Arctic LNG 2 PROJECT

ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS OF THE ARCTIC LNG 2 PROJECT IN ACCORDANCE WITH REQUIREMENTS OF THE INTERNATIONAL FINANCIAL INSTITUTIONS

SCOPING REPORT

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ACRONYMS

CGTP	Complex gas treatment plant
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
DCA	Designated conservation area
DOI	Declaration of intent
ECA	Export Credit Agency
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPIII	Equator Principles (revision III)
EPIV	Equator Principles (revision IV)
EPF	Early Port Facilities
ESAP	Environmental and Social Action Plan
ESMP	Environmental and Social Management Plan
ESHIA	Environmental, socio-economic and human health impact assessment in accordance with international standards
FEED	Front-end engineering and design
FSUE	Federal State Unitary Enterprise
GAGE	Gydan agricultural enterprise
GBS	Gravity-based structure
GHG	Greenhouse gas
GTPP	Gas turbine power plant
IDSW	Industrial and domestic solid wastes
IFC	International Finance Corporation
IPIECA	International Petroleum Industry Environmental Conservation Association
ISPN	Indigenous small-numbered peoples of the North
LA	License area
LLC	Limited liability company
LNG	Liquefied natural gas
MPC	Maximum permissible concentration
$MPC_{o.t.}$	Ditto, one-time
$MPC_{m.d.}$	Ditto, mean daily
MR	Mixed refrigerant
MRR-2017	Harmful (pollution) emissions dispersion analysis methodology (approved by the RF Ministry of Natural Resource, Order No.273 of 06.06.2017)
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
OGCF	Oil, gas, and condensate field
OECD	Organisation for Economic Cooperation and Development
OPF	Operating Port Facilities
PFHI	Publicly funded health institution
PJSC	Public Joint Stock Company

PS	Performance Standards
PS	Polluting substance
RF	Russian Federation
SEC	Securities and Exchange Commission, US
SEP	Stakeholder Engagement Plan
SGC	Stabilised gas condensate
SO_2	Sulphur dioxide
SPZ	Sanitary protection zone
ToR	Terms of Reference
TS	Topside structures
URZ	Use-restricted zone
VOC	Volatile organic compounds
YNAO	Yamal-Nenets Autonomous Okrug

TERMS AND DEFINITIONS

Client, Company	Arctic LNG 2 LLC
Arctic LNG 2 Project (the Project)	Project comprising Salmanovskoye (Utrenneye) OGCF facilities setup, GBS LNG & SGC Plant (LNG Complex), Utrenniy LNG and SGC Terminal, as well as point, areal and linear infrastructure facilities
Salmanovskiy (Utrenniy) license area	Subsoil area of federal significance including the Salmanovskoye (Utrenneye) oil, gas, and condensate field, for which subsoil license СЛХ 15745 НЭ of 20.06.2014 (as updated) has been issued to Arctic SPG 2 LLC, for exploration and production of crude hydrocarbons
FIELD	The totality of facilities and activities for the Salmanovskoye (Utrenneye) OGCF facilities setup to support extraction and preparation of feedstock for production of LNG and SGC, and to provide the necessary utilities for all facilities of the Arctic LNG 2 Project
GBS LNG & SGC Plant (the Plant, LNG Complex)	Plant on gravity-based structures for liquefied natural gas and stabilized gas condensate production, storage, and offloading comprising three trains and onshore infrastructure facilities
Train	System of facilities for production, storage and shipment of liquefied natural gas (LNG) and stable gas condensate (SGC), on gravity-based structures (GBS), with a stated annual capacity of about 6.6 million tons of LNG each. The total peak SGC capacity of the Plant can be as much as 1.6 million tons per year
Utrenniy Terminal (the Port)	A section of the Sabetta seaport the purpose of which is to provide offshore logistics for gas carriers and tankers for the LNG and SGC shipment, offloading and storage of the processing and construction cargo
Associated facilities	Facilities which: i) are not funded as part of the project, ii) would not have been constructed or expanded if the project did not exist, and iii) without which the project would not be viable
Project Operator	Entity responsible for project management at the construction, commissioning, operation and decommissioning phases (Arctic SPG 2 LLC is the Project Operator)
Consultant	Ramboll CIS LLC, Project Independent Environmental and Social Consultant
Environmental, Social and Health Impact Assessment (ESHIA)	In the context of International Finance Corporation (IFC) - the process of identification, prediction and assessment of significance of beneficial (positive) and adverse (negative) environmental and social impacts of a project, including characterization of project environment, review of project alternatives, analysis and as far as possible quantification of global, transboundary and cumulative effects, and impacts management programme. In the context of the International Association for Impact Assessment (IAIA[1]) - the process of identifying, predicting, evaluating and mitigating environmental and social impacts and other adverse effects of a planned activity before decision to implement it is made
ESHIA documentation	Documentation package for the assessment and management of environmental and social risks and impacts of the Arctic LNG2 Project in accordance with requirements of the International Financial Institutions (Scoping Report, ESHIA Report, Non-technical Summary, Environmental and Social Action Plan, Stakeholder Engagement Plan, Environmental and Social Management Plan(s))

[1] Leading global network on best practice in the use of impact assessment for informed decision making regarding policies, programs, plans and projects (http://www.iaia.org/).

Stakeholders	Persons or groups who are directly or indirectly affected by the planned activity, as well as those who may have interests in the project and/or the ability to influence its outcome, either positively or negatively
Lender	Entity that finances the project (or its part) to which the Company assumed obligations under the loan agreement including environmental, health and safety commitments
EPFI institutions	Equator Principles financial institutions
Equator Principles	The internationally accepted environmental and social risk management system for financial organizations, including 10 key principles[2]
IFC Performance Standards	A set of environmental and social sustainability requirements of the International Finance Corporation that the organizations to be funded must follow throughout the life cycle of an investment project. Available at: http://www.ifc.org/performancestandards
Lenders' Consultant IESC	Lenders' Independent Environmental and Social Consultant
Planned activity's area of influence[3]	Land and water area, including: 1) onshore plots and offshore water areas, within which the Planned activity is directly implemented; 2) other land and water areas used or controlled by the Plant'soperator and its subcontractors (contractors); 3) the land and water areas where the associated facilities are sited (see the corresponding definition); 4) land and water areas that may be subjected to the cumulative impacts from the proposed activity; 5) land and water areas potentially affected by impacts from unplanned but predictable developments caused by the planned related activities that may occur later or at a different location. The Planned activity's area of influence does not include the area of dispersion of impacts, which can be observed with a no-project version (abandonment of the Planned activity) or without the project
The area of influence of air pollutant emission sources[4]	For a single source of emissions – the area of influence is described as circumference of the larger of two radii: radius equal to ten distances from the source to the point of maximum ground level concentration of the most common pollutant (out of all PSs emitted by the source), or circumference of radius equal to the distance from emission source to the furthest isometric line of ground level concentration of 0.05 MPCo.t. For an area source of pollution emission – the area of influence is a territory or water area including influence areas of single sources within the area source, as well as isometric line of 0.05 MPCo.t. for the calculated total concentration of each PS emitted by the area source.
Areas with controlled habitat quality indicators	Areas, where the existing hygienic air standards for chemical, biological and physical factors must be strictly followed. These include areas such as residential development, cottage development, sports and children's playgrounds, landscape and recreational areas, recreation areas, resorts, sanatoriums, rest homes; horticultural partnerships, collective or individual dachas and garden plots; sports facilities; educational and childcare facilities; general medical treatment and rehabilitation facilities
Social impact area	Territories and communities which may be exposed to positive and negative impacts of the planned and associated activities

[2] The Equator Principles. A financial industry benchmark for determining, assessing and managing environmental and social risk in projects. Edition III. - The Equator Principles Association, 2013 (the EP edition IV is expected to take effect in July 2020)

[3] The definition refers to the IFC Policy & Performance Standards and Guidance Notes. Glossary and Terms - http://www.ifc.org/). Here and in all other general cases, the term "project" is a traditional synonym of the phrase "Planned activity" (in Russian "намечаемая деятельность").

[4] In the terminology of MRR-2017 (Dispersion Modeling Of Harmful Air Pollutants. Approved by the Russian Ministry of Nature Order No.273 dated June 06, 2017)

1. INTRODUCTION

1.1 Planned Activity Overview and Background

This document represents the Scoping Report for the **assessment and management of environmental and social risks and impacts of the Arctic LNG 2 Project in accordance with requirements of the International Financial Institutions**.

Scoping is the first stage of preparation of the ESHIA documentation. The main requirements for the ESHIA documentation and this Report are defined by the Terms of Reference issued by Arctic LNG 2.

Arctic LNG 2 is a project for extraction of gas and gas condensate, production and shipment of liquefied natural gas and stable gas condensate. The resource base for the Arctic LNG 2 Project is the Salmanovskoye (Utrenneye) field (Salmanovskoye (Utrenneye) OGCF) opened in 1979 in the northern part of the Gydan Peninsula and the adjacent area of the Ob Estuary of the Kara Sea. The field belongs to the Gydan and Yamal petroleum regions and comprises gas and gas condensate to be developed by drilling 213 wells arranged in 20 pads.

The exploration and development of the Salmanovskoye (Utrenneye) OGCF is carried out by Arctic SPG 2 limited liability company - joint venture of NOVATEK PJSC (60 %), China National Oil and Gas Exploration and Development Company (CNODC, 10 %), China National Offshore Oil Corporation (CNOOC, 10 %), French oil and gas company Total (Total E&P Salmanov, 10%), Consortium JAPAN Arctic LNG B.V. (10 %) of Japan Oil, Gas and Metals National Corporation (JOGMEC holding 7.5% share) and Japanese finance and industry group MITSUI & CO., LTD (2.5% share) - under the license which is valid till year 2120[5].

The facilities of **Salmanovskoye (Utrenneye) OGCF setup** along with **GBS LNG & SGC Plant** (**LNG Complex**) and Utrenniy Terminal **(Port)** are the main components of the **Arctic LNG 2 Project** (Figure 1.1).

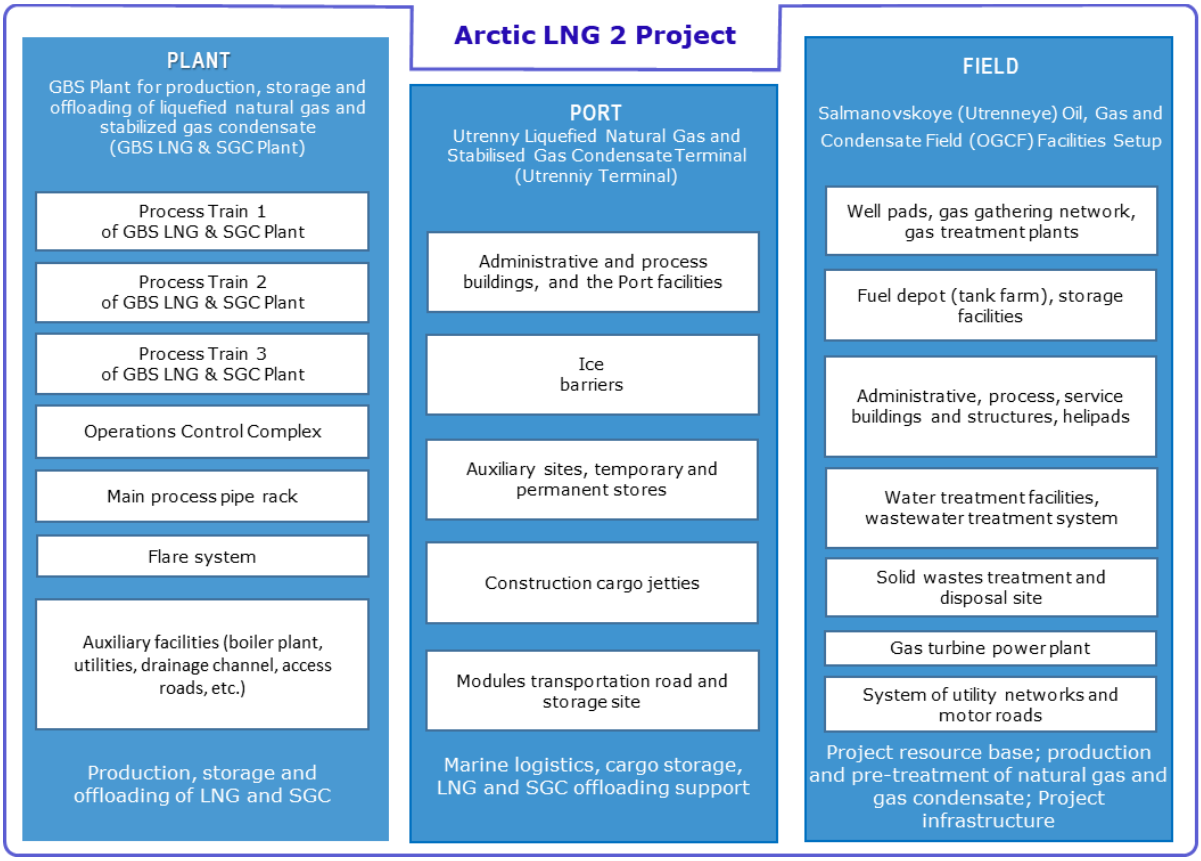

Figure 1.1: Arctic LNG 2 Project structure

[5]Subsoil license СЛХ 15745 НЭ of 20.06.2014 for exploration and production of crude hydrocarbons in subsoil area of federal significance including Salmanovskoye (Utrenneye) oil, gas, and condensate field / Consolidated National Register of Subsoil Areas and Licenses. - Russian Federal Geological Fund of the Federal Agency for Mineral Resources. As amended by Addendum No.3 dated 29.03.2018.

Earlier (in 2017-2018) the Consultant developed ESHIA documents for one of the Project components - GBS LNG & SGC Plant (LNG complex)[6] which have been approved by the Company and discussed with stakeholders. The assessment reflected the FEED stage of the LNG complex.

This assignment provides for combined examination of the LNG complex, Utrenniy Terminal, Salmanovskoye (Utrenneye) OGCF Facilities Setup and their associated facilities as part of the assessment of environmental, social and human health impacts of the Arctic LNG 2 Project.

ESHIA scoping approach recognised the need to conduct the Project ESHIA studies in compliance with standards and recommendations of the financial institutions that adhere to the Equator Principles in their financial activity (EPFI institutions). The standards and recommendations for the environmental and social aspects of the Planned activity are based on the following approaches and principles:

- Common approaches of OECD (Organization for Economic Cooperation and Development) for Officially Supported Export Credits and Environmental and Social Due Diligence;
- The Equator Principles (EPIV) which are the standards of the finance sector for determination, evaluation and management of the ecological and social risks related to the financed projects[7];
- The International Financial Corporation (IFC) Environmental and Social Sustainability and Performance Standards;
- Recommendations of other International Finance Institutions that the Company considers as potential Project Lenders.

1.2 Ramboll - Company's Environmental and Social Consultant

Ramboll, founded in 1945, is the largest Nordic holding in the field of engineering, design, construction and related consulting. In 2014 Ramboll Group A/S merged with a global leading environmental consultancy - ENVIRON Corp. Ramboll Environment and Health was established as a business line responsible inter alia for environmental consultancy services, including assessment of environmental and social impacts (ESHIA) of proposed or existing operations.

One of the world's leading environmental and health consultancies for industry and construction sector, Ramboll is trusted by clients to manage their most challenging environmental, health and social issues. Ramboll has an impeccable reputation in its professional sphere, relies on the cutting-edge research and development experience, devises innovative approaches to assessment of environmental and social impacts of construction projects and a wide range of producing and processing industries. The independent science-oriented approach of Ramboll guarantees integrity and comprehensiveness of the prepared assessments and recommendations.

Ramboll's network of experts includes more than 17,000 experts across 300 offices in 35 countries around the globe; over 3 thousand are engaged in environmental consulting. Russia is among the most important countries of Ramboll operations where the company is represented by Ramboll CIS LLC.

More details are available at the official website of Ramboll: http://www.ramboll.com.

1.3 Input Data for Scoping Studies

The following documents have been provided by the Company and reviewed during the scoping studies:

- Declaration of Intent "Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup";
- Pre-design technical solutions for the main design objects (FIELD, LNG Complex, PORT);
- Results of geotechnical studies for design of the FIELD, LNG Complex, PORT, and associated facilities;
- Previous EIA studies for the FIELD, LNG Complex and PORT;
- Stakeholder engagement materials concerning the FIELD, LNG Complex and PORT;
- Design documentation for associated and other facilities (operations) located (being implemented) in the adjacent territories and water areas (including the Utrenniy airport);
- Results of operational environmental monitoring and control of the current activities (reports from 2018 and 2019);

[6] Plant on gravity-based structures for liquefied natural gas and stabilized gas condensate production, storage, and offloading comprising three trains and onshore infrastructure facilities

[7] The current edition III of the Equator Principles (EPIII, 2013) will be superseded by edition IV (EPIV) with effect from July 2020, i.e. before completion of the assignment under Contract No. 228-ALNG2-2020 of 31.03.2020. The Consultant examined the differences between the two versions of the Equator Principlles, and the ESHIA documents will be prepared to meet the requirements of EPIV.

- Initial permitting documentatio for the main design objects (FIELD, LNG Complex, PORT);
- Other documentation of the companies involved in the Project (policies, strategies, corporate standards, etc.).

Along with the above materials, the review also covered publications on the planned activity and its potential area of influence in mass media, scientific publications, official statistics, websites of municipal administrations and the RF Government, and other open sources.

1.4 Scoping Report: Purpose and Structure

This Report summarizes the findings from the initial review of the proposed activity in its implementation area (Section 1.2), and also publicly available information on environmental and social situation in Tazovskiy Municipal District of YNAO and the Ob Estuary. Scoping phase in the overall procedure of assessment in accordance with international requirements is mostly similar to preparation of the terms of reference document for a Russian EIA: both documents – EIA ToR and Scoping Report – are subject to disclosure prior to start of the assessment, for consultation with stakeholders and subsequent incorporation of their comments.

Scoping Report is structured to describe the Consultant's current understanding of the nature of the proposed activities (both main and associated), considered alternatives (in terms of geographic location and process technologies), most probable impacts of the Project construction and operation on the components of natural and social environment, and vulnerability of the latter toward the anticipated impacts:

- Section 1 provides introduction and description of this document;
- Section 2 describes the tasks of scoping stage in overall ESHIA process, provides overview of the legal framework applicable for assessment of the Planned activity impacts, and presents the assessment methodology;
- Section 3 identifies the Planned activity stakeholders and summarises their engagement so far;
- Section 4 provides description of potential Project alternatives;
- Chapter 5 informs about the current status of project design development;
- Section 6 characterises current environmental status in the potential area of influence of the Planned activity;
- Section 7 provides a review of socio-economic situation in the area of the Planned activity implementation and its impacts;
- Section 8 describes potential environmental and social impacts of the Planned activity;
- Section 9 summarizes the impact assessment plan and timeframe.

2. APPROACH TO SCOPING OF IMPACT ASSESSMENT

2.1 Main Tasks of ESHIA Scoping

Scoping of the environmental, social, health impact assessment studies is an important preparatory stage of international ESHIA procedure which in terms of its tasks and objectives partially overlaps the process of preparation of Terms of Reference for Russian EIA[8].–

The main objectives at this stage are:

- Initial review (screening) of the documents provided by the Client with information on the planned activity and potential alternatives; identification and consideration of changes since July 2018;
- Updating information on the natural and social situation in the respective territory and water area, and clarification of the earlier identification of the most sensitive (vulnerable) receptors;
- Identification of similar projects for benchmarking of the planned activity;
- Clarification of earlier identification (during the Preliminary ESHIA 2018) of stakeholders and planning of initial consultations with their representatives;
- Initial identification of the Project impacts (considering the results of ESHIA 2018).

Findings prepared as a result of fulfilment of the above tasks are used for the following:

- Identification and description of overall methodology to be applied for the impact assessment;
- Preparation of a list of additional information requirements;
- Development of Stakeholder Engagement Plan;
- Preliminary identification of the Planned activity's influence area;
- Definition of structure of ESHIA output materials.

2.2 Legal Framework for Implementation of the Planned Activity

Russian law regulates the use and protection of natural resource, environment and social, health and safety, working and recreation conditions at the national and regional level. The respective legislation is ranked in the list below (from general frameworks to more particular and specific requirements):

- Constitution of the Russian Federation;
- International treaties, conventions, agreements and other international acts where Russia is a party;
- Federal Codes and Laws;
- Decrees and Instructions of the President of the Russian Federation, Resolutions and Instructions of the Government of the Russian Federation;
- Orders issued by the federal executive authorities (ministries, agencies, services);
- Laws of the RF territorial entities;
- Resolutions, instructions of executive authorities of the RF territorial entities;
- Federal regulations e.g. health standards and rules (SanPiN), hygienic standards (GN), national standards (GOST), building standards and rules (SNiP), codes of practice (SP), guidelines (RD);
- Sector, industry, corporate regulations and standards.

2.2.1 Federal law. General environmental and human health requirements

The main principles of Russian environmental policy are established in the RF Constitution, Federal Law No.7 of 10.01.2002 "On environmental protection" (as revised on 27.12.2019), "Principles of the State policy in the area of environmental development of the Russian Federation for the period up to the year 2030" approved by the RF President on 30.04.2012). The latter is strategically focused on "solving socio-economic tasks enabling environmentally-oriented economic growth, preservation of good environmental quality, biodiversity and natural resource to satisfy the needs of present and future generations, and exercise the universal right to good environment, strengthen legal enforcement in the sphere of environmental protection and provision of ecological safety".

The Constitution of the Russian Federation is the main law that lays down the right to "favourable environment, reliable information about its state and for a restitution of damage inflicted on his health and

[8] In terms of Regulation "On environmental impact assessment of planned economic and other operations in the Russian Federation" (Approved by the State Committee for Environmental Protection, Order No.372 of 16.05.2000).

property by ecological transgressions" (Article 42). According to the Constitution, natural resources of Russia shall be utilized and protected in the Russian Federation as the basis of life and activity of the people living in corresponding territories (Articles 9, 58).

Federal Law No.7 of 10.01.2002 "On environmental protection" (as revised on 27.12.2019) sets out a legal framework for the state policy in the sphere of environmental protection, regulates the relationships between the public and nature ensuing from economic and other activities. It further establishes:

- Basic principles of environmental protection, including the use of natural wealth for a pay and the reimbursement of a harm inflicted to the environment (Article 3);
- The right of citizens, non-governmental and other non-profit organizations to put forward proposals for a public environmental expert review and take part in the conduct thereof in the established manner; provide assistance to governmental bodies of the Russian Federation, governmental bodies of Russian regions, local government bodies in the resolution of environmental protection issues (Articles 11 and 12);
- The requirement to conduct assessment of effects on the environment in respect of a planned economic or another activity capable of exerting a direct or indirect effect on the environment (Article 32);
- General environmental provisions for location determination, design, construction, and operation of industrial facilities (Article 34);
- Provisions applicable to oil and gas production facilities, the facilities intended for processing, transporting, storing and selling of gas and petroleum products (Article 46);
- The duty of legal entities and natural persons, which have inflicted damage to the environment by polluting, depleting, damaging, destroying it, by irrational use of natural resources, degrading and destroying natural ecological systems, natural landscapes and other violation of the environmental protection legislation, to compensate (Article 77).

In July 2014 the Federal Law was amended with the following significant changes that took effect in 2018-2019:

- Categorisation of industrial operations in four groups depending on their negative environmental impact (NEI), each subject to different state regulation measures;
- Introduction of process codes for preferential treatment of the best available technologies (for operations of category I, from 01.01.2019);
- Three permits for emissions, discharges and disposal of wastes have been replaced with a comprehensive environmental permit (for operations of category I), declaration (for operations of category II) and reporting (from 01.01.2019);
- Operations of category I remain under the Federal level environmental supervision, and supervision of operations of category II and further is delegated to the level of the RF Territorial Entities;
- Operational environmental monitoring requirements are differentiated depending on the operations category;
- State environmental expert review is mandatory for operations of category I (from 01.01.2018)[9];
- Legal regulation of charges for environmental impacts;
- Introduction of environmental incentives for reduction of environmental pollution.

The GBS LNG & SGC Plant, gas pre-processing treatment facilities at the field site, and several other permanent facilities of the FIELD and PORT components meet the criteria of NEI category I[10], which triggers application of the most stringent environmental safety standards and mandatory implementation of the best available technologies (BAT).

Federal Law "On the sanitary and epidemiological welfare of the population" of 30.03.1999 No.52-FZ (as revised on 26.07.2019) regulates relationships in the sphere of sanitary and epidemiological welfare of the population. In particular, legal entities are obliged to ensure the safety of performed works and rendered services for human health, to exercise production control over the observance of sanitary and counter-epidemic (preventive) measures during the performance of work and the rendering of services, to inform the population, local self-government bodies, the bodies engaged in the state sanitary and epidemiological

[9] At the same time, environmental survey materials and environmental sections of the design documents approved by the state environmental expert review board are not subject to further approval together with state expert review of other survey materials and design documentation

[10] RF Government Decree No. 1029 of 28.09.2015 "On the approval of criteria for classifying facilities that have the negative impact on the environment as facilities of the I, II, III, IV categories".

supervision in a timely manner about emergency conditions, production stoppages and breaches of technological processes endangering the sanitary and epidemiological welfare of the population (Article 11).

2.2.2 Assessment of impacts as a form of environmental support for operations

Engineering surveys (including environmental studies) in the entire area of potential influence of the Project are integral part of design development for construction or reconstruction of permanent facilities.

The prepared design documentation and findings of engineering survey shall be submitted to the state expert review which is aimed at evaluating their conformity to the applicable technical standards, including sanitation and epidemiology, environmental requirements, protection of cultural heritage sites, as well as fire and industrial safety-related, etc. The state expert review is provided by the RF governmental body (FAI Glavgosekspertiza of Russia).

RF Government Resolution No. 87 of 16.02.2008 "On the scope and contents of project documentation" establishes the requirements for inclusion of special section titled "List of environmental protection measures" (LEPM)[11] with description of findings of environmental impact assessment (EIA) and proposed mitigations, as well as environmental monitoring and control programme. The required approvals and information from various environmental and other authorities are attached as supporting materials. Industrial projects can be implemented only when the above documentation is approved by the expert review authorities.

The process of state environmental expert review (SEER) is regulated by the Federal Law of 23.11.1995 No.174-FZ and the Urban Development Code (Federal Law No.190-FZ of 29.12.2004 as revised on 24.04.2020). In accordance with subclause 7.5 of Article 11 which took effect on 01.01.2018, design documents for capital construction projects for operations of NEI category I are subject to SEER.

Legal base for EIA process in Russia is established in Regulation "On environmental impact assessment of planned economic and other operations in the Russian Federation" approved by the RF State Committee for Environmental Protection (Goscomecologia), Order No.372 of 16.05.2000. This Order sets out three stages for EIA process in Russia:

- EIA terms of reference (ToR) preparation and agreement with stakeholders;
- Development of EIA materials and consultations with stakeholders;
- Preparation and issue of final EIA with incorporated results of the above consultations with stakeholders.

In general, the Russian EIA process is comparable to international practice in this sphere, and in many respects it is compliant to the procedures recommended by the international financial institutions, including the World Bank. The main difference lay in the scope and methodology applied for the studies. Furthermore, Russian EIA can be conducted separately for different parts of major projects, whereas international ESHIA must cover the whole project including its background and prospects, as well as potential overlapping impact with third party activities (cumulative effects).

2.3 Categorization of the Planned activity Based on International Requirements

2.3.1 Equator Principles

Equator Principles are the ten voluntary environmental and social standards to be adhered to in case of project financing by the Equator Principles Financial Institutions (EPFI). The Equator Principles were first established in 2003 and were subsequently amended in 2006, 2013 and 2019.

The Equator Principles are focussed on the environmental and social standards including responsibility for compliance. Particular attention is paid to protection of indigenous peoples, labour standards, and the need for consultations with affected communities.

The Equator Principles include the following:

- Principle 1: Review and Categorisation
- Principle 2: Environmental and Social Assessment
- Principle 3: Applicable Environmental and Social Standards
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Principle 5: Stakeholder Engagement

[11] For the linear infrastructure facilities this section is titled "Environmental measures".

- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

Principle 1 is applied to the projects with capital cost of USD 10 M or more, and includes the measures taken by EPFI to define the project category in terms of its potential impact. The procedure is based on IFC classification of environmental and social risks.

The projects are categorized using the following criteria:

- Category A - Projects with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible or unprecedented;
- Category B: Projects with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures; and
- Category C - Projects with minimal or no adverse environmental or social risks and/or impacts.

As was demonstrated in the ESHIA materials 2018, the Planned activity for the construction and operations of the GBS LNG and SGC Plant falls under Category A for the following reasons:

- The LNG Complex facilities and related infrastructure are included in the standard list of Category A projects;
- Potentially significant and adverse impacts are probable, and some of them may be irreversible;
- High environmental and social sensitivity of the Project area.

Project as a whole clearly matches Category A too, with reference to the OECD's Common Approaches criteria[12]: scale and nature of potential impacts of the intended activities extends beyond the boundaries of the Project sites, which requires the development of a mitigation hierarchy to avoid, minimise and compensate the adverse impacts depending on their significance and receptors' sensitivity.

Principles 1 through 6 are the most applicable to ESHIA process. The new version IV of the Equator Principles that will take effect in July 2020 has several differences from the current EPIII. More specifically, the new scope of ESHIA will be enhanced to cover observance of human rights.

Furthermore, EPIV refer to the Paris Climate Agreement of 2015 and require that EPFIs adhere to this provision of the agreement, including promotion of disclose of climate-related information. Principle 2 establishes the need for assessment and categorisation of project climate impact with reference to the Climate Physical Risk and Climate Transition Risk categories of the TCFD (Task Force on Climate-related Financial Disclosures). The assessment requirements are further clarified in Appendix A. For projects of categories A and B the assessment should include consideration of relevant physical risks. For projects with combined GHG emissions more than 100,000 tonnes of CO2 equivalent annually? consideration must be given to relevant Climate Transition Risks (as defined by the TCFD) and an alternatives analysis completed which evaluates lower greenhouse-gas-intensive alternatives. Companies implementing Category A and Category B projects must publish annual reports on GHG emissions, prepared and arranged in compliance with adopted international requirements.

Another important accent of EPIV is encouraging companies to share commercially non-sensitive project-specific biodiversity data (for projects of Categories A and B) with the Global Biodiversity Information Facility (GBIF) and relevant national and global data repositories.

From the perspective of the Arctic LNG 2 Project, it is particularly important that EPIV provide a clear definition to remove ambiguity in interpretation of the requirements for obtaining FPIC (Free, Prior and Informed Consent) from representatives of indigenous communities affected by the project. In particular, along with establishing the need to secure FPIC whenever this is required by IFC PS7, EPIV allow for implementation of certain projects without formal FPIC; such waiver of the IFC standard is permitted only in situations of full compliance with the intention of PS7 verified by the financial institution and engaged consultants (i.e. when documentary evidence is available to demonstrate that all disputes between the company and indigenous people are settled, and that the consultation process meets the requirements of

[12] Recommendation of the Council on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence. – OECD, 2016

IFC standards). If it is not clear if FPIC has been effectively achieved as a result of consultations with indigenous communities, EPFI can propose further corrective actions to be taken by the company.

2.3.2 IFC Performance Standards (2012)

The IFC Environmental and Social Sustainability Policy (2012) requires that projects are screened to identify their category and thus define the applicable scope and type of environmental assessment. Institutional requirements of IFC for information disclosure are also established depending on the project category, in accordance with IFC Access to Information Policy. Projects may be attributed to one of the four categories depending on their type, place of implementation, sensitivity and scale, and also the nature and scale of their potential environmental impacts. Description of various project categories is provided below:

- Category A - Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible or unprecedented;
- Category B - Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures;
- Category C - Business activities with minimal or no adverse environmental or social risks and/or impacts;
- Category FI - Business activities involving investments in financial institutions or through delivery mechanisms involving financial intermediation. The project being subject matter of this document may not be attributed to this category.

The Project has many components (e.g. LNG Complex, PORT, gas pre-processing treatment facilities at the field site, etc.) that can potentially produce significant adverse environmental and social impacts. For this reason, Arctic LNG 2 Project is classified as Category A. However major part of the proposed activity impacts can be mitigated and controlled by adequate environmental and social management procedures and the monitoring activities which are defined in the Stakeholder Engagement Plan, Environmental and Social Action Plan, ESHIA Report, and the appropriate Management Plans at the construction and operation phases.

The scope of information to be disclosed to stakeholders includes the following key documents:

- ESHIA Report;
- Stakeholder Engagement Plan;
- Environmental and Social Action Plan;
- Non-technical Summary; and
- Environmental and Social Management Plan(s).

IFC is part of the World Bank Group and a recognised international leader in the sphere of development and implementation of environmental and social sustainability policies. In accordance with its Environmental and Social Sustainability Policy, IFC uses a set of environmental and social Performance Standards (PS) to assess planned activities. In April 2012 IFC issued a new version of Environmental and Social Sustainability Policy and PSs. In July 2019, Guidance Note for PS6 was re-issued with a series of amendments and clarifications concerning the assessment of biodiversity impacts.

PS 1:	Assessment and management of environmental and social risks and impacts
PS 2:	Labour and working conditions
PS 3:	Resource efficiency and pollution prevention
PS 4:	Community health, safety and security
PS 5:	Land acquisition and involuntary resettlement
PS 6:	Biodiversity conservation and sustainable management of living natural resources
PS 7:	Indigenous peoples
PS 8:	Cultural heritage

Applicable General EHS Guidelines of IFC

IFC Environmental, Health and Safety (EHS) Guidelines applicable to the Project:

- General EHS Guidelines (April 2007);
- IFC EHS Guidelines for Natural Gas Processing (April 2007);
- IFC EHS Guidelines for Onshore Oil and Gas Development (April 2007);

- IFC EHS Guidelines for LNG Development (April 2017);
- IFC EHS Guidelines for Thermal Power (December 2008);
- IFC EHS Guidelines for Ports, Harbours and Terminals (February 2017);
- IFC EHS Guidelines for Crude Oil and Petroleum Product Terminals (April 2007);
- IFC EHS Guidelines for Shipping, (April 2007);
- IFC EHS Guidelines for Waste Management Facilities (December 2007);
- IFC EHS Guidelines for Water and Sanitation (December 2007).

Other applicable procedures and guidelines of IFC:

- Environmental and Social Review Procedures, 2016;
- Environmental and Social Management System Implementation Handbook (General), 2015;
- Environmental and Social Management System Implementation Handbook for Construction, 2014;
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007;
- Good Practice Note: Managing Contractors' Environmental and Social Performance (October 2017);
- Use of Security Forces: Assessing and Managing Risks and Impacts (February 2017);
- Worker's Accommodation: Processes and Standards (Guidance Note by IFC and EBRD, 2009);
- Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (August 2013).

2.4 Identification of Potential Impacts

Potential environmental and social impacts can be identified by the following key methods:

- Review of previous studies, surveys, impact assessments, environmental monitoring data in the proposed location area of the LNG Complex and the associated facilities. The above materials provide information on environmental baseline status, its transformation under the influence of various business operations, and efficiency of environmental measures.
- Stakeholder Engagement. Stakeholder Engagement Plan (SEP) to be developed as part of the ESHIA process is a framework document regulating information exchange with earlier identified communities and organizations which may be potentially affected by the Planned activity and/or expressed interest in getting information about the planned activity during the preliminary consultations. The document provides a basis for continuous engagement with stakeholders during the whole Planned activity lifetime (refer to Section 3).
- "Source - Path - Receptor" Analysis[13]. Potentially significant social and environmental impacts are also identified by structured analysis of potential sources of impacts, ways they can impact the environment and human health (e.g. transport of emissions/discharges in the environment), and type of potentially affected receptors (e.g. human, flora and fauna, etc.). Thus, the analysis at the same time considers the following:
- Characteristics of the planned activity (separately for construction, operation, decommissioning and liquidation) and associated activities which may cause environmental, social and human health impacts;
- Characteristics of receptors of the predicted impacts and assessment of their sensitivity (vulnerability).

