



ARCTIC LNG 2 PROJECT

Project Area of Influence (Addendum to ESHIA)

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ACRONYMS AND ABBREVIATIONS

AOI	Area of Influence
CAFF	The Conservation of Arctic Flora and Fauna
CHA	Critical Habitat Assessment
CGTP	Complex Gas Treatment Plant
EBSA	Ecologically and Biologically Significant Area
FSBI	Federal State Budgetary Institution
GWP	Gas Well Pad
LIESC	Lenders' Independent Environmental and Social Consultant
IFC	International Financial Corporation
ISPN	Indigenous Small-Numbered Peoples of the North
IEPI	AO «Institute of Environmental Survey, Planning & Assessment»
IUCN	International Union for Conservation of Nature
JSC	Joint Stock Company
EBSAs	Ecologically or Biologically Significant Marine Areas
ESHIA	Environmental and Social Impact Assessment
GBS	Gravity-Based Structures
LA	License Area
LIESC	Lender's Independent Environmental and Social Consultant
LLC	Limited Liability Company
LNG	Liquefied Natural Gas
MAC	Maximum Allowable Concentrations
MSU	Moscow State University
MTPA	Million Tonnes Per Annum
OECD	Organization for Economic Cooperation and Development
OGCF	Oil ¹ -Gas Condensate Field
PGTS	Primary Gas Treatment Plant
PJSC	Public Joint Stock Company
PS	Performance Standard, Project Standards
RAS	Russian Academy of Sciences
RF	Russian Federation
SGC	Stabilized Gas Condensate
SPZ	Sanitary Protection Zone
YNAO	Yamalo-Nenets Autonomous Okrug
UN	United Nations
UNEP	United Nations Environment Programme

¹ Despite the field is titled as oil, gas and condensate one, the Company has no plans related to oil extraction, so only natural gas and gas condensate will be extracted for further processing and delivery

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1 EXECUTIVE SUMMARY

This addendum to the ESHIA has been prepared in response to Lender's IESC's (LIESC) Final Environmental and Social Due Diligence Report to address the comments made by LIESC about the Project's Area of Influence ("AOI") and the need to further align the Project AOI with the requirements of the IFC Performance Standards. The LIESC recommended developing an addendum to the ESHIA with the Project AOI revised, taking into account implications connected to Associated Facilities (such as shipping activities), supply chain, proximity of the Project to areas of known biodiversity value (such as the Kara Sea) and areas providing Ecosystem Services. More precisely, LIESC recommended that:

- in the terrestrial environment, the implications (impact significance) of direct, indirect, induced and cumulative effects for the relevant features across the Gydan Peninsula should be considered' and
- in the marine environment, the Project AOI should extend up to the Northern Sea Route and be wide enough west, east and north to capture the longest effect distances (for instance, underwater noise impacts) and to consider a greater (in comparison to the NSR) impact of the Project related to shipping activities over the total overall volume of shipping through the corresponding area.

The Consultant has considered the comments made by LIESC and taken into account the various matters noted above. In doing so, it has concluded that:

- in the case of the terrestrial environment, the Project AOI as set out in the ESHIA remains appropriate taking into account the implications of direct, indirect, induced and cumulative effects of the Project across the Gydan Peninsula.
- in the case of the marine environment, having consideration of additional data regarding areas highly valuable for biodiversity conservation, identified in the Kara Sea in recent publications and during the ESHIA, it would be appropriate to extend the Project AOI up to the divergence point towards the western and eastern shipping routes of the NSR, where a greater (in comparison with the NSR) impact of the Project related shipping activities on the total volume of shipping in this area is anticipated. As the north border it is considered to apply the northern limit of biodiversity significant area the 'Ob-Yenisey River Mouth' EBSA.

Table 1 below summarises major comments/concerns raised by LIESC and shows how they are addressed in this Addendum

Table 1.1: Summary of LIESC comments related to the Project AOI

LIESC comment/concern	How comment/concern are addressed
<i>Align the Project AOI with requirements of the IFC's PS 1 and PS 6.</i>	Fully addressed in this Addendum. The AOI was defined in accordance with PSs. Please see section 3.2 of this Addendum for further details
<i>Update the Project AOI to cover Project activities and all zones of direct, indirect and cumulative effects following recommendations made in this report.</i>	<p>Fully addressed in this Addendum, please see section 3 of this Addendum for further details.</p> <p>It is clearly shown in Section 3.2. that direct impacts (physical footprint) of the Project will be localized within the Salmanovsky (Utrenny) License Area (LA).</p> <p>Indirect impacts of the Project and associated facilities onshore are analysed in Section 2.4. and it is shown that they will be localized within the LA:</p> <ul style="list-style-type: none"> • As proved by the emission dispersion modelling, Project's impacts on air quality by air emissions and noise (except shipping) will be localized within the LA. • Indirect impacts on surface water, even in the worst case of accidental spills and leakages from the Project facilities will be also localized within the LA. This is due to the fact that Project facilities are located on the rivers and streams that flow in west direction and discharge to the Ob

LIESC comment/concern	How comment/concern are addressed
	<p>Estuary. There are practically no Project facilities on the rivers that flow east and discharge to the Gydan Estuary.</p> <ul style="list-style-type: none"> Noise, key impact of the main associated facility (Airport Utrenny) will be localized within the LA. <p>Cumulative Impacts (sea channel construction, vessel traffic) are considered in Section 3.6 of this Addendum</p>
<p><i>Specify effect distances/zones and superimpose on Areas of Occupancy or confirmed habitat for features of importance (i.e. Natural and Critical Habitat).</i></p>	<p>Fully addressed in this Addendum. Please refer to Section 4 of this Addendum.</p> <p>Based on recent monitoring results and literature review the key issues are considered: influence of suspended matter on hydrobiological communities, underwater noise on cetaceans, artificial light on migratory birds. Critical habitats and impacts are addressed in a specially prepared separate report</p>
<p><i>Extend marine AOI to include shipping impacts as far as the main channel of the NSR (north of the Estuary) and associated impact zones – in line with the classification of shipping as an Associated Facility.</i></p>	<p>Fully addressed in this Addendum. Please refer to section 3.6.4 for details. Extended to the north AOI also covers the seascape up to the divergence point towards the western and eastern shipping routes of the NSR, where a greater (in comparison with the NSR) impact of the Project related shipping activities on the total volume of shipping in this area is anticipated. More information will be provided in a special Addendum devoted to assessment of shipping activities in the Ob Bay.</p>
<p><i>The assessment should address impacts on Critical Habitat to the north of the estuary and to the NSR.</i></p>	<p>Fully addressed in this Addendum. Please refer to section 4.3 and 4.6 for details. Detailed information is provided in special Addendums devoted to the Critical Habitat Assessment and during transportation along Northern Sea Route</p>
<p><i>Extend terrestrial AOI to include all areas exposed to indirect and cumulative impacts.</i></p>	<p>Fully addressed in this Addendum. All impacts will be concentrated within the boundaries of the LA. No need to expand the terrestrial AOI beyond the LA boundaries is demonstrated. Please refer sections 3 and 4 for details</p>

The justification for this position is set out below.

