction and Pre-Commissioning Phase may impact on local health and emergency response service providers, as the Project may affect demand for their resources, particularly in the event of an unplanned event that affects large numbers of the construction workforce.

Lack of availability and accessibility of municipal services such as libraries, health facilities, doctors' surgeries, schools and social support can have a negative social impact on communities and affect both physical and mental health (Ref. 15.37).

The baseline notes that in the ranking applied by a State Report on Sanitary Epidemiological and Consumer Protection in the Krasnodar region, ART municipal district is placed in the mid-range for healthcare expenditure and in the highest range for per capita physician coverage.

Chapter 5 Project Description states that first aid and medical emergency response will be available to workers as part of the Occupational Health and Safety procedures (see also Appendix 15.1). However, no on-site medical facilities will be provided. Furthermore the facilities, personnel and resources that will be needed to support the provision of medical services for workers will be provided at local hospitals and clinics. The increase in population (assuming a temporary construction phase landfall section workforce of 330 workers at peak) would equate to a temporary increase in the permanent population of the Anapa Resort Town municipal district of approximately 0.14%.

As discussed in Section 15.4.3, interviews with ART municipal district Administration (including the Deputy Chief for Health) in early 2013 and early 2014 confirmed that there is no perceived shortage of facilities or health professionals; during the peak season the authorities bring in extra medical staff and transport (ambulances); and free medical services are provided to Russian citizens whether or not they are based in the ART municipal district (Ref. 15.13).

On this basis, coupled with data on health infrastructure (Section 15.5.3.4 and Tables 15.5 and 15.6), no existing shortages of local health facility provision were identified and therefore it was concluded that the number of non-local workers likely to lodge within Local Communities is not expected to be high enough to have any significant impact on the demand for local health facilities.

Nevertheless, there is a need for further investigation, prior to construction activities commencing, of health conditions and facilities as part of the assessment of workforce accommodation options. This will ensure that the health needs of the workforce (onshore and offshore) are met in a way that does not adversely affect health services for the town of Anapa and the Local Communities.

No specific mitigation measures to manage potential periods of high demand on local health and emergency service resources have been identified as being included from other ESIA chapters or assessments. However, other existing related mitigation measures in the ESIA Report include:

- The site-specific Emergency Response Plans that will be prepared and maintained by each construction contractor will include measures that aim to protect the workforce and

members of the public. These plans will define measures that aim to initially stabilize medical cases (which would be carried out by an on-site first aider, nurse or physician) and then enable evacuation carried out by ambulance or helicopter. The injured party would be evacuated to the nearest designated hospital or accident and emergency centre;

- Each contractor will ensure that sufficient first-aid or medical staff and equipment are located at the construction site to meet the identified occupational health risks; and
- The location and capability of local ambulance stations (public and private) will be identified (and mapped) together with contact details, times of operation, distance and travel times. A qualified occupational physician will inspect and report on the capacity and capability of these services. A designated hospital or accident and emergency centre will also be identified (including contact details, times of operation, distance and expected travel times).

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be high as it concerns people seeking medical care. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be low. This is because the resource demands of the construction workforce are expected to be small in the context of the local population, particularly when seasonal tourism is considered. Applying the scoring of the Significance Matrix and professional judgement, the significance of health impacts arising from this issue, without including any additional mitigation or monitoring requirements, is **Low/Moderate**.

15.8.1.3 Mitigation and Enhancement

The mitigation measures recommended in relation to each of the significant adverse impacts are set out below. Enhancement measures, which have the potential to enhance beneficial outcomes of the Project, are also outlined.