Typical questions considered by the comparative assessment of significance are:

1. Will the environmental changes caused by the impact be significant?
2. Will the newly developed landscape element stand out against the background?
3. How typical is the impact for the project area?
4. What is the size of area potentially affected by the impact? Can it develop to transboundary level?
5. What is the population number in the area affected by the impact?
6. Are there any nature conservation areas, habitats of protected species, other unique natural resources, historical or cultural heritage sites in the area affected by the impact?
7. Can the impact result in deviation from the existing environmental quality standards in the project area?
8. Is there a potential for transformation of socio-economic conditions in the project area?

[13] Hereinafter the term "receptors" is used to describe objects affected by impacts of the planned activity

9. What is the impact duration and nature (e.g. one-time, intermittent with regular intervals, repeated with irregular intervals, etc.)?
10. Will the environmental response be reversible?
11. Is it possible to prevent, mitigate or compensate the impact?

One of the most important components of the ESHIA process is development of measures for prevention, minimization, remediation and compensation measures (listed in the order of priority).

2.5 Approach to Classification and Assessment of Identified Impacts

2.5.1 Selection of ESHIA Methodology

The ESHIA process identifies, describes and evaluates the potential environmental and social impacts of planned activities, and formulates measures that will be implemented to manage these impacts, so that adverse impacts can be avoided or reduced to an acceptable level and beneficial impacts can be enhanced.

The methodology for the Supplementary ESHIA is based on the provisions of the EU Directive 2011/92/EU "On the assessment of the effects of certain public and private projects on the environment"[14] and Performance Standard 1 of the International Finance Corporation (IFC)[15]. The two documents describe environmental and social impacts as any change to an environmental or social receptor (including community, workers, etc.), whether potential or actual, resulting from the business activity to be financed.

From the methodology perspective, the ESHIA process includes all necessary steps: from screening, stakeholder identification and consultations, identification and evaluation of beneficial and adverse effects of the planned activity, to planning of mitigation and remediation actions, development of management recommendations for the planned activity, and appropriate monitoring and control.

2.5.2 Impact Identification and Evaluation of Significance

Potential impacts on individual components of the environment are identified for all phases of the proposed operations, and their magnitude is assessed. An impact is any change to an environmental or social (including community health and safety) receptor, whether direct or indirect, expected to result from the construction, operation and decommissioning of a proposed Project[16]. Impacts on individual receptors may be negative (adverse) or positive (beneficial).

The approach adopted to determine and evaluate the significance of potential impacts involves four key steps:

- Prediction;
- Evaluation of significance;
- Identification of mitigation measures; and
- Assessment to determine whether residual impact is acceptable.

If mitigation measures are not sufficient (i.e. residual impact is not acceptable for the receptors or is of high significance), the process needs to be repeated to identify reasonable ways to minimise the negative impact.

2.5.3 Impact Types

Impacts can be divided into types and, also, exhibit a number of characteristics. The degree to which an impact can be managed or modified by the mitigation measures is dependent upon the impact type and its characteristics. Table 2.1 provides definitions of key impact types.

All of these impact types exhibit certain characteristics in terms of:

- Reversibility;
- Extent;

[14] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the Assessment of the Effects of Certain Public and Private Projects on the Environment (amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014)

[15] Performance Standard 1. Assessment and management of environmental and social risks and impacts / Performance Standards on Environmental and Social Sustainability. - IFC, 2012. Can be accessed at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards

[16] This definition reflects the wording provided in the internationally recognized standard ISO 14001:2015, as well as Russian Standard GOST R ISO 14001-2016: "Environmental impact - any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects. Environmental aspect - element of an organization's activities or products or services that can interact with the environment".

- Duration; and
- Frequency.

Table 2.1: Classification of Project Impacts

Classification of Impacts	Definition	Description
By overall effect	Beneficial	Impacts expected to result in positive changes at the identified receptors
	Adverse	Impacts expected to result in negative changes at the identified receptors
By origin	Direct	An impact that results from a direct interaction between a planned activity and the receiving environment (receptors)
	Indirect	An impact that follows on from the primary interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g. increased demand for resource as a result of workforce drift to the area of planned activities from other regions, or feedback effects in ecosystems affected by direct impacts)
By the nature of secondary effects	Cumulative	Proposed activity impacts which may be amplified if combined with impacts caused by third party operations (projects) on the same resources and/or receptors

Comprehensive assessment of the Arctic LNG 2 Project will be provided, considering the current stage of design development and potential cumulative effects in the examined area.

2.5.4 Evaluation of Impact Significance

The impacts are assessed in a structured and coordinated manner throughout the ESHIA process. The approach adopted enables attribution of potential impacts to specific environmental and social aspects. For adverse impacts, significance is assigned in accordance with the methodology described below, based on determining impact magnitude and receptor sensitivity, after which mitigation is identified depending on impact characteristics.

The magnitude of each impact is assessed using the following characteristics (refer to Table 2.2):

- Reversibility;
- Extent; and
- Duration.

Table 2.2: Description of impacts

Criterion	Description	Definition
Reversibility	Irreversible	Impacts that cause a permanent change in the affected receptor
	Reversible	Restoration of the pre-impact status of a receptor due to mitigation/reinstatement measures and/or natural recovery. Duration of the impact and duration of subsequent recovery period should be considered
Extent (spatial)	Site	Impact within the boundaries of land and water area allocated for the proposed activity and associated use-restricted zones (sanitary protection, security, etc.)
	Local	Within the boundaries of local municipality (Yamal Municipal District of YNAO)
	Regional	Within the boundaries of a region, territory, republic (YNAO)
	National level	Impact that affects more than one regions or territorial entities of the Russian Federation, water flows/bodies of the national significance
	Transboundary	Impact that affects receptors, beyond the boundaries of the country in which the project is located and producing transboundary / global effects (e.g. impacts of greenhouse gas emissions, vection of invasive species, etc.).

Criterion	Description	Definition
Duration	Short-term irregular or occasional	Impact caused by short-term single or recurrent events
	Mid-term regular or associated with a phase of activities	Impacts with duration equal or nearly equal to that of certain activity or a phase of the planned operations
	Long-term	Impacts with duration equal or comparable to the Project lifetime. Impacts of this category may cease after completion of Project activities

Table 2.3 provides generic criteria to be used to determine the impact magnitude. Taking the results derived from the previous step a decision can be made on impact magnitude (negligible, minor, moderate, major).

Table 2.3: Impact magnitude

Impact	Criteria
Negligible	No persistent discernible impact. The change is essentially indistinguishable from natural background variation.
Minor	Limited impacts that can be identified by the available means of monitoring, with no effect on functions of ecosystems and communities **Extent:** site / local **Duration:** short / medium term **Reversibility:** reversible
Moderate	Noticeable impacts which may result in quantitative changes in ecosystems, however without their quality transformation, and without loss (partial or complete) of their natural functions **Extent**: local / regional **Duration**: medium / long term **Reversibility**: reversible / irreversible
Major	Prominent impacts that may result in temporary or permanent transformation of ecosystems, with loss of their functions, and transformation of communities life style and quality **Extent**: regional / national / transboundary **Duration**: medium / long term **Reversibility**: reversible / irreversible

Once the respective magnitudes of each impact have been allocated the next step is to determine receptor sensitivity. Receptor sensitivity is based on two components: the degree to which a receptor is resilient to a change and the value attributed to the receptor by stakeholders or applicable regulations/policies.

Table 2.4 provides an account of the key features (definitions) of each of the impact significance classifications (form Not Significant to High); specifically linking them to need for mitigation measures.

Table 2.1: Impact Significance Matrix

		Receptor Sensitivity			
		Negligible	**Low**	**Moderate**	**High**
Impact Magnitude	**Negligible**	Not significant	Not significant	Not significant	Not significant / low[17]
	Minor	Not significant	Low	Low / Moderate	Moderate
	Moderate	Not significant	Low / Moderate	Moderate	High
	Major	Low	Moderate	High	High

This method is applied at least twice: to both pre- and post-mitigation scenarios for all impacts identified.

Besides the qualitative assessment of project impacts using the above approach, ESHIA may include quantitative assessment of certain impacts on receptors. In this case impact assessment precedes development of technical documentation for the Project and associated facilities to the level of detail required for quantitative simulation of future impacts (e.g. pollution dispersion analysis). However, parameters of these and other impacts of the Project can be assessed using the available survey materials, results of environmental monitoring of current operations, and benchmarking with similar facilities elsewhere. The closest equivalent of the designed Project facility is the operational Yamal LNG Project comprising the LNG Plant and Terminal located at a distance of 70 km from the LNG Complex and PORT site.

Quantitative assessment of project impacts on receptors can be also provided using the official Russian methodologies for estimation of potential damage which may be caused by specific impacts.

2.5.5 Impact Mitigation

As part of the ESHIA process, when adverse impacts are identified, measures for mitigation, minimization and control of risks, and monitoring of residual impacts are developed.

The process of identifying design controls and mitigation measures must follow the sequence of the mitigation hierarchy, as specified in IFC's Performance Standard 1 (priority order: avoid - minimise - repair - offset), which is widely regarded as the best practice approach to managing impacts. The measures are developed and implemented in the same order as they are listed above.

Development of the mitigation measures will be primarily focused on minimization of the impacts of "High" significance. However, where possible and appropriate, mitigations will be also proposed for the impacts of "Moderate" and "Low" significance, in order to reduce environmental and social effects / risks to the lowest level.

2.6 Approach to Identification of Planned Activity's Area of Influence

Spatial coverage of the planned activity is defined by several components. Central part of the future area of influence is the land plot and adjacent water area allocated for construction of the future facilities. Inside the common boundary, the Project facilities are grouped into several process and functional zones[18] comprising production facilities (mostly at the LNG Complex, PORT and adjoining FIELD sites), auxiliary and storage facilities. Together with interconnecting utility lines, they appear as a tree-like system with branches directed from the onshore facilities toward the Northern, Central and Southern domes of the field (refer to Appendix B3).

Land use conditions beyond the territories and water areas directly affected by construction will also change, as the sanitary protection zones (SPZ) will be established. SPZ status means that pollution levels

[17] Allows technical discipline author to decide which significance level is applicable in the given situation

[18] In the terminology of SP 18.13330.2019

in air in this area may be above the MPC limits, and intensity of adverse physical impacts (noise, vibration, electromagnetic fields) may exceed the permissible levels established for regulated areas.

Besides SPZ, other use-restricted zones (URZ) will be also established, in order to ensure safe operation of the future Project facilities[19].

For the next stage of assessment of the outer contour line of the influence area with the central part comprising the allocated land plot, water area used for the Project, sanitary protection zone and other URZs associated with the Project facilities, it is advisable to use the respective criteria of MRR-2017 - isometric line of 0.05 MPC of the most common pollutant emitted by the sources (without background) and ten times distance between the emissions source and the point with the maximum ground level concentration of polluting substances. If pollution sources parameters are not known, potential size of the area of the Project impact on air quality was assessed in 2018 using information from similar facilities, the nearest of which is the Yamal LNG Project. The planned ESHIA will consider design parameters of pollution emissions, as well as outputs of dispersion modelling with MRR-2017, and internationally accepted alternative methodologies.

The main impacts of the Project on geological environment and exogenous processes are predicted to take place in the area of River Khaltsyney-Yakha and River Nyadaj-Pynche valleys and the adjacent water area of the Ob Estuary of the Kara Sea. Most physical and and other effects on soil and vegetation will be also limited by the same areas, however the chemical contamination effects will affect the whole area of influence as determined above, with the 0.05 MPC criterion. The FIELD impacts will be follow the three respective beams toward the producing zones of the field - Northern, Central and Southern; some impacts will have a "patchy" spatial extent (individual wells, quarries and other facilities used only during cold season).

In the Ob Estuary water area the boundaries of the Project area of influence will be defined by propagation of polluting substances and physical impacts (warming effect, turbulence, suspension and re-settling of sediments, etc.) downstream. Some effects will be also felt upstream the future operation sites (secondary transformation of erosion and accumulation processes, changes in ice conditions and water circulation patterns, vibroacoustic impacts) as tidal and downward streams in the LNG Complex and PORT area contribute to the development of those processes.

The inland river and lacustrine-boggy complexes will to a certain extent act as a transfer medium transporting Project impacts to the Ob Estuary and Gydan Estuary: the land mass of the Gydan Peninsula is confined between two large estuaries, with the distance from the LNG Complex and PORT (Ob Estuary coast) to the nearest Gydan Bay waterline being approximately 65 km; the License Area is asymmetrically divided into the western and eastern parts by the watershed located 3-25 km from the Ob Estuary waterline.

Assessment of cumulative impacts of the Project will also consider possibility and resultant effects of overlapping of the above zones with areas of influence of the third-party projects which are not associated facilities (Yamal LNG, etc.).

Final size of the project's area of environmental and social influence will include the following (in the context of IFC terminology):

1) land plots and water areas immediately used for implementation of the planned activity;
2) other territories and water areas that the project operator and its subcontractors use or control;
3) territories and water areas occupied by associated facilities;
4) territories and water areas affected by potential impacts from the proposed and associated operations;
5) territories and water areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

In accordance with IFC standards, project's area of influence does not include potential impacts that would occur without or independently of the Planned activity.

[19] According to p. 4 Art. 1 of the RF Urban Development Code, URZ include protective zones, sanitary protection zones, cultural heritage protection zones, water protection zones, flooding zones, drowning zones, protective sanitary zones of sources of drinking water and household water supply, exclusion zones and other zones established in accordance with the Law of the Russian Federation

The cumulative impact area of the planned activity should be presented in the ESHIA materials with the detail possible, based on currently available data.

3. STAKEHOLDER ENGAGEMENT

3.1 Overview

Stakeholder engagement is vital for identification and control of potential adverse and beneficial impacts, and for implementation of the Project with the maximum benefits for local communities. In accordance with IFC Performance Standard No.1 (PS1), stakeholder engagement initiated at an early stage of the planned activity will ensure open access to the relevant information and stakeholders' contribution to development of the facilities' design, identification and assessment of impacts, as well as mitigation/enhancement measures as appropriate. In order to facilitate this process, ESHIA materials 2018 included Stakeholder Engagement Plan (SEP) for the LNG Complex. SEP is a live document which will be updated as part of the Project ESHIA process, and is subject to regular updating also in the future. SEP will include the following:

- Identification of key stakeholders;
- Records and accounting of stakeholder consultations and engagement activities;
- Planning of future activities and procedures within the stakeholder engagement process at all stages of the Project life cycle.

The above aspects are of vital importance for stakeholder engagement, and their summary is provided in the sections below.

3.2 Identification of Key Stakeholders

Stakeholders[20] are persons or groups who are directly or indirectly affected by the proposed construction and operation of the Project and associate facilities, as well as those who may have interests in the proposed activity and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include affected communities or individuals, as well as their formal or informal representatives, authorities at the Federal level and level of the Territorial Entity, and also local authorities, political leaders, religious leaders, NGOs and special interest groups, academic community or companies/entrepreneurs.

The following classification is adopted to IFC requirements:

- Affected parties including those exposed to direct and indirect impacts;
- Other stakeholders;
- Vulnerable groups.

Detailed description of stakeholders is provided below. The list of key stakeholders is included in SEP which along with the Scoping Report is disclosed to stakeholders. It should be noted that the list can be extended, modified and altered throughout the Project life cycle. It is expected that the list of stakeholders which is provided herein below and in SEP will be discussed with various stakeholder groups and extended and/or replaced as appropriate. This approach allows for contributions of various stakeholders into further engagement plans.

3.2.1 Affected parties

Affected parties are individuals, groups and entities within the social area of influence of the Project who are exposed to its direct impacts (actual or potential) and can be identified as being the most sensitive to the changes related to the proposed activity. These stakeholders require extensive engagement both at the stage of identification and assessment of significance of impacts, and during decision making about mitigation of impacts and arrangement of management system.

The stakeholders list[21] includes groups, individuals, communities, organizations and other social institutions as follows:

Subject to direct impact

- Indigenous peoples leading a nomadic life and occupied in traditional activities (reindeer herding, fishery, wild crops harvesting, hunting etc.) within the territory of Salmanovskiy (Utrenniy) LA, which can be exposed to direct impacts of the Project construction and operation;

[20] IFC, Stakeholder Engagement Handbook, 2007

[21] These are the results of the preliminary identification and categorization of the affected parties which will be corrected during the consultations and the EIA materials preparation.

- Personnel of the companies engaged for construction and operation of the Project and associated facilities;
- Agricultural enterprise MUE State Farm Antipayutinskiy being a potential receptor of both beneficial and adverse impacts of Project and associated facilities.

Potentially subject to indirect impact

- Indigenous peoples leading a nomadic life and occupied in traditional activities (reindeer herding, fishery, wild crops harvesting, hunting etc.) within the territory of Salmanovskiy (Utrenniy) LA, which will not be exposed to direct impacts of the Project construction and operation, but may be affected by indirect effects of the Project;
- Indigenous communities in the Gyda Tundra and Antipayuta Tundra in general, who hold on to customary lifestyle outside the Salmanovskiy (Utrenniy) LA. The routes of reindeer-herders within the Salmanovskiy (Utrenniy) LA can be changed, which in turn may affect economic activity indigenous population beyond the boundaries of LA;
- Village Gyda (170 km from the designed LNG Complex) and village Antipayuta (240 km from the designed LNG Complex) which are the nearest to the Salmanovskiy (Utrenniy) LA relatively large settlements where the nomading indigenous people are often registered and use medical services, go shopping etc.;
- Yuribey village / trading station (115 km from the designed LNG and SGC Plant) and Tadebya-Yakha village / trading station (70 km from the designed LNG and SGC Plant). Location of these small villages is also relatively close by the the Salmanovskiy (Utrenniy) LA, and they may be also used for residence by the indigenous nomadic population of the LA territory. Besides, the nomading families visit shops located in these villages and the medical station located in Yuribey;
- Agricultural Enterprise GAGE GydaAgro LLC engaged in reindeer herding and fishery, which can be impacted affected by the planned activity;
- Companies that run fishing operations in the Ob Estuary which may be affected by the planned activity;
- Health institutions, particularly publicly funded health institution (PFHI) Tazovskiy Municipal District Central Hospital

The above stakeholder groups may be related to each other or overlap. For instance, it is expected that residents of Gyda may be involved in operations of agricultural enterprises (GAGE GydaAgro LLC, MUE «State Farm Antipayutinskiy), and residents of Yuribey may be at the same time individual fishers and reindeer herders.

Based on stakeholder consultations, the list of affected parties may be changed, amended and extended with a more specific description of their relation to the Project, potential impacts on them, contact data (if applicable) and other relevant details. Stakeholder category may be changed if adequate rationale is provided.

3.2.2 Interested parties (organizations and individuals)

This category includes individuals/groups/organizations which may be not affected directly by impacts of the Project and associated facilities, but whose interests may be affected, and also those able to influence the planned activity.

Tentative list of this category of stakeholders includes the following:

- YNAO authorities (YNAO Government), in particular Department for Natural Resource Regulation, Forestry Affairs and Development of Oil and Gas Industry (DPRR) of Yamal-Nenets Autonomous Okrug, Department for Indigenous Small-numbered North Peoples of Yamal-Nenets Autonomous Okrug, etc.;
- Local branches of Federal authorities operating in YNAO, in particular: the Sea Port of Sabetta of FSUE Rosmorport; Federal Service for Nature Management Supervision, Department for Yamal-Nenets Autonomous Okrug (Rosprirodnadzor Department for YNAO), etc.;
- Agricultural enterprises of Tazovskiy Municipal District which may be potentially affected by indirect impacts of the Project and associated facilities (e.g. Tazovskiy Agroindustrial Fish Producing Enterprise LLC or Tazovskiy Agricultural Complex LLC);
- Tazovskiy Consumer society (Tazovskiy) and trading stations which, according to preliminary assessment, are located outside the area of social impacts of the Project;
- Tazovskiy branch of the Regional Non-governmental organization "Association of indigenous small-numbered peoples of the North of Yamal-Nenets Autonomous Okrug "Yamal – Potomkam!" (regional group "Yamal – Potomkam!");

- Charity Foundation for Development of Indigenous Small-numbered Peoples of the North (ISPN Development Fund, representation in Tazovskiy Municipal District of YNAO);
- Other civil society organizations: World Wildlife Fund (WWF), Interregional public environmental and sociological organization "Green Arctic", Charity Foundation "Biodiversity Conservation Centre" (BCC), District public organization of women "Zhenschiny Tasu'Yava", war veterans' organizations of Tazovskiy Municipal District, etc.;
- Federal, regional and local mass media;
- Professional unions and associations (e.g. YNAO branch of the Russian Union of Industrialists and Entrepreneurs);
- Academic institutions.

Stakeholder categorization may be changed, modified and extended in the course of the Project construction and operation, if adequate rationale is provided.

3.2.3 Vulnerable groups

Vulnerable groups are those who could experience adverse impacts from the proposed activity more severely than others based on their vulnerable status. This status may stem from ethnicity, property, level of income, economic situation, gender, language, religion, national or social origin, age, culture, literacy, physical or mental disability, and dependence on unique natural resources.

Ensuring equal representation and involvement of vulnerable groups in the Project engagement and decision making process may require additional efforts. The following tentative list has been prepared based on definition of this stakeholder category:

- ISPN individuals and families living in traditional places of inhabitance and engaged in customary activities including nomadic, in the territories within the influence area of social impacts, whose welfare depends on public subsidies and status of the main ecosystem services;
- Low-income individuals and families whose welfare depends on public social support, living and/or engaged in business activities within the influence area of the Project;
- Junior or senior individuals having residence in the influence area of the Project;
- Individuals with ill health, disabilities and/or diagnosed socially sensitive diseases (tuberculosis, HIV/AIDS, etc.) living and/or engaged in business activities within the influence area of the Project;
- Households led by women within the influence area of the Project.

Categories of vulnerable groups may be amended and expanded based on the results of stakeholder consultations.

3.3 Stakeholder Engagement to Date

At present the key method of engagement of communities in the potentially affected territories are public consultations in the format of public hearings arranged in accordance with requirements of the Russian Law (Table 3.1), as well as other methods of engagement.

Table 3.1: Statutory consultations

Year	Facility(ies)	Topic of discussion / engagement event	Date of public hearings
2013	Arctic LNG 2 Project	Declaration of Intent (DoI) "Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup". *Public consultations were arranged to study public opinion at the pre-design stage and included discussion of potential natural gas transportation alternatives*	29.03.2013
2014	GBS LNG & SGC Plant	Design survey programme for the LNG Complex on RC gravity-based structure (RCGBS) in the area of Salmanovskoye (Utrenneye) OGCF in the Ob Estuary, including EIA materials	01.07.2014
	FIELD	Berth structures infrastructure at Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field, including EIA materials	11.03.2014
	FIELD	Review of EIA materials at implementation of the "Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup" project. Amendment of dredging design for Arctic SPG 2 LLC	07.11.2014

Year	Facility(ies)	Topic of discussion / engagement event	Date of public hearings
2015	FIELD	Review of documentation for construction of exploration well No. R-281 at Salmanovskoye (Utrenneye) oil, gas, and condensate field, including environmental impact assessment (EIA) materials, for Arctic SPG 2 LLC	11.11.2014
2016	FIELD	Establishing temporary public easement at the land plots with the total area of 153.1564 ha for geocryological studies at Salmanovskoye OGCF during the period from January 09, 2017 to December 08, 2019, for Arctic SPG 2 LLC	29.11.2016
2017	GBS LNG & SGC Plant	Comprehensive design survey for "LNG and SGC production, storage and offloading facilities at Salmanovskoye (Utrenneye) OGCF. Plant for production, storage and offloading of LNG and SGC on gravity-based structures"	05.09.2017
	GBS LNG & SGC Plant	Comprehensive design survey programme in the water area for development of design documentation for the following facilities: "Plant for production, storage and offloading of LNG and SGC on gravity-based structures", "Utrenniy LNG and SGC Terminal", "General purpose terminal" including EIA	18.07.2017 20.07.2017
	FIELD	Review of design documentation: "Early development facilities at the Salmanovskoye (Utrenneye) OGCF" including EIA materials for Arctic SPG 2 LLC	18.07.2017
	FIELD	Establishing temporary public easement at the land plots with the total area of 5272.9853 ha for the period from July 01, 2017 to September 30, 2018, for design survey for the project: "Salmanovskoye OGCF Facilities Setup in Tazovskiy Municipal District of YNAO" for Arctic SPG 2 LLC	06.06.2017
	PORT	Review of documentation for the project: "Maintenance dredging at the berth facilities of Salmanovskoye (Utrenneye) OGCF" including EIA for the future operations of Arctic SPG 2 LLC	14.02.2017
	FIELD	Review of documentation for the project: "Construction of exploration well No.294 at the Salmanovskoye (Utrenneye) OGCF" including EIA for the future operations of Arctic SPG 2 LLC	21.02.2017
	FIELD	Review of design documentation: "Early development facilities at the Salmanovskoye (Utrenneye) OGCF" including EIA materials for the future operations of Arctic SPG 2 LLC	01.07.2017
2018	Arctic LNG 2 Project	Primary disclosure of information on the Arctic LNG 2 Project to community of Gyda and Tazovskiy Municipal District Administration	27.02.2018 – presentation at community gathering
	FIELD	Review of design documentation for the following facilities: "Salmanovskoye (Utrenneye) OGCF Facilities Setup. MSW, Industrial and Construction Wastes Landfill", "Salmanovskoye (Utrenneye) OGCF Facilities Setup. Gas supply design for the power supply facilities to support construction, soil jetting and drilling operations", including environmental impact assessment (EIA) for Arctic SPG 2 LLC	11.05.2018
	PORT	Review of design documentation: "Utrenniy LNG and SGC Terminal", including EIA materials for the future operations of Arctic SPG 2 LLC	18.07.2018
	GBS LNG & SGC Plant	ESHIA consultations (refer to section 4.3.3)	03.2018 – 08.2018
	FIELD	Construction of exploration well No. 297 PO at Salmanovskoye (Utrenneye) oil, gas, and condensate field, including EIA	23.07.2018 – 23.08.2018
	FIELD	Construction of well pads No. 2 and No. 16 at Salmanovskoye (Utrenneye) oil, gas, and condensate field, drilling and testing period, including EIA	24.07.2018 – 23.08.2018

Year	Facility(ies)	Topic of discussion / engagement event	Date of public hearings
	FIELD	Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup, including "List of environmental protection measures" Section, and EIA for Arctic SPG 2 LLC	13.10.2018 – 11.11.2018
	PORT	The Utrenniy liquefied natural gas and stabilised gas condensate terminal, including EIA, for Arctic SPG 2 LLC	18.06.2018 – 18.07.2018
	FIELD	Salmanovskoye (Utrenneye) OGCF Facilities Setup. MSW, Industrial and Construction Wastes Landfill, including EIA	01.04.2018 – 11.11.2018
2019	PORT	Public hearings on documentation substantiating the Design Survey Programme for the Sea Channel, including EIA, for Arctic SPG 2 LLC	07.11.2019 – 10.12.2019
	PORT	Discussion on the topic: "Utrenniy liquefied natural gas and stabilised gas condensate terminal. Introduction of changes and amendments"	15.04.2019 – 15.05.2019
	FIELD	Construction of 18 well pads at Salmanovskoye (Utrenneye) oil, gas, and condensate field, drilling and testing period, including EIA	01.11.2019 – 12.12.2019
	LNG Complex (PLANT)	Plant on gravity-based structures for liquefied natural gas and stabilized gas condensate production, storage, and offloading, including LEPM Section and EIA	17.04.2019 – 17.06.2019

The engagement activities arranged to date support regular dialogue with communities, disclosure of information on the Project and its potential impacts, and provide opportunities to contribute to development of appropriate mitigation measures. It should be noted that the Company's approach to stakeholder engagement includes contacts with nomadic communities through opinion polls arranged by the ISPN Development Fund and Tazovskiy branch of Association "Yamal - potomkam!".

3.3.1 Statutory consultations (2013-2018)

Public discussions and meetings with stakeholders on the following documents and topics were arranged during 2014-2019 in relation to the Project:

Year 2013

- Declaration of Intent (DOI) "Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup" (public hearings were held on 29.03.2013). Public consultations were arranged to study public opinion at the pre-design stage and included discussion of potential natural gas transportation alternatives.

Year 2014

- Design survey programme for the LNG Complex on RC gravity-based structure (RCGBS) in the area of Salmanovskoye (Utrenneye) OGCF in the Ob Estuary, including EIA (public hearings were held on July 1, 2014);
- Provision of berth facilities at Salmanovskoye (Utrenneye) oil, gas, and condensate field, including EIA (public hearings were held on March 11, 2014);
- Review of EIA for the "Berth structures at Salmanovskoye (Utrenneye) oil, gas, and condensate field" Project, amendment of dredging design for Arctic SPG 2 LLC (public hearings were held on October 7, 2014).

Year 2015

- Review of documentation for construction of exploration well No. R-281 at Salmanovskoye (Utrenneye) oil, gas, and condensate field, including environmental impact assessment (EIA) materials, for Arctic SPG 2 LLC (public hearings were held on November 11, 2014).

Year 2016

- Establishing temporary public easement at the land plots with the total area of 153.1564 ha for geocryological studies at Salmanovskoye OGCF during the period from January 09, 2017 to December 08, 2019, for Arctic SPG 2 LLC (public hearings were held on November 29, 2016).

Year 2017

- Comprehensive design survey for "LNG and SGC production, storage and offloading facilities at Salmanovskoye (Utrenneye) OGCF. LNG Complex for production, storage and offloading of LNG and SGC on gravity-based structures" (public hearings were held on September 5, 2017);
- Comprehensive design survey programme in the water area for development of design documentation for the following facilities: "LNG Complex for production, storage and offloading of LNG and SGC on gravity-based structures", "LNG and SGC Terminal "Utrenniy", "General purpose terminal" including EIA (public hearings and meetings/presentations were held on July 18 and July 20, 2017, respectively);
- Review of design documentation: "Early development facilities at the Salmanovskoye (Utrenneye) OGCF" including EIA for Arctic SPG 2 LLC (public hearings were held on July 18, 2017);
- Establishing temporary public easement at the land plots with the total area of 5272.9853 ha for the period from July 01, 2017 to September 30, 2018, for design survey for the project: "Salmanovskoye OGCF Facilities Setup in Tazovskiy Municipal District of YNAO" for Arctic SPG 2 LLC (public hearings were held on June 6, 2017);
- Review of documentation for the project: "Maintenance dredging at the berth facilities of Salmanovskoye (Utrenneye) OGCF" including EIA for the future operations of Arctic SPG 2 LLC (public hearings were held on February 14, 2017);
- Review of documentation for the project: "Construction of exploration well No.294 at the Salmanovskoye (Utrenneye) OGCF" including EIA for the future operations of Arctic SPG 2 LLC (public hearings were held on February 21, 2017);
- Review of design documentation: "Early development facilities at the Salmanovskoye (Utrenneye) OGCF" including EIA materials for the future operations of Arctic SPG 2 LLC (public hearings were held on July 1, 2017).

Year 2018

- Primary disclosure of information on the Arctic LNG 2 Project to community of Gyda and Tazovskiy Municipal District Administration.
- Construction of exploration well No. 297 PO at Salmanovskoye (Utrenneye) oil, gas, and condensate field, including EIA;
- Construction of well pads No. 2 and No. 16 at Salmanovskoye (Utrenneye) oil, gas, and condensate field, drilling and testing period, including EIA;
- Salmanovskoye (Utrenneye) OGCF Facilities Setup. Gas supply design for the power supply facilities to support construction, soil jetting and drilling, including EIA, for Arctic SPG 2 LLC;
- Salmanovskoye (Utrenneye) Oil, Gas, and Condensate Field Facilities Setup, including "List of environmental protection measures" Section, and EIA for Arctic SPG 2 LLC;
- The Utrenniy liquefied natural gas and stabilised gas condensate terminal, including EIA, for Arctic SPG 2 LLC.

Year 2019

- Discussion of documentation substantiating the Design Survey Programme for the Sea Channel, including EIA, for Arctic SPG 2 LLC;
- Discussion on the topic: "Utrenniy liquefied natural gas and stabilised gas condensate terminal. Introduction of changes and amendments";
- Construction of 18 well pads at Salmanovskoye (Utrenneye) oil, gas, and condensate field, drilling and testing period, including EIA;
- LNG Complex on gravity-based structures for liquefied natural gas and stabilized gas condensate production, storage, and offloading, including LEPM Section and EIA;
- Salmanovskoye (Utrenneye) OGCF Facilities Setup. MSW, Industrial and Construction Wastes Landfill, including EIA.

The consultations included meetings with stakeholders in the format of public hearings. The total of 23 public consultations were held on the topics listed above. Representatives of various stakeholder groups participated including:

- Residents of residential units of Tazovskiy Municipal District (Tazovskiy, Gyda, Antipayuta, Gaz-Sale and Nakhodka);
- Tazovskiy branch of the regional group "Association of indigenous minorities of the North of Yamal-Nenets Autonomous Okrug "Yamal – potomkam!";

- Representatives of Tazovskiy Municipal District Administration (Land and Environmental Protection Board of the Department for Property and Land Relations, Inter-settlement Territory Communities and Customary Activities Board) and administrations of rural municipalities;
- State Public Institution (SPI) "Arctic Research Centre";
- Representatives of YNAO Government (DPRR YNAO, SPI "Nedra Yamala", Department for ISPN);
- Representatives of YNAO Legislative Assembly (Committee for Industry, Nature Management and Environment).

All public consultations were advertised in media, and adequate information was disclosed in advance in reception offices arranged for residents of inter-settlement territories.

Residents of so called Gyda, Antipayuta, Tazovskiy and Nakhodka tundra inter-settlement territories took part in the public consultations (including in the form of opinion polls). Their engagement was facilitated by the Association "Yamal - potomkam!" and/or the ISPN Development Fund which arranged the opinion polls. Results of the polls were presented at the hearings. Participants of the consultations made the following requests and comments:

- Need for disclosure of detailed information on the Salmanovskoye (Utrenneye) OGCF development project and construction of complex/plant for production, storage and offloading of LNG and SGC (workforce numbers, geographic coverage, etc.);
- Employment opportunities for local residents (including young professionals);
- Responsible attitude to the environment and potential impact on the ecosystem services which are significant for local land users (pollution of water bodies, emissions, impacts on landscape, animals' migration routes, etc.);
- Responsible attitude to customs, cultural values and sacred sites of ISPN;
- Provision of aid to local indigenous communities (including targeted support);
- Adequate management of contractors' activities;
- Employment of ISPN;
- Adequate environmental protection and remediation measures;
- Construction of berth facilities and dredging operations should be arranged taking into account the migration patterns of aquatic species

At further stages of the Project implementation the Company will continue the practice of public consultations and meetings with local communities, so that opinions of a wide range of stakeholders will be duly incorporated.

3.3.2 Ethnographic survey (2015)

Opinions of ISPN communities representing the customary occupations were studied in detail in 2015 in the course of ethnographic survey by non-profit partnership "Ethno-ecological and Technological Studies Centre of Siberia" for PURGEOCOM LLC. The survey was arranged within the license area in the Project FIELD facilities. The survey report contains information on 30 reindeer herding farms (total of 170-200 persons) leading nomadic life in the area of Salmanovskiy (Utrenniy) LA and identifies the following points of concerns relating to the interaction of customary occupations of the indigenous people and the Field development project which were expressed by the reindeer herders:

- Potential adverse impact of OGCF development on reindeer health;
- Concerns about potential reduction of livestock numbers as a result of the FIELD facilities development;
- Depletion of pasture resources as a result of their fragmentation by the pipelines, overexploitation and contamination of soil (e.g. due to transport of sand used for filling of infield roads);
- Mixing of herds and consequential conflicts with other reindeer herders;
- Negative impact on lakes and rivers of livelihood significance;
- Risk that lakes and rivers of livelihood significance will be used by migrant workforce for fishing.

The ethnographic survey also describes several provisions on mitigation of potential impacts which are based on findings from the opinion poll of indigenous people in Tazovskiy Municipal District.

3.3.3 Consultations as part of international ESHIA 2018 for the LNG Complex

A kick-off meeting with Tazovskiy Municipal District Administration, ISPN Development Fund and Tazovskiy branch of Association "Yamal – potomkam!" was arranged as part of the Scoping Report preparation.