The Consultant acknowledges that this ESHIA Addendum will be further supported and supplemented by the other ESHIA Addendums that are currently being prepared including the strategic assessment of shipping activities in the Ob Estuary updated of Cumulative Impact Assessment, updated Ecosystem services report, and Update Profile of Indigenous People.

2 INTRODUCTION

Arctic LNG 2 (hereinafter the Company) are undertaking the Arctic LNG Project (hereinafter the Project) which is a project in the sphere of hydrocarbons extraction, production and offloading of liquefied natural gas and stabilized gas condensate.

Key components of the Arctic LNG 2 Project are:

- the Salmanovsky (Utrenny) field - the resource base for the Project;
- the GBS Plant for liquefaction of natural gas and stabilization of gas condensate (the GBS LNG & SGC Plant). The Plant will have three LNG trains with declared annual capacity of 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 Utrenny LNG & SGC Terminal (the Utrenny Terminal, the Port) purposed to provide offshore logistics for gas carriers and tankers, offloading of LNG and SGC, reception and storage of cargoes for operations and construction. Construction and operation of the Port facilities are financed and will be owned and operated by different parties; some of them will be owned by the Project while others will be federal property therefore their treatment for the purposes of the IFC Performance Standards differs accordingly. (This is considered in more detail below).

For the ALNG2 Project, the core business processes include gas extraction, processing and loading in liquefied form to third parties' vessels.

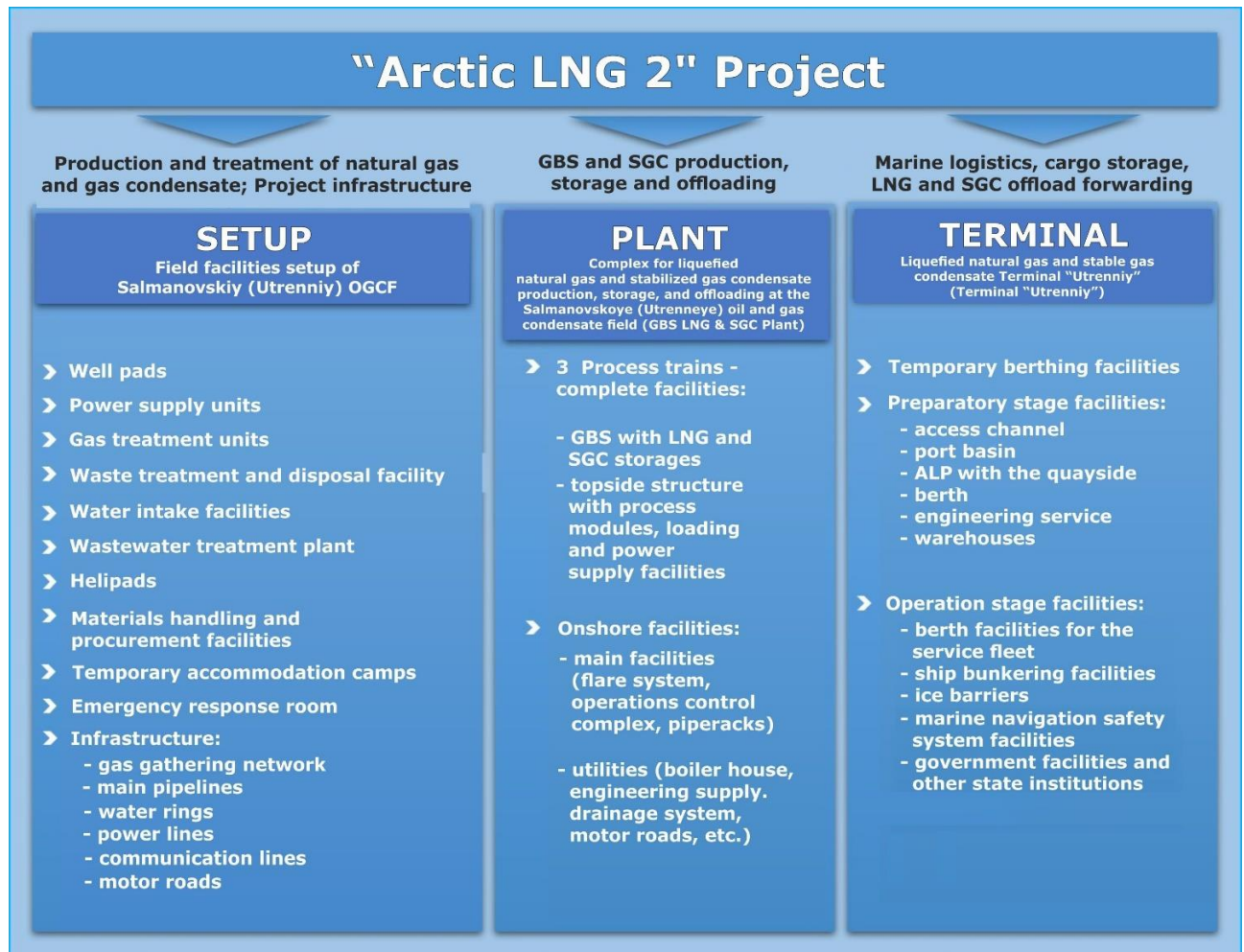


Figure 2.1: Arctic LNG 2 Project structure²

Administratively, the field lies within the territory of Tazovsky Municipal District of the Yamal-Nenets Autonomous Okrug; a part of the field area extends into the water area of the Ob Estuary of the Kara Sea,

² The scheme is generated using the design documentation of LLC "Arctic LNG 2"

which belongs to the internal marine waters of the Russian Federation and managed as Area 5 of the Northern Sea Route³.

The site for the onshore and near-shore facilities has been allocated after a comprehensive site selection process based on multi-year studies and supporting collection of the archive data on geological, hydrometeorological and ecological conditions of this area. Siting alternatives for most of the facilities as well as the pipeline routing and layout variants have been evaluated throughout the multi-staged ESHIA process (2017-2020), with the environment and social team working closely with potentially affected communities to make sure their opinions and interests are taken into account properly at early stages of the Project. In all cases, alternatives were evaluated based on environmental and social risks and impacts, technical feasibility and financial feasibility criteria. A key focus of the alternatives analysis was to avoid, minimise and mitigate potential environmental and social impacts.

In particular, the Project is being implemented in the territory listed as an area of customary residence and practices of indigenous small-numbered peoples of the North (ISNP), Nenets. Migration routes of Nenets reindeer herders' families pass across the Salmanovsky (Utrenny) license area, though they do not set up stationary camps here.