A Community Health Construction Management Plan will form part of the Environmental and Social Management Plans for the Project. The CHCMP will establish the proposed actions needed to mitigate identified impacts and promote health opportunities in the Project. The CHCMP will assign actions, timeframes, resources, responsibilities and collaborating organizations to the mitigation and enhancement measures identified in this assessment. It will include a monitoring system designed to track implementation progress and selected outcomes. The monitoring system will include appropriate key performance indicators and an early-warning system for any problems occurring at the community level. Evaluation and Verification protocols will also be included to determine when successful implementation has been accomplished. The CHCMP will be reviewed by key stakeholders prior to construction activities commencing. It will incorporate key findings from the Rapid Health Appraisal which will provide additional baseline data and set further parameters for mitigation during the Construction Phase.

Social factors

Conduct of the workforce in the community

- All workers contracted or sub-contracted for this Project will be required to comply with a code of conduct to the extent that contractual requirements governing periods of leave and out of work hours allow;
- South Stream Transport will be guided by applicable law, the principles of proportionality and Good International Industry Practice in relation to hiring, rules of conduct, training, equipping, and monitoring of security forces;
- Residents and visitors to the town of Anapa and the Local Communities will be able to contact the Project at any time and utilize the Grievance Procedure if there are any concerns regarding security arrangements and acts of security personnel;
- As part of the HSSE-IMS, a Security Plan will be developed for each phase of the Project per Good International Industry Practice; and
- If government security personnel are deployed for Project security, South Stream Transport will make every effort to ensure the above training, due diligence, and monitoring are also employed.

Spread of sexually transmitted infections (STIs) due to in-migration of non-local workers

- All workers contracted or sub-contracted for this Project will be required to attend an awareness and educational programme that covers the risks associated with sexually transmitted infections (STIs);
- Specific sexual health testing and clinic facilities will be identified for the Project;
- Condoms will be made available to the workforce; and
- South Stream Transport will have a policy statement regarding sexually transmitted infections (STIs) including HIV/AIDS, and this policy will be communicated internally to staff, and externally to Contractors.

Employment opportunities for the local population

- No further enhancement measures are proposed.

Environmental factors

Construction noise impacts from vehicles, plant and vessels

- In the event that 'Lesnaya Polyana' or 'Club Village Chateau' (Ref. 15.36) become occupied during the construction of the landfall facilities, South Stream Transport will further assess noise levels in respect of legal requirements and determine appropriate mitigation measures.

Road transport impacts, particularly heavy goods vehicles

General mitigation for traffic safety impacts on the community

Measures will be implemented by South Stream Transport prior to construction works commencing, to address transportation related impacts, including:

- Preparation and implementation of a Traffic Management component of the Russian Landfall CMP. The CMP will:
 - Be consistent with, and take into consideration, the construction traffic management procedures that are followed by Gazprom Invest as part of the construction of the Russkaya CS;
 - Be aligned with the Logistics Plan and ensure that access to the pipeline landfall and associated above ground installations will be restricted to the agreed access routes and the construction corridor;
 - Ensure that movement of 'outsize' or 'large/long' vehicles, or convoys, will be timed, where practicable, to avoid busy traffic periods and will be restricted to the agreed access routes and the construction corridor; and
 - Include strict enforcement of speed limits for employees driving company vehicles and adherence to driving and health and safety guidelines during both work and non-work hours.
- The implementation of safe driving protocols. These protocols will include the following measures:
 - Drivers will be briefed to maintain vehicular access to all existing properties and relevant safety measures to be applied along the designated construction access route;
 - Training and enforcement to ensure that all South Stream Transport and Contractor drivers adhere to all Russian driving rules;
 - All drivers will be trained in 'well driven' principles and guidance; and
 - Driving performance will be assessed and monitored with additional training provided if necessary.

Mitigation specific to the community of Rassvet

South Stream Transport will liaise with local authorities regarding the installation of a pedestrian crossing in Rassvet at an appropriate location for the community. The crossing will be of a standard and quality similar to that shown in Figure 15.12 (pedestrian crossing to a bus shelter on the M25 just west of the turning into Rassvet).