The meeting agenda included the following items:

- Summary of the Project construction process;

- Requirements of international standards, in particular IFC PS 1-8;
- International ESHIA process;
- Key methods of stakeholder engagement, including potential participation of Ramboll in the activities related to Reindeer Herder's Day in Tazovskiy, Gyda and Antipayuta;
- Customary types of land use (fishery, reindeer herding) and potential impacts on them caused by the Company's activities for the Project construction.

Two further series of consultations were conducted in 2018 in relation to the international ESHIA for the LNG Complex:

- Scoping stage:
  - Disclosure of SEP and Scoping Report, and
  - Face to face meetings with representatives of ISPN communities and Tazovskiy Municipal District Administration;
- Environmental and social impact assessment stage:
  - Disclosure of SEP and Scoping Report (SR) (updated after the 1st consultation stage), ESHIA Report, and Non-technical Summary (NTS);
  - Face to face meetings with stakeholders in Tazovskiy Municipal District, and
  - Disclosure of final versions of ESHIA, SEP, SR and NTS with incorporated comments from stakeholders.

More details of the activities under ESHIA 2018 are provided in SEP.

3.4 Future Stakeholder Engagement Activities

Current and future stakeholder engagement activities include the disclosure process related to publication of the future ESHIA and communications throughout the life cycle of the Project, in particular[22]:

- Stakeholder engagement in the course of assessment of the Project environmental, socio-economic and human health impacts in accordance with international standards, including:
  - Scoping stage:
    - Disclosure of SEP and Scoping Report, and
    - Consultations with representatives of indigenous minority communities and Tazovskiy Municipal District Administration: at the time of reporting, in view of the epidemiological situation and restrictions applied to prevent spread of virus SARS-CoV-2, consideration is being given to remote consultations (e.g. teleconferences) or other alternative methods of disclosure to be agreed with Tazovskiy Municipal District Administration;
  - Environmental and social impact assessment stage:
    - Disclosure of SEP (updated after the 1st consultation stage), ESHIA Report, and Non-technical Summary;
    - Consultations with stakeholders in Tazovskiy Municipal District (specific format to be identified depending on epidemiological situation), and
    - Disclosure of final versions of ESHIA, SEP, SR and NTS with incorporated comments from stakeholders.
- Stakeholder engagement throughout the Project life cycle, i.e. at the stages of design development, construction, commissioning, operation and decommissioning. Measures of this category are presented in the form of the Consultations and Disclosure Plan included in SEP which is subject to disclosure to stakeholders alongside with this Report.

During the consultations with indigenous communities, Ramboll will apply efforts to ensure adequate representation of opinions of women from nomadic population.

SEP will remain in open access throughout the Project life cycle, and will be regularly reviewed at different stages in order to ensure timely identification of new stakeholders and their engagement into the consultations process. The methods of engagement will be regularly reviewed to make sure that they are always efficient and match the changing status of the Project.

[22] More details of the future activities including deadlines for specific activities are provided in the SEP.

4. PROJECT ALTERNATIVES

4.1 Geographic Alternatives

Possible alternatives for the transportation of hydrocarbons from the Salmanovskoye (Utrenneye) OGCF are schematically shown in Figure 4.1. One alternative way to the traditional Russian pipeline transportation of gas and condensate, which is associated with the alienation and fragmentation of large tracts of land and, in this case, further ecosystems risks to be caused by the construction of crossings through the Ob or Taz Estuary of the Kara Sea, is the construction of a plant for the liquefaction of natural gas and stabilization of condensate with the subsequent shipping of both products to tankers and gas carriers for sea transportation to end users.

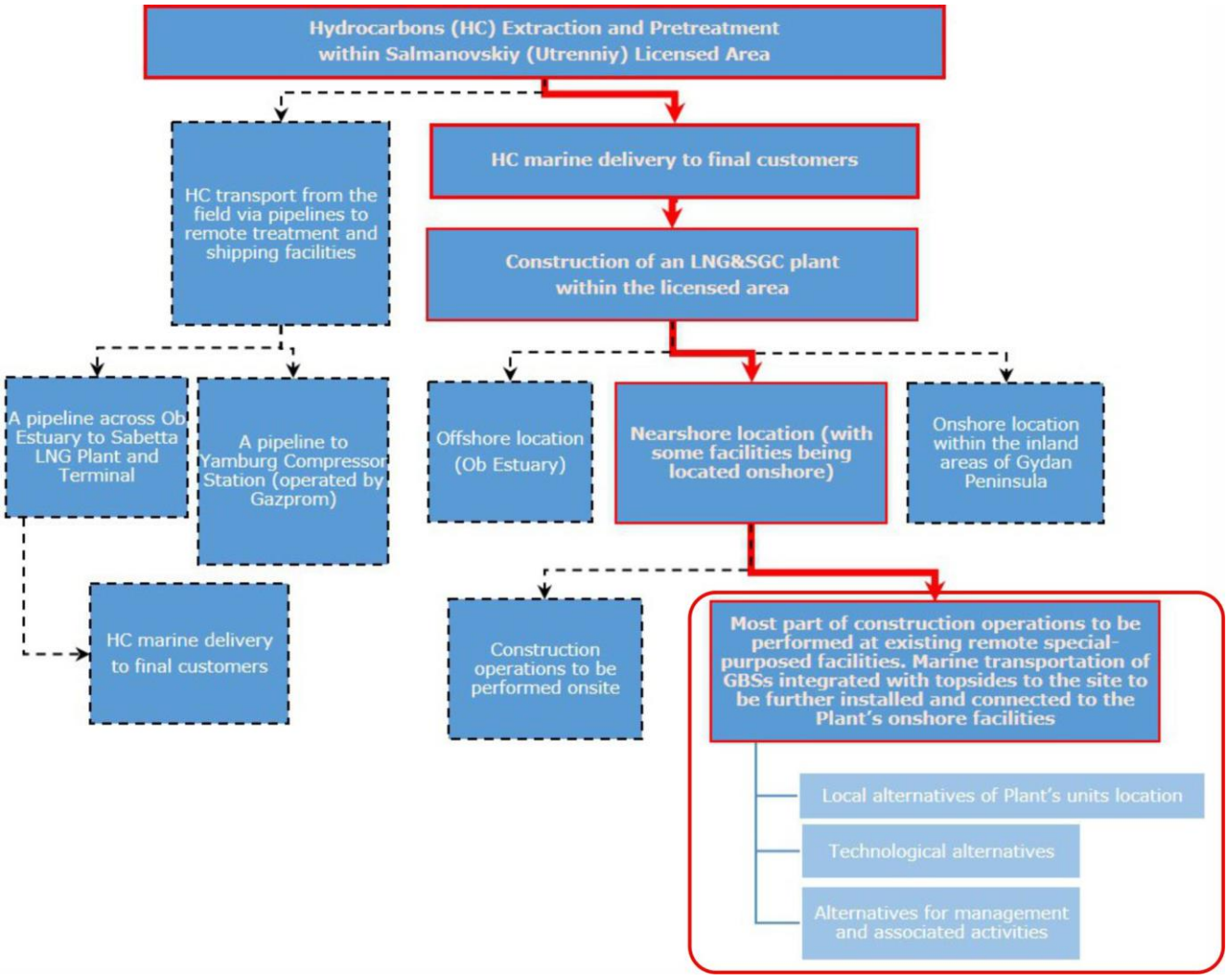

Figure 4.1: Project alternatives (the preferred option is shown with red arrows)

The fact that the Salmanovskoye (Utrenneye) OGCF of hydrocarbons is in the Arctic and located at a significant – over 5,000 km – distance from the gas and condensate consumers, dictates the approach. The down-hole fluid will be pre-separated at the FIELD's facilities, and then natural gas will be fed separately from condensate to the GBS LNG and SGC Plant. After acidic gases and mercury have been removed from the gas, it is cooled down to minus 160°C to be transferred to the liquid stage and delivered to consumers in gas carrier cryo-tanks.

Solutions where gas liquefaction plant is located near sources of feedstock and/or on the nearest seacoast are becoming more and more common throughout the world. Since 2017, the LNG plant on the eastern coast of the Yamal Peninsula has been operating in Russia. The company is part of the Yamal LNG project, which is operated by Yamal LNG OJSC, jointly managed by NOVATEK (50.1%) and TOTAL (20%), China National Petroleum Corporation (20%) and the Silk Road Fund (9.9%). Implementation of a few other similar projects is in progress in various regions of Russia - Pechora LNG (Nenets Autonomous Okrug), Vladivostok LNG (Primorskiy Kray), Far East LNG (Khabarovskiy Kray), Baltic LNG (Leningrad Region),

Portovaya LNG Plant (Leningrad Region), as well as expansion of the Sakhalin-2 Project (Sakhalin Region) and construction of LNG-Gorskaya floating plant (Leningrad Region).

When choosing the location for the LNG Complex and PORT within the boundary of the license area, alternatives for its construction in the sea, on land and in the coastal area were discussed, with the main complex of structures in the sea on gravity-based structures – and the onshore auxiliary facilities. The latter option was selected as preferred one, as it enables spatial integration of the LNG Complex with the port facilities needed for this option, minimizes the need for land allocation and at the same time beneficially limits the use of the Ob Estuary area (the activities will be concentrated in the coastal area where the LNG Complex and PORT are located), and also provides for full utilization of the benefits of GBS technology.

Selection of specific site location for construction of the LNG Complex and PORT on the coast line of the Gydan Peninsula is based on the comparison of several potential locations that was conducted earlier as part of the Russian EIA studies (Figure 4.2; also refer to geographic scale schemes in Appendices B1 and B3):

- Option 1 - at the mouth of Khaltsyney-Yakha River;
- Option 2 - 2 km to the south-east of the mouth of Khaltsyney-Yakha River;
- Option 3 - at the mouth of Nyadaj-Pynche River;
- Option 4 – 3.2 km to the south-east of the mouth of Nyaday-Pynche River.

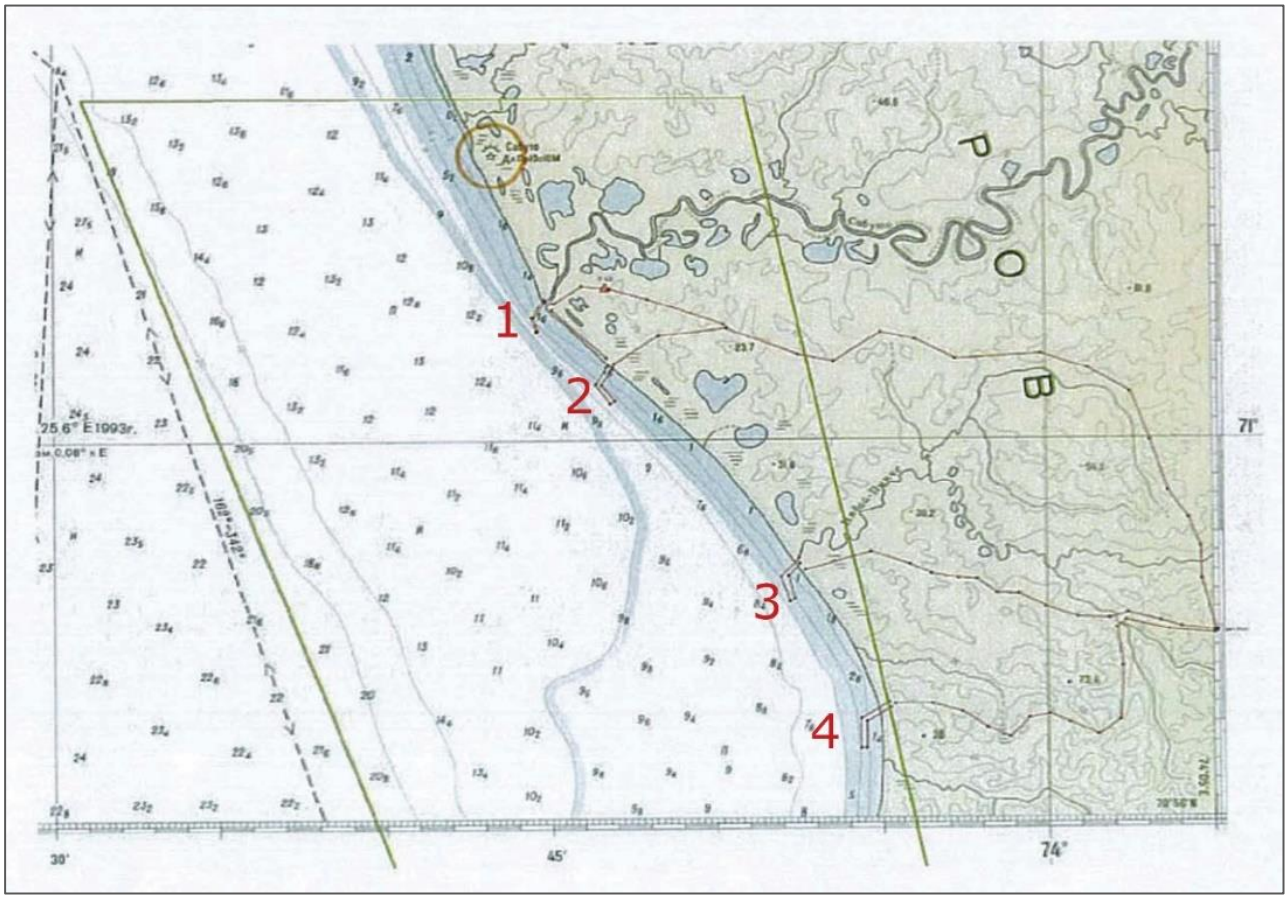

Figure 4.2: Schematic map of the port structures location options (seasonal port)

The figure is provided by the Company

All four site options are located in the north of a small sinuous curvature of slightly indented coastline the Ob Estuary facing south-west. They have a common benefit of Remote location relative to designated conservation areas, both existing (Gydan Nature Reserve - distance over 100 km) and future (Yuribeyskiy protected natural landscape of municipal significance - about 70 km).

None of the four options was finally approved following the comparative analysis, as position between site options 2 and 3 was found to be optimum for development of the LNG Complex and PORT (refer to Figure 4.1). This location offers the best opportunity to minimise the influence of natural hazards and the environmental impact of the planned activity (e.g. the scope for underwater technical operations - dredging and dumping).

4.2 Benefits of LNG Technology

The core process within the Project is liquefaction of natural gas for subsequent transportation to consumers. The development of this technology dates back to the first experiments in the 1910s and industrial implementation in the 1940s in the USA. Today, this is a priority global approach for the international transportation of gas, successfully competing with pipeline gas transportation systems if consumers are located remotely and thanks to the advantages associated with increased modular deliveries.

Prospects for the further spread of LNG technology are associated with the expansion of global consumption of liquefied natural gas, including its use as a motor fuel, as well as the concomitant use of high technologies and modern materials, which contributes to the development of other industries.

The most important conditions and prerequisites for successful application of LNG technology for Russia include:

- strengthening the position of the Russian Federation in the global market for LNG production, shipping and sales;
- developing LNG production and shipment projects simultaneously in several Russian regions with sea coasts and / or large hydrocarbon reserves such as the Yamal-Nenets and Nenets Autonomous Okrugs, Sakhalin and Leningrad Regions, Primorskiy and Khabarovskiy Krai; and
- exploiting and developing the Russian sector of the Arctic, with the Yamal-Nenets Autonomous Okrug as one of the key areas.

The first Russian plant for the liquefaction of natural gas was launched in 2009 in the Sakhalin Region with the joint participation of PJSC Gazprom and international companies Shell, Mitsui and Mitsubishi. More than 80 LNG process trains with a total capacity of 340 MTPA became operational around the globe by the start of year 2017, and about 30 more trains were under construction[23]. The technology offers the following proven advantages:

- Technical and environmental safety of LNG (the liquid does not burn, is not prone to spontaneous ignition or explosion, re-gasifies and quickly mixes with air under atmospheric conditions, is not toxic);
- Relatively small footprint and minimal associated impacts on ecosystems; and
- Economic efficiency and motivation for development of technologies and hosting regions.

Comparison of LNG technology with pipeline transport in terms of their contribution to the environmental pollution and, in particular, to the greenhouse effect, does not yield a definitive conclusion: for some impact parameters the two options demonstrate similar performance, while in other situations LNG scenario is slightly better[24].

To date, there are 12 known versions of the gas liquefaction technology, differing mainly in the natural gas cooling mode, the composition of the refrigerants used and the compressor equipment drives[25]. The most common option is the use of a mixed refrigerant with preliminary propane cooling, developed by APCI (a variation of this process is used for natural gas liquefaction under the Yamal LNG Project).

Another common solution which is applied in Sakhalin Region is the double mixed refrigerant (DMR) process presented by Shell who also participates in the Sakhalin 2 Project.

For the Arctic LNG 2 Project NOVATEK selected the mixed fluid cascade (MFC) process by Linde AG which is based on using three separate loops with mixed refrigerants.– It was this process that has become the main one used for the northmost LNG plant in Europe - Snohvit, which has been successfully operated by the Norwegian company Statoil since 2008.

4.3 Benefits of GBS Technology

The Arctic LNG 2 Project has an important technological feature which differs it from the nearby Yamal LNG Project: The Company decided to construct the LNG and SGC production facilities on a gravity-based structure. This arrangement offers the following advantages:

[23] IGU 2017 World LNG Report — Barcelona (Spain): International Gas Union, 2017

[24] L. E. Ametistova, A. Yu. Knizhnikov Environmental aspects of LNG projects in Arctic Conditions. - Analytical review of WWF. 2016

[25] I.V. Meshcherin, A.N. Nastin Analysis of technologies for the production of liquefied natural gas in the Arctic climate // Proceedings of the Gubkin Russian State University (National Research University). Chemical Sciences. 2016. No. 3. pp. 145-157.

- Short time required for installation of the LNG and SGC Plant installation without application of expensive heavylift and transportation equipment;
- Main components of the LNG Complex can be towed by sea to long distances;
- Main components of the LNG Complex can be reused at other sites at a later time;
- Low failure rate of the LNG Complex;
- Minimal land acquisition requirements for onshore facilities of the LNG Complex;
- High energy performance;
- Minor environmental impact of the LNG Complex (compared to other arrangements).

According to the FEED materials and design documentation for the LNG Complex, this arrangement can be considered as an optimal technical solution to minimize pollution emissions to the sensitive air environment of Gydan Peninsula and the Ob Estuary. Firstly, at the construction stage, the contribution of the sources is minimized by carrying out most of the construction and installation work at remote shipyards and other technical sites, including foreign ones. Secondly, the power gas needs of the LNG Complex's gas turbine generators will be met by collecting and using the boil-off gas (90% of gas consumption will be in a standby mode, that is, without loading a tanker or gas carrier). The remaining 10 percent will be supplied by getting gas from the mercury adsorbers. Feed gas will only be used at the start-up stage of the LNG Complex, when the above-mentioned secondary hydrocarbon streams are not available. Thirdly, there will not be permanent flares at the LNG Complex: gas mixtures will only be cold or warm flared for the start-up and commissioning of the main equipment of the LNG Complex, in case of the equipment malfunction, maintenance or shutdown of the LNG Complex.

4.4 Zero Alternative

A "zero" alternative for the LNG Complex and PORT (i.e. without the Project) would mean that it will be necessary to follow other scenarios for the preparation and transportation of the Salmanovskoye (Utrenneye) OGCF products, the most likely of which – the pipeline transportation to Sabetta or in the direction of Yamburg – would require construction of pipeline mains across sensitive waters and acquisition of larger areas than those allocated for the selected scheme.

Cancellation of the Project altogether (including the FIELD) would have the following consequences:

- Results of the long-term prospecting and exploration of the field deposits that have been conducted since 1970 will remain unclaimed (and the investments will be wasted);
- No new base points for developing the Russian sector of the Arctic will be established on the Ob Estuary coast and in the inland areas of the Gydan Peninsula;
- The favourable external economic preconditions for increasing Russian hydrocarbons export to the remote consumers will not be used;
- The Socio-Economic Development Strategy of the Ural Federal District (of which YNAO is a part) for the period 2020, approved by RF Government Resolution of 06.10.2011 No.1757-r, will not be implemented to a full extent. The Strategy provides for priority development of the fuel and power sector in the north of the Western Siberia on the basis of its hydrocarbons resource base of the global significance;
- The existing Salmanovskoye (Utrenneye) OGCF facilities, mooring and other infrastructure will remain in their current locations, and their environmental impacts will not change. Due to the need for preservation or dismantling of the above facilities, cancellation of the Project does not offer any significant environmental or social benefits in the onshore and offshore part of the license area, or for Tazovskiy Municipal District and Yamal-Nenets Autonomous Okrug in general.

5. CHARACTERISTICS OF PLANNED ACTIVITY

The main activities conducted earlier and as part of the Project are listed in consecutive order and briefly described in Table 5.1. Implementation time frames of the Project components are schematically presented in Appendix C4.

Table 5.1: Arctic LNG 2 Project phases and implementation time frames

#	Activity	Time frames and current status	Link to other activities
1	Exploration and production of crude hydrocarbons in subsoil area of federal significance including Salmanovskoye (Utrenneye) OGCF	2011 till the end of Project. The respective subsoil license held by Arctic SPG 2 LLC is valid till year 2120.	All other activities are conducted within the boundaries of the license area of the Salmanovskoye (Utrenneye) OGCF as defined in respective license
2	Construction of the berth structures at Salmanovskoye (Utrenneye) OGCF	2014 - to date	The berth structures have been in operation since 2015 and will be integrated into the Utrenniy Terminal
3	Maintenance dredging in the water area of the berth structures of the Salmanovskoye (Utrenneye) OGCF	2016 – to date, every two years	The water area within the boundaries defined in the berth structures design documentation will be integrated into the Utrenniy Terminal
4	Early development facilities at the Salmanovskoye (Utrenneye) OGCF	2017 - to date The facilities have been put into service	All facilities (except for temporary) will be integrated into the Salmanovskoye (Utrenneye) OGCF Facilities Setup (item 6). Temporary buildings and structures will be dismantled, and respective land will be reclaimed and returned to the lessors
5	Salmanovskoye (Utrenneye) OGCF Facilities Setup. Gas supply for the power supply facilities to support construction, soil jetting and drilling operations (PIR-1)	Phased construction and commissioning for service in 2019-2020. Operation - till completion of drilling, construction and soil jetting operations	
6	Salmanovskoye (Utrenneye) OGCF Facilities Setup (PIR-2…5)	Construction and commissioning for service in four phases over the period 2020-2026. Operation - till the end of Project	A few support facilities can be designed under separate titles (e.g. construction camp for the onshore facilities, Utrenneye runway)
7	Construction of well pads No.2 and No.16 at Salmanovskoye (Utrenneye) oil, gas, and condensate field, drilling and testing period	Design development and the state expert review[26] procedures were completed in 2018-2019. Planned completion of the construction works - 2025.	Specific works for completion of the well pads are implemented under respective titles
8	Construction of 18 well pads at Salmanovskoye (Utrenneye) OGCF, drilling and testing period	The design works were completed in 2019. The materials have been submitted for the state expert review. Implementation is planned during 2020-2026.	
9	Completion of well pads P304 and R295 at the Salmanovskoye (Utrenneye) OGCF	Engineering survey has been completed. EIA and preparation of design documentation is in progress. Public consultations on the EIA and state expert review is planned in 2020.	The single wells are intended to supply fuel gas for the FIELD power supply complexes

[26] Hereinafter the term *"state expert review"* refers to the state expert review of engineering survey reports and design documentation, as well as state environmental review of the planned activity (if applicable)

#	Activity	Time frames and current status	Link to other activities
10	Utrenniy liquefied natural gas and stabilised gas condensate terminal: Early port facilities (EPF, PK 1)	Construction – 2019-2021, operation – from 2021 till the end of Project	The existing berth structures (item 2) will be integrated into the Terminal
11	Utrenniy liquefied natural gas and stabilised gas condensate terminal: Operating port facilities (OPF, PK 2)	Construction – 2019-2024, operation – from 2024 till the end of Project	Configuration of the ice barriers is selected to provide the inner area of the Port that allows for future extension of the Terminal and LNG&SGC capacities from three to six GBS units
12	Plant on gravity-based structures for liquefied natural gas and stabilized gas condensate production, storage, and offloading	Design development and the state expert review procedures have been completed in 2020. Construction – 2020-2026, operation – first line - from 2023, second line – from 2024 and the third one from 2026 till the end of Project	

Further to the above list, there is one more major facility that relates to the Arctic LNG 2 Project at the infrastructure level - the Utrenniy Airport. It is not a part of the Project and, formally, does not meet the association criteria (as the Project can be implemented without the airport). Therefore, impacts of the airport construction and operation should be assessed in the context of cumulative effects. Design for this facility has been developed, and the state expert review of the survey reports and design documentation was completed in 2019. The times of construction start and putting the airport into service are to be clarified. The airport will be operated by Sabetta International Airport LLC. Arctic SPG 2 LLC acts as lessor of the land plots and utility supplier for the airport.

5.1 Project background. Exploration and planning for the Salmanovskoye (Utrenneye) OGCF Facilities Setup

The resource base for the Project - Salmanovskoye (Utrenneye) oil, gas, and condensate field[27], was discovered in 1979 when exploration company "GlavTyumenGeologiathe" Tyumen Main Geologic Department drilled the first exploration well. The preliminary studies were conducted during 1980-1985.

Since 2011, licenses for the use of the field subsoil resources are held by subsidiaries or joint ventures with participation of NOVATEK PJSC, including Arctic SPG 2 LLC that holds the license since 2014[28]. The field reserves and geological model were clarified by further exploration during 2012-2014. The total of 34 high-quality hydrocarbon reservoirs were found in the field, of which 16 are gas reservoirs, 15 - gas and gas condensate, 2 - oil and gas condensate, and 1 is oil reservoir. The reservoirs are associated with the Mesozoic deposits of Peksedskoye dome. They reach to the depth of 2 km, with the most common range is between 1 and 1.5 km.

Table 5.2 lists the main productive characteristics of the Salmanovskoye (Utrenneye) OGCF being one of the largest fields for two adjoining petroleum regions - Gydan and Yamal[29]:

- Original dry gas reserves – 1582 billion m^3, including category C1 – 681 billion m^3, category C2 – 901 billion m^3;
- Original gas condensate reserves – 76.2 million tons, of which 59.3 million tons are extractable reserves.

The field will be developed by drilling 213 wells with near-horizontal tailing-in and horizontal sections' lengths up to 1500 m.

The license area occupies 3409 km^2 and includes three distinct zones of "domes": Northern, Central and Southern (Table 5.2, Appendix B5).

[27] In 2008 the field was re-named as a tribute to petroleum geologist Farman Salmanov who worked at the leading roles in the Tyumen Main Geologic Department and the USSR Ministry of Geology

[28] License СЛХ 15745 НЭ dated 20.06.2014 as revised on 29.03.2018 г. / Consolidated National Register of Subsoil Areas and Licenses. – Russian Federal Geological Fund of the Federal Agency for Mineral Resources

[29] Originally, the Utrenneye OGCF was assigned to Gydan petroleum region (GPR), due to its geographic location on the Gydan Peninsula. According to the latest geological oil and gas zoning of the West-Siberian oil and gas province (FSUE VNIGNI, 2012), Salmanovskoye (Utrenneye) field belongs to the Yamal petroleum region, along with Shtormovoye field which is located further to the north

Table 5.2: Characteristics of the Salmanovskoye (Utrenneye) OGCF, breakdown by producing zones

Characteristics	Producing zones		
	Central dome	Southern dome	Northern dome
Original dry gas reserves, billion m^3 (% of total field reserves)	680 (43)	576 (36)	327 (21)
Number of producing wells (well pads)	89 (7)	92 (7)	32 (5)
Maximum production of dry gas, billion m^3/a	14.5	12.0	4.0
Maximum production of stabilised gas condensate, thousand TPA	721.0	591.0	202.0
Design year of putting into operation	2023	2024	2026

The different timing of planned putting the domes into operation implies individual consideration of the development parameters for each dome.

Sequence numbers are assigned to the gas and condensate well pads (KGS Nos.1…19). The pads location in the map reflects their attribution to different domes: KGS Nos.1...7 belong to the Central dome, KGS Nos.8...14 - to the Southern dome, KGS Nos.15...19 - to the Northern. In 2018, the license area was extended in its southern part, to include the gas and condensate well pad No.20 that was not originally included in the scope of well pads design (refer to the scheme in Appendix B5).

5.2 Construction and operation of the berth structures

The berth structures are among the first permanent facilities within the Salmanovskiy (Utrenniy) license area. The distance to Salekhard – the capital of YNAO – is 540 km, to Sabetta seaport near which the Yamal LNG Project and other third party projects are being implemented, distance to the nearest settlements of YNAO Tazovskiy Municipal District is 440 km (Tazovskiy settlement), 240 km (Antipayuta village) and 170 km (Gyda village).

The berth serves as a base point for the development of the territory and water area which performs the function of reception and dispatching of construction cargos, fuel and lubricants. The berth is designed to handle 140 thousand tons of cargo during each navigation season. The structures are not used during the periods when navigation is impractical (about 300 days per year).

As a hydraulic structure, the berth is divided into two sections:

- Waterside (jetty) comprising construction cargo jetties (two jetties with the total length of 202 m), and a diesel and kerosene reception jetty which is 137 m in length);
- Access section of 142 m providing a transport link between the berth and onshore facilities (storage, etc.).

The construction materials will be unloaded by shipboard and mobile harbour cranes and transported from the jetty via the access section to the access road and storage sites.

The water area of the berth structures is integrated into the Sabetta port by the decision of FSUE Rosmorport and Rosmorrechflot in 2014. The water area provides operational and manoeuvring area, as well as fairway sufficient for movement of vessels of the designed type ("Pioner Moskvy", water draft up to 6.79 m).

The berth design documentation was prepared by Morstrojtechnologia LLC under commission of NOVATEK-YURKHAROVNEFTEGAS LLC; in 2014 it was discussed at public consultations in Tazovskiy Municipal District of YNAO along with the survey reports, after which it was approved by the State Expert Review Board[30].

The berth structures have been in operation since 2015; in the future they will be integrated into the Utrenniy Terminal (item 5.5).

5.3 Maintenance dredging in the water area of Salmanovskoye (Utrenneye) OGCF

Maintenance dredging is intended to ensure adequate water depth throughout the area of the berth structures. Bottom relief in the Ob Estuary is variable due to the extensive hydrodynamic and ice processes; excavations are soon filled with sediments. Therefore, underwater technical operations must be repeated on a regular basis to maintain safe conditions for vessels traffic (maintenance dredging). The scope for the

[30] The common title of the design documentation and EIA is "Berth structures at Salmanovskoye (Utrenneye) oil, gas, and condensate field" (NOVATEK - YURKHAROVNEFTEGAS, 2014).

works is defined in dedicated project documentation[31] that provides for maintenance dredging with two years' intervals during the period 2017-2022. In particular, the project EIA materials were discussed in October 2016 - February 2017 by the Public Council at the Department for Natural Resource Regulation, Forestry Affairs and Development of Oil and Gas Industry of YNAO. Later in 2017, the dredging design package passed the State Expert Review[32], and the designed activities are conducted in accordance with the agreed schedule. Following integration of the berth structures into the Utrenniy Terminal, the corresponding water area will become a part of the common port area to be maintained in accordance with the respective Terminal design.

5.4 Salmanovskoye (Utrenneye) OGCF Facilities Setup

5.4.1 Early development facilities

The main components of the early development facilities, i.e. elements needed to start the main works for the field facilities setup, include provision of basic transport and utility infrastructure within the license area, shift accommodation facilities, power, water and wastewater services, fuel supply, storage premises, and waste management infrastructure. Given the extremely low initial level of development of the license area, most of the early development facilities were first constructed close by the berth structures and the designed power supply complex No.2, after which the activity gradually moved toward the Nortnern and Central domes.

The nodal points for the early development facilities are the jetty, as well as single wells for fuel gas supply to the field facilities - P304 (Central dome) and R270 (Northern dome). Each well supplies gas to the nearby sites of two portable gas turbine power plants (PAES-1 at the Central dome and PAES-2 at the Northern dome), to the boiler house at the temporary accommodation camp (TAC), gas flares, and other consumers.

All sites of the early development facilities are interconnected with each other and the berth structures by a system of utility corridors. The main corridors that run from the jetties to the east (toward the Central dome) and to the north-north-east (the Northern dome) comprise motor roads, communication and power transmission lines, and in some sections - process pipelines (refer to the scheme in Appendix B3). The total land requirement of the early development facilities is estimated at 434.3298 ha (the land category is 'industrial, transportation, communications and other special purpose land'), of which 50 ha is intended for areal facilities, while the rest of 385 ha is occupied by process and utility networks.

Most part of the early development facilities have been designed by EnergoGasEngineering JSC and GK RusGasEngineering JSC for Arctic SPG 2 LLC under the common title[33]. The respective environmental impact assessment report was considered and discussed in Tazovskiy in July 2017[34] and has been approved by the State Environmental Review Board.

Construction of the early development facilities commenced in 2018. The works are divided into 13 stages to be implemented during four years, with the maximum number of 378 of construction workforce (second year). Elements included in each stage are listed in Appendix C1.

All early development facilities (except for temporary elements) will be integrated into the Salmanovskoye (Utrenneye) OGCF Facilities Setup. Temporary buildings and structures will be dismantled, and respective land will be reclaimed and returned to the lessors.

5.4.2 Gas supply for the power supply facilities to support construction, soil jetting and drilling operations

Most of the FIELD facilities will be constructed and commissioned in five stages (five start-up packages), the first of which is intended to supply gas for the power supply facilities for the construction, soil jetting and drilling operations (PIR-1). Design for this element is developed by YUZHNIIGIPROGAS Institute LLC and passed the state expert review in 2018. Construction and commissioning of the facilities is divided into several stages during the period 2019-2020.

[31] The common title of the design documentation, survey materials and EIA is "Maintenance dredging at the berth structures of the Salmanovskoye (Utrenneye) oil, gas, and condensate field" (Eco-Express-Service LLC, 2016).

[32] Hereinafter the term "state expert review" refers to the state expert review of engineering survey reports and design documentation, as well as state environmental review

[33] Early development facilities at the Salmanovskoye (Utrenneye) oil, gas, and condensate field. Survey and design documentation. - GK RusGazEngineering CJSC, 2014. These facilities are included into the FIELD facilities shown in Figure 1.2.

[34] Tazovskiy Municipal District Administration Resolution No. 727 of 01.06.2017 on conducting of public hearings

The temporary power supply complex No.2 will use the Company's existing portable automated power plants PAES-2500 to produce power for the drilling and construction activities, and for operation of dredgers during the whole period of the respective works. Gas for the power supply complex will be provided from well pad KGS No.16, gas condensate wells No.1601 and No.1602. Besides these two sites, the design provides for the use of four sites with temporary site facilities (TSF) and temporary access roads.

The scope of PIR-1 design and construction further includes a thermal wastewater treatment unit (plant) and the following linear facilities:

- Gas flow-line with a methanol pipeline from KGS No.16 to power supply complex No.2;
- Motor road MR No.1: Section 1 from the Utrenniy Terminal to the TAC site;
- Motor road MR No.2 from the TAC site to the site of KGS No.16;
- Motor road MR No.7 from MR No.1 to the site of power supply complex No.2;
- Motor road MR No.3 from MR No.1 to the site of water treatment plant WTP-3;
- OHTL 10 kV "Power supply complex No.2 - KGS No.16";
- OHTL 10 kV "Power supply complex No.2 – TAC";
- OHTL 10 kV "Power supply complex No.2 – Field support base (FSB)";
- OHTL 10 kV "Power supply complex No.2 – WTP-3";
- Communication networks system (FOCL).

5.4.3 Main FIELD facilities

Most part of the construction design for the FIELD facilities is developed by NIPIgaspererabotka JSC as part of PIR-2...5 (the design has passed the state expert review). The total land area required for this group of facilities is estimated at 1128.3 ha (without temporary sites and utility corridors). Brief characteristic of different functional groups of the FIELD is provided below.