The design, construction, and subsequent operation of the Project is managed by ALNG 2 (the Company), which has been specifically established for this purpose.

ALNG2 Project has committed to complying with the International Finance Corporation Performance Standards on Environmental and Social Sustainability (IFC PS) and the OECD "Common Approaches" (adopted on 28 June 2012 and revised by the OECD Council on 6 April 2016) and other international standards applicable to the Project (specified in Project Standards Document). The most stringent requirements are applied. Performance Standard 1 (IFC PS 1: Assessment and Management of Environmental and Social Risks and Impacts) requires the Company to undertake a process to identify the environmental and social risks and impacts of the Project. GN5 of PS6 also places requirements for the definition of an AOI for biodiversity. This includes requirements for the identification of a project's AOI.

³ No marine exploration activities are planned by the Company, with the offshore part of the licensed area staking the Company's claims related to general use of the subsoil

3 THE PROJECT AND AREA OF INFLUENCE

For the purpose of the IFC Performance Standards, "project" refers to "a defined set of business activities, including those where specific physical elements, aspects and facilities likely to generate risks and impacts, have yet to be identified". Guidance Note 4 recognises that each user of the Performance Standards should define the business activity to which the Performance Standards should apply, and build its approach to assessment and management of environmental and social risks and impacts consistent with this Performance Standard and in accordance with the level of environmental and social risks that is expected to require management.

Within this context, we have considered the business activities, and those physical elements, aspects and facilities, associated with the Arctic LNG 2 Project and have reached the view that, for the purposes of the IFC Performance Standards, the Project comprises:

- the Salmanovsky (Utrenny) OGCF - the resource base for the Project;
- the GBS Plant for liquefaction of natural gas and stabilization of gas condensate (the GBS LNG & SGC Plant). The Plant 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 Utrenny LNG & SGC Terminal (the Utrenny Terminal, the Port) purposed to provide offshore logistics for gas carriers and tankers, offloading of LNG and SGC, reception and storage of cargoes for operations and construction; but only to the extent that the construction and operation of the Port facilities are financed and will be owned and operated by the Project⁴.

3.1 Project Components

When defining a Project and Project's Area of Influence (which is considered in more detail below), the IFC Performance Standards also introduce the concept of "components of the Project". While there is no formal definition for "components of the project" (or project components), project components are generally recognised within the IFC Performance Standards as "the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project"⁵.

Further guidance on what constitutes a project component is provided by way of the OECD Common Approaches. As with IFC PS1, the OECD Common Approaches does not specifically define "project components" but similarly introduces them in the context of defining a "project". It states that: "For the purposes of screening, classification and review, a project includes those components that the buyer and/or project sponsor (including contractors) directly owns, operates or manages and that are **physically and technically integrated** with the undertaking." This additional requirement that the components must be "physically and technically integrated" with the rest of the project is particularly important as it intentionally limits what is a potentially very broad concept to only those aspects which are clearly integrated within the project.

The OECD Ex Ante Guidance for Tied Aid (2006), which uses the same phrase, defines "project" as: "the smallest complete productive entity, physically and technically integrated, that fully utilises the proposed investment and captures all financial benefits that can be attributed to the investment." While not the same definition, it provides additional context to the concept of "physically and technically integrated", underlining the importance of the need for some kind of physical nexus between different elements of the undertaking.

This is particularly important as it has a bearing on the identification and classification of facilities and activities associated with the Project and is considered in more detail in section 3.

3.2 Project Area of Influence

To aid in the identification of risks and impacts as required by IFC PS1, this standard provides for the identification of a project's "area of influence". IFC PS1 provides that "where a project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's "area of influence". According to

⁴ Those parts of the Port that will be constructed and operated by government departments will be federal property and are therefore considered Associated Facilities for the purposes of the IFC Performance Standards (referred to as "the Project").

⁵ According to Footnote 14 in paragraph 8 in PS1: *Examples include power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, construction camps, and contaminated land (e.g., soil, groundwater, surface water, and sediments).*

Footnote 13 in paragraph 8 of PS1 “Examples include the project’s sites, the immediate airshed and watershed, or transport corridors”.

This "area of influence" encompasses, as appropriate:

- a) *The area likely to be affected by:*
 - i. *the project*
 - ii. *and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;*
 - iii. *impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or*
 - iv. *indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities’ livelihoods are dependent.*

- b) *Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.*

- c) *Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.*

Table 3.1 below shows if each of these five elements is applicable in respect of ALNG2:

Table 3.1: Area of Influence elements defined in IFC PS1 and PS6 and their application to ALNG 2

AOI Elements defined in IFC PS1	Application to ALNG 2
<p><i>The area likely to be affected by: (i) the project and the client’s activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project.</i></p> <p><i>It includes the footprint of the Project itself and the physical extent of Project-specific activities that are outside the Project footprint. Examples include power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, construction camps, and contaminated land (e.g., soil, groundwater, surface water, and sediments).</i></p>	Such elements are considered applicable to ALNG2
<p><i>The area likely to be affected by: (ii) impacts from unplanned but predictable developments caused by the Project that may occur later or at a different location.</i></p>	No such unplanned but predictable developments have been identified for ALNG2.
<p><i>The area likely to be affected by: (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities’ livelihoods are dependent.</i></p>	Such additional areas subject to indirect impacts on biodiversity or ecosystem services have been identified for ALNG2 Project in the Ob Estuary and in the outer shelf zone of the Kara Sea, viz. the Ob-Yenisei shallow part, in the area of the Shokalsky Island. These impacts are likely to arise from shipping activities and dredging in the sea channel and dumping operations performed by the federal enterprise for the implementation of several projects.
<p><i>Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.</i></p>	Associated facilities are considered applicable with respect to ALNG2.

AOI Elements defined in IFC PS1	Application to ALNG 2
<p><i>The cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted (see the ALNG2 Cumulative Impact Assessment (CIA) section).</i></p>	<p>Cumulative impacts are considered applicable with respect to ALNG2</p>
<p><i>The area likely to be affected by: potential impacts on biodiversity and ecosystem services in the project's area of influence, taking into account the following: (i) the location and scale of project activities, including those of associated facilities; (ii) its supply chains (as required in paragraph 30 of Performance Standard 6); (iii) the project's proximity to areas of known biodiversity value or areas known to provide ecosystem services; (iv) the types of technology that will be used (for example, ... directional drilling and multi-well pads versus high-density single-well pads, , and so forth) and efficiencies of the proposed equipment; and (v) the project's potential to induce impacts by third parties</i></p>	<p>Potential impacts on biodiversity and ecosystem services in the project's area of influence are considered in Chapter 4 as well as in special Addendums to the ESHIA report prepared in response to Lender's IESC comments¹</p>

As stated in the ESHIA, Chapters 5 and 15, the Project's AOI has been defined by reference to the abovementioned IFC Performance Standards and applicable guidance and includes the following:

- Direct Impacts – Project's footprint (Land plots and water areas immediately used for implementation of the planned activity);
- Direct and indirect impacts and land use restrictions outside the Project's footprint⁶;
- Direct Impacts - Territories and water areas occupied by associated facilities;
- Cumulative Impacts - Land and water areas that may be subject to the cumulative impacts of the planned activity⁷;
- Indirect impacts - 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.