South Stream Transport will undertake further traffic assessment at the community of Rassvet to determine:

- The state of road safety infrastructure including the existence of: pavements, cycle lanes, traffic calming measures and pedestrian crossings;
- The need for any additional mitigation measures such as the installation of further pedestrian crossings and other appropriate traffic calming measures;

- The physical state of the road infrastructure and determine measures to be taken to restore the state of the road between the highway, through Rassvet, to the turn-off to the Gai Kodzor bypass; and
- As part of the Traffic Management component of the Russian Landfall CMP, all drivers contracted or sub-contracted for this Project will be required to attend an awareness and training programme that covers road safety and emphasises the vulnerability of cyclists and compliance with pedestrian road crossings in and around Rassvet.

Mobilisation of historic seabed pollutants during trenching and tunnelling

- Protocols similar to those that will be used in the event of marine fuel spills will be prepared and followed to deal with any disturbance of petroleum products in the marine sediment that result in a significant oil film at the surface; and
- The use of bentonite mud for microtunnelling (an inert, heavy and sticky substance which pools on seabed and doesn't disperse) will be carefully planned and monitored to avoid deposits migrating into bathing waters.

Institutional factors

Local health and emergency service resources due to in-migration of non-local workers

- Prior to construction activities commencing, agreement will be reached with local health services as part of the Rapid Health Appraisal (see below) to confirm how the healthcare needs of the construction workforce, including non-Russian workers, will be met. Such consultation will include a solution that avoids any adverse impact to local populations due to resource demands of the Project being greatest at the nearest healthcare facilities;
- With local health services and other authorities on how demand for health and other emergency response services will be met in the event of an unplanned event that affects both Local Communities and the construction workforce;
- The location of hospitals, clinics, doctors' surgeries and pharmacies will be identified to ensure that access to and from them is not restricted by Project activities or that alternative access is in place and has been agreed with the local health authorities; and
- The construction contractor will undertake a Rapid Health Appraisal of the potential socio-economic and health impacts related to the preferred option(s) for workforce accommodation during the Construction and Pre-Commissioning Phase of the Project. The purpose of this appraisal is to avoid significant adverse impacts on the town of Anapa and the Local Communities by identifying potential impacts and appropriate mitigation and management measures prior to the start of construction and to confirm appropriate housing and health provision is in place prior to making accommodation arrangements for the onshore workforce. The appraisal may include consultation with applicable local and regional authorities, including health and social service providers and will include an assessment of local health conditions and services. The assessment will also include a review of the accommodation, conduct, sexual health and general health service resource requirements of the estimated offshore workforce, employed to work aboard Project vessels, during periods of shore based transit to and from their vessels.

15.8.1.4 Residual Impacts

This section presents a summary of the potential Construction and Pre-commissioning Phase residual community health and safety impacts arising from the Project following application of the identified mitigation measures.

Social factors

Conduct of workforce in the community

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA, the residual significance of potential community/population health impacts arising from the conduct of the workforce, including the offshore workforce, if any, in the town of Anapa and the Local Communities during the Construction and Pre-Commissioning Phase is considered to be **Low**.

Spread of sexually transmitted infections (STIs) due to in-migration of non-local workers (STIs)

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; and assuming the Rapid Health Appraisal determines that the assumptions made for sexually transmitted diseases due to lack of baseline data are accurate, the residual significance of potential community and population health impacts arising from the spread of sexually transmitted infections (STIs) during the Construction and Pre-Commissioning Phase is considered to be **Low**.

Employment opportunities for the local population

Subject to the full adoption of the enhancement measures set out in the ESIA Report; the residual significance of potential community / population health impacts arising from employment opportunities during the Construction and Pre-Commissioning Phase is considered to be **limited and beneficial**.

Environmental factors

Construction noise impacts from vehicles, plant and vessels

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; the residual significance of potential community and population health impacts arising from construction noise impacts during the Construction and Pre-Commissioning Phase is considered to be **Low**.