Well pads. The technical design for the field development provides for construction of 191 wells arranged in 19 pads within the license area[35]. Since working pressures during the first years of the field development will be relatively low, and gas flow-lines for all considered configuration options will be quite long, the pressure boundary is located at the outlet of gas production well pad. Therefore, the wellhead connections and equipment of the well pads are designed for maximum static pressure of 21 MPa, and the flow-lines between the pads and valve stations are designed for the working pressure of 11.8 MPa. Overpressure protection of the gas gathering network (GGN) will be provided by safety valves at each well pad.

Connection systems of each well pad include the following elements:

- Wellhead connections;
- A horizontal flare system; and
- Connecting assembly for portable test separator.

The wellhead connections allow for purging the wells using the tubing string, killing of well and flow stimulation, safe flaring of gas in flare pit in case of purging after workover or lineup.

Reservoir gas flows through wellhead equipment to the valve assembly on the product line and fuirther to the reservoir gas manifold at the well pad connected to the gas gathering network. To prevent hydrate formation, respective inhibiting agent will be injected into the gas gathering network pipelines.

Horizontal flares are provided in the connection piping of each well pad, so that gas from purging during wells lineup operations will be safely burnt.

Fuel gas for the flares is supplied from the well pad manifold via a pressure reducing station.

Gas gathering network. Formation fluid will be transported from the well pads to the primary gas tretment plant (PGTP-3, Northern dome) and complex gas treatment plants (CGTP-1 and CGTP-2, Central and Southern domes) by a radial-pattern manifold system of the gas gathering network (GGN). Underground installation of the flow-lines is impractical due to the omnipresent permafrost soil, complex relief prone to gullying, and the high temperature of the transported media. This leaves the only possible option - installation of GGN on elevated pipe racks.

[35] Additional KGS No.20 may be developed within the Southern dome in the future. To allow for this, the license area was extended in its southern part in 2018. The total number of wells within KGS Nos. 1…20 is 213.

The field GGN is characterised by long gas flow-lines between the well pads and receiving facilities, some of which are longer than 20 km. The total design length of gas flow-lines DN 250 – 500 mm within the field GGN is estimated at 168 km.

Based on the result of comparison of GGN with design pressure of 12.98 MPa (working pressure 11.8 MPa) and 21 MPa, working pressure within 11.8 MPa is adopted for transportation of formation fluid from all well pads to CGTP/PGTP. Achievement of the required gas pressure at the inlet of CGTP and PGTP with this arrangement is verified by hydraulic analysis.

Pig trap stations (PTS) are provided on all pipelines longer than 0.5 km for diagnostic, cleanup and regular bleeding of liquid. In accordance with p.9.2.1 of GOST R 55990-2014 "Field pipelines", flow-lines longer than 30 km and methanol pipelines longer than 10 km are fitted with block valve stations. Block valve stations are also provided at branch pipe connections. Safety valves are installed immediately upstream the CGTP and PGTP sites.

Gas Treatment Plants. The complex gas treatment plants (CGTP1 and CGTP2) treat formation fluid from the well pads to achieve the required quality of natural gas feed for the LNG plant, and separate gas condensate and water-mineral solution (WMS). From the CGTP, pre-treated natural gas and unstabilised condensate flow by separate pipelines to the GBS LNG & SGC Plant. WMS is fed into the methanol regeneration unit (MRU) designed as part of CGTP and PGTP, for recycling of methanol.

Based on the assessment and comparison of the gas and condensate pre-treatment technology, the preferred process option is based on low-temperature separation (LTS) using a turbo-expanding assembly (TEA), where gas from the field Central dome is treated in CGTP1, from the Southern dome - CGTP2, and from the Northern dome - in PGTP3. This configuration of the sites, pre-treated gas and condensate supply to the GBS LNG & SGC Plant is guaranteed even in case of accident at one of the gas pre-treatment sites.

The LTS with TEA technology will be implemented in each of the complex gas treatment plants CGTP1 and CGTP2 comprising the following process units:

- Valve station;
- Pig receiver;
- Separation unit;
- Low-temperature separation unit;
- Condensate degassing unit;
- Booster compressor station (for adequate cold supply);
- Separated gas compressor;
- Methanol regeneration unit;
- Methanol storage tanks with a pumping station;
- Flare system;
- Fuel gas treatment unit;
- Instrument air compressor station;
- Nitrogen facilities.

The LTS with TEA technology is capable of producing gas and condensate at the CGTP outlet below 0ºC during all seasons. With the low temperature of gas and condensate, pipelines for their transportation can be installed underground, with no risk of soil thawing.

Gas from the field Northern zone will be treated at the PGTP3 site. The process analysis has shown that, considering the relatively small quantity of gas from the Northern zone, sufficient gas pre-treatment at the PGTP site can be achieved by separation of formation fluid only. The feed gas quality requirements of the LNG and SGC Plant will be satisfied by mixing the stream from PGTP3 with the main streams from CGTP1 and CGTP2. The list of process units at PGTP3 site differs from CGTP sites as it does not include the low-temperature gas separation unit.

Trunk pipelines. The gas pre-treatment facilities will be connected to the GBS LNG & SGC Plant by a system of trunk pipelines: gas pipeline feeding gas to liquefaction, condensate pipeline supplying gas condensate to stabilisation, and methanol pipeline transporting methanol from the storage sites to the gas pre-treatment plants. Pipelines for transportation of condensate, methanol and fuel gas will be installed in a common trench, with a technologically safe clearance. The transported media temperature will be maintained below zero at all times. The linear facilities' corridors are also designed to accommodate a system of areal pipeline facilities - valve stations, corrosion-prevention elements, etc. The total length of interfield pipelines DN100-1000mm is about 202 km.

Logistics system areal facilities. A number of auxiliary areal facilities of the FIELD gravitate to the berth structures and are intended for materials and equipment management, accommodation and services for rotation shift personnel, vehicles, construction and other special machinery (Appendix C2).

Power supply for the FIELD facilities will be provided from the existing power supply complex No.2, and the new gas turbine compressor power plant (GTCPP) to be constructed at the site of PGTP3. In the future, temporary power supply complex No.3 will be constructed at the Southern dome to produce power for the drilling and construction activities, and for operation of dredgers using the Company's existing portable automated power plants PAES-2500 and fuel gas from single well R295.

Buildings and structures at the GTCPP site will include power modules, substation 10/35kV comprising switchgear 10kV, step-up transformers 10/35kV and switchgear 35kV, as well as site Package Transformer Substations (PTS, 2 units).

Emergency power supply will be provided by liquid-fuel emergency diesel power stations (EDPS), and uninterrupted power supply system with accumulator batteries. The emergency power supply scheme is decentralized, with locally installed package container automated EDPSs. The EDPSs are connected to 0.4kV buses at the package transformer substations (PTS). Loss of voltage on 0.4kV buses in PTS will trigger starting of the EDPSs to restore power supply to consumers. The design provides for installation of 41 EDPSs with capacities ranging from 100kW to 2000kW in the field territory.

Water supply. The design provides for construction of several surface water intake facilities to supply technical and potable water for the FIELD consumers. Most part of the water will be abstracted from lakes that do not freeze to the bottom in winter. In some cases, abstraction of water for technical water supply will be arranged in soil-based construction materials quarries.

The water intake facilities comprise: a first lift pumping station, intake head elements and gravity-flow pipelines, pressure pipelines, and modular-packaged power plant 10/0.4kV.

To preserve the natural quality of surface water and prevent potential contamination of water body, in accordance with SanPiN 2.1.4.1110-02 "Protective sanitary zones of drinking water supply sources and pipelines", the designed facilities must be surrounded with protective sanitary zones (PSZ) comprising three belts.

Design water intake capacity at Khaltsyney-Yakha meander lake and Quarry No.25n for the onshore facilities is 85 m^3/h during normal operation; capacity of the water intake at Quarry No.31n for the site of CGTP1 - 40 m^3/h; at Quarry No.2g for CGTP2 - 40 m^3/h.

The intake facilities are designed to match category II for water supply availability. Water abstraction with the design flow rate is provided using three head elements, of which two are backup. The head elements are fitted with cartridge filters and fish protecting devices. Suction lines that connect the head elements and the pumping station are made of flexible reinforced pipes.

From the intake facilities water is pumped through two pipelines to the raw water tanks at the WTP sites of the early development and gas treatment facilities.

All facilities in the field territory will be served by two systems of water supply:

- Potable water; and
- Process-and-fire water.

The following treatment facilities will be provided for production of potable water:

- Water purification and treatment stations (with pump groups to supply water for household and drinking needs);
- Potable water storage tanks.

Potable water distribution system is intended to supply potable water to fuel depot, Utrenniy Terminal, TAC, ERC, FSB, PGTP3, GBS LNG and SGC Plant, process-and-fire water PS and wastewater treatment plant No.3 (WWTP3), for respective site needs, and also for the internal firefighting in buildings at the sites of the Utrenniy Terminal.

The WTP facilities at CGTP1 and CGTP2 will include the following elements for potable water supply:

- Water treatment plant WTP-100 (with pump group to supply water for household and drinking needs); and
- Potable water storage tanks.

Wastewater treatment and disposal. The FIELD design provides for several different systems for collection and disposal of

- Domestic wastewater;
- Industrial wastewater and runoff;
- Storm water (rain water and snow-melt water);
- Process wastewater; and
- Waste methanol-water.

Wastewater treatment stations will be constructed at all sites with significant wastewater streams (otherwise, storage tanks are provided for collection and transportation of wastewater to WWTPs at other sites). Wastewater treatment plant at CGTP1 consists of the following elements:

- Biological wastewater treatment plant WWTP-100;
- Dewatered sludge temporary storage site;
- Industrial wastewater and runoff treatment unit;
- Industrial wastewater and runoff equalization tanks; and
- Treated wastewater equalization tanks.
- Wastewater treatment plant at CGTP2 consists of the following elements:
- Domestic wastewater treatment unit;
- Dewatered sludge temporary storage site;
- Industrial wastewater and runoff treatment unit;
- Industrial wastewater and runoff equalization tanks; and
- Treated wastewater equalization tanks.

The design provides for injection of treated wastewater into deep formation near the sites of CGTP1, CGTP2 and PGTP3. For this purpose, twelve deep appraisal (absorbing) wells will be drilled (8 operating and 4 standby) for the absorbing stratum monitoring.

A part of treated wastewater will be disposed in surface water bodies - lakes (during sand jetting), inland water courses and the Ob Estuary (controlled discharge).

MSW, Industrial and Construction Wastes Landfill (MSW, I&C Landfill) is intended for centralized collection, thermal treatment (incineration) and disposal of industrial and domestic wastes of hazard classes III-V generated during construction and operation of the Salmanovskoye OGCF Facilities Setup, Utrenniy Terminal, Plant on gravity-based structures for liquefied natural gas and stabilized gas condensate production (GBS LNG & SGC Plant), and also immediately by the MSW, I&C Landfill operations.

The following operations will be conducted at the landfill:

- Reception, disposal, isolation and burial of construction and industrial wastes of hazard classes IV and V;
- Pre-treatment (crushing) of bulky wastes and compaction of packaging;
- Temporary storage (accumulation) till generation of the shippable quantity of wastes prohibited for disposal at the landfill, and valuable recyclables;
- thermal neutralization and in the thermal treatment system (TTS) of industrial wastes of hazard class III-IV (including oily), municipal solid wastes of hazard class IV-V, and liquid wastes of hazard class III-IV.

The waste treatment methods are selected to minimise the volume of landfilling and transfer the wastes prohibited for disposal at the landfill to recycling (reuse). Thermal treatment will be applied to minimise the volume of the wastes buried in the landfill.

The landfill design capacity is 161,400 tons of wastes, including 63,200 tons to burial, 96,000 tons - thermal treatment, and 2170 tons - accumulation (temporary storage).

The landfill service life is 25 years. The landfill will have two buildings (office and WWPS) and several process facilities, namely:

- Isolating soil site;
- Bulky waste site;
- Site for collection of MSW produced during the landfill activities;
- Site for temporary accumulation of compacted and crushed wastes in containers;
- Parking space for specialized vehicles;
- Covered site for wastes crushing and compaction;
- Weighing bridge with a radiation control station;

- Fire water tanks; and
- Waste incineration system.

Emergency Rescue Centre (ERC) is intended for prevention of and response to emergency situations at the FIELD facilities, and to ensure that personnel and property of companies involved in the Project construction and operation are protected against natural and man-caused disasters. The ERC consists of two facilities - Fire Station and Gas Rescue Station. The former is fitted with foam extinguishing road tankers and vehicles (6 units), communication and lighting vehicles, as well as equipment and materials for oil spill response.

The Fire Station premises include bays for fire-fighting machinery, service rooms (offices, training room, rest room for duty personnel, communication station, facilities for maintenance of fire hoses, washing and drying of special clothing, etc.), auxiliary facilities (shower, toilet, storage premises for accessories, fire-fighting equipment and foaming agent, dining room, etc.), and utility rooms (ventilation, sewerage, communication equipment rooms).

For containment and liquidation of accidents, including decontamination of rooms and/or outdoor areas affected by gas emissions, and for control of air quality and levels of harmful substances in air during gas rescue operations and after containment of emergency, the Gas Rescue Station will provide premises for gas rescue service (paramilitary mine rescue squad, PMRS) duly attested and equipped with all necessary machines, equipment, outfit and tools.

Temporary Accommodation Camp. The Samlanovskoye OGCF facilities setup will be operated by rotation shift personnel accommodated in dormitories. In accordance with the design specification, the temporary accommodation camp (TAC) should also serve the accommodation needs of adjoining facilities - GBS LNG and SGC Plant and Utrenniy Terminal. The TAC facilities are designed to accommodate 1500 workers (with a 5% reserve). This capacity will be provided by construction 10 dormitories each for 150 beds.

The TAC location is selected to minimise the distance to the permanent work sites during operation, however accommodation facilities are always kept outside sanitary protection zones of the industrial facilities. The Temporary Accommodation Camp comprises the following main buildings:

- Boiler plant;
- Reserve data storage and telecommunication center;
- PTS;
- EDPS;
- WWPS;
- Community centre;
- Dormitories Nos. 1…10;
- Warehouses for food and non-food products;
- Health and recreation module;
- Canteen;
- Foot bridges; and
- Laundry.

Feldsher's aid post in the building of the community centre is intended to provide medical services to personnel.

Helicopter pads. Helicopter landing site (helipad) is a land area or specially prepared site with improved surface, intended for regular or occasional take-offs and landings of helicopters. Helipads within the field territory are designed for operation of helicopters Mi-8 and Mi-26.

A helipad of 50.4-50.4m for take-off and landing of helicopters Mi-8 will be provided in the area of each site of CGTP1, CGTP2 and PGTP. Each helipad will be connected to the general road network by an access road with a turning circle of 15x15m at the end. Another helicopter landing site - the Utrenneye helipad - will be constructed close by the berth structures and field support base.

The helipads locations in relation to other facilities in the field territory are selected considering configuration of the approach ways and obstacle clearance requirements for no-run take-off and landing, without using the cushion creep effect for takeoff. The approach ways for helicopters Mi-8 and Mi-26 meet the obstacle clearance requirements of 1:2 and 1:4 (distance of 300 m and 600 m) in the direction of take-off and landing, respectively, and 1:1 within the side strips (distance up to 150 m). Overhead HV transmission lines within the approach ways are located at a minimum distance of 1 km from the boundary of airstrip. Distance from side border of air strip to OHTL is at least 0.3 km.

Motor roads. The designed motor roads are internal industrial roads, or more specifically - inter-site roads between isolated industrial sites, that provide a road network within the field territory for transportation of technical goods, passengers, as well as general household cargoes.

In accordance with SP 37.13330.2012, the following technical categories (and respective standard parameters) have been assigned to the designed internal roads within the field territory (Table 5.3).

Table 5.3: Technical parameters of designed roads within the field territory

Parameter	Technical category	
	III-B	IV-B
Number of traffic lanes	2	2
Design traffic speed, km/h	50	less than 50
Roadbed width, m	10-12.5	6.5
Carriageway width, m	7-9.5	4.5
Shoulder width, m	1.5	not regulated
Maximum longitudinal gradient, ‰	30	
Permissible longitudinal gradient in particularly complex situations, ‰	80	
Road surface clear sight distance, m	100	
Cross profile	Duo-pitch	
Road topping design	Capital, prestressed RC panels on geotextile, supported by cement-reinforced sand on geoweb	Interim type, choke-stone layer on geoweb

The total length of all roads in the field territory is 153.5 km, of which 40 km will be put into operation as part of the early development facilities, and about 15 km - with PIR-1.

Other linear facilities. Besides the gas flow-lines, inter-site gas lines, and motor roads, the field infrastructure will include the following elements:

- Inter-site condensate pipelines DN1000 (total length 26.8 km) and DN200 (37 km);
- Inter-site methanol pipelines DN150 (97.7 km) and DN100 (0.7 km);
- Methanol pipelines within the corridors of the gas gathering network corridors, DN50 (168 km);
- Overhead power transmission line OHTL-35 kV (113 km);
- OHTL-10 kV (107 km);
- Four fiber-optic communication lines (main and backup communication line, one line of the drilling control information system, and one line for high-tech security system) with the total length of 913 km.

The designed location of the above elements is within the common technical corridors, with adequate clearances for safe construction and operation.

5.4.4 *Well pads and single well sites Management of drilling wastes*

Certain operations related to the development of drilling sites are designed separately from the aforementioned facilities and activities. More specifically, design for site preparation for gas and condensate wells KGS-1...19 (including grading, waterproofing, thermal insulation, bunding and arrangement of waste ponds), for treatment and disposal of drilling wastes, and technical reclamation of the well pad area at the end of service life has been prepared by SERVISPROEKTNEFTEGAZ LLC using the survey reports of UralGeoproket LLC and PurGeoCom LLC (KGS Nos.2-16) and NOVATEK SCIENTIFIC AND TECHNICAL CENTER LLC (KGS Nos.1, 3-15, 17-19). The respective survey reports and design documents have passed the State Expert Review. Both water-based and oil-based muds will be used for drilling, therefore, the design provides for separate management of the different drilling waste streams.

Besides the well pads with hydrocarbon production wells intended to provide feedstock to the Arctic LNG 2 Project, several single wells will be drilled for production of fuel gas for internal consumers within the Project. Phases 2 and 10 of the early development facilities (as defined above) provide for drilling of single wells No. R270 (Northern dome) and No. P304 (Central dome) to supply fuel gas to the sites of respective gas turbine power plants PAES-2500. A separate design package is currently being developed for the individual well sites P304 and R295 (the latter one belongs to the field Southern dome). The main design

company is NOVATEK SCIENTIFIC AND TECHNICAL CENTER LLC, and company in charge of preparation of the design documentation is Scientific-Research Design Institute EleSy LLC. The following associated linear facilities are included in the scope of the well site design: Gas flow-line from well site No.201 (KGSNo.2) to well site P304; methanol pipeline from well site P304 to well site No.0201 (KGSNo.2).

5.4.5 Jet quarrying of soil-based construction materials

Major part of the sand and sand-and-gravel materials needed for the construction will be produced in jet quarries (the whole required quantity of crushed stone will be supplied from remote sites). As a rule, contours of the jetting quarry sites follow the contour lines of the lakes on the shores of which hydraulic fills are arranged. Sand will be transported to the fill sites by seasonal (winter) roads. Design documentation for the early development facilities provides for operation of three jetting quarries with the total sand reserves of approximately 16 million m^3 - Nos. 5, 2 and 10.

Sand jetting quarry No.5 is located at Tangusumto lake, 27 km east of the Ob Estuary, near KGSNo.7 (Central dome). Average haulage distance from jetting quarry No.5 to the construction sites is 10.7 km for the sites in the area of PGTPP No.1 and other facilities within the Central dome, 32 km for the facilities in the area of TAC, and 43 km to the sites in the area of PGTPP No.2 (Northern dome).

Sand jetting quarry No.2 is located at unnamed lake south of KGS No.11 (Southern dome). Haulage distance for transportation of soil material from this site is 28 km to the sites in the area of PGTPP No.1; 56 km to TAC area; 60 km to the sites in the area of PGTPP No.2.

Sand jetting quarry No.10 will be arranged at unnamed lake at a distance of 350 m from the Ob Estuary waterline, 11 km NNW of the berth structures. In this case, sand haulage distance is about 40 km to the sites in the area of PGTPP No.1; 11 km to TAC area; 25 km to the sites in the area of PGTPP No.2.

The total of 14 jetting quarries with sand reserves in excess of 20 million m^3 will be used for the construction of all major elements of the FIELD. The largest quarries (Nos. 9, 4 and 2n - refer to the schematic map in Appendix B3) are located close by the LNG Complex and Port sites. By present, seven jetting quarries are operational, and others have reached the stage of land acquisition, application for water use permits, development and approval of technical designs for minerals extraction. Besides the jetting quarries, the FIELD design also provides for operation of 16 dry-excavation quarries for which 200 ha of land is allocated (including access roads).

The respective subsoil licenses and land lease agreements for the quarrying activities are held by Arctic SPG 2 LLC. Besides the technical design for minerals extraction, the design package for each quarry also includes a reclamation design. The permits for assignment of the lakes for sand jetting operations are subject to the approval of water body monitoring programme by the supervising authorities.

5.5 Utrenniy LNG and SGC Terminal

The Utrenniy liquefied natural gas and stabilised gas condensate terminal (the PORT) is intended to provide the marine logistics support in terms of gas carriers and tankers for offloading of LNG and SGC, reception and storage of cargoes for operations and construction. The offshore facilities of the Terminal will be constructed in the Ob Estuary area between the outlets of Khaltsyney-Yakha[36] and Nyaday-Pynche Rivers. The berth structures have been operated in this area since 2015 (refer to sub-section 5.2).

The designed facilities will be developed in two sites: the administrative area close by the existing general-purpose berth which is subject to reconstruction; and the quay area to be developed within the designed site of the LNG and SGC Plant on three gravity-based structures.

The hydraulic structures of the PORT include the northern and southern ice barriers that shape the inner area of the port (520 ha, or 4000 m by 1500 m), and two adjoining artificial land plots (ALP-1 and ALP-2) with the total area of 24.1 ha. Design position of the latter is on the rear side of the quay, so that they will be protected against external impacts by hydraulic structures on three sides, and on the fourth side they will adjoin the existing coastline. Both ALPs will be constructed by seize of water area by means of filling with sand from quarries. The volume of dredging works in the PORT water area is estimated at 12.0-12.5 million m^3.

[36]Hereinafter, water bodies are referred to using their designation in the State Water Register, which may differ from commonly used naming and hydronyms in geographical maps

The waterside configuration is aligned with the parameters and adopted mutual positions of the three gravity-based structures of the future GBS LNG and SGC Plant. The available internal water area surrounded by the ice barriers allows for extension of the Terminal for up to six GBSs. After completion of the LNG Complex construction, the quay designed as part of the early development facilities will be used for installation of GBS, leading in and maintenance of the LNG Complex process facilities. Design for the Terminal facilities was developed for Arctic SPG 2 LLC by LENMORNIIPROEKT JSC jointly with GT Morstroy CJSC in 2017-2019. Both survey reports and design documentation for the Terminal have successfully passed the state expert review. The Terminal will be constructed and commissioned in two stages (start-up packages): start-up package I - early port facilities (EPF); and start-up package II - operating port facilities (OPF).

EPF facilities of the Terminal are intended for the following functions: year-round reception of vessels; reception and handling of building materials, oversized modules, machinery, equipment, petroleum products for the period of construction and operation of the Salmanovskoye (Utrenneye) OGCF Facilities Setup, GBS LNG and SGC Plant, and the Terminal.

Design for the early port facilities provides for reconstruction of the existing berth structures to provide a general purpose berth; dredging in the Ob Estuary of the Kara Sea; dredged soil dumping in the Ob Estuary of the Kara Sea; construction of artificial land plot ALP-1 of 13.6 ha in the water area in federal ownership (Ob Estuary); construction of quay (sections 1-3) and shore reinforcement in the resulting territory; construction of facilities in the administrative area and navigation aids.

The following permanent facilities will be constructed at the EPF phase (some of them will be owned by investors whilst others will be federal property):

- Construction: sea port water area and access channel; general purpose berth; utility systems (power supply, surface runoff drainage system, fire water system, liquid bulk cargo reception system, etc.); tide gauge; traffic safety facilities; office building; navigation aids; quay: Section 1 including shore reinforcement, section 2, section 3 including shore reinforcement; ALP-1;
- Outdoor storage areas; infrastructure to match the cargo turnover requirements; boom pad;
- Reconstruction: Sea port and access channel; jetty, berth No.1, berth No.2, berth No.3, access section of 142 m (for general purpose berth).

Functions of operating port facilities: year-round reception of vessels; LNG and SGC offloading to marine vessels; GBS maintenance from the Terminal territory; harbour vessels base during the operation of the GBS LNG and SGC Plant and the Terminal; reception of liquid bulk cargo (methanol during summer navigation, diesel fuel in all seasons); reception of cargoes for operation of the Terminal and adjoining facilities.

The operation period facilities will include construction of the quay (sections 4-6) and shore reinforcement in the resulting territory; construction of ALP-2 of 10.5 ha in the water area of the Ob Estuary; construction of facilities in the administrative area; reconstruction of quay (sections 1-3) for new function; reconstruction of general purpose berth; dredging; dredged soil dumping; construction of the northern and southern ice barriers.

The OPF facilities include:

- Reconstruction: sea port water area; general purpose berth (berth for the port fleet and emergency response facilities with an extension for reception of rolling cargo); quay (sections 1-3);
- Construction:
- Ice barriers;
- Berth for the port fleet and emergency response facilities with an extension for reception of rolling cargo integrated with the general-purpose berth;
- Quay (sections 4-6, the latter with shore reinforcement);
- ALP-2;
- Methanol reception system;
- Bunkering infrastructure for the port fleet at the berth;
- Components of the ice management system (IMS);
- Navigation safety system (NSS), including ARTP-4 with the following facilities: diesel power plant; equipment module; fuel reception station for DPP; navigation aids; outdoor sites and storage facilities: navigation aids outdoor storage and maintenance site; spill response equipment store; outdoor storage for containers and special machinery; temporary storage sites for special machinery and containers with equipment (including sites on the berth rear side); traffic safety

facilities (including navigation traffic safety facilities) and counter-terrorist protection, with allowance for the construction and operation of GBS 1...3;
- Premises for the state institutions (federal property): RF state border checkpoint and traffic safety facilities; facilities of the federal services including indoor parking; offices and domestic facilities; transport and utility infrastructure.

Cristophe de Margerie vessel - the lead ship of Yamalmax class (ice class Arc-7, draught up to 11.78 m) which is already used by the Yamal LNG Project is adopted as prototype for the design of Utrenniy Terminal. So designed water area will feature seabed levels down to minus 15.0 m and will consist of three main elements - berth operation zones, turning/maneuvering area, and access channel for safe working of vessels of the designed type.

Construction of the Utrenniy Terminal is planned for the end of year 2022. Average number of construction workforce for the construction of the early port facilities and operating port facilities is tentatively assessed at 746 and 2193, respectively. The maximum turnover of construction cargoes is expected in 2021 - up to 1.5 million tons. Cargo turnover target of the Terminal during the operation phase is 19.8 MTPA of LNG (39.6 MTPA for extension in a long term) and 1.8 MTPA of SGC (3.6 MTPA in a long term).

Institutionally, the Terminal is included in section No.2 of the Sabetta Port (RF Government Decree of 31.08.2019 No.1948-r on the modification of the sea port boundaries) and will be supervised by FSUE Hydrographic Enterprise (under the Rosatom State Corporation).

5.6 GBS LNG & SGC Plant

The LNG Complex will have three LNG trains with declared annual capacity about 6.6 MTPA of LNG (for one train), which will be integrated with the artificial land plot to be constructed in the Ob Estuary. The total SGC capacity of the Plant during the peak operations period may be as high as 1.6 MTPA of SGC. The adjacent coastal area will be used for construction and operation of auxiliary facilities and infrastructure (hereinafter – *the Plant Onshore Facilities*), and the Utrenniy liquefied natural gas and stabilised gas condensate terminal (hereinafter – *the Port or the Utrenniy Terminal*). High-level layout of the future LNG Complex and Port facilities is included in Appendix B2.

The LNG Complex features a special design where the process trains are built on gravity-based structures (GBS) designed to withstand heavy ice, seismic and wave impacts. GBSs are conventionally used in areas with challenging environmental and technical conditions for construction (e.g. development of offshore fields in Sakhalin Region) at a maximum depth of 150 m. Each GBS is designed as a platform which is kept in its position on the sea bed by its own weight and the contact of its bottom with the sea bed soil. Sea bed surface relief and deposits are subject to grading and stabilisation prior to installation of GBS.

In view of the benefits of the GBS technology with regard to environmental impact mitigation (refer to Section 4), the Company made a decision to engage remote specialized yards for manufacturing of the process trains including GBS and modular structures to be transported (towed) to the designed location area of the LNG Complex. To enable transportation, certain sections of the route will have to be prepared, including arrangement of a shipping channel at the outlet of the Ob Estuary to the main area of the Kara Sea (this section is indicated in the scheme in Appendix B1), as well as shallow access channels to the shore at the site of the future Terminal "Utrenniy" (refer to the scheme in Appendix B2).

Each of the three process trains will include the following:

- Gravity-based structure with internal LNG and condensate storage;
- Topside structures (TS) comprising several decks to accommodate pretreatment facilities to prepare gas and condensate for production of commercial LNG and SGC products, LNG and SGC loading arms, main and emergency power generation systems;
- process pipe rack on the artificial land plot (ALP[37]).

The full list of the LNG Complex facilities includes the following:

- Turn-key factory-fabricated technical equipment:
  - Process train 1 comprising topside (TS) and gravity-based structure (GBS) with LNG and SGC offloading systems and storage tanks for process fluids, LNG and SGC accommodated in the GBS hull;

[37] The ALPs are included in the scope of the PORT design

    - Process train 2 comprising topside (TS) and gravity-based structure (GBS) with LNG and SGC offloading systems and storage tanks for process fluids, LNG and SGC accommodated in the GBS hull;
    - Process train 3 comprising topside (TS) and gravity-based structure (GBS) with storage tanks for process fluids and LNG accommodated in the GBS hull;
- Base structures in the Ob Estuary of the Kara Sea for installation of turn-key factory-fabricated technical equipment 'Process Train 1', 'Process Train 2', 'Process Train 3';
- Main onshore facilities (to be commissioned simultaneously with the LNG Complex Process Train 1):
    - Common flare system;
    - Operations control system (OCS);
    - Pipe racks;
- Auxiliary onshore facilities:
    - Catch-water drain for protection against impact of external water bodies;
    - Utility systems:
    - Telecom tower No.1;
    - Auxiliary boiler plant;
    - Industrial wastewater and runoff water pumping stations Nos. 1, 2, 3;
    - Fire water storage tanks;
    - Fire water pumping station;
    - Process water pre-treatment facilities;
    - Glycol water collection and drainage site.
    - Substation ESS-001;
    - Site roads;
    - Grading and landscaping elements;
    - Site fence.

Further technical details of the LNG Complex are provided in Appendix C3.

The approach for the LNG Complex construction can be described as follows:

- GBS manufacturing at specialized remote site;
- Building of the topside (TS) process modules at remote module-building yards;
- Transportation of fabricated process modules to the GBS manufacturing site followed by installation of TS structures from the modules and their integration with GBS, partial commissioning;
- Towage of the turn-key factory-fabricated process train (GBS+TS) to the designed location of the LNG Complex;
- Preparation of base in the Ob Estuary for installation of the process trains;
- Construction of onshore infrastructure;
- installation of the process trains on the prepared base structures in the Ob Estuary, and subsequent integration with onshore infrastructure;
- LNG Complex commissioning and putting into operation.

The LNG Complex construction period is Q1 2020 - Q2 2026. The first production train of the LNG Complex will become operational in 2022-2023, and further capacities will start operating in 2024 and 2026. Comprehensive geotechnical surveys have been completed by present; design has been developed, and the state expert review of the survey reports and design documentation has been successfully completed (approved by the State Environmental Review Board of Rosprirodnadzor and the Main State Expert Review Board of FAI Glavgosekspertiza of Russia).

5.7 Utrenniy Airport

The local airline airport Utrenniy (category I, class D) is designed for year-round (9:00 - 19:00) air transportation of rotation-shift workforce and production cargoes to the Utrenneye OGCF using aircraft An-12 (design prototype), as well as Gulfstream G550, An-24, An-26, ATR-42, ATR-72, Dash-6-400, Dash-8 (Q-200, Q-300), L-410, Mi-8, Mi-26, and aircraft of lower class. The airstrip size will be 1550x36 m. Passenger flow capacity of the airport passenger terminal is 100 passengers per your; cargo turnover is category IV group C as per the 'arctic freight depots' classification / 15 tons per day.

The airport facilities include:

- Improved airstrip 1550x36 m;
- Taxiways RD-A (209 m) and RD-B (194 m);
- Apron for aircraft taxiing and parking (333 m);
- Aircraft De-icing area;

- 2-4-floor service and passenger terminal with a control tower, passenger flow capacity 100 passengers per hour;
- Terminal square of 0.76 ha with vehicle parking lots;
- Emergency rescue station;
- Training area for fire response crews;
- 2 garages for specialised vehicles;
- Bulk materials store;
- Covered fuel filling station (note: no aviation fuel supply facilities are provided, as aircraft fuelling will be arranged in Sabetta Airport);
- Covered gas cylinder storage site;
- Cargo store with design cargo turnover 15 t/day;
- Works building of the specialised vehicles service and airfield service;
- Building of the electrotechnical flight support service;
- Boiler plant;
- Water supply pumping station with a water treatment unit;
- Radio sites (6 units);
- Surface runoff treatment unit;
- Access road of 2.4 km;
- Gas supply pipeline of 16 km;
- Hotel for 160 beds, with a canteen, food and materials storage facilities;
- Patrolling road of 5.236 km;
- Fence.

The airport site is located 15 km east of the berth structures. Its total area is 259.2516 ha, of which 243.8481 ha is acquired permanently, and 15.035 ha is allocated for the period of construction.

The airport will be operated by Sabetta International Airport LLC, a subsidiary of Yamal LNG OJSC. Nova LLC performs the Client function at the stage of design development for the airport[38]; Arctic SPG 2 LLC acts as land lessee[39] and issues technical specifications for the utility connections and supply.

The airport design is developed by a group of design companies under general supervision of Design Institute Krasaeroproekt LLC (Main Designer). FAI Glavgosekspertiza of Russia approved the survey reports and design documentation for the airport in December 2019.

The airport will be constructed in 45 months, with a peak number of 369 of construction workers. The available materials do not specify the planned time of the airport commissioning for operation - this is to be clarified in the process of the ESHIA.

5.8 Associated Facilities and Activities

In accordance with IFC Performance Standard 1 (PS1), Associated Facilities of a Project are those activities and facilities that are not financed within the scope of the Project and would not be conducted, built or expanded if the Project was not carried out, and without which the Project would not be viable. It is important to note that impacts of associated facilities and activities should be examined to the same degree as impacts of the Project.

The Consultant has checked if the above criteria are met by the fields in Gydan and Yamal petroleum regions, elements of the equipment and materials supply chain for the Project, remote facilities for disposal of the Project construction and operation wastes, communications and transport hubs, marine operations (Table 5.4).

Facilities and activities of the Utrenniy Airport at the site selected specifically to provide transport access to the Project facilities meet two of the three association criteria. Apparently, the Project viability would not be significantly affected by absence of the airport, therefore, the respective impacts can be examined in the context of their overlapping with Project impacts (cumulative effects).

Among the marine operations related to the Project implementation, the obvious associated activities/facilities are underwater technical operations and navigation in the external water area of the

[38] Before 2008 - Samarskoye Narodnoye Predpriyatiye "Nova" OJSC. Incorporated in Novokuibyshevsk, on the basis of NovokuibyshevTruboprovodStroy Group. The core business is construction of pipeline trunk mains, oil and gas field facilities (corporate website http://www.snpnova.com/).

[39] Nova LLC sub-leases the land from Arctic SPG 2 LLC.