The following sets out why the Project AOI has been delineated in the way that it has, by reference to these areas⁸. The information presented is a summary of the further detail already presented in the ESHIA.

3.3 Direct Impacts – Project's Footprint (land plots and water areas within the boundaries of which the Project is directly implemented)

The part of the area of influence of the Project is the land acquisition and the adjacent water area of the projected structures (Figure 3.1).

The total land area of the Project is estimated at 3,627 hectares (a little more than 1 % of the license area), of which the SETUP facilities, coastal structures of the PLANT and the PORT account for, respectively, 3,501 (96.5 %), 56 (1.5 %) and 70 ha (1.9 %). Together with the land allocation of the Utrenny Airport (446 hectares leased by the Company and subleased to Sabetta International Airport LLC), the total size of the land plots used within the boundaries of the LA is 4,073 hectares.

Of the 6,000 ha of the water area used, the inner part of it, limited by ice protection structures, accounts for about 400 ha (6.7 %), of which 24.1 ha will be occupied by artificial land plots and about 35 ha by hydrotechnical constructions.

Physical footprint (direct impacts) of the Project will be localized within the Salmanovsky (Utrenny) License Area.

⁶ Direct and indirect impacts occur on land and at sea where there is construction footprint and shipping occurs.

⁷ Cumulative impacts relate to where direct and indirect impacts occur.

⁸ The AOI for considering direct, indirect and cumulative impacts relates to project impacts and also those arising from Associated Facilities.

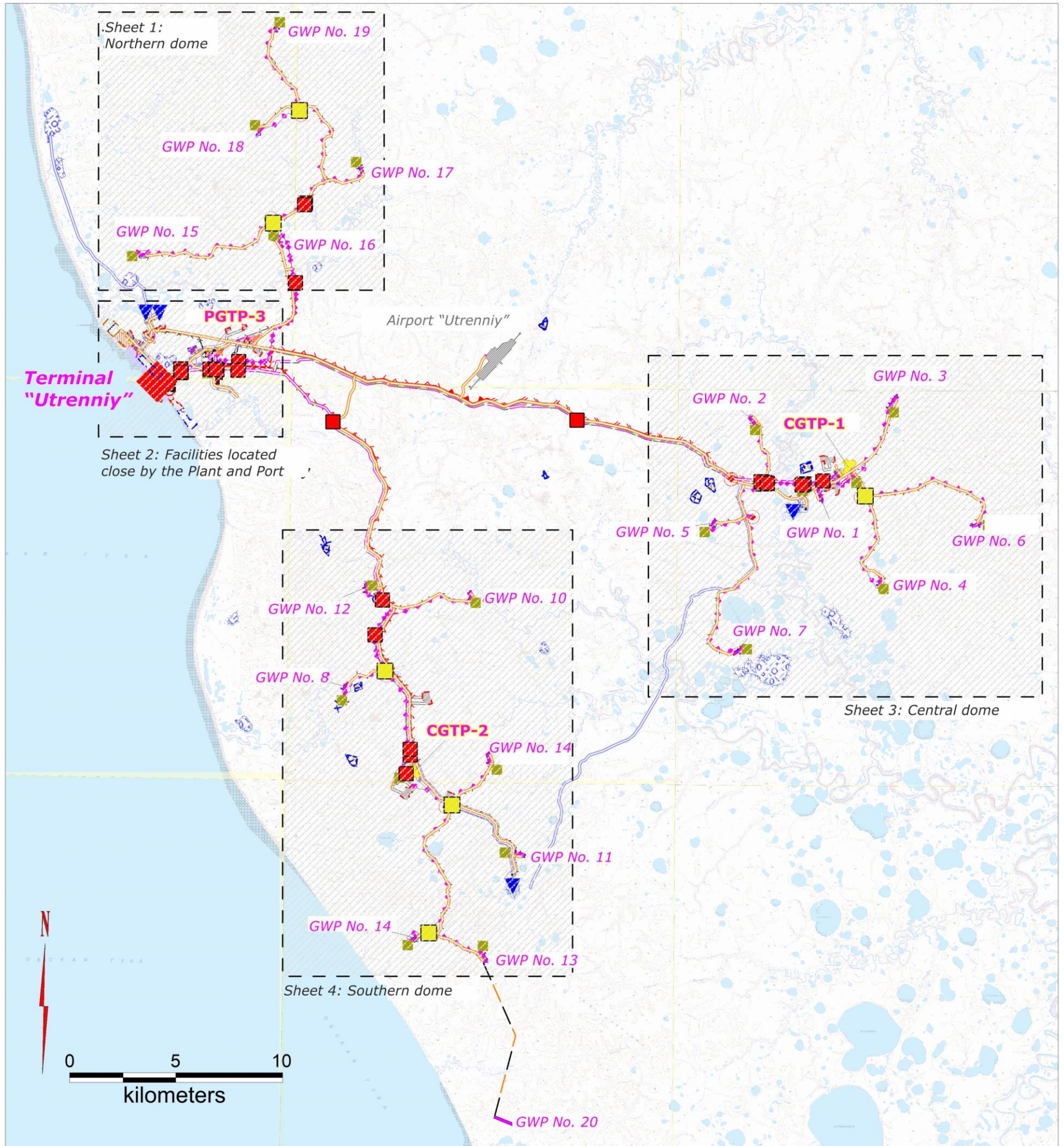


Figure 3.1: Location of the Salmanovsky OGCF Facilities Setup: general layout

Reference: design documentation of JSC "NIPIGAZ", 2019

3.4 Direct and indirect impacts and land use restrictions outside the Project's footprint

The boundaries of the Salmanovsky (Utrenny) OGCF of federal subsurface area (license area, LA) record the spread of restrictions for third parties, the use of subsurface resources at the territory and in the water area of LA is possible only with the consent of Arctic LNG 2 LLC. In this regard, the entire license area (that has the status of a "mining allotment") should be included in the Project's area of influence.



Figure 3.2: Boundaries of Salmanovsky (Utrenny) LA

All the land plots formed for the needs of the Project and the Utrenny airport are located within the Salmanovsky (Utrenny) subsurface area, while part of the outer water area of the Port and the areas of dumping of bottom soil extend beyond its limits up to 25 km (more detail in section 3.5).

The responsibility of the Company and the operators of associated facilities extends not only to the footprint and directly used areas of water space, but also beyond them in the format of zones with special conditions / restrictions of use of the territory.