Road transport impacts, particularly heavy goods vehicles

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; the residual significance of potential community and population health impacts arising from road transport impacts during the Construction and Pre-Commissioning Phase is considered to be **Low / Moderate**.

Table 15.13 Summary of Residual Impacts during Construction and Pre-Commissioning

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
<i>Social Factors</i>							
Interactions between the workforce and the local population	Anti-social incidents	Town of Anapa and Local communities	Moderate	Moderate	Moderate	Stakeholder Engagement Plan and Grievance Procedure Workers Code of Conduct Appropriate living, working and recreational conditions for the workforce – Rapid Health Appraisal to identify workforce accommodation	Low

Continued...

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
Interactions between the workforce and the local population	Spread of sexually transmitted infections (STIs) due to in-migration of non-local workers	Town of Anapa and Local communities	Moderate	High	High	<p>Workers Code of Conduct including awareness and education programme on STIs and provision of condoms</p> <p>Identification of specific centres for sexual health testing</p> <p>Appropriate living, working and recreational conditions for the workforce –</p> <p>South Stream policy statement on sexually transmitted infections (STIs)</p>	Low
Landfall and nearshore construction activities	Employment opportunities for the local population	Town of Anapa and Local Communities	Not identified	Not identified	Beneficial (limited)	Not applicable	Beneficial (limited)

Continued...

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
<i>Environmental Factors</i>							
Traffic flows due to movement of materials and personnel	Noise impacts, daytime	Receptor 4 – dwellings near the Varvarovka bypass	Moderate	Low	Moderate	Further assessments should currently unoccupied planned developments become occupied during the Construction Phase.	Low
Use of the compressor spread	Noise impacts, night time	Varvarovka community receptors					

Continued...

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
Traffic flows due to movement of materials and personnel	Impacts on road safety due to construction traffic, particularly heavy goods vehicles	Local Communities and vulnerable groups (children, elderly, pedestrians and cyclists) Community of Rassvet	High	High	High	<p>Logistics Plan to manage and coordinate the transport and logistics, including with the Russkaya CS.</p> <p>Temporary bypass roads around Gai Kodzor and Varvarovka</p> <p>Traffic Management component of the Russian Landfall CMP</p> <p>Implementation of safe driving protocols</p> <p>Liaison with local authorities regarding installation of pedestrian crossing in Rassvet</p> <p>Further assessment of traffic to determine necessity for any additional mitigation measures, including further traffic calming</p> <p>Awareness education for drivers on road safety and compliance with pedestrian crossings.</p>	Low / Moderate

Continued...

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
Mobilisation of historic seabed pollutants during trenching and tunnelling	Overall historic seabed pollutant impact (phenol, petroleum products)	Receptor 2 – Shingari and Don Resorts Communities of Sukko and Varvarovka Tourist visitors to the Sukko	High	Low	Low / Moderate	UXO survey Storage of dredged spoil Appropriate dredger to minimise sediment re-suspension (within engineering constraints) Careful planning and monitoring of the use of bentonite mud for microtunnelling	Not significant

Continued...

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
<i>Institutional Factors</i>							
In-migration of non-local workers during landfall and nearshore construction activities	Impact on local health facilities and emergency response service resources	Town of Anapa and Local Communities	High	Low	Low / Moderate	<p>Emergency Response Plans</p> <p>First-aid or medical staff and equipment at the construction site</p> <p>Mapping and report on the capacity of local ambulance stations capability-</p> <p>Rapid Health Appraisal to identify appropriate housing and health provision</p> <p>Health Plan with actions and monitoring to address potential health impacts.</p>	Not significant

Complete.

Mobilisation of historic ground contaminants during site clearance and trenching

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; the residual significance of potential community and population health impacts arising from mobilisation of historic ground contaminants during the Construction and Pre-Commissioning Phase is considered to be **Not Significant**.