PORT and in the access channel, and the remote dredged soil dumping sites. For the future, extension of the shipping channel at the outlet of the Ob Estuary (intersection with the Ob bar) may be also considered as associated with the Project, however at the moment the determining requirements for the channel parameters are defined by dimensions of the vessels used by the Yamal LNG Project, and the cargo traffic intensity generated by simultaneous implementation several projects (item A4 in Table 5.4).

The remote facilities for construction of the gravity-based structures and topside structures may not be considered as associated facilities either, as cancellation of the Project would not cause termination of their operations, and, besides participation in the LNG Complex Project, they also run other activities (item A2 in Table 5.4).

Since the Project capacities for waste neutralisation, recycling or disposal are mostly intended for management of low-hazard wastes, the wastes of higher hazard classes will be transferred for disposal at dedicated remote sites run by licensed contractors. These operations are independent of the LNG Complex construction and operation plans, therefore, they are not considered as associated facilities (item A3 in Table 5.4). In the course of further development of design for the LNG Complex, PORT and other parts of the Arctic LNG 2 Project, the list of associated facilities may be extended, in which case ESHIA materials would have to be updated accordingly.

Table 5.4: Associated activities

Index	Facilities and operations	Relation to the Project	Implementation phase	Compliance with IFC criteria for associated facilities	Justification of compliance/non-compliance with the IFC criteria for associated facilities
A1	Construction and operation of the Utrenniy Airport	Ensuring transport access to the Project facilities	Design development and expert review completed. Construction	Non-compliance	The airport will be operated by Sabetta International Airport LLC. Arctic SPG 2 LLC acts as utility supplier and land lessor. The facility is not financed within the scope of the Project and would not be constructed without the Project, however, its effect on the Project viability is yet to be determined. The answer to this question will guide the ESHIA approach to the assessment of impact of the airport (as associated facility or as third party activity).
A2	Operations at specialized remote construction sites	GBS construction Manufacturing of topside modules for the LNG Complex		Non-compliance	The yard for construction of large-scale offshore structures for oil-and-gas industry which is currently being developed in Murmansk Region is intended to construct integrated offshore facilities for production, storage and offloading of LNG and SGC, subsea production facilities, and for repair and maintenance of offshore plant and facilities needed for development of offshore oil, gas and condensate fields. The yard operated by NOVATEK-Murmansk LLC, the Company's subsidiary, will produce the GBS. The plan to develop the Yard was announced in 2015, its construction started in 2017, and phased commissioning started in 2019 and continues in 2020. GBS construction will be one of the several business lines of the yard, and gravity-based structures constructed by the Yard may be used for the Project (LNG & SGC Plant at the Salmanovskiy LA) and also for other projects (including in case of the "zero alternative", i.e. without the LNG Complex). Therefore, the Consultant does not consider the Yard, as well as other remote specialized sites as associated facilities: on the one hand, gravity-based structures for the Plant could be produced also at other facilities, and on the other hand, if the Plant Project is not implemented, the Yard and other facilities engaged for production of various components of the LNG Complex can viably operate fulfilling orders from third parties.
A3	Remote waste neutralization, treatment and disposal sites	Waste management at the Plant construction and operation phases	Operation	Non-compliance	Wastes of hazard classes V, IV and (partially) III generated by the Project will be disposed at dedicated sites in the territory of Salmanovskoye (Utrenneye) OGCF managed by the field Operator (a part of the Project, along with dredged soil from the Port area). The wastes of hazard classes I, II and (partially) III will be transported by sea and disposed of at remote sites operated by third parties. None of the above sites was built or extended specifically for the range or volume of wastes attributable to the project, therefore, they fail to meet one of the association criteria established by IFC.
A4	Operation of communication lines between the Project area and specialized construction sites and other sources of materials and equipment supplies, remote concentration points of personnel of construction, operating and other companies involved in the Project (residential units, water, air, motor, railroad transport terminals), waste management facilities	Materials and equipment delivery from the remote specialized construction sites. Transportation of personnel. Transportation of wastes to remote utilization and disposal sites	Preparation of transportation scheme for the Arctic LNG 2 Project with due regard to location of potential suppliers, involved transport hubs, waste disposal sites	Compliance - for the communication lines and transport facilities operation of which would be impossible or unnecessary without the Project	The main part of this type of activity is considered by the Consultant as *primary supply chains*. As part of the ESHIA studies, specific review shall be carried out to identify those transport routes (corridors) which are intended specifically for the proposed construction and operation of the PLANT, PORT and FIELD, and the vehicles which are solely used to serve the needs of the Project (e.g. ships with certain technical parameters). In particular, the association criteria will be met by the access roads which connect the license area with the public road network[40], and the sea route between the PORT and the navigation line of the Ob Estuary. The marine operations conducted for the Project will be examined for the cumulative impacts of increased cargo turnover and intensity of shipping traffic on the concerned routes
A5	Extension of sea channel in the Ob Estuary (at the intersection of the navigation routee and Ob Bar)	Ensuring safe navigation at the stage of the Plant and Port operation	Design development	Non-compliance[41]	Operation of the sea channel is needed for the marine operations of third parties, and will be maintained irrespective of the Planned activity implementation. The channel has been independently operated by third parties for a long period. The need to enhance the channel is determined by the general increase of traffic flows, and also considering the projected cargo turnover of the three terminals - Sabetta, Utrenniy and Arctic Gate. The channel dimensioning is defined by the design vessel parameters of the Yamal LNG Project. Implementation of the Arctic LNG 2 Project will not cause any change in the range of vessels (the only difference is potential increase of draught by 0.1 m for one vessel category), however it will cause an increase of ship journeys to the ports of Sabetta and Arctic Gate by approximately 90%[42]. On the Consultant's opinion, the sea channel at the exit of the Ob Estuary cannot be considered as associated facility of the Arctic LNG 2 Project at this stage, as it fails to meet two of the association criteria established by IFC: firstly, the Project would be viable even without extension of the channel, and secondly, the channel's extension is planned anyway, in the context of third parties' shipping operations[43], and does not relate to the Plant construction. If the Project design review shows a need for changing the sea channel parameters specifically for the Arctic LNG 2 Project, the respective impact will be assessed as impact of associated activity.
A6	Development of infrastructure of other fields in the Gydan and Yamal Petroleum Region (Geofizicheskoye, Shtormovoye, etc.) to provide additional resource base for the Plant	Anticipated future element of the Project resource base	Exploration, appraisal	Non-compliance	The Company expressly confirms that the Salmanovskoye (Utrenneye) OGCF has sufficient resources for the whole life cycle of the Project. Therefore, development of the neighbour fields (refer to the schematic map in Appendix B5) will be considered solely in the context of cumulative effects

[40] The Tazovskiy District Municipality Master Plan refers to a long-term plan to construct a railway line in Gydan Peninsula in the direction of the Salmanovskiy (Utrenniy) LA, with a terminal point in the LA territory

[41] If the sea channel is to be extended specifically for the Plant needs, such activities should be considered as associated activities; final decision on the need for and parameters of the channel reconstruction is yet to be made.

[42] Investment application (declaration of intent) for the Complex for production, storage and offloading of liquefied natural gas and stabilised gas condensate at the Salmanovskoye (Utrenneye) oil, gas, and condensate field. Remote terminal Utrenniy at the port of Sabetta. Justification of sea channel dimensions in the north of the Ob Estuary. Document code 89.03.14.5.184-MK. - StPb: GT MORSTROY CJSC, 2016.

[43] As part of examining potential cumulative effects of the proposed operations, the Consultant will update the previously collected and reviewed information on the channel and its impact on water environment of the Ob Estuary (the thermohaline structure, aquatic life, potential cumulative effects); therefore, if the channel is recognized as an associated facility, further assessment of its impact as a part of the Arctic LNG 2 Project follow-up will consider both the detailed design, and findings of the ESHIA.

6. ENVIRONMENTAL BASELINE

Until recently, the Gydan Peninsula was one of the less studied territories of the Russian Arctic, which is largely due to lack of development and inaccessibility. A systematic study of the natural environment of these areas began in the 1920s-1940s through the works of the Gydan expedition of the Academy of Sciences of the USSR, the Russian Geographical Society and the Russian Botanical Society. The economic importance of the Gydan ecosystems of that time was limited to ensuring the productivity of reindeer pastures.

A new page in the history of the peninsula landscapes study was turned by large-scale explorations, which were carried out here in the 1960-70s through the joint efforts of oil and gas companies and specialized research institutes. From 1975 to 1993, 12 hydrocarbon fields were discovered and explored within Gydan, eight of which are gas – Gydanskoye, Antipayutinskoe, Toto-Yakhinskoye, Minkhovskoye, Vostochno-Bugornoye, Trekhbugornoye, and Ladertoyskoe fields, and two are oil and gas condensate (Utrenneye and Geofizicheskoye).

The associated environmental and geographical studies complemented and updated the results of the previous work and collected new data on the peninsula and the adjacent area of the Ob Estuary. As of the mid-1990s, the total human-induced disturbance of the Gydan's landscapes was estimated at hundredths of a percent; that is, this large land mass remained nearly pristine, displaying the following main features:

- a moderately continental arctic climate with prevalent negative air temperatures across the year, excessive atmospheric moisture, snow cover accumulating most of the atmospheric precipitation, seasonal long-term freezing of soils and soils, monsoon type atmospheric circulation with prevailing northerly winds in summer and southerly winds in winter, constantly high humidity, low frequency of thunderstorms and calm, high frequency of cloud cover and advective fogs, high wind loads on the earth's surface, seasonal alterations of constantly high- and constantly low-light conditions of the land surface;
- the predominantly flat terrain represented by a series of marine and lagoon-laid sand-loamy weakly drained terraces (Figure 6.1), with a floodplain complex of modern river valleys, with an intense — up to several meters per year — abrasion-accumulative transformation of the Ob Estuary coast;

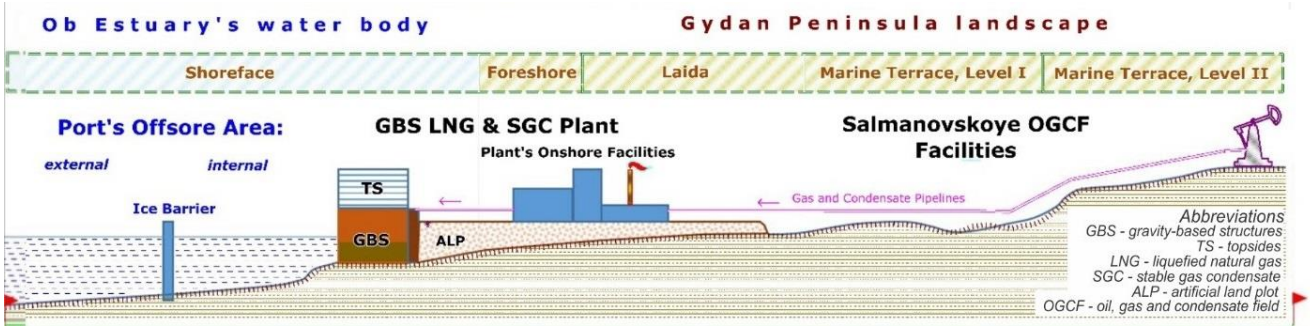

Figure 6.1: Schematic location of the LNG Complex, PORT and FIELD in the terrain

- association with a **cryolithozone** with a continuous occurrence of permafrost which acts as a permeability barrier of a reginal magnitude, features a multi-layer structure with some local intrapermafrost cryohaline water areas (cryopegs), and gas-hydrates. The permafrost is found near the ground surface determining to a considerable extent the nature of the recent terrain forming geological processes where a major role is played by waterlogging, thermokarst and thermal erosion, solifluction (displacement of over-moistened soil on the slopes), frost heaving and frost cracking;
- the dominant combination of tundra and marsh **vegetation** with a pronounced complexity of phytocenoses due to the microrelief and the nature of the exogenous geological processes, a relatively low bioproductivity and weak soil-forming function of higher plants, instability and fragmentation of vegetation on areas with intensive exogenous geological processes including cryogenic, eolian, erosion- and abrasion-accumulative;
- the prevalence of thin **soils** with low resistance to man-induced loads, classified as tundra gley and marsh soils with a characteristic complexity of the soil cover due to exogenous processes;
- high significance of the subject territory and water area for **biological diversity** in general, with pronounced spatial irregularity and seasonality availability of most species of terrestrial vertebrate animals and representatives of the ichthyofauna;

- a predominantly local and generally insignificant **transformation of landscapes by patchy and irregular business operations**; low level – close to the regional baseline figures – of the natural environments chemical pollution, mainly due to impacts from remote sources and effects of long-range transport of pollutants to the Arctic.

In the 2000-2010s, amidst general expansion of interest towards the Arctic Region and the development of its resources, a series of comprehensive expeditions were organized, tasked with ecosystem studies and environmental sampling for subsequent material analysis. In addition, as regards the areas of construction and operation of engineering structures, the knowledge of the land and water areas is complemented by the data obtained through operational environmental monitoring. In particular, to assess the impact of the pipeline corridor connecting the Nakhodkinskoye field to the Yamburgskaya compressor station (with a 22-kilometer two-pipe underwater crossing through the Taz Estuary), hydrogeochemical surveys were carried out on the Messoyakha and Monguiribei rivers. The baseline and operational environmental self-monitoring of PiterGaz LLC of 2010 contributed to a much better understanding of the aquatic ecosystems of the Taz Estuary within the boundaries of the Tota-Yakhinsky and Antipayutinsky subsoil areas. FGBOU VPO Tyumen State University carried out detailed surveys on the peninsula lakes (Kremleva et al., 2012). The "Gazflot" LLC (2000-2009) and the Northern UGMS ("Yamal-Arctic – 2013") expeditions collected extensive data on the Ob Estuary ecosystems. The Atlas issued recently by Arctic Research Center LLC (2016) with the support of Rosneft was a major compilation of a large array of data on the Kara Sea ecosystems and their resistance to anthropogenic impacts.

A number of comprehensive studies were devoted to Gydan's population centers and addressed medical, ecological and epidemiological issues. The results of the studies were published by specialists of Scientific Center for Arctic Exploration (YNAO, Salekhard), Research Institute of Medical Problems of the Far North (YNAO, Nadym), Department of Hospital Pediatrics of the St. Petersburg Pediatric Medical Academy and the Institute of Cytology and Genetics of the Siberian Branch of the Russian Academy of Sciences (Novosibirsk).

In recent years, much attention has been paid to the conservation of biological diversity of the Gydan tundra landscapes, and to this end, in addition to the existing protected areas, of which the one nearest the proposed Plant site is the Gydan Reserve (108 km to the north-northeast), consideration was given to establishing Yuribey conservation area with the status of wildlife sanctuary or protected natural landscape of municipal significance (70 km to the southeast, refer to the map in Appendix B4[44]). The territory of the future protected areas has become the object of detailed environmental studies, which confirmed the prospects of assigning protection status to preserve unique complexes of hypoarctic tundra, fish breeding grounds, wildlife nesting sites, and to prevent poaching.

In the Territorial Planning Scheme of Tazovskiy Municipal District (Magnitogorsk: Arkhivarius LLC, 2015), Yuribey DCA is designated as a wildlife sanctuary; in the explanatory memo to the same document, the DCA is mentioned as a future protected natural landscape of municipal significance (Ibid., p.36). Establishing of this DCA is included in the Sub-programme "Ecological balance and good environmental quality for Yamal-Nenets Autonomous Okrug" under the YNAO State Programme "Environmental Protection 2014-2024" (adopted by YNAO Government Resolution of 25.12.2013 No.1135-П, as amended on 14.02.2020). It was mentioned in the context of the activities of the Ecology Year in 2017 (official website of Tazovsky Municipal District https://tasu.ru/), based on the unique natural landscapes, as well as presence of sacred sites and areas of customary nature use practices of the indigenous population of Tazovskiy Municipal District.

According to the ESHIA 2018, territory of the future DCA is located outside the Project's area of influence; operations within the Salmanovskiy (Utrenniu) LA will not affect the catchment area of Yuribey river. During the ESHIA process, the Consultant will clarify and document the prospects of establishing new DCAs and other designated territories and water areas of ecological value that can be established within the Project area, considering its current parameters, and in the context of potential cumulative effects.

In 2016, the Government of the Yamal-Nenets Autonomous Okrug launched a comprehensive study program for the Gydan Peninsula, the main goal of which was to avoid mistakes during the first wave of the district's industrial development (first and foremost the Yamal Peninsula) and to ensure the collection of objective background data on Gydan before the start of large-scale development of its hydrocarbon

[44] The Plant site location is shown in the schematic map of the nearest DCAs for orientation only. Assessment of the Project impacts will take into account locations of all elements of the FIELD, PLANT and PORT, as well as associated facilities (section 5.7) and third-party activities that may have a cumulative effect with the Project.

fields. The five-year research program was prepared by the Arctic Research Centre together with the Research Institute of Ecology and Sustainable Use of Natural Resources of the Tyumen State University, Institute of Water and Ecology, Institute of Earth Cryosphere of the Siberian Branch of the Russian Academy of Sciences, Rosgidromet's Arctic and Antarctic Research Institute and other research centers and institutes of Moscow, St. Petersburg, Tyumen, Novosibirsk and Irkutsk.

Along with integrated ecological-landscape research, the Program provides for the reinstatement of the state environmental monitoring network in Gydan.

The ESHIA will use the published results of the above-listed scientific and applied environmental studies in the Gydan Peninsula and in the water area of the Ob Estuary, but the main attention will be paid to the results of pre-project engineering survey, local environmental monitoring (LEM) and operational environmental control (OEC). The onshore part of the survey was performed in stages for the territory of the Salmanovskiy (Utrenniy) License Area (FSBSI PINRO, 2012), the early field development facilities sites (RusGazEngineering LLC, 2014), the areas of the proposed site of the Plant (together with the area of the required 1,000 m sanitary protection zone) and the Port (TsGEI LLC and Uralgeoproekt LLC, 2017). The offshore part of the survey was conducted by FSBSI PINRO FSUE (2012) for the water area of the Ob Estuary within the license area, by EcoExpressService LLC (2013) – for the quayside construction area, by NPF DIEM (2014) – for two alternative Plant location sites, InzhGeo LLC (2017) – for the proposed locations of the Plant facilities, Fertoing LLC (2017) – for the dredging and dumping sites, FPFI AANII (2017) – for the extensive part of the water area including the Plant and Port facilities and extending upstream about 15 km.

The Company provided the LEM and OEC reports 2018 and 2019 which will be used to track the natural and anthropogenic trends in the environmental components within the Project area of influence.

7. SOCIAL BASELINE

This section provides an overview of socio-economic background in Tazovskiy Municipal District and the area of social impact of the Project and its associated facilities (see below). The section is based on the secondary data sources available by the time of reporting, including the following key referenced sources:

- Territorial Planning Scheme of Tazovskiy Municipal District, 2015;
- Tazovskiy Municipal District Investment Passport, 2019;
- Report on Ethnographic Survey in Tazovskiy Municipal District of Tyumen Region, territory of the Utrenneye Field, 2015;
- Results of archaeological surveys in 2015 and 2017;
- Statistical data available on the website of the Federal State Statistics Service (Rosstat);
- Information and official documents published at the web sites of administrations of Tazovskiy Municipal District and rural residential units;
- Publicly available information accessible as web resource (media articles, etc.);
- ESHIA 2018 for the LNG Complex.

The information provided in this section on the potential social impacts of the Project, is preliminary and will be further clarified in the ESHIA process.

7.1 Project Area Overview

Tazovskiy Municipal District where Arctic LNG 2 Project will be implemented is one of the seven districts of Yamal-Nenets Autonomous Okrug (YNAO). YNAO comprises 7 districts and 6 regional cities, including the administrative centre of the Okrug - the city of Salekhard. Tazovskiy Municipal District is located in the north of YNAO, on the western shore of Gydan peninsula.

Territory of Salmanovskoye (Utrenneye) field is situated north of the Arctic Circle. Living environment is challenging due to the climatic conditions: harsh continental climate with long winters and relatively short and cool summers. The field area is occupied by virgin tundra with low-sloped hilly plains, small rivers with multiple tributary streams, and a large number of lakes.[45]

The main economic activity in Tazovskiy Municipal District is development of oil and gas fields. The district is also a place of residence of small-numbered Indigenous Peoples of the North. Nenets people accounting for more than a half of the District population are actively engaged in reindeer herding and other customary activities.

Information about residential units nearest to the territory of the Salmanovskiy (Utrenniy) license area (LA) is summarised in the table below.

Table 7.1: Residential units and other social objects nearest to the LNG Complex and the Salmanovskiy (Utrenniy) LA

Residential unit / social object	Tentative distance to the LNG&SGC Plant, km	Tentative distance to boundary of the Salmanovskiy (Utrenniy) LA	Population number, persons*)	Tentative proportion of indigenous peoples, %
Gyda settlement	170	120	3692	93%
Antipayuta settlement	240	200	2707	83%
Yuribey village	115	65	56/165**	100%
Tadebya-Yakha village	70	40	36/40	100%
Tazovskiy township	430	390	7209	24%

* Information on population numbers and proportion of small-numbered Indigenous Peoples of the North is provided below

** Population numbers for Yuribey and Tadebya-Yakha describe both permanent residents of the villages and nomadic communities migrating in the vicinity (permanent/nomadic)

Residential units nearest to the designed Project are Gyda and Antipayuta. Population numbers in the two settlements are 3692 and 2707, respectively, as by 2019. Indigenous peoples account for 80-90% of the total population number. Each settlement has a school and kindergarten, outpatient care station and a small hospital, as well as a club and library. It should be noted that population numbers in these settlements

[45] Salmanovskoye OGCF Facilities Setup. Main technical solutions. Part 1. General data. Ranking and selection of infrastructure development options. Volume 1. 77.17.016.1-OTP1. Yuzniigiprogas Institute LLC, 2018

describe both people who live there, and also nomadic communities migrating within the vast territories of the Gyda and Antipayuta tundra. Only about 1000 persons permanently live in Gyda, i.e. 25-30% of the reported number. In Antipayuta this figure is about 1500, i.e. 60%.

Also there are two villages - Yuribey and Tadebya-Yakha - near by the field territory. Yuribey village is located at a distance of 115 km from the designed LNG&SGC Plant and about 65 km from boundary of the Salmanovskiy (Utrenniy) LA. The number of permanent residents of Yuribey reported in 2018 is 56, with 165 persons migrating in nearby territories. Tadebya-Yakha village is located on the shore of Ob Estuary, about 70 km to the south of the designed LNG&SGC Plant and about 40 km from boundary of the Salmanovskiy (Utrenniy) LA. The number of permanent residents in the village reported in 2018 is 36, with 40 persons migrating in nearby territories.

There are about 15 trading stations in Tazovskiy Municipal District, where residents of remote tundra areas can sell or exchange their goods and buy products, materials, etc. which they need. Trading stations play an important role in internal relations of indigenous peoples and also function as interface for external communication. They serve as a meeting place for indigenous peoples, for exchange and dissemination of information, etc. Trading stations nearest to the Project area are Mangty-Yakha and Yara-Vonga. However, according to the tentative information as of 2018, the two trading stations are inoperative. Nomadic communities buy goods in Gyda, Antipayuta, Yuribey and Tadebya-Yakha villages, and also at Tanamo trading station. The latter is located far away from the Salmanovskiy (Utrenniy) LA (about 180 km).

The administrative centre of the district - Tazovskiy with 7209 residents as by 2019 (Rosstat data) - is situated at a significant distance (more than 400 km) from the Project.

Territory of the Salmanovskiy (Utrenniy) LA is also used by indigenous peoples. The key customary activities of indigenous peoples are reindeer breading, fishing, hunting and picking wild crops. For more details refer to Section 7.5 below.

7.2 Preliminary Assessment of the Project Social Area of Influence

Tentative area of social impacts of the Project which has been identified at the Scoping stage includes certain territories and communities which may be exposed to beneficial and adverse impacts. Due to the specific nature of social impacts, and potential differences between spatial boundaries of environmental and social impacts, the social impact area is identified separately. The tentative Social Impact Area includes the following elements:

- *Area of immediate (direct) impacts:*
  - Indigenous population migrating and leading traditional way of life (reindeer herding, fishing, wild crops harvesting, hunting, etc.) within the boundaries of the construction sites of the Project and the associated facilities;
  - Agricultural enterprise MUE State Farm Antipayutinskiy being a potential receptor of both beneficial and adverse impacts of Project and associated facilities;
  - Personnel of contractors engaged for implementation of the planned activities;
- *Area of potential indirect impacts:*
  - Gyda and Antipayuta settlements being the nearest relatively large settlementsin the vicinity of the Project, where indigenous population migrating in the territory of the Samanovskiy (Utrenniy) LA are often registered, use medical services, go to shops, etc.;
  - Yuribey and Tadebya-Yakha. These small villages also are located relatively near to the borders of the Project area. The indigenous nomading people within the Samanovskiy (Utrenniy) LA borders can also live there. Besides, the nomading families visit shops located in these villages and the medical station located in Yuribey;
  - Indigenous communities in the Gyda Tundra and Antipayuta Tundra in general, engaged into customary economic activities and customary lifestyle. Implementation of the Project and associated facilities may affect the customary nomadic routes of the reindeer herders in the area of Salmanovskiy (Utrenniy) LA. This may in turn affect economic activities of other indigenous communities in the Gyda Tundra and, to a lesser extent, Antipayuta Tundra;
  - Agricultural Enterprise GAGE GydaAgro LLC. The planned activities may affect operations of GAGE GydaAgro LLC, if personnel of the Project and associated facilities will practice unofficial purchase of products (fish) from personnel of GAGE GydaAgro LLC.
  - Companies that run fishing operations in the Ob Estuary and may be affected by the planned activities.

Based on initial understanding of Ramboll, the following areas are not included in the Project's social area of influence:

- Yara-Vonga and Mangty-Yakha trading stations. Even though, according to the Territorial Planning Scheme of Tazovskiy Municipal District, the two trading stations are the nearest to the Samanovskiy (Utrenniy) LA, information collected in the Preliminary ESHIA process indicates that they are non-functional;
- Tanamo trading station. The trading station is sometimes used by indigenous nomadic communities migrating in the area of the Project and associated facilities. However, Tanamo is not included in the social area of influence of the Project, due to its remote location, while ISPN communities that use the trading station are considered together with other indigenous communities of the Gyda Tundra and Antipayuta Tundra (see above).

Determination of the social area of influence will be clarified and may be revised during the ESHIA process.

7.3 Demography

According to the data reported for year 2019, population number in Tazovskiy Municipal District is 17405[46], where indigenous population is in majority (see below). Demographic situation in 21st century is fluctuating, with periods of population growth and decline. This is mainly explained by variations of birth rates and death rates in the district. Migration balance has been negative throughout the studied period, i.e. the number of emigrants was larger than the number of immigrants[47].

The age profile is characterized by relatively high proportion of employable age population - 56% of the total number. Percentage of residents under employable age is 35%, and people at the age beyond employable age account for 9% of the total population number[48].

Key demographic parameters of Tazovskiy Municipal District and residential units in the social impact area of the Project as of 2018 are summarized in the table below.

Table 7.2: Demographic characteristics of residential units in the social impact area of the planned activity, and in the administrative centre - Tazovskiy (2018)[49]

Parameter	Tazovskiy Municipal District	Tazovskiy township	Gyda settlement	Antipayuta settlement	Yuribey village / nomadic communities in the vicinity	Tadebya-Yakha village / nomadic communities in the vicinity
Population number	17,251	7469	3614	2685	56/165	36/40
Birth rate, per thousand of residents	23.5‰	21.6‰	30.3‰	24.8‰	N/A	N/A
Death rate, per thousand of residents	7.5‰	6.9‰	6.8‰	12.4‰	N/A	N/A
Natural growth, per thousand of residents	16.2‰	14.7‰	23.5‰	12.4‰	N/A	N/A
Immigration rate, per thousand of residents	43.3‰	N/A	14.2‰	17.3‰	N/A	N/A
Emigration rate, per thousand of residents	72.2‰	N/A	14.2‰	19.2‰	N/A	N/A
Migration gain/loss, per thousand of residents	-29‰	N/A	-0.3‰	-1.9‰	N/A	N/A
Average size of household (persons)	3.2	2.8	4.1	4	N/A	N/A

[46] Tyumenstat data.

[47] Territorial Planning Scheme of Tazovskiy Municipal District. Volume 2. Explanatory memo. Arkhivarius LLC. Magnitogorsk, 2015. Web resource: https://tasu.ru/gradostroitelnaya-deyatelnost/dokumenty-territorialnogo-planirovaniya/skhema-territorialnogo-planirovaniya/.

[48] Refer to the link above

[49] Preliminary ESHIA 2018

According to the national census of 2010, indigenous population of YNAO was 41.2 thousand, or 8% of the total population number. Very high concentration of indigenous people is reported in Tazovskiy Municipal District, in particular in Antipayuta and Gyda. Indigenous Nenets people are the largest group of population. Information on numbers of indigenous people in Tazovskiy Municipal District and surveyed settlements is provided in Table 7.3 below.

Table 7.3: Numbers of indigenous small-numbered peoples of the North, 2016[50]

Parameter	Tazovskiy Municipal District	Tazovskiy township	Antipayuta settlement	Gyda settlement
Number of indigenous small-numbered peoples of the North (capita), including:	10072	2608	2600	3371
Nenets	10021	2580	2592	3359
Khanty	46	23	8	12
Selkup	5	5	0	0

Indigenous people account for 60% of a total number of population in Tazovskiy Municipal District. This proportion is substantially higher than YNAO's average. In fact, the surveyed rural settlements are almost fully populated with indigenous people. E.g. the share of ISPN in a total number of population is 96% in Gyda and 99% in Antipayuta. In the administrative centre of the district - Tazovskiy - indigenous peoples account for only 35% of population. As mentioned above, all residents of Yuribey and Tadebya-Yakha villages are indigenous people.

Further socio-economic studies within the scope of ESHIA will clarify demographic situation of Tazovskiy Municipal District, and more comprehensive information will be collected on demographic situation in the residential units within the social impact area of the Project and associated facilities.

7.4 Economics

The main economic sector in Tazovskiy Municipal District is industry, more specifically minerals extraction (RUB 196 B[51] in 2016).[52] Resources industry and associated auxiliary infrastructure actively develop in southern area of the district. During 11 months of year 2019, local industries supplied goods, works and services worth RUB 455 B[53], which is by 11 % more that during the same period of year 2018. Mineral extraction accounts for major part of this result. Tazovsky Municipal District contributed 16.3% to the total product of YNAO over the same period.

Total gas extraction volume in the district is almost 180 B m3, i.e. more than one third of the total amount of gas produced in YNAO.[54] The main subsoil users in the District are subsidiaries of Gazprom, Lukoil and NOVATEK.[55] There are 35 proven hydrocarbon fields in the District area, including 8 fields offshore.[56]

Even though agriculture plays only minor role in Tazovskiy Municipal District economy (RUB 0.4 B in 2016)[57], agricultural lands account for 80% of the district territory.[58] The total of 6 agricultural enterprises operate in Tazovskiy Municipal District, including GydaAgro in Gyda and State Farm Antipayutinskiy in Antipayuta. The district is a place of customary activities of indigenous peoples. The main customary activity of indigenous peoples is reindeer herding; however, fishing, hunting and picking wild crops are common too (refer. to Section 7.5 - Indigenous Peoples).

[50] Passport of settlements of Tazovskiy Municipal District, 2016

[51] Value of products, works and services supplied.

[52] Tazovskiy Municipal District Investment Passport, 2017

[53] Tazovskiy Municipal District Investment Passport, 2019

[54] Territorial Planning Scheme of Tazovskiy Municipal District. Volume 2. Explanatory memo. Arkhivarius LLC. Magnitogorsk, 2015. Web resource: https://tasu.ru/gradostroitelnaya-deyatelnost/dokumenty-territorialnogo-planirovaniya/skhema-territorialnogo-planirovaniya/.

[55] Refer to the link above.

[56] Tazovskiy Municipal District Investment Passport, 2017

[57] Socio-economic development projection for Tazovskiy Municipal District, 2018-2020 (Key indicators).

[58] Tazovskiy Municipal District Investment Passport, 2017

In accordance with the Preliminary ESHIA, Gyda settlement is a domicile for agricultural enterprise GydaAgro which, according to preliminary information, is engaged in fishing and fish processing. The main businesses in Antipayuta are MUE State Farm Antipayutinskiy, butchering facility of Tazovskiy Agricultural Complex LLC, and Antipayuta Consumers Association. Several small retail shops function in the village.

More details of economic situation and employment in residential units within the Planned activitys' social impact area and at the level of Tazovskiy Municipal District will be provided as part of the ESHIA process.

7.5 Indigenous Peoples

Tazovskiy Municipal District of YNAO is a customary area of residence and activities of indigenous small-numbered peoples of the Russian Federation.[59] Until 1970 indigenous peoples, primarily Nenets, accounted for more than a half of the district population. Since the start of extensive development of the oil and gas deposits in Tazovskiy Municipal District, the share of local population decreased due to the strong immigration flow. However, the numbers of Nenets have been restoring during recent decades, and nowadays Nenets make up more than a half of total population in Tazovskiy Municipal District - 10021 persons[60]. Therefore, the District is the place of residence for about 20% of the total number of this indigenous people.[61] In Gyda and Antipayuta, Nenets people are the majority (more than 95%). In the District administrative centre - Tazovskiy township - ISPN make up about one third of the total population number. The villages of Yuribey and Tadebya-Yakha are fully populated with indigenous peoples. Besides Nenets, other ISPN are also present in Tazovskiy Municipal District, namely 46 Khantys and 5 Selkups.

Indigenous communities conduct customary economic activities in the Salmanovskiy (Utrenniy) LA. According to the Preliminary ESHIA, the area was used for customary activities of private reindeer herders, and also for operations of State Farm Antipayutinskiy. About 60 nomadic families, i.e. tentatively 350 persons are present in the area (the exact number of nomadic families may slightly vary between years). The size of private herds grazing in the area varies from 60 to 1500 reindeer. According to the Preliminary ESHIA, the total number reindeer is about 25 thousand.

Customary economic activities of the Tundra Nenets are reindeer herding, fishing, hunting and wild crops harvesting. Historically, Nenets followed two economic patterns: one focussed on large-scale reindeer herding, and other one built on fishing activities. In many cases impoverished herders took on fishing business, therefore fishing was generally regarded by Nenets as a less "prestigious" occupation. It was often accepted only as a temporary solution needed to raise the necessary resource and get back to the more prestigious herding business. The size of reindeer herd is the measure used by Nenets to describe the level of person's welfare.

Net fishing in tundra rivers and lakes, and in the Ob Estuary is a customary activity of Tundra Nenets. The main objects of customary fishing are round-nosed whitefish, grayling, omul and syrok. The greatest diversity of fish is reported in the largest of nearby rivers - Yuribey River located to the east of the Salmanovskoye (Utrenneye) OGCF. Here local communities practiced commercial fishing of round-nosed whitefish, pydschjan, vendace, syrok, omul, muksun, nelma, pike and rockling.

Hunting is another important customary economic activity of Nenets people, though less significant than reindeer herding and fishing. Indigenous population practices Arctic fox and waterfowl (ducks and geese) hunting. Partridge and hare hunting are often practiced in February-April using traps and snares, as well as gun shooting. Nenets people in Yavaisalinskaya Tundra hardly engage with sea game and polar bear hunting. Indigenous people migrating in the Salmanovskiy (Utrenniy) license area use most products of hunting for own needs.

Wild crops harvesting has always played an auxiliary role in subsistence of Tundra Nenets people. Edible plants were consumed on seasonal basis, as food or for brewing. Gathering of wild crops is mainly practised by Nenets children and women.

The ESHIA will collect more details of customary activities of indigenous peoples.

[59] List of customary residence and economic activities of indigenous small-numbered peoples of the Russian Federation approved by the RF Government Resolution of 08.05.2009 No.631-r.