The most characteristic form of such zones for the Project facilities is a sanitary protection zone (SPZ) – a territory or water area, on the outer border and outside of which the maximum permissible concentrations of pollutants for the atmospheric air of urban and rural settlements, as well as the maximum permissible levels of harmful physical influences (SanPiN 2.2.1/2.1.1.1200-03) are not exceeded. In fact, the SPZ is a buffer zone necessary for the dispersion of harmful impurities in the atmosphere, attenuation of noise,

vibration, electromagnetic fields and other physical influences to the values allowed within the territories under consideration.

Excluding the land allocation of the facilities themselves, the total area of all sanitary protection zones, taking into account the overlap of some of them and the SPZ of the airport's ground facilities, is estimated at approximately 12,000 hectares of land in the Tazovsky district, i.e. no more than 5 % of the area of the license area (Figure 3.3).

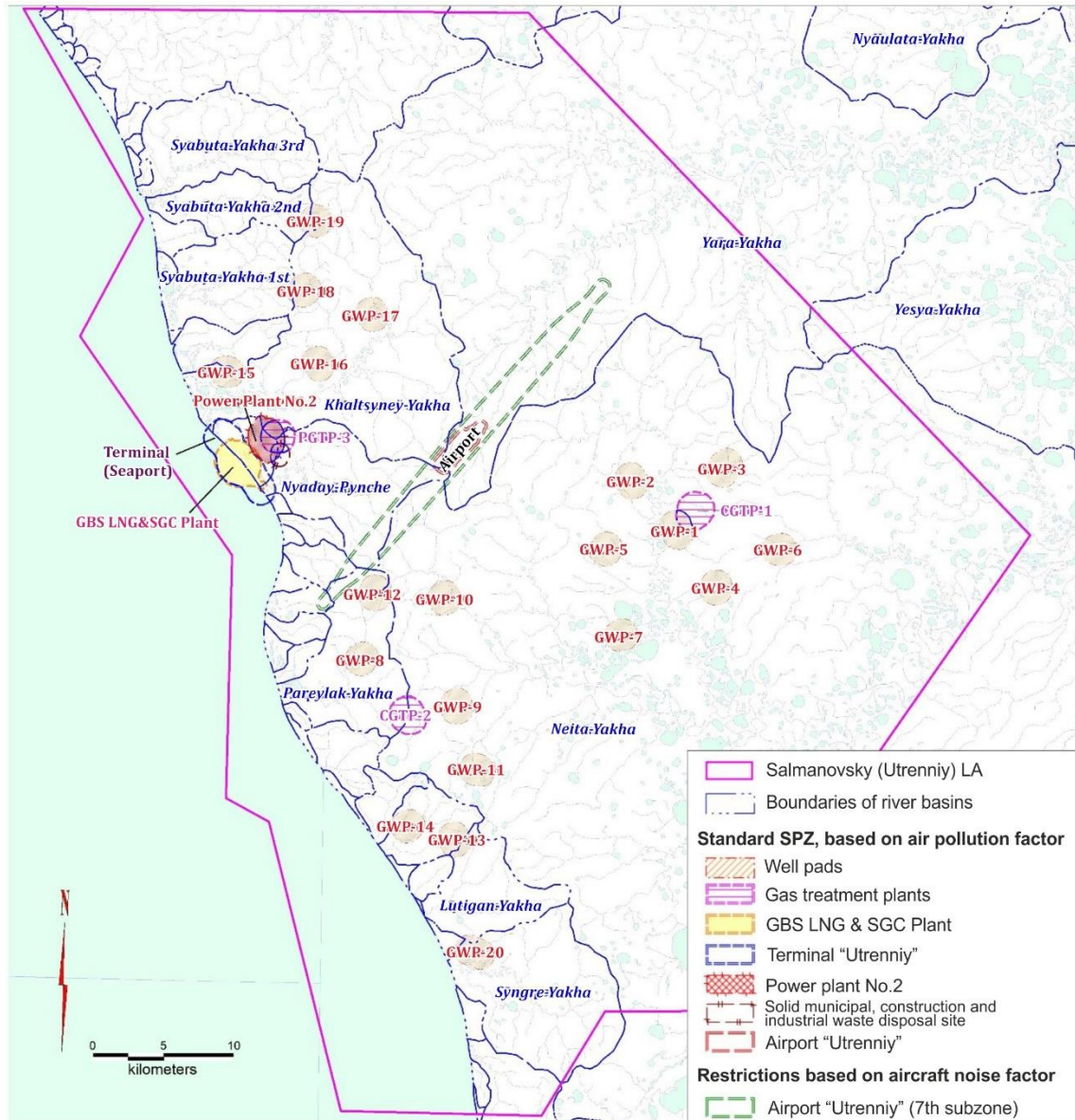


Figure 3.3: Sanitary protection zones and sanitary gaps organized around the Project facilities and the "Utrenniy" airport»

The acoustic effects (air-born noise) of a number of Project facilities are either comparable to, or even superior to, the emissions of pollutants. In particular, for the calculated SPZ of the Plant, both the propagation of noise (isoline of 45 dBA) and the dispersion of pollutants' emissions in the atmosphere (up to 0.71 MPC of NO₂ at the SPZ boundary) are decisive; for the Landfill, exceedances of 1 MPC will not go beyond the site, and the boundary of the SPZ is determined solely by the propagation of acoustic impact (the standard of 45 dBA is reached at a distance of up to 440 m from the Landfill). Air transport will be the dominant source of acoustic impacts on the territory of the LA: the area of the acoustic discomfort zone around the Utrenniy airport, created by the take-off and landing of aircraft, is estimated at 4,900 hectares (see Figure 3.3).

For the next level of assessment of the external contour of the area of influence, the center of which is the land allotment, the water area used, sanitary protection zones and other territories with special conditions

of use, the corresponding criteria of MRR-2017 - isoline of 0.05 MPC of the pollutant with the highest estimated dispersion from emission sources (excluding the baseline values) -are used (Table 3.2).