Institutional factors

Local health and emergency service resources due to in-migration of non-local workers

At this point in time, and based on the information collected to date through engagement with local health authorities, the expected Project workforce for construction in the landfall section of the Project will not have a significant impact on health care infrastructure of Anapa Resort Town and will not place undue pressure on existing health facilities. Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; and any additional information obtained during the Rapid Health Appraisal and through continuous engagement with local health authorities, the residual significance of potential community and population health impacts arising to local health and emergency service resources during the Construction and Pre-Commissioning Phase is considered to be **Not Significant**.

15.8.1.5 Monitoring

South Stream Transport will develop an Environmental and Social Monitoring Plan for the Project which will detail all monitoring requirements applicable to the Project regardless of associated phase, topic or location. **Chapter 22 Environmental and Social Management** discusses the monitoring programme based on the monitoring requirements across the ESIA Report. This section briefly outlines the key issues, receptors and monitoring activities for community health, safety and security during the Construction and Pre-commissioning Phase of the Project.

Social factors

Conduct of workforce in the community

The monitoring programme will record any issues of poor conduct by the Project's workforce (including contractors and sub-contractors) in the town of Anapa and the Local Communities, and will cover offshore workforce interaction, if any, with the local population (residents and visitors). Additional mitigation measures will be adopted and consultation will be undertaken with local law enforcement and health and social service providers, especially as it pertains to potential impacts to CSW, as necessary and indicated by monitoring results.

This will include monitoring the number of grievances raised by local residents via the Grievance Procedure relating to the workforce and its interaction with the community, including the number of anti-social incidents involving workforce recorded by police, monitoring of health statistics (e.g. of STDs and HIV / AIDs) recorded by local health officials, and recording of any incidents where the worker code of conduct has been violated and whether this has triggered local health / emergency response.

Spread of sexually transmitted infections (STIs) due to presence of workers (STIs)

South Stream Transport will work with local public health and commercial sex worker support organisations to monitor any adverse effects attributable to the Project workforce or Project activities. If significant adverse impacts are indicated then additional mitigation measures will be adopted in collaboration with those organisations.

Employment opportunities for the local population

The monitoring programme will record the number of employment opportunities advertised in local media and taken up by members of the Local Communities.

Environmental factors

Construction noise impacts from vehicles, plant and vessels

Noise impacts to human receptors and monitoring thereof are addressed in **Chapter 10 Noise and Vibration**. With regard to the construction activities monitoring has been specified to occur at the start of the following activities:

- Daytime construction traffic during period of maximum movements (Mid Jun – Nov 2014);
- Daytime trenching, pipe fabrication, pipe laying and landfall facilities construction; and
- Night-time microtunnelling works.

Road transport impacts, particularly heavy goods vehicles

The monitoring programme will record the impact of construction transport on road safety and community severance in Rassvet. Monitoring will include vehicle counts and consultation with residents of Rassvet. If the monitoring indicates that road safety or community severance becomes a significant concern for the local community then further mitigation measures will be investigated.

Monitoring of vehicles based on construction site vehicle entry and exit data will be undertaken and results collated on a regular basis. Perception monitoring in regards to traffic and other potential issues recommended as part of regular stakeholder engagement with communities – including with schools, shop owners, local community leaders. Rassvet and Varvarovka engagement will be held regularly or as otherwise agreed with the relevant municipal / rural district administrations; and with the other communities as warranted or if a grievance is filed.

Mobilisation of historic seabed pollutants during trenching and tunnelling

During dredging, backfilling and trenchless tunnelling activities water quality will be monitored to check that national bathing water quality standards are maintained in surrounding coastal areas, particularly at popular beach locations such as Sukko beach and Shingari Holiday Complex. Monitoring will include engagement with the Shingari and Don holiday complexes. If monitoring indicates that bathing water quality is affected by the Project's activities then further mitigation measures may be required.

Institutional factors

Local health and emergency service resources due to increase of non-local workers

Monitoring of potential changes in the demand and capacity for accommodation, local health and emergency services will be primarily undertaken through direct engagement with local officials, and health and emergency response service providers to discuss whether or not the Project has had increased demands on local health and emergency service resources.