[60] National census of the Russian Federation 2010

[61] National census of the Russian Federation 2010

7.6 Land Use

Territory of the Salmanovskiy (Utrenniy) LA is located in inter-settlement area of Tazovskiy Municipal District. The license area is virgin tundra with small rivers and tributary streams, and multiple lakes. The LA does not include any residential units with permanent population. However, the territory is actively used for activities of indigenous people (Nenets). According to the Preliminary ESHIA, Tazovskiy Municipal District territory does not include any areas specifically allocated to certain Indigenous Peoples communities or organizations. Indigenous population run their practices on the basis of customary law in the whole of area of Tazovskiy Municipal District which has official status of a territory of customary residence and practices of indigenous minorities of Russia.[62]

The main customary activity of indigenous people migrating in the Salmanovskiy (Utrenniy) LA is reindeer herding. As mentioned above, Nenets also practice fishing, hunting and picking wild crops. Accordingly, reindeer herders have specific river crossings, grazing areas, fawning areas, camping and equipment storage places, as well as dedicated places for fishing and hunting "on the way".

The land use issues in the territory of the Salmanovskiy (Utrenniy) LA will be considered in more detail during the ESHIA process. Indigenous peoples will be included in the list of the key stakeholders to be consulted during the process of ESHIA. The ESHIA report will include information on the migration routes of ISPN, location of their fishing grounds, grading corrals (stock pens) and fawning grounds.

7.7 Social Infrastructure

7.7.1 Education

According to the Preliminary ESHIA (2018), 23 boarding schools function in YNAO to provide education for about 9 thousand children from nomadic families. As a rule, children leave their families and stay at schools for nine months or longer periods. The cost of education is fully covered by the state budget (including helicopter transport from tundra, accommodation and food). The education arrangement using remote boarding schools deprives children of the chance to acquire customary skills and knowledge, and after graduation they are often reluctant to resume the customary practices. In order to preserve distinct culture of the small-numbered indigenous peoples of the North, "nomadic schools" are established at settlements of reindeer herders, hunters and fishers. This model can better match the needs of indigenous peoples, as children will have a chance to study in their traditional environment, without having to leave their families.

According to ESHIA 2018, there are five general education institutions that provide full cycle secondary education, one primary school, and 10 kindergartens in the District.[63] Currently there are queues for places in kindergartens. According to the preliminary information, there are no "nomadic" schools in Tazovskiy Municipal District. Nomadic short-term groups are functioning at local kindergartens in Gyda, Antipayuta and Nakhodka.[64] In Gyda there is kindergarten "Severyanochka" and a boarding school. In 2015-2016 the kindergarten provided a short-term "nomadic" group at Yuribey trading station which functioned in summer. The "nomadic" group personnel consisted of one teacher and the group was attended by 20 children at the age of 2 to 7 years.

In Antipayuta there is kindergarten "Zvezdochka" and a boarding school. In summer 2015-2016 the kindergarten provided two "nomadic" pre-school groups. The groups were staffed with two teachers and were attended by 8 children of pre-school age. One group functioned at a distance of about 1.5 km from Antipayuta, and other one was at Khalmer-Yakha, 35 km south-west of the village.

The ESHIA will clarify information on education infrastructure in Tazovsky Municipal District.

7.7.2 Public Health

According to the Preliminary ESHIA, access to medical services for local communities in Tazovskiy Municipal District is complicated by low density of population and vast area of the District. As major part of indigenous population adheres to nomadic practices, medical services for them are provided by doctors and paramedics of the mobile health unit. The base stations for the mobile health unit are rural district hospitals and five paramedic stations at the trading stations. Emergency healthcare services are supported by ambulance

[62] The list of customary residence and economic activities of indigenous small-numbered peoples of the Russian Federation approved by the RF Government Resolution of 08.05.2009 No.631-r.

[63] Official website of YNAO Department for Youth Policy and Tourism: https://dmpt.yanao.ru/

[64] Nomadic education atlas of YNAO. http://www.yamaledu.org/engine/modules/my/nomand_atlas/html/.

aircrafts with five bases in Salekhard, Nadym and Tarko-Sale cities, in Tazovskiy township and in Seyakha settlement.

Details of the medical institutions in the tentative social impact area of the Project are provided in the table below.

Table 7.4: Medical institutions in the tentative social impact area of the Planned activity, and in the district administrative centre Tazovskiy[65]

Residential unit	Type of institution	Number of medical personnel	Number of beds
Gyda	Rural district hospital Outpatient station	3 doctors (pediatrist and therapist, surgeon) 25 paramedics	15
Antipayuta	Rural district hospital Outpatient station	2 doctors (pediatrists) 14 paramedics	9
Yuribey	Medical and obstetric station (MOS)	1 paramedic	-
Tazovskiy	District Central General Hospital Outpatient station	51 doctors 166 paramedics	124

More details of medical institutions and their status in the Planned activity social impact area will be provided in the ESHIA report. In addition, ESHIA will provide information of the morbidity rates in Tazovskiy Municipal District.

7.8 Transport

Transport modes used in the territory of Tazovskiy Municipal District include motor roads, air and water transport. Onland transport infrastructure in Tazovskiy Municipal District is scarce. The only road main between Tazovskiy Municipal District and the "Mainland" is Novy Urengoy - Tazovskiy motor road. The road route also passes through st. Korotchayevo (area in Novy Urengoy city), Urengoy, and rotational camp Novozapolyarny. The road is paved with asphalt concrete[66] and has a branch toward Gaz-Sale in Tazovskiy Municipal District.

According to the Preliminary ESHIA, no road links are available or planned for transport communication with Nakhodka, Gyda and Antipayuta. These settlements can be accessed by overland transport only using seasonal winter roads. The district transport infrastructure is characterized by long seasonal motor roads in winter. Logistics communications with the trading stations and residential units are supported by crawler vehicles and tractor-and-sled trains. Public bus transport is available only in Tazovskiy and Gaz-Sale.

Railroad communication in the district is non-existent. The nearest railway station Korotchayevo is located at t distance of 170 km from Tazovskiy. Thus about 50% of the district residents live in settlements without regular bus or railway links.

Absence of adequately developed land communications induces reliance on air transport. Air transportation in Tazovskiy Municipal District is arranged via the transit point at the airport of Novy Urengoy. The existing aerodrome in Tazovskiy is only used as a landing field, starting from January 2012. At present no airplane communication is provided. Helicopter pads in the district are available in Tazovskiy, Nakhodka, Gyda, Gaz-Sale, Antipayuta, and Tadebya-Yakha. Helicopter transport is used primarily for communication during transitional seasons, and when land communication routes between Tazovskiy township and other residential units are not available.

[65] Information of Tazovskiy settlement are based on the Passport of settlements of Tazovskiy Municipal District, 2016; information on Gyda and Antipayuta villages was provided at interviews with managers of the local healthcare institutions during the Preliminary ESHIA process (2018).

[66] Territorial Planning Scheme of Tazovskiy Municipal District. Volume 2. Explanatory memo. Arkhivarius LLC. Magnitogorsk 2015, ref.: https://tasu.ru/gradostroitelnaya-deyatelnost/dokumenty-territorialnogo-planirovaniya/skhema-territorialnogo-planirovaniya/.

Water transport is mainly used for cargo transportation. Berths are available in Tazovskiy township, and in the settlements of Gaz-Sale, Nakhodka and Gyda. Th berths are also used by fishing vessels. In summer passenger transportation by water is provided between Antipayuta and Salekhard.[67]

The ESHIA will include a more detailed description of transport access to Gyda and Antipayuta, as well as other residential units and social infrastructure facilities in the social impact area of the Planned activity.

7.9 Vulnerable Groups

Vulnerable groups are those who could experience disproportionate adverse impacts from the proposed activity more severely than others based on their vulnerable status. Vulnerable status may stem from ethnicity, property, level of income, economic situation, gender, language, religion, national or social origin, age, culture, literacy, physical or mental disability, and dependence on unique natural resources.

The following tentative list of communities in the Project social impact area been prepared based on definition of this stakeholder category:

- ISPN individuals and their families engaged in customary economic activities in the territories included in the social area of influence of the Project. The vulnerable status of such families is defined by their reliance on public subsidies, and dependence on the status of certain components of ecosystem services;
- Low-income individuals and families whose welfare depends on public social support;
- Junior and senior individuals;
- Individuals with ill health, disabilities and/or diagnosed socially sensitive diseases (tuberculosis, HIV/AIDS, etc.).

The ESHIA will examine the above groups in more details.

7.10 Cultural Heritage

Several archaeological / history-and-culture surveys were conducted in the territory of the Salmanovskoye (Utrenneye) field and offshore area in 2015 and 2017.

The archaeological survey in Salmanovskoye (Utrenneye) field near Khaltsyneysalya cape at the eastern shore of the Ob Estuary identified two cultural heritage sites - medieval Khaltsyneysalya sites 1 and 2. The former site which is located within the designed site of the LNG Complex onshore facilities was the subject of an urgent archaeological research the output of which formed the basis for the decision to remove the site from the list of heritage. For Khaltsyneysalya 2 site which is not exposed to immediate impact of the Project, boundaries of the restricted use territory have been identified and registered in the cadastre.

Table 7.5: Previous archaeological / history-and-culture studies

Facility	Offshore/onshore studies section	Results of studies	Year of studies
The LNG Complex	Offshore	No cultural heritage sites (CHS) identified[68]	2017
Utrenny Terminal	Offshore	No CHS identified[69]	2015
Berth structures	Offshore	No CHS identified[70]	2017
Territory of the Salmanovskoye (Utrenneye) field	Onshore	2 CHSs (see below)[71]	2015

[67] *Ditto.*

[68] Plant for production, storage and offloading of liquefied natural gas and stabilised gas condensate on gravity-based structures. History-and-culture studies. Final technical report on history-and-culture studies. Offshore area. INZHGEO LLC, 2017

[69] Utrenny Liquefied Natural Gas and Stabilised Gas Condensate Terminal. Archaeological survey field report. ОТД.301.17.ПО4-0008-К031-17. FERTOING LLC 2017

[70] Berth structures infrastructure at Salmanovskoye (Utrenneye) OGCF. Archaeological survey field report. ОТД.319.17.ПО4-0008-К031-17. FERTOING LLC 2017

[71] Archaeological studies in Tazovskiy Municipal District of Tyumen Region, 2015 (Contract "Archaeological studies in the area of Utrenneye OGCF". Volume 1. Purgeocom LLC, NPP "Ethno-ecological and Technological Studies Centre of Siberia". Tyumen, 2015.

No CHSs were identified in other parts of the Salmanovskoye (Utrenneye) field. Results of the survey also indicate potential presence of other historical artefacts or objects.

Ethnographic survey in 2015 also identified sacred sites and burial sites of indigenous population in the territory of the Salmanovskoye (Utrenneye) field. As a rule, sacred sites of Nenets people are located at elevated places and include piles of antlers (normally with a wooden stake in the centre pointing to sun), skulls and bones of reindeer and other animals, and other things. Information about 38 sacred sites in the territory of the Salmanovskiy (Utrenniy) LA and surrounding territory that was collected during the Preliminary ESHIA will be clarified and updated, as appropriate.

8. IMPACTS AND MITIGATION MEASURES

Most of the Project environmental and social impacts were identified and assessed by the ESHIA 2018. Impacts of the LNG Complex and PORT, and of the associated FIELD facilities, marine operations and underwater technical operations were examined with the level of detail allowed by the available input data. The extended ESHIA will update the previous assessment with information about developments and changes in technical design over the period 2018-2020, and supplement it with a comprehensive assessment of the impact of all designed FIELD facilities.

8.1 Environmental Impacts

8.1.1 Impact on Air

Pollution emissions will occur during the construction, operation, decommissioning and dismantling of the Project facilities. The list of emission sources, and therefore, composition and quantity of emissions will vary. The best initial data for detailed assessment of emissions is available for the operational phase. The operational emissions will be related to pretreatment of gas and condensate supplied from the Field, their storage, offloading and other related operations (power generation, flaring and other support facilities) at the LNG Complex, gas pre-treatment and power supply facilities.

Technologically and regionally similar LNG plants and terminals in Canada, Norway and the Yamal region of the Yamal-Nenets Autonomous Okrug (Russia) demonstrate low or, locally and in individual components, a moderate level of ambient air quality impacts that are in compliance with national and internationally recognized standards in this area. As a whole, this confirms the general concept of LNG plants as facilities with a relatively low potential for air pollution (as far as the oil and gas industry is concerned) mostly caused by high power consumption and attendant emissions of greenhouse gases.

According to the pre-project documentation for the LNG Complex, a number of technical options have been found to be the best solutions from the point of view of minimizing air emissions of pollutants in the sensitive Gydan Peninsula and Ob Estuary areas. Firstly, at the construction stage, the contribution of the sources is minimized by carrying out most of the construction and installation work at remote shipyards and other technical sites, including foreign ones. Secondly, the power gas needs of the Plant's gas turbine generators will be met by collecting and using the boil-off gas (90% of gas consumption will be in a standby mode, that is, without loading a tanker or gas carrier). The remaining 10 percent will be supplied by getting gas from the mercury adsorbers. Feed gas will only be used at the start-up stage of the LNG Complex, when the above-mentioned secondary hydrocarbon streams are not available. Thirdly, there will be no permanent flares at the LNG Complex: gas mixtures will only be cold or warm flared for the start-up and commissioning of the main equipment of the LNG Complex, in case of the equipment malfunction, maintenance or shutdown of the LNG Complex.

As for the LNG Complex, it is obvious that the emissions will demonstrate a traditional (for industrial facilities of this kind) prevalence of nitrogen oxide and carbon monoxide, molecular nitrogen and methane hydrocarbons, whose air dispersion values are not expected to exceed the national MPC outside the regulatory sanitary protection zone of 1 km.

The ESHIA will compare emissions from the LNG Complex with emissions from other Project facilities, to identify potential cumulative effects and evaluate the resulting impacts. Due to the large number of fixed and mobile emission sources that will be present in the designed location area of the LNG Complex and Port onshore facilities, it appears reasonable to build a combined analysis module for the whole territory which should also cover the nearest Field facilities – PGPT, well pads No.15 and No.16, Power Supply Complex No.2, and the waste landfill.

To assess the Project's air quality area of influence, the relevant MRR-2017 criteria will be used – isoline of 0.05 MPC of the pollutant with the highest estimated dispersion from emission sources (excluding the baseline values) and tenfold distance between the sources of pollutants and the maximum ground-level concentration of the substances. As pollution sources parameters were not known, potential size of the area of the LNG Complex impact on air quality was assessed using information from similar facilities, the nearest of which is the Yamal LNG Project. The planned ESHIA will consider design parameters of pollution emissions, as well as outputs of dispersion modelling with MRR-2017, and internationally accepted alternative methodologies.

Classification of any components of the Project as Category I facilities by the level of negative environmental impacts[72] will trigger the need to continuously record emission parameters of the respective sources through automated stationary systems. In addition, the programme of operational environmental monitoring will provide for collection of air quality data at the boundary of the standard SPZ, in shift camps and other facilities within the Project area of influence.

8.1.2 Physical impacts

The most significant physical impacts of the Project are noise and vibrations, whereas impacts of electromagnetic fields and radioactivity are apparently negligible and therefore can be excluded from the ESHIA review.

The highest intensity and largest extent of noise and vibrations are commonly associated with construction activities, due to high concentration of machinery and vehicles, operation of drilling and piling rig, portable generators and other equipment with significantly higher levels of noise, compared to stationary equipment with similar functions.

As applied to the LNG Complex, the various construction stage associated impacts on the sensitive recipients of the Ob Estuary and the Gydan Peninsula are minimized by carrying out most of the work at remote shipyards and other construction sites. On the other hand, the associated construction activities with regard to the Port and FIELD facilities, as well as associated marine operations, are recognized by the Consultant as the most significant factor on physical impacts on the land and water area adjacent to their sources.

A special category of physical impacts is underwater noise affecting sensitive marine fauna. Its main source are offshore activities using various floating craft, and underwater technical operations - dredging, dumping, and other offshore and onshore construction activities. Noise from operating vessels impacts marine mammals by masking their communication signals, causing changes in behaviour potential temporary hearing damage. Hearing damage in belugas and other cetaceans occurs when sound pressure exceeds 180 dB. Avoidance and other visible behavioral reactions occur with threshold valuesexceeding 150–160 dB. For pinnipeds, these parameters are comparable, although, in general, they are considered more tolerant to underwater noise. At high levels of noise in the area of work, one can also expect an impact on the food base of marine mammals, in particular, the departure of schooling fish from traditional areas of concentration and a change in their migration routes. In spawning grounds confined to river estuaries, with increasing noise levels, the death of eggs and juvenile fish may be observed. An additional negative impact on marine mammals will be during the operation stage in connection with the ice pilotage of gas tankers, which can lead to the death of ice seal forms, and in springtime – also their young.

8.1.3 Impact on Surface Water

Ob Estuary of Kara Sea

Acquisition and physical transformation of seabed relief. The Project provides for construction of several hydraulic structures in the near-shore areas of the Ob Estuary, particularly the ice barriers at the perimeter of the Port inner area, and the artificial land plots shaping the quay and waterside for GBSs and other berths. The ESHIA will provide assessment of the impacts of permanent acquisition of a part of water and seabed area, and of construction of an artificial peninsula on a relatively straight section of the coastline of the Ob Estuary. At the same time, effects of the access channel and maneuvering area of the port will be examined: seabed surface in such areas will be transformed by dredging, and the remote sites further to the north will be exposed to the effects of sediments disposal (dumping), i.e. artificial ground elevations will appear under water.

Dredging operations will generate a cloud of resuspended sediments which will move in the direction that depends on the prevailing direction of flow from the Ob River toward the Arctic Ocean, but also on the tidal circulation and wind-induced fluctuations that sometimes cause water mass to flow in a direction opposite to the main flow.

The respective impacts will be assessed by suspended solids dispersion modeling for the Ob Estuary water area. The maximum reach of the turbidity plume upstream and downstream of the sites of underwater technical operations will be assessed, in order to identify potential overlap with the effects of similar operations of other projects in the region.

[72] Criteria established by the RF Government Decree No. 1029 of 28.09.2015.

Wastewater Discharge The basic principle for designing the wastewater disposal systems for the LNG Complex and Terminal is, according to the Company, a "zero" discharge principle, i.e. no controlled discharge of any wastewater, including pre-treated to surface water bodies, including to the Ob Estuary. This principle is complemented by the onsite system of collecting non-point wastewater to divert it to remote wastewater treatment facilities that are part of the Salmanovskoye (Utrenneye) OGCF facilities setup. A horizontal flare unit and several well sites for reinjection into deep formation are designed for final disposal of wastewater. The ESHIA will assess the respective impact on air quality and geological environment.

During the Project construction, certain quantity of treated wastewater will be discharged to the Ob Estuary and to Nyaday-Pynche River, not far from the river mouth. The ESHIA will examine the impact on water quality and bottom sediments in the surface water bodies, considering the results reported the operational environmental monitoring.

Both at the construction and operations stages of the LNG Complex, PORT and FIELD, wastewater will be generated not only at the stationary facilities and engineering platforms, but also on the vessels (bilge water). Impact of this category of wastewater will also be considered by the ESHIA.

Ice management system

To improve safety of the fleet operations in the water area of Utrenniy Terminal, an ice management system (IMS) will be provided: discharge of heated sea water to the internal basin, to prevent it from freezing during the period of steady negative air temperatures. As the system will not change chemical composition of the used water, its impact will be limited to a local increase of recipient water temperature and minor local physical effects in the area of Terminal.

Surface Waters of the Gydan Peninsula

The main impact of the Project construction on surface water is related to potential transport of suspended matter and pollutants by surface runoff, and with construction activities in the water protection areas of rivers, streams and lakes, which may disturb the hydrology and morphological structure of river bed.

The most intensive impacts will be related with jet quarrying of sand in the lakes. Besides the obvious suspension of solids, lake bed degradation in the cryolithic environment may provoke release of intrapermafrost brines resulting in a rapid and permanent increase of mineral content in the lake water. However, jet quarrying may also have positive effects: lake bed cleaning and deepening, and development of non-freezing aquatic habitats for valuable fish species.

The main impacts of the LNG Complex, PORT and FIELD facilities operation on inland waters include water abstraction from surface water sources, discharge of domestic and process wastewater, pollution of natural water at operation of linear facilities and in case of emergency.

8.1.4 Impact on Soil and Geology

One physiographic feature of the subject area is the spatial and temporal correlation of the soil formation and exogenesis processes, and therefore the impacts of the planned activity on the soil cover, terrain and exogenous processes, as well as on the geological environment require that a joint forecast process, a single set of response measures, and a common monitoring program be developed.

Subsoil and Subsoil Use Conditions

Under the Arctic LNG Project, extraction of hydrocarbons, gravel and earth construction materials will irreversibly change the state of the subsoil, while the conditions for subsequent subsoil use in this land and water area will get more complicated with the appearance of numerous engineering facilities in the geological environment. Despite the fact that the license area is not classified as an earthquake-prone area, FIELD development can lead to the activation of local geodynamics, the most common variant of which is a slow stable subsidence of the land surface and sea bottom over the subject subsoil zone.

Geodynamic observations at other fields in the West-Siberian province (e.g. Bovanenkovo in the Yamal petroleum region) indicate potential subsidence in the range of several dozens centimetres, which is less likely to develop to few meters over the whole period of field development. "Induced" geological processes of this scale will not affect the land use conditions in the field territory, however it is considered as an engineering risk. Therefore, surface movements monitoring is included in the overall geotechnical monitoring programme. The observation network that will be established at the time of construction of the Project facilities will provide regular measurement of elevations at the reference points, and comparison of the measured and baseline elevations will indicate the upward or downward movements of ground due to the exogenous and endogenous processes. The published GTM data from Bovanenkovo field show that the

areas of greatest geodynamic risk will be intersections of fractures, especially those near the well pads sites. The respective thematic section of the ESHIA Report will also consider the available GTM data from the gas condensate field nearest to the Project - South Tambey GCF (information request has been sent to Yamal LNG OJSC).

Exogenous Geological Processes

The Project area is characterized by a variety of occurrences and intensive exogenous geological processes (EGP), with an average area prevalence in natural settings exceeding 75%. The stability of the terrain decreases from the interstream areas to the bottom surfaces of the Ob Estuary. In the coastal zone, which geomorphologically is the most complex one, there are relatively stable Laida lake-marsh assemblages, which may primarily be exposed to the risk of their shores destruction and changes of water conditions under the influence of construction. By contrast, the slopes of the second marine terrace, which are prone to gravitational, erosion and deflation, cryogenic and other exogenous processes, are very sensitive to technological impacts. The stability of the shoreface, foreshore and valley network is recognized to be low too, but unlike the stable equilibrium that is characteristic for the undisturbed slopes of the Gydan marine terraces, here the terrain features are being continuously altered by ice gouging, downcutting and lateral erosion, and by water accumulation.

Onshore, the Planned activity will mostly have direct physical and mechanical impacts on the geological environment contributing to the secondary activation of EGP, the most dangerous of which include cryogenesis, underflooding and waterlogging, erosion-accumulative processes, deflation and eolian accumulation. Locally developed processes will also include settling of slopes, suffusion, and other engineering processes within the contour of earth structures to be established and excavations. Construction and operations in tundra are always accompanied by these processes, however their range and intensity can be controlled by appropriate technical measures and effective reclamation.The ESHIA will examine sufficiency of the designed measures for prevention of hazardous exogenous processes in the onshore areas and reclamation of land disturbed by the construction.

The underwater technical works and artificial structures to be established in the water area of the Ob Estuary and the coastal zone will redistribute ice and wave loads, transform the circulation of water and the balance of sediments, which will cause the inevitable reorganization of the underwater terrain. The ESHIA materials will provide comprehensive summary information on such areas, prediction of the impact of underwater technical operations on water quality in the Ob Estuary and determination of the boundaries of the Project's area of influence on the marine environment.

Based on ESHIA 2018, the impacts associated with activation of hazardous exogenous geological processes are estimated as of moderate significance, and the Consultant will propose respective measures for control and monitoring of the most probable EGP.

Soil

The most important ecological functions of soil in the Project area are maintaining the fragile status of local ecosystems, including productive lichen pastures, conserving permafrost through thermal insulation, regulating the water regime of the seasonally thawed layer, and maintaining the stability of the terrain. At the same time, the soils of the subject area are also a natural depositing medium for pollutants and microorganisms, including causative agents of dangerous diseases.

Due to intensive exogenous geological processes, the concerned area is characterized by poorly developed thin soils (psammozems / Arenosols, alluvial / Fluvisols) with no economic value. The soils loss will be followed by their rapid – within a few years or decades – restoration on sites free from buildings and pavements. Mature clearly profiled soils (Spodic Cryosols, Gleysols) and thick organogenic horizons (Histic Gleysols, Histosols, Histic Turbic Cryosols) were formed over hundreds and first thousands of years, but they are also highly sensitive to technological impacts, and restoration of their profile after physical and mechanical damage would not be practical.

To this end, given the above functions of the local soils, the key soil management recommendation is to take the utmost care to keep soils undisturbed. For those areas that will be disturbed but will be free from buildings, land reclamation and monitoring measures should be implemented in accordance with the Consultant's recommendations. The recommendations will be prepared taking into account the approved land reclamation designs of the Company and contractors for the disturbed territories of the Salmanovskiy (Utrenniy) LA.

Groundwater

Ground waters in the Project area are not used in economic activities and are not highly sensitive to technogenesis. The shallow groundwater horizon is generally represented by fresh, free-flowing, supra-permafrost waters of the seasonally thawed layer which undergo phase changes on the annual basis. Along with waters of hydrogenous non-through taliks, which are confined to modern alluvial, marine and biogenic sediments and hydrologically associated with surface water bodies that caused their presence, those horizons are not protected from the ingress of pollutants with surface runoff and act as a carrier medium.

One hydrogeological feature of the onshore structures of the LNG Complex and PORT is cryohaline water (cryopegs) found within its boundary – these are intra-permafrost supercooled brines, occurring at a depth of 10-20 m, whose occurrences on the surface are an accident factor due to the pressure levels, high corrosivity and negative temperature of these waters. It is predicted that the impact of the planned activity on the permafrost waters will be significant, but local and most pronounced during the construction period. During that stage, the occurrences of cryopegs and dissociating gas-hydrates are most likely, and the fact that the results of the current surveys do not allow accurate prediction of their occurrences should be compensated for by developing and implementing an appropriate action plan. The ESHIA will provide an assessment of the risk of explosion gas occurrences during the Project construction and operation, based on the thematic regional research materials and the survey reports received from the Company.

A direct Project impact on deeper water-bearing horizons is expected in relation to the injection of treated wastewater into the geological environment. This issue will be examined and assessed by the ESHIA.

8.1.5 Impact on Biodiversity

The terrestrial ecosystems of the Gydan Peninsula within the Project area of influence are represented by natural and locally transformed habitats. The former, within the planned activity's footprint, is represented mainly by low-value and widespread open willow shrub-mixed grass-moss-lichen tundra, and within the boundaries of the projected sanitary protection zone – by its combination with sedge-moss-lichen tundra and different types of bogs.

Engineering surveys and industrial environmental monitoring conducted in this territory in 2012-2017 did not reveal presence, habitats and migration routes of rare and protected species of flora and fauna, but at the same time, some individual plant and animal species were recognized as areographically expectable there. In particular, these include 9 herbaceous plants of genera *Ranunculus*, *Bromopsis*, *Eriophorum*, *Lychnis*, *Luzula*, *Saxifraga*, *Polemonium* and Castilleja, one shrub (Arctic bog willow Salix fuscences); and 7 bird species (red-throated goose *Rufibrenta ruficolis*, snowy owl *Nictea scandiaca*, Bewick's swan *Cygnus bewickii*, peregrine falcon *Falco peregrinus*, gyrfalcon *Falco rusticolus*, velvet scoter *Melanita fusca*, and white-tailed eagle *Haliaeetus albicilla*).

The most significant habitats of these species are located in the existing and planned specially protected nature territories, the nearest of which are situated in 70-110 km from the boundaries of the LNG Complex and PORT. This means that the biological diversity of the land allocation area and the onshore section of the Planned activity's area of influence is not of paramount importance at the national, regional and local levels – In such cases, the IFC Performance Standard 6 allows for compensating measures to be targeted to areas whose biological diversity is more important as compared to the areas affected by the project.

An example of transformed habitat, closest to the designed boundaries of the new facilities, is the area where the onshore complex of the Port berth structures are situated, affecting both the terrestrial ecosystems described above, and the littoral zone of the Ob Estuary.

Marine ecosystems of the Ob Estuary. Due to the significant contribution of the Ob River runoff in the water balance of the Arctic Ocean and its proximity to the lower reaches of habitats and migration routes of a large number of rare and endangered animal species, the entire Ob Estuary is included in the list of *Ecologically or Biologically Significant Marine Areas, EBSA*) according to the Convention on Biological Diversity (Rio de Janeiro, 1992).It is also one of the most important fishing regions of Russia with the largest and most productive population of whitefish (muksun, chester, omul, etc.) and the habitat of the "Red Book" Siberian sturgeon.

Engineering surveys in the water area of the LNG Complex and PORT, conducted in 2012-2017, revealed the presence of two species of marine mammals widespread in the Arctic (both from the Procidae family), and from 3 to 11 species of fish (of 55 species typical of the Kara Sea as a whole). The surveys showed a predominantly low density and uneven distribution of ichthyofauna across the water areas, with the migratory Arctic omul *Coregonus autumnalis,* semi-migratory Asian smelt *Osmerus mordax dentex* and Siberian vendas *Coregonus sardinella*, the bottom four-horned sculpin *Triglopsis quodricornis* dominating

the catches. Less frequent were northern navaga, lamprey, Siberian whitefish, peled, broad whitefish, humpback salmon, and roach.

It has been found that the water area that will be affected by the Project has no relation to the biotopes preferred by the species listed above, i.e. places of permanent habitats, feeding and breeding of mammals, spawning or wintering of fish. The mouths of the Khaltsyney-Yakha and Nyaday-Pynche rivers are recognized as the nearest to the boundary of the Planned activity zones of seasonally increased density of ichthyofauna and fisheries. The former may be subject to the greatest impacts, since it is located 110 m north-west of the PORT within its sanitary protection zone[73]. The latter is 1350 m south-east of the Plant and therefore is considered less threatened. None of the rivers will be used for the needs of the Project (TBC); however, there might be some indirect impacts from the LNG Complex and Port off-shore facilities, associated with local transformation of water circulation, tectonic and other processes in the river estuary areas and adjacent water area of the Ob Estuary.

According to the IFC Performance Standard 6, in the land and water areas with natural habitat, mitigation measures should be aimed at excluding the total loss of biological diversity as completely as possible, which necessitates additional measures aimed at compensating for residual effects.

Given that the LNG Complex and Port locations are associated with one of the ecologically and biologically important marine areas, categorized as such on the basis of scientific criteria under the Convention on Biological Diversity, the Consultant considers it possible to identify habitats that meet the critical habitat criteria of IFC PS 6 in those sections of the Planned activityarea that are also part of the protected species of animals habitat, and are characterized by the presence of ecosystems with high biodiversity importance, including relict faunistic communities and, at the same time, is outside the boundaries of the previous site and environmental surveys.

Should such habitats be identified in the Project area of influence, it will be necessary to develop a Strategy to mitigate the impacts of the Planned activity aimed at achieving an absolute increase in those biodiversity indicators, which served as a basis to identify the corresponding habitat as critical.

8.2 Social Impacts

8.2.1 Overview

This section describes the key socio-economic aspects of construction, commissioning and operation of the Project. It also presents the approach to assessment and mitigation of socio-economic consequences to be considered during the ESHIA process. This Scoping Report is only intended to identify the key potential impacts of the Project and associated facilities[74]. Detailed assessment of the identified potential impacts and development of appropriate control measures will be provided as part of the ESHIA.

Potential positive and negative impacts of the Project on the social environment were identified based on the socio-economic conditions analysis (refer to Section 7) and forecast of the Project and associated facilities future impact in listed below socio-economic aspects:

- Health and safety of local communities, Company personnel and contractors, including potential impacts of the following:
  - security provisions related to construction and operation of the Project and associated facilities' infrastructure, as well as transport traffic (including emergency preparedness and response);
  - presence of security personnel at the sites of the Project and associated facilities;
  - risk of adverse impacts on human health, e.g. infectious and ecdemic[75] diseases brought by construction personnel at the Project and associated facilities, and any impact on psychological welfare of local communities due to the Project;
- Migration processes related to immigration flows into the social impact area of the Project and associated facilies, including labour migrants, and potential unplanned migration to the territory for employment and economic opportunities;

[73]The valley of Khaltsyney-Yakha river will be also occupied by a number of FIELD's facilities including sand quarries and water supply station; the river of Nyaday-Pynche will be used as treated wastewater receiver

[74] The key potential impacts of the Projects have been identified in accordance with the requirements of International Finance Corporation formulated in the Performance Standard (PS) 2. Labour and working conditions, PS 4. Community health, safety and security, PS 5. Land acquisition and involuntary resettlement, PS 7. Indigenous peoples, and PS 8. Cultural heritage.

[75] Diseases which are not typical among population of the region or specific territories within the social impact area of the Project.

- Land acquisition for the Project and associated facilities, including potential economic displacement and impacts on the customary land use practices:
  - potential migration restrictions due to location of the Project and associated facilities at the construction and operation phase;
- Economic impacts including:
  - impact on the existing enterprises in the social impact area of the Project, and on their operations;
  - impact on livelihood conditions of indigenous peoples, based on use of natural resource;
- Labour conditions including review of the following issues:
  - industrial safety and occupational health (taking into account the harsh Arctic climate in the region, simultaneous operations (works), etc.);
  - workplace ethics;
  - workers' accommodation and housing conditions;
  - demobilisation of workforce upon completion of the main stages of the Project;
  - contractors' employment relations practices and working conditions;
- Cultural heritage including:
  - tangible heritage (in particular that of indigenous peoples);
  - intangible heritage (in particular that of indigenous peoples);
- Potential socio-economic benefits.

During the assessment, Ramboll will consider potential differences in the level of impacts on men and women.

Potential social impacts relating to the above aspects are considered in the following sections, separately for construction, commissioning and operation stages as applicable.

8.2.2 Community health and safety

Overview

Potential human health and safety impacts and risks of the Project and associated facilities will be limited by the territory of the Salmanovskiy (Utrenniy) LA and specific construction sites/zones, both onshore and offshore. As the nearest residential units are located at a significant distance (40 km and more) from the territory of the Salmanovskiy (Utrenniy) LA, the Project is not expected to cause any direct impact on health and safety of their communities. However potential impact of the planned activity may affect the nomadic indigenous people who are engaged in reindeer breeding and other customary occupations in the territory of the Salmanovskiy (Utrenniy) LA. Owing to this, the special attention during ESHIA will be given to the nomadic indigenous population within the license area borders who in particular may be affected by direct impact due to the construction and operation of the Project and associated facilities. Indigenous peoples presumably live or are registered in Yuribey, and potentially in Tadebya-Yakha, as well as Gyda and Antipayuta settlements. The ESHIA will highlight potential risks related to spread of virus SARS-CoV- 2.

Construction

At the Project construction stage, the main potential human health and safety risks and impacts will be related to the following aspects:

- Construction sites. Construction sites may cause risks if access to them is not adequately controlled. To address this issue:
  - Site access control methods will be considered by the ESHIA. In particular, ESHIA will describe the access control procedures including physical personal protection and safety equipment;
  - Safety provisions in the ESHIA will include appropriate protocols (code of practice) for safety provisions, e.g. control of use of tasks dogs and fire arms. Adequate crossings and other facilities will be provided as required to ensure safe migration of the herders and herds through or around the areas affected by construction activities;
- Construction noise and emissions. Permanent population reside at a significant distance from the Project and associated facilities, and indigenous people visit the territory of the Salmanovskiy (Utrenniy) LA only for a short time during migration of reindeer herds. Thus, no significant impact on indigenous people is anticipated;
- Construction traffic. Traffic assessment should consider the following aspects:

- taking into account the poor development (practically absence) of the road network in the area of the proposed operations the main means of cargo delivery to the assumed Plant location is the marine transport. Construction workers will most probably be transported by air (helicopters). Sea transport may be also used during the navigation period. This impact will be examined and specifically assessed during the ESHIA process; the impact of traffic in the intra-field roads will also be assessed;
- indigenous population practice fishing in the rivers and lakes of Gydan peninsula (i.e. onshore), therefore, it is unlikely that the marine transport operations of the Project would produce a significant impact on such practices. Nevertheless, this potential impact will be considered by the ESHIA process. ESHIA will identify the catch areas used by the fishing enterprises based in Gyda and Antipayuta settlements and in Tazovskiy township, and assess potential impact of the Project marine traffic on safety of their operations;

- Workforce inflow.
  - arrival of significant number of labour migrants may result in conflicts between them and indigenous population engaged in customary activities in the territory of the Salmanovskiy (Utrenniy) LA;
  - workforce inflow to the Project's social impact area may also bring infectious diseases to the region and affect local communities. It is expected that all construction personnel will be accommodated in the dedicated rotational camps in the LA;
  - arrival of a large number of labour migrants may also cause general disturbance of customary mode of life in the territories which had never been populated before.
  - The above impacts and appropriate mitigation measures will be considered by the ESHIA.