Table 3.2: The size of the areas of influence of the Project components and the Utrenny airport on the quality of atmospheric air

Project component	The substance with the highest projected distribution in the atmosphere	Distance of the isoline 0.05 MPC (max. one time) from the boundaries of the industrial site, km	Comments
LNG Plant	Nitrogen dioxide (NO ₂)	21	The size of the zone of influence for the operation stage is given. At the construction stage, the predicted distribution of nitrogen dioxide corresponds to the distance of the isoline of 0.05 MPC for 28 km.
Terminal (Port)	Nitrogen dioxide (NO ₂)	10	The size of the zone of influence for the operation stage is given
SETUP: GWP sites	Nitrogen dioxide (NO ₂)	2	Example of GWP No.16 (operation phase)
SETUP: Energy Centre №2	Nitrogen dioxide (NO ₂)	6.2	The size of the zone of influence for the operation stage is given
SETUP: Sites of CGTP-1, CGTP-2, PGTP-3 + GTPP + STF-3	Nitrogen dioxide (NO ₂)	9.5	
SETUP: Landfill	Integrated assessment for all emission components	4	
Quarries of ground construction materials	Nitrogen dioxide (NO ₂)	1.5	Dimensions are exemplified by quarry No.5n (hydraulic jetting). Duration of the quarries development is defined in the design documentation as 2-5 years
Airport	Nitrogen dioxide (NO ₂)	4.7	The size of the zone of influence for the operation stage is given

According to the dispersion modelling calculations presented in the design documentation, the highest distribution will be for nitrogen dioxide: the size of the corresponding area of influence for the Plant is about 20 km, for the Terminal (Port) and natural gas treatment facilities-about 10 km, and for other facilities - from 1.5 to 6.0-6.5 km.

The total area of all the areas of influence that meet the MRP-2017 criterion is approximately estimated at 190,000 ha, which is about half of the area of the license area (Figure 3.3). On land, the impact of the Project and the airport on the quality of atmospheric air will not go beyond the LA, but over the water area of the Ob Estuary, due to the proximity of the Plant and the Port to the western periphery of the license area, it will extend beyond its limits for 10-20 km.

Other impacts of the proposed activities on the components of local ecosystems will not go beyond the designated boundaries. In particular, for the soil and vegetation cover, the main part of the physical-mechanical and possible pyrogenic effects will be limited to the Project land acquisition and the immediately adjacent territory with a width of up to 100 m (this is confirmed by the results of local environmental monitoring of the Project facilities in 2018-2019). At the same time, the zone of indirect chemical contamination of soils, vegetation and snow cover will extend to the entire above-mentioned area of influence with the criterion of 0.05 MPC, the central part of which is formed by sanitary protection zones (see also Figure 3.4).

To sum up, direct and indirect impacts of the Project and associated facilities onshore will be localized within the LA:

- As proved by the emission dispersion modelling, Project's impacts on air quality by air emissions and noise (except shipping) will be localized within the LA.
- Impacts on surface water, even in the worst case of accidental spills and leakages from the Project facilities will be also localized within the LA. This is due to the fact that Project facilities are located on the rivers and streams that flow in west direction and discharge to the Ob Estuary. There are practically no Project facilities on the rivers that flow east and discharge to the Gydan Estuary.
- Noise, key impact of the main associated facility (Airport Utrenny) will be localized within the LA.

As described in Chapter 9 of the ESHIA, the main impacts of the Project on the geological environment, exogenous processes and continental water bodies will be localized within the territory limited to the license area. The impact of the planned activities in the Ob Estuary will go beyond the limits of the LA.

The parameters of the Project's area of influence on biological diversity and the social environment are characterized by the greatest uncertainty, and therefore these issues are specifically discussed separately below in Section 4 of this Addendum.

3.5 Territories and water areas for the placement of associated facilities and the spread of impacts from them

The main part of the impacts of Utrenny Airport, the most significant associated facility within the territory of LA, does not extend beyond the license area (see above).

Other facilities and activities associated with the Project are confined to the waters of the Ob Estuary: hydraulic structures, underwater engineering works, as well as shipping in the Ob Estuary.

In the water area of the Ob Estuary, the boundary of the joint influence zone of the Plant and the Port was determined by the spread of pollutants and physical impacts (warming effect, turbulence, churning of bottom sediments, underwater noise, transformation of the thermohaline structure of water, etc.), mainly in the direction of the dominant currents – river runoff, marine intrusive, tidal and run-up.

Understanding of the above effects and their propagation in the water environment of the Ob Estuary is achieved by the appropriate modelling exercise using two different models:

- 2018 - a 3D thermo-hydrodynamic model of the Princeton University, US;
- 2019 - model of the Marchuk Institute of Numerical Mathematics, RAS⁹.

Both models were first adapted by EcoExpressService (2018) and IEPI (2019) for the conditions of the Ob Estuary and implemented in two versions: for the natural hydro-thermodynamic conditions in the examined water area, and for simulation of hydro-thermodynamic conditions considering the hydraulic structures of the Project and changes of underwater terrain due to dredging and dumping of bottom soil.

The model produced similar predictions that indicate that the longest transport of suspended solids during the dredging activity is expected in relation to underwater dumping of soil. In this case, suspended solids with concentrations above 0.25 mg/l (threshold considering the negative effects of increased input of suspended matter on water quality and aquatic life¹⁰) may occur within a distance of 25 km to the north and south of the dump site.

⁹The international designations of the two models are: POM (The Princeton Ocean Model) and INMOM (The Institute of Numerical Mathematics Ocean Model)

¹⁰Considering potential coincidence of the Project's dumping effects and impacts of third party activities resulting in increased turbidity of water in the Ob Estuary, this threshold is selected with a certain margin: first, the annual average concentrations of suspended solids in the estuarian water vary between 6.5 mg/l and 9.0 mg/l (refer to the survey reports by Fertoiing, 2017); second, the minimum threshold concentration of suspension at which the first signs of adverse effects can be observed (usually in the form of reduced photosynthesis in algae and deterioration of filter-feeding in invertebrates) is 10 mg/l; third, there is multiple evidence to demonstrate that suspended solids concentration below 10 mg/l (Russian MPC standard for the top category fishery waters) does not cause any negative effect on planktonic communities