The first such engagement will be undertaken through a face-to-face meeting, and regular engagement will be established (e.g. quarterly or semi-annually) to review the use of health and emergency services related to the Project's workforce and activities. Carrying out engagement with local officials and service providers will also enable South Stream Transport to identify any trends or qualitative changes. South Stream Transport will also monitor their own records (such as Human Resource data, the Grievance Mechanism) for any workplace incidents that may require a response from local officials, health and emergency providers. Open lines of communication will also be established between South Stream Transport, the Contractor, and local service providers.

If monitoring indicates that service demand as a result of the Project is causing resource shortages further mitigation measures will be investigated to ensure that Local Communities are not adversely affected.

15.8.2 Impact Assessment: Operational Phase

15.8.2.1 Introduction

This section identifies the potential impacts and risks to community health, safety and security receptors during the Operational Phase of the Project. For those effects where potentially significant pre-mitigation impacts are assessed in Section 15.8.2.2, potential mitigation measures have been identified in Section 15.8.2.3, followed by a residual impact assessment, the results of which are set out in Section 15.8.2.4.

15.8.2.2 Assessment of Potential Impacts (Pre-mitigation)

Social factors

The following potential impacts resulting from Project activities with community, economic, and financial outcomes were identified as potentially giving rise to community or population level health impacts.

Public anxiety over large volumes of gas close to Local Communities

This issue is relevant to the landfall section.

Perceptions of fear arising from risks of controlled or uncontrolled natural gas releases may give rise to public anxiety.

Stakeholder comments cited safety as a concern, including a fear of potential gas explosion or fire (Ref. 15.34) and the possibility of seismic activity (Ref. 15.34).

The existing mitigation measures in the ESIA Report include:

- Consultation with stakeholders, including the residents of the town of Anapa and the Local Communities has been on-going and will continue, including for disclosure of the ESMPs, as outlined in **Chapter 6 Stakeholder Engagement**; and
- South Stream Transport has developed a Stakeholder Engagement Plan which identifies stakeholders and their interests, describes the consultation undertaken and that planned as part of the Project's ESIA process, and establishes a framework for stakeholder engagement activities to be undertaken as the Project progresses beyond the ESIA phase.

Public anxiety can reasonably be expected to decrease as public understanding develops amongst the local population of the design controls and as the design controls are seen to be effective. For example the air quality assessment notes that the vent stack height has been pre-determined based on safety requirements in the workplace in order to manage air quality and protect workers from the unlikely event that the vented gas might ignite. This level of localised dispersion to safe levels for onsite maintenance personnel, should reassure local residents that there is not expected to be a risk to community receptors, which are far more distant. The continuing success of such alleviation will also depend on good communication between the Project and the local population.

The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be low. Certain vulnerable sub-populations may be concerned about these processes, e.g. people with existing anxiety type disorders. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be moderate. An unknown number of people may experience mental ill health, such as increased anxiety and stress, for more than one month as a result of the proposed works. Applying the scoring of the Significance Matrix the significance of health impacts arising from this activity, without including any additional mitigation or monitoring requirements, is considered to be **Low**.

Benefits to the Russian economy from increased gas sales

This issue is relevant to the landfall, nearshore and offshore sections.

The Project will increase demand for Russian goods and services (gas) and increase government revenues, taxes and royalties. On this basis the socio-economic assessment concludes that there will be a beneficial economic impact nationally from gas sales associated with the Project.

The total current gas pipeline capacity between Russia and Europe is approximately 200 bcm/year, which will increase to 318 bcm/year if the South Stream Pipeline System and other new projects are completed. This could in turn lead to an increase in Russian gas production and sales. In this case, the Project would give rise to increased tax revenues for the Russian government of several billion euros annually. On this basis the socio-economic assessment concludes that there will be a beneficial economic impact nationally from gas sales associated with the Project.