Commissioning and operation

At the Project commissioning and operation stages, the main potential human health and safety risks and impacts will be related to the following aspects:

- Operating facilities. Operating production facilities may cause risks to local communities in absence of adequate access control arrangements. Access control arrangements for the commissioning and operation stage will be considered by the ESHIA;
- Noise and emissions at commissioning and operation. Permanent population reside at a significant distance from the Project sites, and indigenous people visit the territory of the Salmanovskiy (Utrenniy) LA only for a short time during migration of reindeer herds. Thus, no significant impact on small-numbered Indigenous Peopels is anticipated. However, these impacts will be assessed during the ESHIA process. In particular, assessment of the Project impact on human health will consider the boundaries of sanitary protection zones (SPZ) of the Project and associated facilities;
- Traffic. Due to the lack of a permanent road network in the main part of the Tazovskiy Municipal District and the extremely poor development of the network of seasonal roads (winter roads), the main part of the traffic associated with the Project will be carried out using sea and air transport; the impact of traffic in the intra-field roads will also be assessed;
- Emergency risks. Evaluation of the impacts associated with the accident rate of individual elements of the Project will include the risk examination for third-party landusers near the Project and associated facilities, and also the risks for sea-users (fishing boats, marine transport etc).
- Due attention will be paid to development of spills response measures in the shore belt and water area, in order to contain potential impacts of any accident involving sea transport.

8.2.3 Workers' influx

At the time of reporting, information on the numbers of personnel that will be engaged for the Project construction and operation was not available. However, it is probable that the number of workforce engaged by the Project will be significant, especially at the construction stage. It is assumed that accommodation for the workforce will be provided in dedicated rotation shift camp(s) to be constructed nearby the Project facilities within the Salmanovskiy (Utrenniy) LA. In this case impact on housing in Tazovskiy Municipal District is expected to be zero.

In case of rotation shift arrangement, workers are not expected to arrive with their families including children. Thus, no impact on the district education infrastructure is anticipated.

The Project provides for arrangement of medical stations to serve the workforce. However, it is expected that in situations where adequate medical care cannot be provided on site, local medical institutions will be used, and emergency medical evacuation will be provided using helicopters. This may cause the risk of excessive load on local healthcare infrastructure, especially if the baseline load is high.

The above potential impacts of workers influx and loads on local infrastructure will be considered by the ESHIA.

8.2.4 *Land acquisition*

Territory of the Salmanovskiy (Utrenniy) LA is used for activities of indigenous people (Nenets). The main customary activity of indigenous people migrating in the Salmanovskiy (Utrenniy) LA is reindeer herding. Nenets also practice fishing, hunting and picking wild crops. It means that this category of land users will be exposed to potential impacts of the Project construction and operation, due to loss of access to land which may result in economic displacement.

Potential impacts on indigenous people may include:

- Direct impacts on migration routes of reindeer breeders caused by potential loss of access to the territories allocated for the Project and associated facilities, and also as a result of segmentation of areas which will be crossed by the associated linear facilities, e.g. pipelines, roads and power transmission lines;
- Indirect impacts if reindeer breeders forced to change their migration routes and herds grazing areas as a result of implementation of the Project and associated facilities will have to occupy territories used by other reindeer breeders in Tazovskiy Municipal District, with resultant increase of load on grazing resource in the affected territories, and consequential alteration of the traditional migration routes;
- Nuisance to reindeer near the Project and associated facilities caused by the operational noise/illumination, physical presence of workers and moving machinery (including road vehicles), as well as animals (dogs);
- Restriction or loss of access to rivers and lakes, as well as parts of the Ob Estuary traditionally used by breeders for fishing;
- Impact on fish resource as a result of construction activities (e.g. construction of river crossings for pipelines and roads, dredging);
- Restriction or loss of access to the areas traditionally used by local communities for hunting and picking wild crops;
- Impacts on population of hunting resource and wild crops, due to construction and operation of the Project and associated facilities.

The above impacts will be considered by the ESHIA. The ESHIA will recommend mitigation measures to address the above impacts in the Project social area of influence, e.g. provision of special crossing (passage) sections on the linear facilities, consultations with reindeer herders to understand the migration routes and preferred locations of crossings; provision of compensations, including reaching an agreement with the affected land users on the form of compensation (monetary, in kind or through provision of alternative land plots), as appropriate; etc.

8.2.5 *Economic impacts*

Potential economic impacts of the Project are mainly related to impacts on customary activities of indigenous communities as described above. Besides indigenous communities, there are no other land users in the territory of the Salmanovskiy (Utrenniy) LA.

Implementation of the Project may also affect operations of the fishing enterprises in Gyda, Antipayuta and Tazovskiy. The ESHIA process will clarify location of the operation areas where the above enterprises. Potential impacts of the Project may restrict operations of the enterprises. Mitigation measures will be developed as appropriate and included in the ESIA report.

8.2.6 *Working conditions*

Working conditions will be regulated according to the Arctic LNG 2 Project standards, the Labour Code of the Russian Federation and applicable standards and guidance documents of the International Labour Organization, including prohibition of forced and child labour. The company is responsible for compliance to the cited above standards, including responsibility for compliance by contractors with standards of labour protection and industrial safety during the Project construction and operation. ESHIA materials will identify the minimum requirements and mechanism of their implementation. In addition, adequate attention will be paid to the specific regional aspects, including physical and psychological health risks related to the inherent harsh environment in the social impact area of the Project.

ESHIA will also consider the issues of workers accommodation in line with the applicable international practice. Noise and air quality impacts on workers accommodation will be also considered by the ESHIA, including location of accommodation facilities with due regard to SPZ boundaries.

8.2.7 Cultural Heritage

Potential impacts on cultural heritage may be related to disturbance or loss of the following items:

- Tangible objects, i.e. physical facilities, structures, landmarks, fragments of landscapes representing historical, ethnographic, spiritual or cultural value (e.g. archaeological, palaeontological and man-made values), including values of indigenous people;
- Intangible cultural heritage, i.e. customary businesses, languages, customs, rituals, religious ceremonies and knowledge, including intangible cultural heritage of indigenous people.

Tangible objects of cultural heritage

Archaeological survey in the territory of the Salmanovskoye (Utrenneye) field identified two cultural heritage sites - medieval sites Khaltsyneysalya 1 and Khaltsyneysalya 2 - which may be affected by the Project. The former site is located within the designed site of the LNG Complex onshore facilities, therefore, it was the subject of an urgent archaeological research. The research collected the maximum possible set of data on the monument the loss of which is recognised inevitable. Decision to remove the site from the the list of heritage has been made. For Khaltsyneysalya 2 site which is not exposed to immediate impact of the Project, boundaries of the restricted use territory have been identified and registered in the cadastre (URZ ref. 89:06-8.2).

It has also been concluded that other objects of cultural heritage may be found in the territory of the Salmanovskiy (Utrenniy) LA. Impacts of the Project on cultural objects, which have been identified and may be found during earth works, will be further considered in the ESHIA materials. The materials will also describe the adequate mitigation measures.

The ethnographic survey identified several sacred sites of indigenous communities in the territory of the Salmanovskiy (Utrenniy) LA and adjacent areas. Also there are two burial sites of indigenous people in the territory of the Salmanovskiy (Utrenniy) LA. The ESHIA will consider potential impacts of the Project on the above sites and propose adequate mitigation measures.

Mitigation measures including a chance finds procedure will be proposed to protect cultural heritage.

Intangible cultural heritage

The Project does not provide for any use of the customary knowledge and skills of local communities. On the other hand the Project has a potential to disrupt religious practices and rituals of indigenous communities at the sacred sites and burial sites in the territory of the Salmanovskiy (Utrenniy) LA. These impacts will be considered by the ESHIA. Adequate mitigations will be proposed and discussed with representatives of indigenous communities.

8.2.8 Potential social benefits

Apart from potential negative impacts, ESIA will also examine possible social benefits. Expected benefits may include the following:

- Economic benefits related to tax contributions to public budgets of various levels;
- Direct and indirect employment opportunities;
- Development of local businesses which may provide services for the Project;
- Implementation of the Company's corporate social responsibility programmes.

Potential beneficial impacts of the Project will be considered by the ESHIA which will also propose enhancement measures as appropriate.

8.3 Cumulative Impacts

According to the IFC standards, impact assessment of a Planned activity should also consider overlapping of the project impacts with the impacts from third-party activities where zones of influence partially or completely coincide in space / time and have common recipients. The significance criteria for such impacts, referred to as ***cumulative***, are assessed on the basis of cumulative impact concerns of the scientific community and / or affected parties of the Planned activity.

Based on the analysis of the research results with a focus on the Gydan Peninsula and the Ob Estuary, the results of public consultations with regard to various facilities of the Arctic LNG 2 Project, as well as consultations with stakeholders in the ESHIA framework in 2018, the Consultant compiled a preliminary list of issues of concern to the local indigenous population of the Tazovskiy Municipal District and which, at the same time, are being proactively discussed by the Russian scientific community. These include the

context of the future comprehensive development of the Gydan Peninsula, the Ob Estuary area and the relevant subsoil areas as follows:

- Adverse changes in the geological environment caused by the extraction of hydrocarbons (including the activation of geodynamic processes over the field extractive area);
- Adverse impact of pollution emissions (including flare units) on atmospheric air quality in the Gyda Tundra;
- Transformation of the Ob Estuary thermohaline structure as a result of widening and operation of the sea channel across the Ob bar;
- Increased turbidity of the Ob Estuary water and surface water bodies of Gydan Peninsula as a result of dredging, underwater dumping of soil and development of soil-based construction materials quarries (increased suspended solids content in water and sediment accumulation rates in the areas of turbidity plumes);
- Chemical pollution of surface water bodies as a result of emergency spills of technical fluids and wastewater discharges;
- Transformation of the species composition and abundance of hydrobionts (primarily ichthyofauna and representatives of the fish food base) in the areas of traditional ISPN fisheries as a result of combined impact of the planned activities;
- Adverse changes in the environment caused by various forms of management of industrial and domestic waste (temporary accumulation, transportation, disposal) as a result of violation of the relevant regulatory requirements and design solutions;
- Loss and fragmentation of terrestrial vertebrate habitats and agricultural lands (pastures) which may undermine natural biodiversity and population of reindeer;
- Degradation of pastures productivity (primarily degradation of reindeer moss resource) and consequential reduction of reindeer population;
- Adverse impacts of vibration and noise from construction and operation of the designed facilities;
- Build-up of conditions supporting degradation of permafrost soil, activation of exogenous geological processes, with resulting disturbance of soil and vegetation cover and increased risk of epizootic outbreaks and zooanthroponosis;
- Increased community morbidity rates as an integral consequence of the adverse impacts listed above.

The above list of impacts will be clarified and supplemented based on the results of consultations with the stakeholders and comments on the content of the disclosed documentation. The IFC requirements concerning the assessment of the significance of cumulative impacts recognize the chronology of the activities of third parties, whose impacts are divided into three categories:

- ***Current***: in the subject case those include the Yamal LNG Project as well as marine operations of third parties in the Ob Estuary, including the operation of the sea channel across the Ob Bar;
- ***Planned (designed)***: their main source will be construction and operation of the Utrenniy Airport, as well as other third-party projects; and
- ***Future (expected)***: in ESHIA 2018 this category included the future development of new fields of the Gydan Petroleum Region; at this time the Company is confident that the Salmanovskoye (Utrenneye) OGCF has sufficient resources for more than 16 years operation of the GBS LNG and SGC Plant at full capacity[76]. The fields of the Gydan Petroleum Region nearest to the Project (Gydanskoye, Geofizicheskoye, Trekhbugornoye, etc. - refer to the map in Appendix B5) will be defeloped by third parties.

All of the listed impacts will be discussed in detail in the ESHIA documentation, and their integral significance will be assessed with due regard to the existing, designed and future impacts of third part projects.

8.4 Planned Activity in the Context of Global Climate Change

Global climate changes are well pronounced in the Russian Federation and especially in the Arctic, as supported by meteorological observations of recent decades and numerous studies. These global climate change manifestations are expressed both in the long-term changes in climatic characteristics and in extreme weather events. The associated risks to the project personnel, facilities and infrastructure must be identified in a timely manner in order to take measures to prevent potential damage.

[76] Source: Arctic LNG 2. Project Information Memorandum. – ARCTIC LNG 2 LLC, February 2020

Climate in the Project area has been assessed on the basis of observations of average annual and extreme temperatures, precipitation intensity, and wind speed at the nearest weather stations, as well as national climate reports and scientific publications. The change trends in snow cover, thickness of the seasonally thawed layer, and ice phenomena will be analyzed. The forecasts of climate change models regarding the possible range of climate changes by the middle and end of this century will be considered.

The potential contribution of the planned activities (i.e. GHG emissions from various sources within the LNG Complex, PORT and FIELD) to the global problem of climate change will be quantified in the greenhouse gas emission units.

PJSC NOVATEK has a corporate Greenhouse Gas (GHG) Emission Management System which includes a corporate Standard document that establishes the basic principles and requirements for management of GHG emissions. GHG emissions are quantified using the Methodology Instructions approved by the RF MNR Order No.300 of 30.06.2015, considering the composition of hydrocarbon mixtures at each field, project-specific material balances, and records of GHG measurements.

The Consultant will examine the GHG emissions inventory for the Arctic LNG 2 Project that the Company provided for review, as well as updated design documentation with information on the emissions of greenhouse gases from the FIELD, LNG Complex and PORT facilities. These data will be interpreted in accordance with the applicable guidance and reference documents recognised at the national and international level (the list is not exhaustive):

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories:
- Compendium of Greenhouse Gas Emissions Methodologies for The Oil and Gas Industry, American Petroleum Institute, 2009 (API Compendium)[77];
- Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the IPCC[78];
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
- Greenhouse Gas Protocol: Corporate Accounting and Reporting Standard[79]
- Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

Using the information received from the Company about the current status of design solutions, proposals will be prepared for a dedicated GHG emission control program to ensure minimization of the respective impacts of the Project.

8.5 Environmental and Social Management System

The Company intends to implement the management programmes in relation to the Project, which will include the mitigation and enhancement measures and activities aiming to minimize potential environmental and social risks identified by the ESHIA. The programmes will include procedures, approaches and plans which ensure comprehensive and systematic control of environmental and social aspects of the proposed activity. The proposed programmes will be adopted for the whole life cycle of the Project, and they will cover both the Project Operator and his contractors.

The Consultant will draft the Environmental and Social Action Plan that will contain the following:

- Overview of the expected adverse environmental and social consequences during and after the Project;
- Measures to prevent the potentially significant negative environmental or social impacts or reduce them to an acceptable level;
- Proposed compensation measures, where prevention/minimisation measures are impractical or unfeasible;
- Proposals for monitoring for early identification of conditions that require corrective action, and for progress and performance reporting.

Given the scale and characteristics of the planned Project, and the requirements of international lenders for projects with similar potential impacts, it is very likely that conclusions of the detailed ESHIA will trigger

[77] American Petroleum Institute. Compendium of Greenhouse Gas Emissions Methodologies for The Oil and Gas Industry. – 2009

[78] Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

[79] The Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard (revised edition). http://ghgprotocol.org/corporate-standard

the need for development of a series of environmental and social management plans and monitoring of the progress of their implementation.

The Consultant has a wealth of experience in preparing such documents for project owners, as well as review and implementation monitoring on behalf of lenders.

Based on the initial review of the Project input data, it is advisable to develop and implement an overarching Environmental and Social Management Plan supported by a series of more detailed sector-specific management plans for the phases of Project construction and operation. The framework Management Plan would normally describe the following:

- Purpose and applicability of the framework and sector-specific management plans;
- Integration with other management plans and procedures;
- Project management structure;
- Functions, roles and duties of the Company and key contractors involved in the Project;
- Approach to management of change;
- Mitigation/corrective and compensation management measures;
- Audit, monitoring, reporting and training mechanisms;
- Main requirements for collection of input data and regular reporting.

Sector-specific management plans will be prepared in accordance with the time frames specified in Phase 4 of the Calendar Plan, and will describe environmental and social management and impacts monitoring activities in specific sectors. They will also define distribution of responsibilities for implementation, audit and progress monitoring between the Company and contractors.

The list of required sector-specific management plans for the Project (including the construction management plans - CMPs) will be included in the ESHIA report. At this time, the planned activities should clearly be focused on such topics as biodiversity conservation and monitoring in the Project's area of influence; conservation of heritage sites and their accessibility for stakeholders; meaningful engagement with indigenous communities in the tundra areas in Tazovskiy Municipal District. The Company supported by the Consultant will develop and adopt a series of sector-specific action plans in accordance with the needs identified by the ESHIA studies.

9. IMPACT ASSESSMENT AND STAKEHOLDER ENGAGEMENT PROGRAMME

This work programme has been drafted by the Consultant according to the Terms of Reference and the Calendar Plan in Agreement No.228-ALNG2-2020 of 31.03.2020, and considering the results of the kick-off meeting between Arctic SPG 2 LLC and Ramboll CIS LLC on 03.04.2020. Summary description of the Consultant's work phase by phase is provided below.

Phase 1. Initial review of the input data on the Arctic LNG 2 Project, gap analysis. Review of the Russian and international standards and guidelines applicable to the Project.

1.1. The Consultant assumed that the works start date is April 01, 2020, i.e. immediately upon receipt of the initial input data from the Client. Within five work days from the official notice to proceed, a kick-off meeting is held where the Consultant makes a presentation to the Client, including draft ESHIA Documentation Development Plan. Final version of the ESHIA Documentation Development Plan with Client's comments incorporated will be integrated into the Phase 1 deliverables to be presented on week 6-10 April 2020.

1.2. The gap analysis is conducted within 11 work days, and its deliverable - Gap Analysis Report - is submitted to the Client on week 13-17 April 2020. The main objective of this task is review of all Project documentation available by the date, and identifications of any items which are deficient or constrain development of the ESHIA materials. The Consultant admits that certain gaps in the input data can be closed in the process of preparation of the ESHIA materials (e.g. if additional information can be sourced from public domain). For the items where deficiency cannot be addressed by the above method, further requests to the Client will be included in the Gap Analysis Report. At Phase 1, this document will be prepared as a preliminary framework which can be amended at a later stage if further gaps of non-compliances are identified in the process of input data review, development of the ESHIA materials and stakeholder consultations.

1.3. Review of the Russian and international standards and guidelines applicable to the Project will be conducted parallel with the activities under item 1.2. Results of this work will be presented in a separate output document - Project Standards Report - which will be submitted to the Client on week 6-10 April 2020.

1.4. Furthermore, during Phase 1 the Consultant will prepare and submit to the Client several other documents in accordance with the list agreed at the kick-off meeting on 03.04.2020:

- Review of changes in the fourth edition of the Equator Principles (EPIV) against current EPIII;
- Memorandum on requirements for disclosure of Project information; and
- Document tentatively titled "Environmental and Social Aspects of the Arctic LNG 2 Project" (predecessor of the ESHIA materials, to inform the Project screening by lenders).

Phase 2. Assessment of environmental, socio-economic and community health impact (ESHIA) of the Arctic LNG 2 Project. Duration of Phase 2 is defined in line with the requirement in ToR that final outputs of the phase must be approved by the Client and issued on or before 31 May 2020.

2.1. ESHIA scoping studies and preparation of the Scoping Report will be completed during the period from 11 April to 20 April 2020.

2.2. Draft Stakeholder Engagement Plan will be developed parallel with the Scoping Report and submitted to the Client on week 20-24 April 2020.

2.3. The date when the Client approves the ESHIA Scoping Report (SR) will become the starting point of the period of disclosure of the document during which the SR will be available for review by representatives of stakeholders, and on-line consultations for discussion of the SR will be held with participation Ramboll experts. Based on these discussions, the Consultant will prepare information report to the Client by May 16, 2020).

2.4. SR and SEP will be finalised to incorporate results of the consultations (p.2.4) and issued by May 29, 2020.

2.5. ESHIA materials will be drafted throughout April and May 2020, and draft sections of the materials will be submitted to the Client when ready. It is expected that the process of the materials approval by the Client will be completed on weeks 18-30 May 2020, and the period of disclosure of the approved materials and collection of stakeholder comments will be counted from June 6, 2020. At the end of this process, the

Consultant will prepare information report to the Client. The final disclosure date may be changed depending on the timing of approval of the ESIA materials.

2.6. The agreed outputs of Phase 2 are the ESHIA materials, including the Report and Non-Technical Summary, agreed with stakeholders and submitted to the Client preliminary by August 5, 2020. The final date of submission of the ESIA report and Non-Technical Summary depends on the date of disclosure of these documents. Structure of the ESHIA Report is provided in Appendix A.

Phase 3. Development of Action Plans

3.1. The Environmental and Social Action Plan will include but not be limited by the following:

- Overview of the expected adverse environmental and social consequences during and after the Project;
- Measures to prevent the potentially significant negative environmental or social impacts or reduce them to an acceptable level;
- Proposed compensation measures, where prevention/minimisation measures are impractical or unfeasible;
- Proposals for monitoring for early identification of conditions that require corrective action, and for progress and performance reporting.

It is expected that the document will be prepared parallel with preparation and approval of the ESHIA materials and submitted to the Company by May 31, 2020.

3.2. Management programmes Given the scale and characteristics of the planned Project, and the requirements of international lenders for projects with similar potential impacts, it is very likely that conclusions of the detailed ESHIA will trigger the need for development of a series of environmental and social management plans and monitoring of the progress of their implementation.

Having examined the Project information provided by the Company, and based on our previous experience, we expect that an overarching Environmental and Social Management Plan supported by a series of more detailed sector-specific management plans (for the phases of construction and operation) will be needed for the Project.

3.2.1. Overarching Environmental and Social Management Plan will describe the following:

- Purpose and applicability of the framework and sector-specific management plans;
- Integration with other management plans and procedures;
- Project management structure;
- Functions, roles and duties of the Company and key contractors involved in the Project;
- Approach to management of change;
- Mitigation/corrective and compensation management measures;
- Audit, monitoring, reporting and training mechanisms;
- Main requirements for collection of input data and regular reporting.

3.2.2. Sector-specific management plans. Development of these plans is beyond the scope of the main Agreement; it can be conducted either during the period specified for Phase 4 activities, or in year 2021. The plans will provide detailed description of environmental and social management and impacts monitoring activities in specific sectors. They will also define distribution of responsibilities for implementation, audit and progress monitoring between the Company and contractors. On the Consultant's opinion, sector-specific plans will be required for the topic areas of biodiversity conservation and monitoring in the Project's area of influence; conservation of heritage sites and their accessibility for stakeholders; meaningful engagement with indigenous communities in the tundra areas in Tazovskiy Municipal District.

Phase 4. Support to the Project during the whole period of negotiations with lenders till the loan documentation is finally approved.

This period does not have specific start and end dates, but lenders' decision about the investments is expected by end of year 2020. During this period, the Consultant will take part in meetings with the Project lenders and lenders' consultants to support the Client in the process of Project due diligence, amend the ESHIA documentation to secure international funding in accordance with comments of the lenders and lenders' consultants (except for amendments requiring additional investigations or necessitated by changes in the Project design at any time after the cut-off date). Also, at this stage the Consultant can develop and introduce the overarching and sector-specific environmental and social management plans for the Project construction phase. Outputs of this Phase will be defined by requests of the Client, lenders and their consultants.

APPENDIX A
TENTATIVE STRUCTURE OF ESHIA MATERIALS

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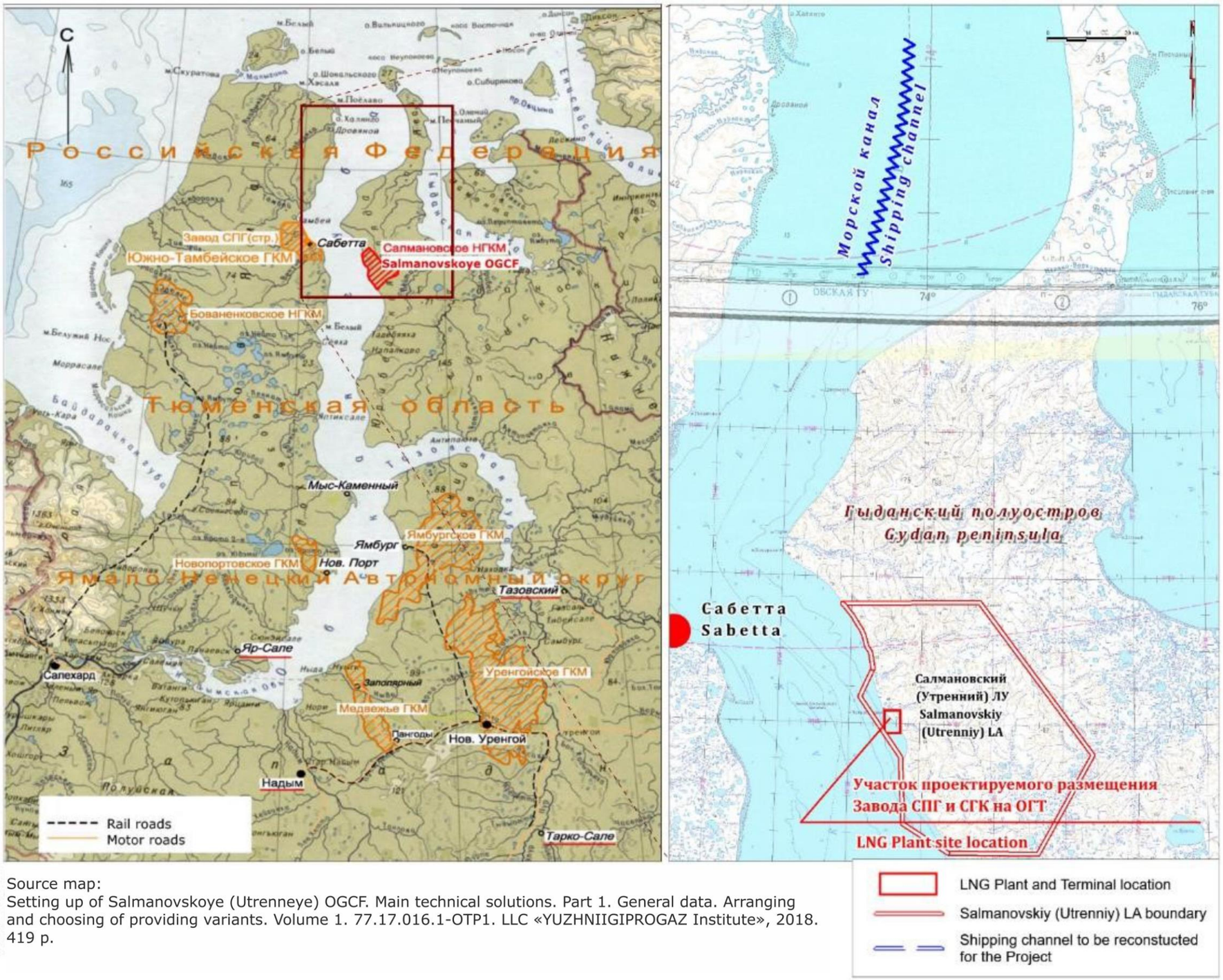
APPENDIX B1

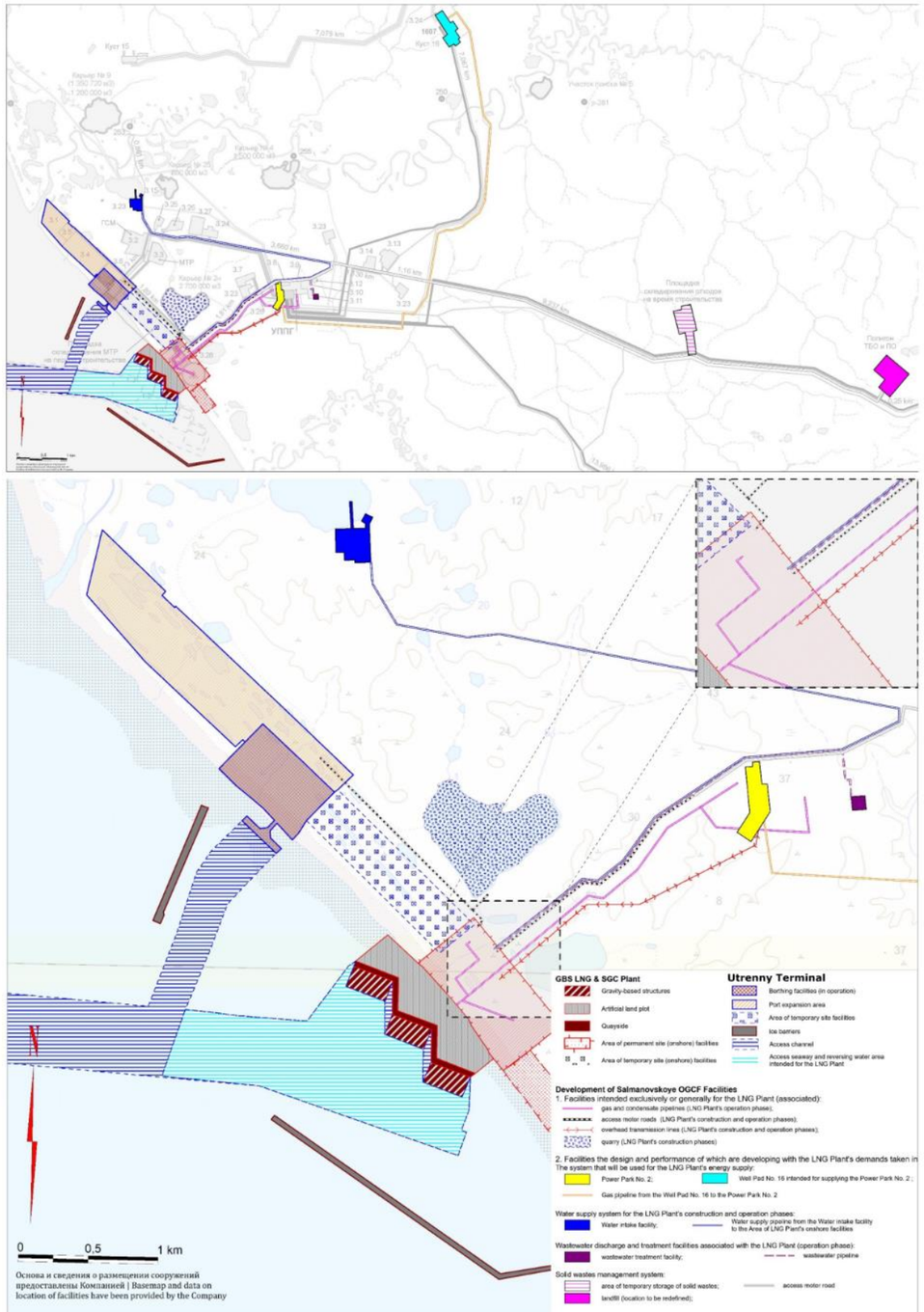
PROJECT AREA IN THE MAP OF YAMAL-NENETS AUTONOMOUS OKRUG

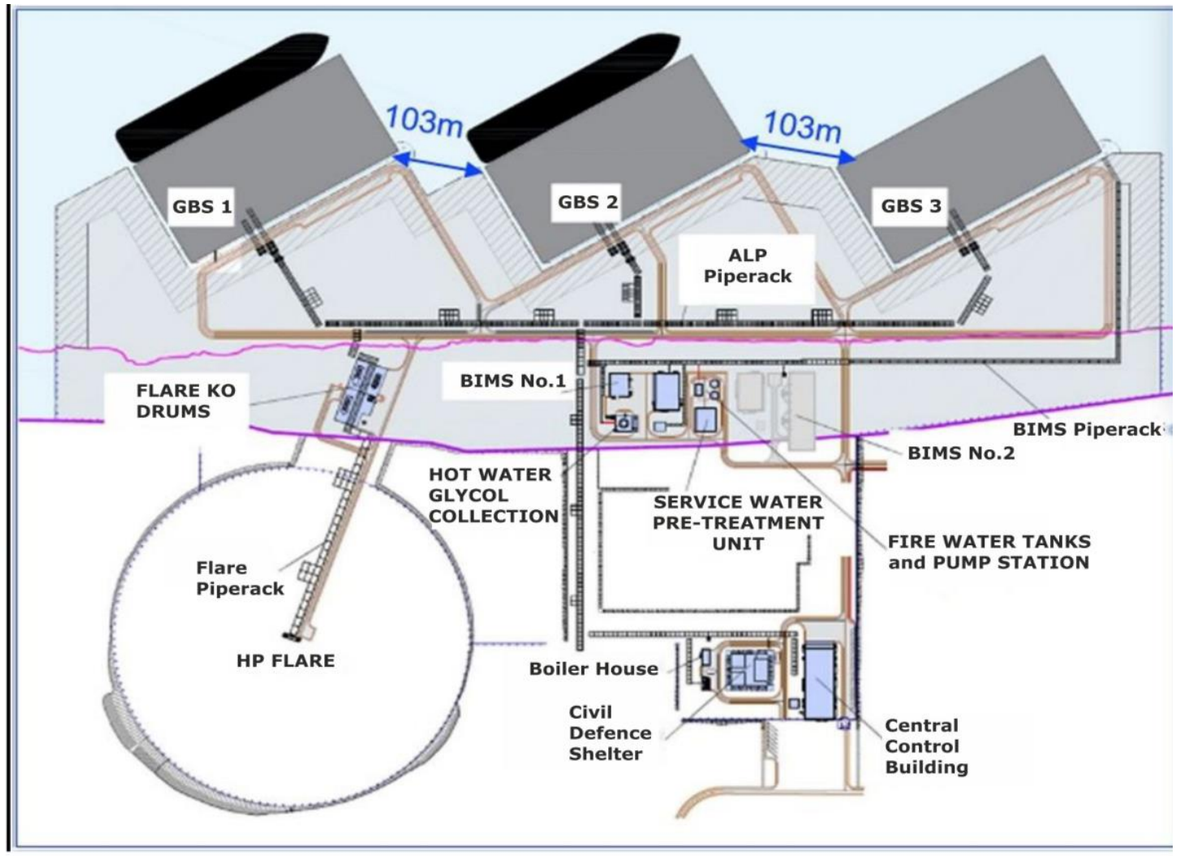


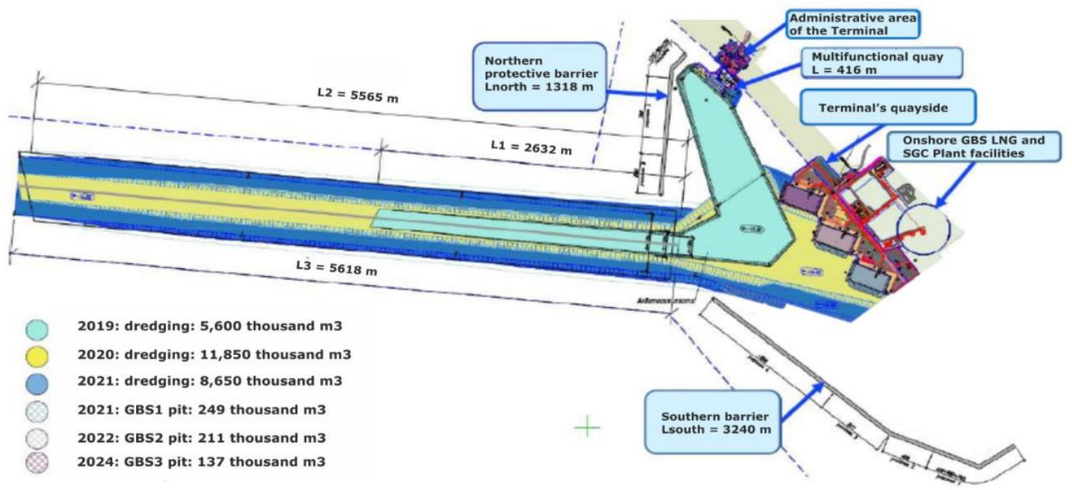
Source map:
Setting up of Salmanovskoye (Utrenneye) OGCF. Main technical solutions. Part 1. General data. Arranging and choosing of providing variants. Volume 1. 77.17.016.1-OTP1. LLC «YUZHNIIGIPROGAZ Institute», 2018. 419 p.