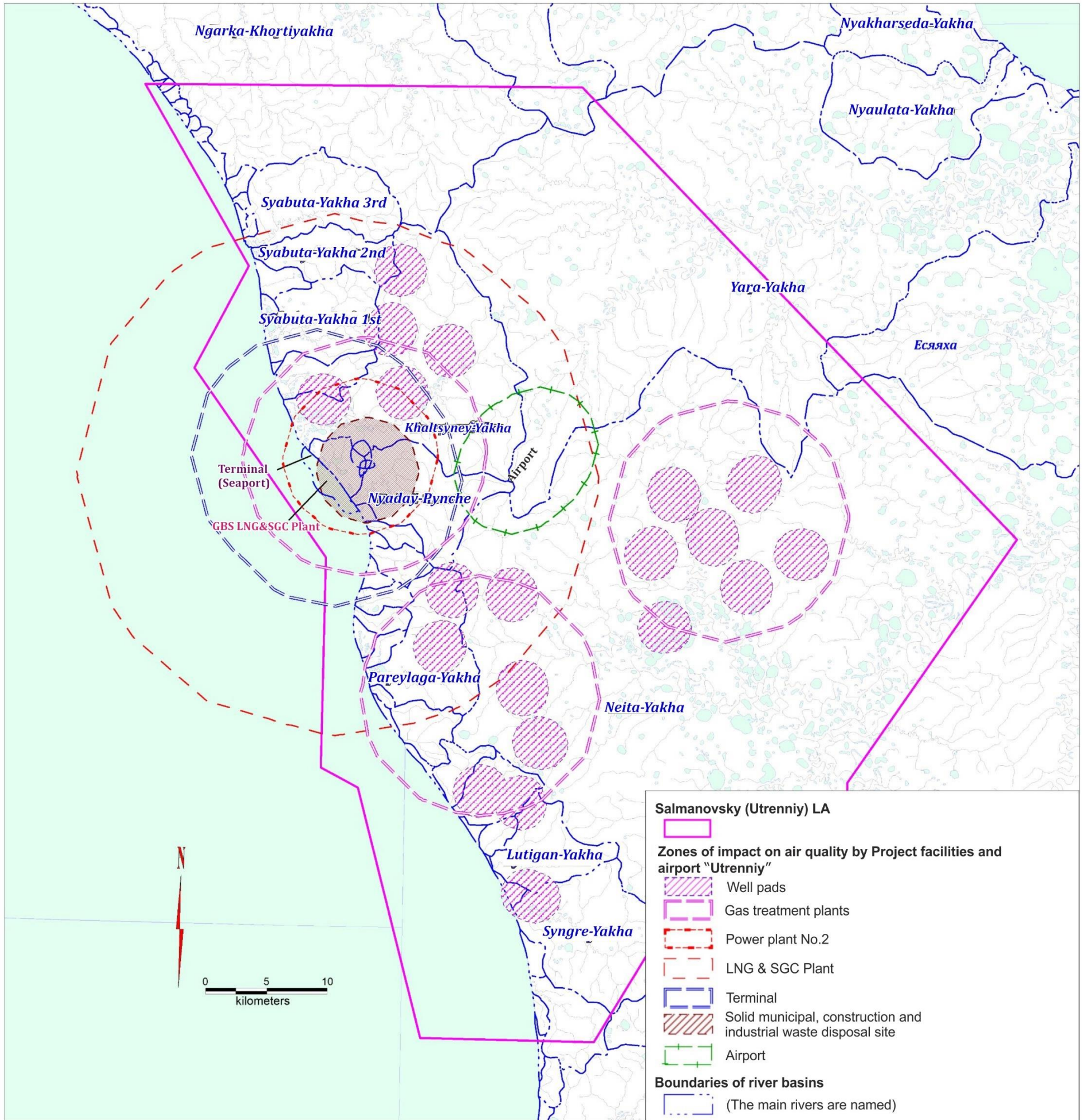


Figure 3.4: Impact areas of the Project facilities and Airport Utrenniy on air quality

3.6 Cumulative Impacts - Territories and water areas that may be affected by the direct and indirect impacts and cumulative effects of the planned activity

Potential cumulative impacts on physical environment associated with the overlap of the planned activity with the activities of third parties, predicted and mapped at this stage of the Project implementation, include impacts on the quality of atmospheric air and the water environment of the Ob Estuary.

The Utrenny Terminal is designed considering the planned increase of the number of GBS LNG&SGC process trains to 6 trains, through the implementation of a new LNG project - Arctic LNG 1 to be launched after 2027. Therefore, the impacts of the plant and vessels traffic are expected to increase approximately two-fold, and be supplemented with the impacts of construction and operation of the utility corridors to connect the Plant and Utrenny Terminal with the future resource base of the Arctic LNG 1 project located south and south-east of the Salmanovsky (Utrenny) LA (refer to Chapter 13 of the ESHIA).

3.6.1 Impact to Atmospheric Air

In terms of air quality, the impact will be significantly enhanced by combined action of impact of the Plant and Port and influence of the nearest third-party facilities - three additional process trains that the Arctic LNG 1 project may implement in the future in the nearby onshore and offshore areas. Considering the location of the main planned air emission sources (three additional process trains) close to the Terminal and the pollution dispersion modelling results for the plant and similar projects, it is not expected that cumulative and indirect impacts of pollution emissions will extend beyond the LA (refer to Chapter 13 of the ESHIA).

3.6.2 Underwater engineering works in seaports Sabetta and Utrenny

As to water quality in the Ob Estuary, the main potential to produce notable cumulative effect are dredging operations of the Project and those conducted by third parties. Outputs of the turbidity modelling in relation to dredging and dumping at Sabetta (Yamal LNG Project) and Utrenny (Arctic LNG 2, refer to Chapter 9 of the ESHIA) indicate that turbidity plumes may propagate in the opposite directions to a distance of several tens kilometres from the respective sites of underwater technical operations. The combination of the simulation results for the Sabetta and Utrenny terminals (Figure 3.6) performed by the Consultant shows that if dumping operations are carried out in parallel or very close to each other, the concentration of such suspended solids in the overlapping zones will not exceed the sensitivity threshold of 10 mg/l. Considering that the dredging for construction of the Sabetta port and approach channel in relation to the Yamal LNG Project had been completed prior to start of construction activities in the Terminal "Utrenny" and that minor volumes of soil will be produced during the maintenance dredging for the Yamal LNG Project and dredging for the Obsky LNG Project (if occurs), their turbidity plumes are unlikely to overlap the turbidity plumes from the Arctic LNG 2 Project. **Monitoring results obtained to date generally confirm that Project's impacts are within the predicted levels.**

3.6.3 Impact of Sea Channel

In terms of environmental impacts, the most significant section of the water ways is the channel across the Ob Bar - so called sea channel. Its dimensioning requirements are dictated by geometry of vessels used by the Yamal LNG Project, and the area affected by the channel extension and regular maintenance dredging activities is included into the area of influence of the Yamal LNG project (Figure 3.6.).

The channel is actually used by several operators of which the largest are Gazpromneft-Yamal (since 2015) and Yamal LNG (since 2017). The increasing traffic of large vessels for which the channel is intended means a need for its local reconstruction - widening of entrance sections from 385 m to 573 m, and arrangement of two dredged bays along the main channel route while maintaining the existing dumping arrangements. The respective dredging activities are planned for ice-free periods during 2020-2022. Similarly to the underwater technical operations for the Port water area, impact of the sea channel activities that spreads to the longest distance is the turbidity plumes from dredging and dumping operations.

Operation and reconstruction of this facility are not solely linked to the Arctic LNG 2 Project (due to the lack of grounds for such attribution), however, the Consultant included the sea channel and adjacent water areas affected by the reconstruction and maintenance activity into the Project's area of influence (Figure 3.6), as the sea channel is seen by the scientific community as a significant factor of transformation of thermohaline structure and aquatic ecosystems in the Ob Estuary.