There is the potential for the additional government income generated through gas sales (made possible by this development) to be spent on directly or indirectly improving the health and wellbeing of the Russian people.

The baseline notes that a comparison of socio-economic indicators of well-off and disadvantaged mortality in Krasnodar Krai in 2010 revealed that there is a very high dependency between the levels of investment in the area and the wellbeing of the population. Coverage by physicians, salary, and healthcare expenditures also play a key role in population wellbeing.

Positive impacts are not scored using the significance matrix; however the following points are noted. The sensitivity of the local population, including consideration of particular vulnerabilities, is considered to be moderate. This reflects the fact that benefits will be diluted across the Russian people. The magnitude of change caused by the Project that has the potential to affect health outcomes is considered to be Beneficial and Limited.

Environmental factors

No potential impacts resulting from Project activities that affect the physical environment were identified as potentially giving rise to community or population level health impacts.

Institutional factors

No potential impacts resulting from project activities that affect institutional factors were identified as potentially giving rise to community or population level health impacts. See the Unplanned Events section (Section 15.10) for issues relating to institutional involvement in the unlikely event of uncontrolled release of gas from the pipeline.

15.8.2.3 Mitigation and Enhancement

The mitigation measures recommended in relation to each of the significant adverse impacts is set out below. Enhancement measures, which have the potential to enhance beneficial outcomes of the Project, are also addressed.

Social factors

Public anxiety over large volumes of gas close to Local Communities

Stakeholder engagement will be continued throughout the life of the Project to ensure that appropriate Project information on operations and safety is communicated.

Benefits to the Russian economy from increased gas sales

This issue is outside the Project's control.

15.8.2.4 Residual Impacts

The below section presents a summary of the potential Construction and Pre-commissioning phase residual community health and wellbeing impacts arising from the Project following application of the identified mitigation measures.

Social factors

Public anxiety over large volumes of gas close to Local Communities

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; the residual significance of potential community and population health impacts arising from Public anxiety during the Operational Phase are considered to be **Not Significant**.

Benefits to the Russian economy from increased gas sales

Subject to the full adoption of the mitigation measures set out in this chapter and elsewhere in the ESIA Report; the residual significance of potential community and population health impacts arising from benefits to the Russian economy during the Operational Phase are considered to be **Beneficial and Limited**.

Environmental factors

No potential impacts resulting from Project activities that affect the physical environment were identified as potentially giving rise to community or population level health impacts.

Institutional factors

No potential impacts resulting from Project activities that affect institutional factors were identified as potentially giving rise to community or population level health impacts. See the Unplanned Events section (section 15.10) for issues relating to institutional involvement in the unlikely event of uncontrolled release of gas from the Pipeline.

Table 15.14 Summary of Residual Impacts during Operational Phase

Activity	Impact	Receptor	Sensitivity of Receptor	Magnitude of Impact	Pre-mitigation Significance	Mitigation Measures	Residual Impact Significance
<i>Social Factors</i>							
Operation of the pipeline	Public anxiety over large volumes of gas close to local communities during pipe operation.	Local communities	Low	Moderate	Low	Stakeholder Engagement Plan, including on-going consultation with residents of the town of Anapa and Local Communities	Not Significant
Operation of the pipeline	Increased demand for Russian goods and services (gas) and increased government revenues, taxes and royalties.	Russian Oil and Gas industry; National Government and Russian tax payers	Moderate	Not identified	Beneficial (limited)	Not applicable	Beneficial (limited)
<i>Environmental Factors (No impacts)</i>							
<i>Institutional Factors (No impacts)</i>							

15.8.2.5 Monitoring

South Stream Transport will develop an Environmental and Social Monitoring Programme for the Project which will detail all monitoring requirements applicable to the Project regardless of associated phase, topic or location. **Chapter 22 Environmental and Social Management** discusses the monitoring programme based on the monitoring requirements across the ESIA Report. This section briefly outlines the key issues, receptors and monitoring activities for community health, safety and security during the Operational Phase of the Project.