APPENDIX B2

MUTUAL POSITION AND INTERNAL STRUCTURE OF THE LNG COMPLEX AND PORT







Source of detailed plans of the PLANT and PORT: Arctic LNG 2. Project Information Memorandum. – ARCTIC LNG 2 LLC, February 2020

APPENDIX B3

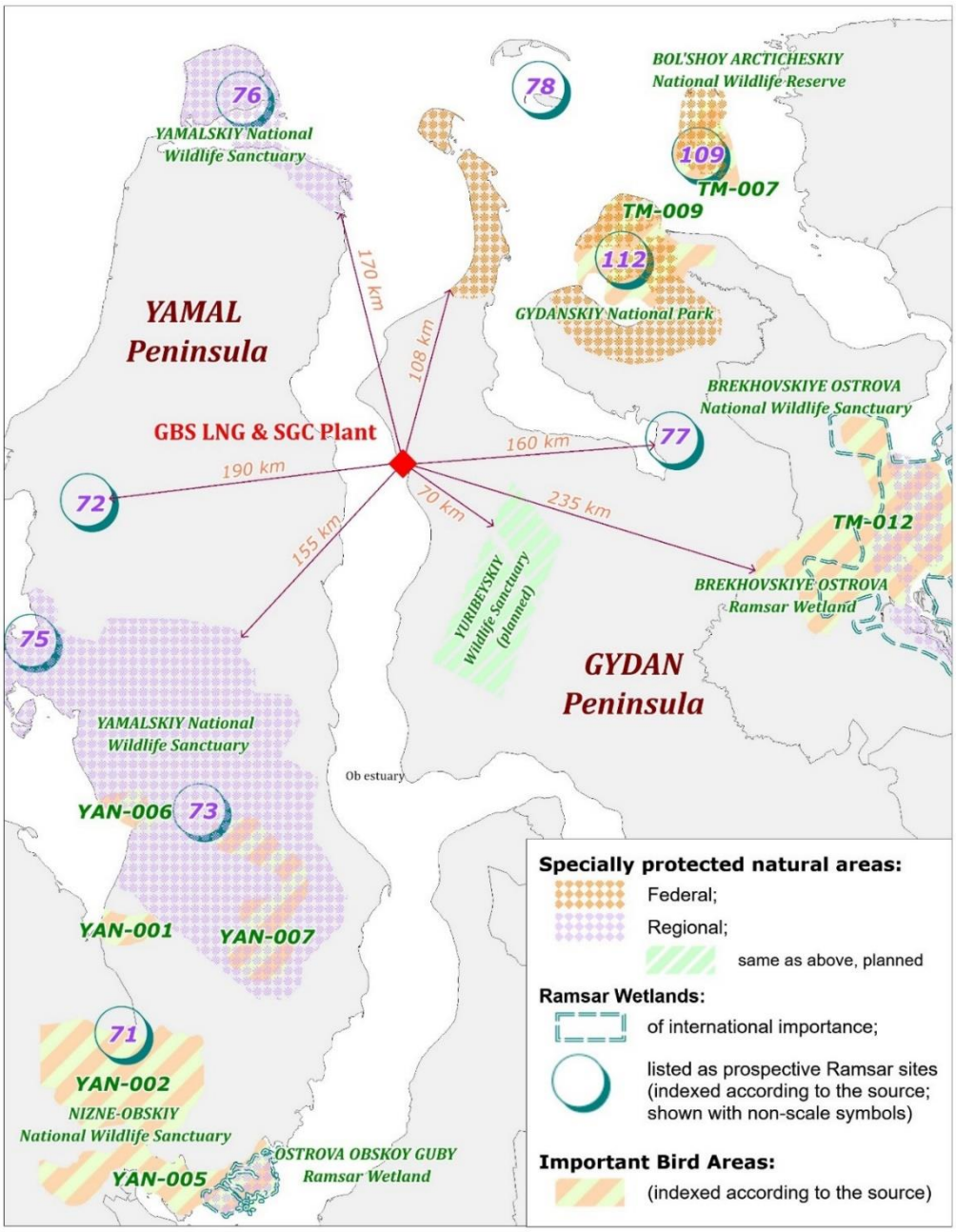
LOCATION OF THE SALMANOVSKOYE (UTRENNEYE) OGCF FACILITIES SETUP, LNG COMPLEX AND PORT IN GYDAN PENINSULA

Source of the map details:
Ethnographic studies on Utrenneye field area in Tazovsky district of Tyumen Oblast. Research report. Volume 2 - Tyumen: LLC «PurGeoKom», 2015.

Base map source:
The basic version of the situation plan for the placement of objects. Document without dateline. Provided by PJSC «NOVATEK»

APPENDIX B4

PROJECT LOCATION IN RELATION TO THE NEAREST DESIGNATED NATURE CONSERVATION AREAS (DCA)[80]



[80] Referenced sources:

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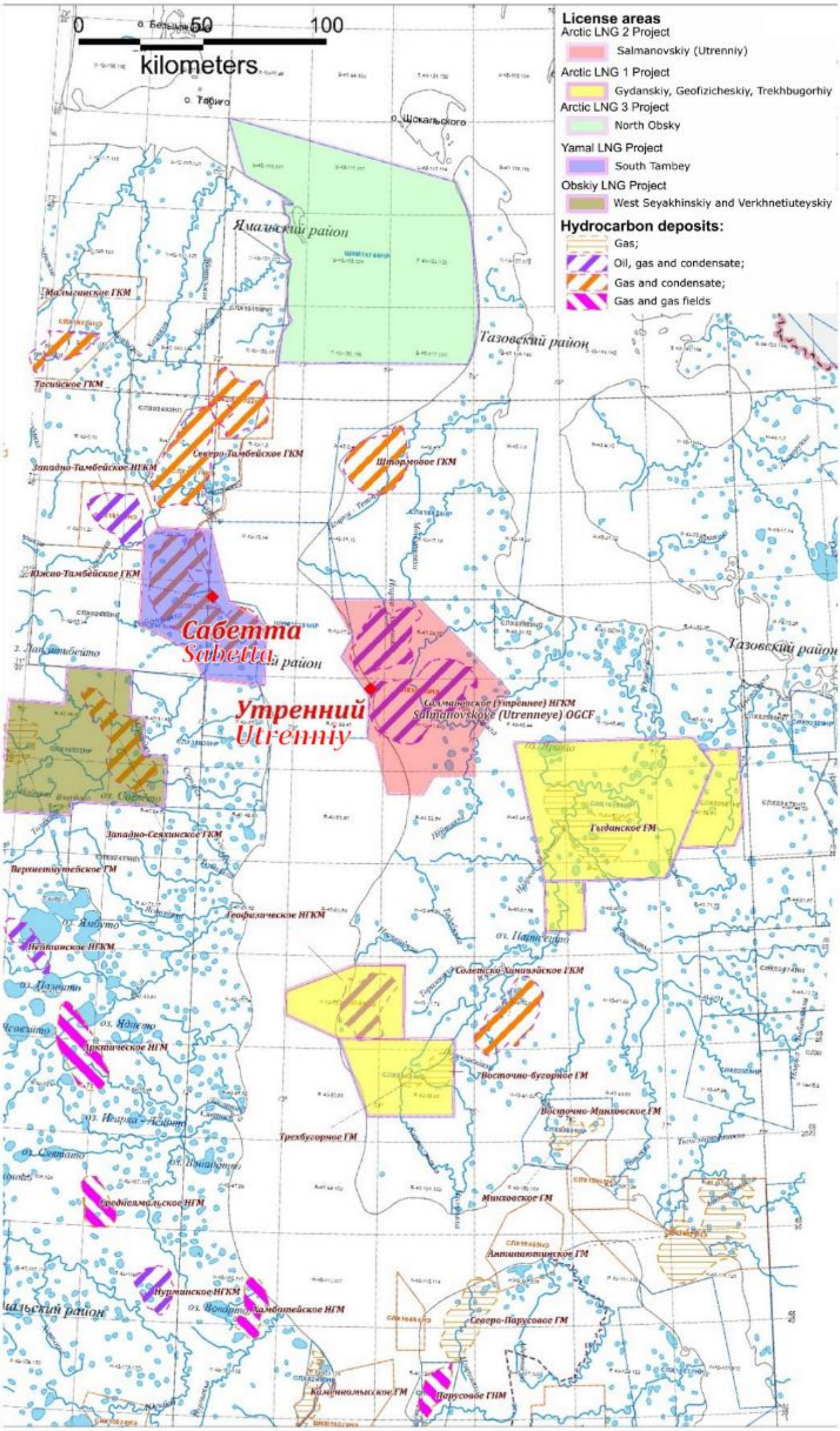
Important Bird Areas. Volume 2. Western Siberian IBA of International Importance – Moscow: Russian Bird Conservation Union (RBCU), 2006. 334 p.

Designated Conservation Areas of Russia: Present-Day and Prospective Status. Eds.: V.G. Krever, M.S. Stishov, I.A. Onufrenya - WWF Russia, 2009.

Russian Bird Conservation Union (RBCU). Official website at http://www.rbcu.ru/

APPENDIX B5

SALMANOVSKIY (UTRENNIY) LICENSE AREA IN THE SUBSOIL USE MAP OF THE GYDAN AND YAMAL PETROLEUM REGIONS[81]



[81] Background source: Online map of subsoil resources of the Russian Federation. https://map.mineral.ru/

APPENDIX C1

PHASING OF EARLY DEVELOPMENT FACILITIES OF THE SALMANOVSKOYE (UTRENNEYE) OGCF FACILITIES SETUP

This Appendix lists the main elements of the early development facilities of the Salmanovskoye OGCF Facilities Setup with reference to respective phases of implementation (1 through 13).

Phase 1. Motor road MR1 from the berth structures to helipad HP3: Section 1 from the berth structures to the point of joining the designed MR2 (refer to Phase 2 item 2.14)

Phase 2. System of areal and linear facilities in the area of the berth structures, power supply complex No.2 and gas and condensate well pad No.16.

2.1. Well R270 site, including wellhead assembly; well workover assembly; flare pit; fire engines and well survey mobile unit site; runoff water storage tank; lightning discharger; inhibitor feed system; site internal utility networks and roads.

2.2. Site of portable turbine power plant PGTPP No.2 comprising: 4 modules PAES-2500, package transformer substation (PTS), two automated emergency diesel power stations (EDPS) 250 kV each, indoor distribution switchgear 6kV, two transformers 6/10 kV, sectionalizing switchgear for OHTL KRUN-SVL 10kV; control room (portable cabin); mineral oil facilities (oil preparation station for local needs, spent oil tank 5m^3); fuel gas treatment facility PBTG (fuel gas treatment unit, boiler station, air compressor station, air receiver, emergency drainage tank 8m^3); 45 m light pole (1 unit); fence; emergency transformer oil discharge tank 25m^3; lightning discharger, height 23 m; fire-fighting equipment storage container; storage site for auxiliary materials in containers; diesel fuel day tanks site for the diesel power station (DPS); diesel fuel day tank 25 m^3 (2 units); diesel fuel drainage vessel 3 m^3; domestic wastewater collection tank 25 m^3; runoff water collection tank 63 m^3; process and fire water storage tanks 300 m^3 each (2 units); road tankers site; methanol storage tank site; methanol dosing unit; emergency drainage vessel 63 m^3; nitrogen ramp with cylinders (10 units); site internal utility networks and roads.

2.3. Cabin camp site of PGTPP No2, including portable cabins for temporary accommodation of 2 persons (4 units); 32.5 m light poles (4 units); fence; cabin-based dining facility; repair workshop cabin; cabins with domestic facilities; domestic wastewater collection tank 25 m^3; surface runoff water collection tank 63 m^3; process water storage tank 10 m^3; cabin-based instrumentation control room; site internal utility networks and roads.

2.4. Trace heating PTS and DPS site comprising: three-transformer PTS No.2 and No.3; HV DPS No.2; fence.

2.5. Temporary Accommodation Camp (TAC) site comprising: water supply system (water treatment plants WTP-1 for technical water and WTP-2 for potable water; untreated drinking water storage tanks 100 m^3 - 2 units); heat and power supply system (boiler station and fuel supply system; diesel power station DPS-630 kW; diesel fuel day tanks for DPS and boiler station 25 m^3 - 4 units; fuel drainage vessel 3 m3); communications container, fire water pumping station; satellite communication antenna post with 90 m antenna mast structure (AMC); car park; gas distribution cabinet (GDC); packaged transformer substation (container PTS 2x1600kVA); industrial wastewater and runoff tank 12.5 m^3 covered; fire water pumping station with a fire-fighting tools store; valve chamber; process and fire water storage tanks 300 m^3; wastewater disposal system (wastewater pumping station WWPS; fence; light poles with lightning discharger 24 m (6 units); communications container; lightning dischargers, height 23 m (2 units); MSW storage site; fire hydrants (7 units); site internal utility networks and roads.

2.6. Water filters site comprising: mechanical water treatment facility (MWTF); treated water tank 20 m^3; filtrate drainage vessel 8 m^3; container PTS 2x400kVA; light pole 24 n; communications container; industrial wastewater and runoff tank 63 m^3 covered; three-transformer PTS No.1; HV DPS No.1; fence; site internal utility networks and roads.

2.7. Wastewater treatment plant (WWTP) site: full-cycle biological treatment of domestic wastewater (WWTP-1) and oily industrial wastewater treatment (WWTP-2); storage tank for untreated industrial wastewater and runoff 25 m^3; untreated domestic wastewater storage tank 25 m^3; treated domestic, industrial wastewater and runoff water storage tank 100 m^3; dewatered sludge storage site; fence; container PCPSU 2x160 kVA; light pole; lightning discharger; fire hydrants (2 units); site internal utility networks and roads.

2.8. Gas flare unit (FGU) site for wastewater disposal, with a burner flare, flare pit, gas regulation unit; site internal utility networks and roads.

2.9. Materials and equipment storage site near berth structures comprising: fire station building; reserve machinery park; light pole 32.5 m; domestic wastewater collection tank 8 m^3; industrial wastewater storage tank 8 n^3; container PTS 2x1000 kVA; site internal utility networks and roads; fence.

2.10. Offsite linear facilities associated with the site of PGTPP No.2 comprising: feed gas pipeline from well R270 site to PGTPP No. 2 site; methanol pipeline from PGTPP No. 2 site to well R270 site.

2.11. Offsite linear facilities associated with the sites of TAC, WWTP and GFU comprising: gas pipeline from the site of PGTPP No. 2 to TAC; branch from gas pipeline of PGTPP No. 2 site to GFU.

2.12. Heat supply network (main) from boiler station to the site of TAC and fire station at the materials and equipment storage site.

2.13. Electric networks: double OHTL No.1 from the site of PGTPP No.2 to the site of filters with branches to the sites of TAC, HP No.2, fuel depot, materials and equipment storage site.

2.14. Motor roads (MR): MR No. 2 from the site of PGTPP No. 2 to the point of joining MR No. 1; access MR to the sites of water filters, TAC, WWTP, GFU, PGTPP No.2, cabin camp of PGTPP No.2; well R270; access MR Nos. 1, 2 and 3 to the materials and equipment storage site.

Phase 3. System of areal and linear facilities in the area of berth structures.

3.1. Materials and equipment storage facilities near the berth structures (additional to those built during Phase 2, site 2.9) comprising: cold storage (2 units), technical cylinder stores, oil store, warm store, outdoor bulk materials storage facilities (2 units), scrap metal store (1), containers store (1) and tubes store (1), service and maintenance building with a vehicle park, equipment steaming site; drainage vessel 5 m^3; operational maintenance module; untreated industrial wastewater and runoff water storage tank 8 m^3; untreated domestic wastewater storage tank 8 m^3; outdoor vehicle and machinery park; fence with a barrier and checkpoint; light poles 32.5 m (7 units).

3.2. Fuel, lubricants and methanol storage site (except for kerosene storage and offloading facilities, Phase 13) comprising: control room; diesel, petrol and methanol stores with filling and discharge bays, intra-park transfer pumping stations, reception modules, drainage vessels, tanks (diesel – 16 units 2000 m^3 each, gasoline and methanol – smaller capacity); nitrogen ramp; automated diesel power station ADPS 250 kW; container PTS 2x630 kVA; power control board module MCC; light poles 24 m (13 units); fire fighting system including water tanks (2 units 1000 m^3 each), pumping station, lightning dischargers 32 m (16 units), fire hydrants (7 units); fire fighting equipment storage container; industrial wastewater and runoff storage tanks (5 units 200 m^3 each and 1 unit 63 m^3) and domestic wastewater storage tank (1 unit, 8 m^3); fence with a barrier and checkpoint; site internal utility networks and roads.

3.3. Offsite linear facilities including kerosene pipeline from connecting assembly to the fuel, oil and methanol storage site; diesel fuel pipeline from connecting assembly to the fuel, oil and methanol storage site.

3.4. Access motor roads to the fuel, oil and methanol storage site (2 units).

Phase 4. Helicopter pad HP No.2 with package container power supply unit (PCPSU) and access road.

Phase 5. Temporary accommodation camp (TAC, refer to item 2.5) - construction of the following facilities in the existing site: dormitory, canteen, 2 warm passages, vegetables and food store.

Phase 6. Motor road MR No.1 from berth structures to HP No.3: Section No.2 from joining point of road MR No.2 to designed joining point of access road to MSW and Industrial Waste Landfill (note: construction of this section of access road has been cancelled, due to the change of designed location of the landfill site).

Phase 7. Single inter-site OHTL No.2 from connection point to designed tapping point to the site of MSW and Industrial Waste Landfill (note: construction of this section of OHTL has been cancelled, due to the change of designed location of the landfill site).

Phase 8. Motor road MR No.1 from berth structures to HP No.3: Section No.3 from the joining point of motor road at MSW and Industrial Waste Landfill (Phase 6) to PK197+44.

Phase 9. Motor road No.1 from berth structures to HP No.3: Section No.4 from PK 197+44 to HP No.3 – unpaved.

Phase 10. Systems of facilities:

10.1. Well P304. List of facilities – refer to item 2.1.

10.2. PGTPP No.1 site List of facilities – refer to item 2.2.

10.3. Utility networks comprising: feed gas pipeline from the site of well P304 to the site of PGTPP No. 1; gas pipeline from the site of PGTPP No. 1 to the site of well P304; methanol water pipeline from the site of PGTPP No.1 to well P304.

10.4. Access motor roads to the sites of well P304 and PGTPP No. 1.

Phase 11. Motor road No.1 from berth structures to HP No.3: Section No.4 from PK 197+44 to HP No.3 – unpaved.

Phase 12. Helicopter pad HP No.3.

Phase 13. Kerosene storage and offloading facilities at the existing site of fuel depot (Phase 2): truck loading bays; kerosene intra-park transfer pumping station; kerosene reception module; kerosene tank 2000 m^3 (4 units); kerosene drainage vessel 25 m^3.

APPENDIX C2

LOGISTICS SYSTEM FACILITIES SALMANOVSKOYE (UTRENNEYE) OGCF FIELD FACILITIES

Functions of the *field support base* (FSB) are reception, storage, distribution of materials and equipment (equipment, rolled metal products of various designations), storage (70 units of cargo vehicles and specialized machinery) and maintenance of vehicles, fitting, welding, metalworking and repair.

Mechanical repair shop (MRS) location at the FSB site. MRS will provide the necessary fitting, welding, metalworking for maintenance and repair, manufacturing of production tools, rehabilitation of worn-out assemblies and components, manufacturing of new components and spare parts, manufacturing of fixtures and other products.

MRS will also provide testing and technical inspection of cylinders for storage of compressed air, propane, acetylene, helium, hydrogen, oxygen, argon.

MRS facilities also include a section for setting and calibration of instrumentation, particularly microprocessor controllers, electronic calculation units, variable speed motors, primary transducers.

Vehicles maintenance shop. A two-floor building for servicing and maintenance of vehicles and specialized machinery, with a heated vehicle park for 70 units, intended for storage, servicing and maintenance82 of vehicles, including all-terrain vehicles and specialized machinery used for maintenance of technical facilities in the field. Heat-insulated parking premises are provided for storage of vehicles. The building upper floor is occupied by offices and domestic facilities. The following facilities are accommodated in the building:

- welding post;
- specialized premises for batteries charging and tire fitting;
- oil depot for packed storage of motor oil, transmission oil, hydraulic oil, coolants, greases;
- spares and materials store;
- storage facilities, tire store;
- clothes drying room;
- domestic and auxiliary facilities for engineering technicians and workforce (office and service building);
- dressing rooms;
- training room;
- dining room, shower and toilets;
- room for pre-trip medical examination of drivers and, when needed, provision of medical aid to personnel;
- truck loaders maintenance station;
- maintenance bays for TM-1, TM-2, SM.

List of the Field vehicles fleet assigned to the shop:

- passenger vehicles - 9 units;
- crew buses - 30 units;
- mobile repair workshop - 1 unit;
- mobile non-destructive testing laboratory - 1 unit;
- cesspoolage trucks - 2 units;
- dump trucks - 6 units;
- snow and swamp-going vehicles - 2 units;
- snowplows - 3 units;
- snow loaders - 3 units;
- waste trucks - 3 units;
- sand spreading machines - 2 units;
- sweeping trucks - 2 units
- fuel trucks - 3 units;
- road tankers - 3 units.

[82] Capital repair of machines and assemblies will be provided by remote specialized contractors

Most of the above vehicles have diesel engines. Diesel fuel storage tanks are located at the fuel depot constructed as part of the early development facilities. Vehicles fuelling will be conducted at the same site.

Besides the vehicles maintenance and mechanical repair shops, the following facilities will be provided at the FSB site:

- storage site for filled and empty oxygen and propane cylinders;
- outdoor park for 50 cargo vehicles and specialized machines;
- packaged transformer substation;
- emergency diesel power station;
- road tankers unloading site;
- diesel fuel storage tank m^3 (2 units);
- emergency diesel fuel drainage vessel 10 m^3;
- container site for collection of industrial and domestic waste;
- domestic wastewater pumping stations No.1 and No.2;
- runoff water storage tank with a pump Nos.1 and 2;
- light pole (8 units);
- pressure washing site for external tube banks;
- industrial wastewater and runoff water storage tank with a pump Nos.1 and 2;
- logistics depot:
- substitute gas turbine engines store;
- warehouse with overhead crane (warm);
- shelter with vertical walls (warm);
- shelter (5 units);
- materials and equipment storage site (4 units);
- panel-and-frame buildings storage site (2 units);
- tubular products storage site (6 units);
- cranes and load-handling equipment site;
- warehouse (warm);
- outdoor storage for building materials and equipment;
- metal scrap collection site with a press;
- valves and fittings storage site;
- packaged goods storage site;
- domestic wastewater pumping station;
- runoff water storage tank with a pump Nos.1 and 2;
- checkpoint;
- light pole (18 units).

Logistics facilities are the stores intended for reception, storage and distribution of building materials, pump and compressor equipment, spare parts and materials, cable products, instrumentation and control equipment, sheet metalwork, shaped sections, tubes and pipeline fittings. In accordance with specifications issued by Arctic SPG 2 LLC, the following storage facilities are provided:

- substitute gas turbine engines store with an overhead electric crane, load capacity 2.0 t;
- warm warehouse with overhead crane, including paints storage and oil depot;
- warm warehouse for storage of chemicals and reagents;
- warm shelter with vertical walls for storage of cable products, personal protection equipment, laboratory equipment;
- cold shelters (5 units);
- outdoor storage for building materials and equipment, with a portal jib crane.

All goods are delivered to storage by road vehicles.

APPENDIX C3
PROCESS OVERVIEW OF THE GBS LNG & SGC PLANT

The GBS LNG & SGC Plant process trains are manufactured in the NOVATEK-Murmansk LLC site in the Murmansk Region. The gravity-based structures for them will be manufactured in casting basin at the above site, whereas the topside modules will be manufactured at various sites located in Russia (including NOVATEK-Murmansk LLC) and other countries and transported to casting basins of NOVATEK-Murmansk LLC for integration into GBS.

The first stage of commissioning of the process equipment at each of the LNG Complex's process trains will be conducted at NOVATEK-Murmansk LLC. Connections to the onshore infrastructure and final commissioning will be arranged after towage, installation and integration with onshore infrastructure at the designed location site of the Plant in the area of Salmanovskoye (Utrenneye) OGCF.

Main process flows at the LNG Complex

Schematic view of the LNG Plant technological process is presented in Figure C1. The main process of gas/liquid separation takes place at the field infrastructure facilities which are located at a significant distance - up to 40 km - from the Plant. Feed stream is transported from the field to the LNG Complex by four pipelines - two for natural gas, and two for unstabilised gas condensate. The pipelines will be installed on surface; within the artificial land plot of the Port, they will be installed on the pipe rack interconnecting the three process trains of the LNG Complex.

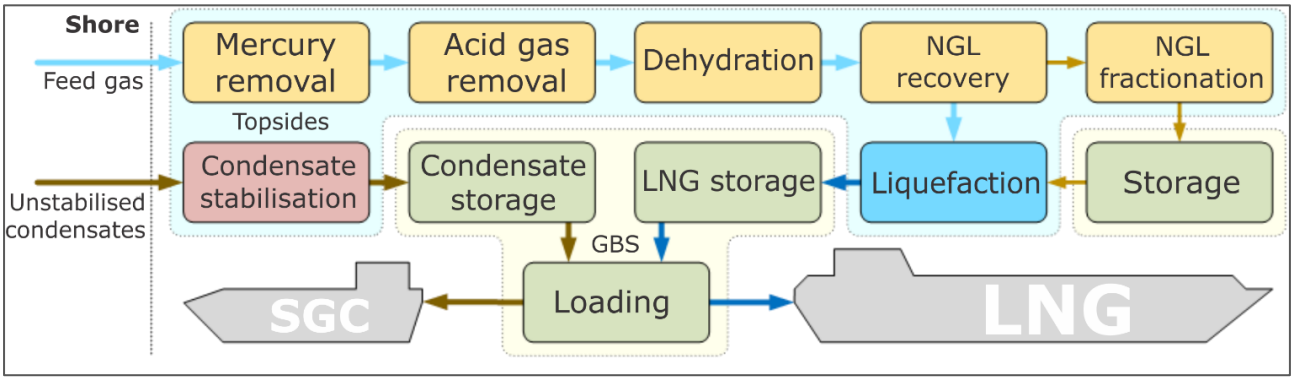


Figure C1: Schematic view of the LNG Complex train

Feed gas is fed to the feed gas separator where entrained or condensed liquid is removed from the flow arriving from the onshore pipeline.

Feed gas is preheated in feed gas heater to about 30°C and supplied to the Acid Gas Removal Unit (AGRU).

Unstabilised condensate is heated in the inlet condensate heater and supplied to the three-phase separator of the Stabilisation Unit. Separated liquid which contains methanol is recirculated to the field infrastructure facilities for further processing. Hydrocarbon liquid from the separator is fed to the condensate stabilisation column for stripping of lighter components.

Operation of the Acid Gas Removal Unit is based on activated solvent adsorption process. Sweet gas from the absorber is cooled down in the inlet cooler of the Dehydration Unit. After that gas is dehydrated by adsorption process.

Mercury Removal Unit is designed as a non-regenerable catalyst bed in a pressurized vessel where trace mercury is captured. Sweet dehydrated gas is then passed through the afterfilters of the Dehydration Unit, with molecular sieves for removal of fine particles before feed to the NGL Extraction Unit.

Sweet feed gas is further fed to the Liquefaction Units. The Company purchased a license of Linde AG for the natural gas liquefaction process to be used for the Arctic LNG 2 Project.

Ethane, propane and butane which can be used as refrigerant are produced at the Fractioning Unit and stored in dedicated tanks which are provided at each GBS. The refrigerants are used to make-up for refrigerant losses in the mixed refrigerant cycles of the Liquefaction Unit. Ethane Refrigerant is stored in double-barrier membrane tank similar to the LNG storage tank. Propane and Butane Refrigerants are stored in low-temperature carbon steel vessels.

Each refrigerant storage capacity is twice as large as the refrigerant volume in the liquefaction cycles, which is sufficient for any start-up scenario that requires filling of cycles in one liquefaction train.

LNG is supplied from a process train to two storage tanks. Storage temperature of LNG is about -161°C.

Each LNG tank is provided with four LNG offloading pumps which pump LNG through the offloading pipelines to the loading arms, with a flow rate of approx. 14,000 m³/h. GBS1 and GBS2 will each have one set of loading arms. No loading arms will be provided at GBS3.

Stabilised condensate from Debutanizer and Stabilisation Unit is supplied to the condensate storage tank on GBS. For offloading, condensate is supplied to the loading arms by means of condensate pumps with a flow rate of approx. 8,000 m³/h. Both loading arms are designed for offloading of liquid. Nitrogen blanket is provided in condensate storage tank, with safe vents to atmosphere in case of high pressure.

Process Train overview

Gravity-based structures are designed as caisson-type RC structures which are divided into compartments by slabs, walls, partitions and web stiffeners. The compartments accommodate LNG tanks and SGC tank, process utility storage, and ballast systems.

GBS supports the topside modules and marine systems for simultaneous mooring of LNG/SGC Carriers.

Main parameters of GBS[83]:

- Dimensions - L / W/ H -331.74/153.74/30.2 m;
- Cantilever width on long/short side of GBS - 22/15 m;
- Cantilever height - 13.75 m;
- GBS base slab depth - 14.7 m below sea level.

The process train will accommodate the main equipment for LNG and SGC production, as well as auxiliary systems.

GBS will also carry the auxiliary and main ballast systems to be used at the stages of construction, GBS float out, towing, installation and operation.

GBS will be manufactured at module-building yard in Murmansk (NOVATEK-Murmansk LLC) and towed to the Ob Estuary.

Towing in the Ob Estuary will be arranged with due regard to the sea channel depth during tidal high water, so that minimum water depth of 1 m under GBS bottom is guaranteed. In case of tide level below 0.4 m, GBS towing through the channel in the Ob Estuary will be suspended until adequate conditions are re-established.

Flare System

The relief and blowdown philosophy adopted for the Planned activity is based on a concept of "No continuous flaring for production". Short-term flaring is acceptable in the following situations:

- start-up,
- maintenance preparation,
- process upset,
- emergencies and shutdown.

The Flare System has been segregated into several systems as it is required to separate the warm wet discharges from the cold dry ones in order to prevent freezing and/or hydrate formation in the flare network. In addition, an independent low pressure (LP) system is required for safe connection of storage tank relieving devices (pressure safety valves and pressure control valves).

Hence, 3 separate systems have been envisaged as follows:

- Warm Flare (high pressure - HP):

The Warm Flare system collects discharges from relief and blowdown valves located on the high-pressure equipment in the hot section of the LNG Complex, i.e. Receiving Facilities, Condensate Stabilisation Unit, AGRU, Mercury Removal and Dehydration units.

[83] Dimensions and other parameters of GBS will be verified against up-to-date design

- Cold Flare (high pressure - HP):

The Cold Flare system collects discharges from relief and blowdown valves located on the high-pressure equipment in the cold section of the LNG Complex, i.e. NGL Extraction and Fractionation Units, Liquefaction Unit and BOG / Fuel Gas Unit.

- BOG Flare (low pressure - LP)

This system is low pressure and is dedicated to the collection of vapour relief from the LNG Storage, Refrigerant Storage and BOG handling system.

The Flare Systems include the collection headers running across the topside facilities of each Train. These headers then flow down to dedicated Flare Knock Out Drums and Flare Stacks, which are located onshore for the Warm and Cold Flare systems (common for the three Trains) and on the process trains for the BOG Flare System.

Warm and Cold Flare Systems are backed up by a common Spare Flare KO Drum and Spare Flare Stack to allow for the equipment maintenance. BOG Flare System is backed up by a Cold Vent System located on the process train.

Water Supply

The Company established the following general requirements for the water supply system:

- potable water shall be available at all work stations;
- ensuring adequate temperature of water in water supply systems;
- if surface water bodies are used as sources of water supply, water shall be adequately treated to meet the applicable standards, if required;
- if central water supply is infeasible, alternative solution is based on supply of bottled potable water.

As reported by the Subsoil Management Department of the Ural Federal District, no fresh groundwater deposits are available in the territory of the Salmanovskoye (Utrenneye) OGCF. Source water for domestic and utility water supply of the Arctic LNG 2 Project will be abstracted from surface water bodies. As natural water quality in the licence area is poor, the intake facilities will be extended to provide treatment of source water.

Construction of the water intake and treatment facilities is part of the Salmanovskoye (Utrenneye) OGCF facilities setup. These facilities will serve as water source for consumers at the LNG Complex during construction and operation.

At the operation stage the LNG Complex will have two separate water supply systems:

- utility water used as feed water for Demineralized Water system, wash water for equipment, and as firewater for the onshore LNG Complex facilities;
- potable water for domestic needs of the LNG Complex personnel.

Fire water system of the LNG Complex will use water from the Ob Estuary which will be abstracted through fish-protection screens. The respective pumps will be provided in the process trains.

Drain Systems

Drainage systems of the LNG Complex are designed in accordance with the "Zero Discharge" principle, which means that all effluents from the Plant are transported by pipelines and in road tankers to the wastewater treatment plant (WWTP) at the Salmanovskoye (Utrenneye) OGCF. Treatment processes at WWTP include mechanical, physical-chemical and biological treatment with discharge of effluent treated to meet regulatory standards to nonfreezing surface water body.

Associated formation water, construction brine solutions and major part of industrial wastewater will be injected into intake formations.

Waste Management

Domestic and industrial wastes management at Arctic SPG 2 LLC is based on the principle of minimization of environmental impacts through reduction of waste generation volumes and weight, recycling of certain categories of wastes, and keeping landfill disposal to the minimum. All waste management procedures shall meet both Russian regulatory requirements and IFC standards. In particular, design solutions relating to a specific category of wastes shall first consider possibility of prevention of the waste generation, and then other solutions shall be considered in the following decreasing order of priority: minimization of waste volume and weight, reuse, recycling, energy recovery, and disposal at landfill.

At the LNG Complex construction stage, wastes will be transported to the temporary accumulation sites which will be arranged by that time at the Salmanovskoye (Utrenneye) OGCF.

At present no waste disposal facilities are available in the license area, however a waste disposal site will be constructed as part of Salmanovskoye (Utrenneye) OGCF facilities setup and subsequently used also to serve the needs of the LNG Complex. Design of the LNG Complex will consider arranging temporary accumulation sites for solid wastes at the operation stage - on the process trains and in the area of the onshore facilities. The waste sorting, temporary accumulation and transportation requirements will be defined with due regard to hazard classes of the wastes and their recycling potential.

Power Supply

At the LNG Complex construction phase, power supply for the construction sites and temporary site facilities of the LNG Complex will be provided from Salmanovskoye (Utrenneye) OGCF facilities setup, using a portable truck-mounted generator PAES-2500. At the commissioning stage power supply will be provided from GTPP of the Salmanovskoye (Utrenneye) field (6 generation units with capacity of 6 MW each are to be commissioned at the first stage of the FIELD Infrastructure development).

At the LNG Complex *operation phase*, gas turbine generators (GTG) with a minimum power capacity of 25 MW will be provided at each process train, for power supply for the main and auxiliary process units and onshore facilities.

The generator backup power supply system will consist of an emergency / backup switch board and several diesel generators connected to it. The backup system shall be capable of providing emergency power supply for the generator, and for cold start-up of any GTG.

APPENDIX C4

PROJECT IMPLEMENTATION TIMEFRAMES[84]

[84] Source: Arctic LNG 2. Project Information Memorandum. – ARCTIC LNG 2 LLC, February 2020