Social factors

Conduct of workers in the community

The monitoring programme will continue to record any issues of poor conduct by the Project's workforce (including contractors and sub-contractors) in the town of Anapa and Local Communities. If a grievance is filed by a member of the Local Community or Local Law Enforcement Providers a meeting will be held with the local Law Enforcement Providers in relation to workforce conduct.

Public anxiety over large volumes of gas close to Local Communities

The monitoring programme will include on-going consultation with residents of Local Communities and the local health authorities.

Benefits to the Russian economy from increased gas sales

This issue is outside the Project's control.

Environmental factors

No monitoring requirement has been identified.

Institutional factors

No monitoring requirement has been identified.

15.8.3 Impact Assessment: Decommissioning

The Project will be decommissioned many years into the future⁵ and impacts during the Decommissioning Phase depend on the alternatives chosen at that time – preservation of the pipelines in place or complete or partial removal. If the latter option is chosen and construction activities (e.g. excavation, removal of pipeline, land rehabilitation) are carried out or construction equipment is used, then impacts are expected to be similar to those assessed in

⁵ The Project Life (i.e. the duration of the Operational Phase) is estimated to be approximately 50 years. As such, decommissioning would take place sometime in the mid to late 2060s.

Section 15.8.1 in relation to the Construction Phase – i.e., generation of employment (beneficial impacts), increased demand for goods and services (beneficial impacts), and impacts on land users (potentially adverse, depending on whether or not productive land uses such as agriculture were disturbed). However, such impacts are likely to be at lower levels and short-term. Assuming that the restriction on areas governing the type and scale of development that can take place on land within certain circumference of the Pipeline are removed, there may be beneficial impacts for land owners associated with the liberalisation of development rights.

A careful record and archive of construction and operation activities will be maintained in a suitable format for future users of such information. It will include any special mitigation measures that were applied retrospectively, in addition to those identified prospectively in this impact assessment. It will also record all unexpected events that occurred during the Construction and Pre-Commissioning and Operational Phases of the Project.

15.9 Occupational Health and Safety

Occupational Health and Safety is discussed in Appendix 15.1.

15.10 Unplanned Events

Unplanned events are discussed in **Chapter 19 Unplanned Events**, while community perceptions of unplanned events are discussed under the issue of 'Public Anxiety' in Section 15.8.2.

15.11 Cumulative Impacts

The cumulative impacts associated with the Project, and those relating to the Russkaya CS, relating to Community Health, Safety and Security are assessed in **Chapter 20 Cumulative Impact Assessment**.

15.12 Conclusion

This chapter has assessed the potential effects of the Project on Community Health and Safety and set out the Project approach to Community Health and Safety. This assessment has been conducted following the standards and guidelines for financing, as well as national legislation and GIIP.

The Construction Phase of the Project will bring limited direct employment opportunities to Local Communities at the landfall facilities. Procurement of goods and services will also give rise to limited indirect employment across a wider area. This local employment is relatively small in number and while the effects will also be small they will be beneficial.

The infrastructure and logistics requirements of the Project mean that there are inevitably some adverse effects for certain population groups. Large construction sites and busy transport corridors can be disruptive for Local Communities. These may manifest as negative health outcomes. South Stream Transport recognises this risk and will take appropriate measures to reduce disruption through mitigation measures that will govern the movement of transport,

noise from Project vehicles and emissions to air. The Project will also maintain communication with Local Communities to ensure that any grievances are addressed promptly.

The Operational Phase of the Project will bring economic benefits to the Russian Federation, which could translate into greater expenditure on infrastructure and initiatives that directly or indirectly improve health across the nation. The Project will also improve energy supply to gas consumers in the EU.

Overall, although this chapter has identified a number of issues that have the potential to give rise to adverse health impacts, mitigation will be included to reduce the residual impact to an acceptable level for both the community and the workforce.

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