Published scenarios based on numerical simulations showed the potential for saline front penetration through the construction of a canal up to 57 km under worst-case conditions^{11 12}. However, later studies show that the role of the channel is insignificant from the point of view of salinity penetration into the Estuary. It cannot lead to a radical restructuring of the salinity field. According to the results of direct observations and model calculations, fluctuations in the position of the salt front in the intervals of synoptic variability are from 50 to 90 km, interannual - 80 km. An increase in the penetration range of a saline waters into the Estuary when a channel appears with a conservative (overestimated) estimate does not exceed 10-12 km. It is considered as negligible in comparison with natural changes in the position of the salt water front¹³.

3.6.4 Marine shipping as direct and indirect impacts and cumulative effects

Sea transport will be used during construction and operation of the Project facilities, and the resulting increase of load on the navigation routes and port infrastructure can be considered as a source of cumulative impacts. Tentative contribution of the Arctic LNG 2 Project to the cargo traffic in the northern section of the Ob Estuary (including the sea channel across the Ob Bar) up to Sabetta is estimated at 25%, and if enhanced twofold - 50%, assuming the vessel parameters similar to those used by the Yamal LNG project.

An important issue for determining the Area of Influence is the configuration of ship routes. When determining the Yamal LNG Project's AOI, it was used NSR line, shown on the hydrographic maps of the 2014 edition. The AOI of the Yamal LNG project in the Kara Sea was taken as a section of 25 km from the main shipping route to the high-latitude route of the NSR.

The website of the FSBI 'Hydrographic Enterprise' shows the promising routes of the Northern Sea Route (<http://z251365.infobox.ru/kage.html>), for which hydrographic surveys are being carried out. Analysis of data on sea traffic 2019-2020 shows that the existing vessel traffic generally follows the configuration of prospective ship routes (Figure 3.5). The actual width of ship routes is determined by ship deviations from the course, primarily due to ice conditions. These deviations were estimated at 2-7.7 miles¹⁴. The point of divergence of ship routes to the west and north / east is considered as a cumulation zone, up to this point the impact of ship traffic will be maximum.

3.7 Territories and water areas potentially affected by unplanned but predictable project-related activities that may be implemented at a later date and elsewhere

The design documentation for the Utrenny Terminal that has passed the State Environmental Expert Review and the Main State Expert Review of the RF allows for ultimate extension of the LNG and SGC production, storage and offloading capacities from three process trains (Arctic LNG 2 Project) to six (prospective project of third party - LLC "Arctic LNG 1").

According to the Company, the reserves of natural gas and condensate in the Salmanovsky (Utrenny) OGCF are sufficient to maintain hydrocarbons feed for the Project through its whole life; therefore, future development of other fields in the Gydan Petroleum Region is considered by the Consultant solely in the context of third-party projects (Chapter 13 of the ESHIA).

Activities that are not designed at this stage but will be required in the future for the Project success, include development of additional capacity to manage solid wastes: The solid municipal, construction and industrial waste disposal site (SMCIW DS) being developed as part of the Field facilities lacks capacity even for disposal of all Project wastes, not to mention the wastes from demolition of the Project buildings and installations after decommissioning (refer to Section 9.7 in Chapter 9 for details). The Consultant is not aware of the location and technical parameters of the future waste management facilities, however it is likely that such facilities will be developed in areas with a better transport access within the Salmanovsky (Utrenny) LA. Furthermore, in case of simultaneous implementation of the Arctic LNG 2 and Arctic LNG 1

¹¹ N.A. Diansky, V.V. Fomin, V.M. Gruzinov, I.M. Kabatchenko, G.I. Litvinenko. Assessment of effect of the approach channel to the port of Sabetta to changes in hydrological conditions of the Gulf of Ob using numerical modeling. Arctic: Ecology and Economy. 2015, Vol. 18. P. 3-19

¹² B.V. Arkhipov, A. M. Alabyan, A. A. Dmitrieva, V. V. Solbakov, D. A. Shapochkin, 2018. Modeling the influence of the Sabetta port sea channel on hydrodynamic conditions and salinity of the Ob Estuary. Georisk, Volume XII, No. 1, p. 46-58
<https://istina.msu.ru/publications/article/117550769/>

¹³ Comprehensive environmental monitoring programme. Ob Bay in the Yamal LNG Project area of influence. PHASE 4 REPORT - Final Report on the results of the Comprehensive environmental monitoring programme. Ob Bay in the Yamal LNG Project area of influence. Book 1. Explanatory note. FRECOM LLC, ZMI MGU LLC. Moscow, 2020. Book 1. Explanatory note. 364 p.

¹⁴ I Ju Korolev. Verification of methods for assessment of the permissible vessel variation from the high-latitude Northern sea route." Vestnik Gosudarstvennogo universiteta morskogo i rechnogo flota imeni admirala S.O. Makarova 9.1 (2017): 88-94. DOI: 10.21821/2309-5180-2017-9-1-88-94

projects, the new landfill will serve as a shared facility for the two projects, similarly to the Utrenny Airport being constructed.

Based on the above, it is concluded that construction and operation for new Project waste management facilities, without reference to their location, will not influence the boundary of the Project's area of influence identified for other factors (Figure 6.1).

3.8 Conclusion

Initially in the ESHIA the northern boundary of the Project's area of influence was defined as the boundary of respective impacts. Based on thorough analysis of marine shipping potential impacts on biodiversity the Consultant proposes to extend the Project's Area of Influence further north.

The issues discussed in this section give reason to consider the configuration of the AOI as follows:

1. Direct and indirect impacts on land do not go beyond the boundaries of the LA;
2. The full extent of the AOI in the water area is determined by ship operations (dredging and dumping) and vessel traffic including all impacts associated with shipping (e.g. underwater noise, lighting, ship collision and etc.).

Details of the suggested AOI extension and its boundaries are discussed below.

The southern boundary of the Project's area of influence within the Ob Estuary is defined considering the following factors:

- Boundaries of the offshore part of the license area;
- Natural asymmetry of hydrochemical (including thermohaline) structure of water, bottom relief and flow field in the examined section of the Ob Estuary, which results in transport of impacts in water along the shore line;
- Configuration of drainage basins of rivers on the Gydan Peninsula that are affected by the Project;
- Specific features of the western shoreline of the Ob Estuary: shore sections protruding far into the water will be most affected by the Project.

Based on analysis of additional materials on biodiversity (including recent WWF monography on priority areas for biodiversity conservation in the Kara Sea, region-specific scientific publications and monitoring 2020 data) and data on current (Figure 3.6) and future shipping activities in the area of interest we have extended the northern boundary of the AOI until the northern boundary of the Ob-Yenisey river mouth ecologically or biologically significant area (EBSA) (Figures 3.5, 6.1). As such AOI also covers the seascape up to the divergence point towards the western and eastern shipping routes of the NSR, where a greater (in comparison with the NSR) impact of the Project related shipping activities on the total volume of shipping in this area is anticipated. Total AOI is equal to approximately 23,100 square kilometres.

Further assessment work is being undertaken as part of the assessment on shipping in the Ob Estuary.

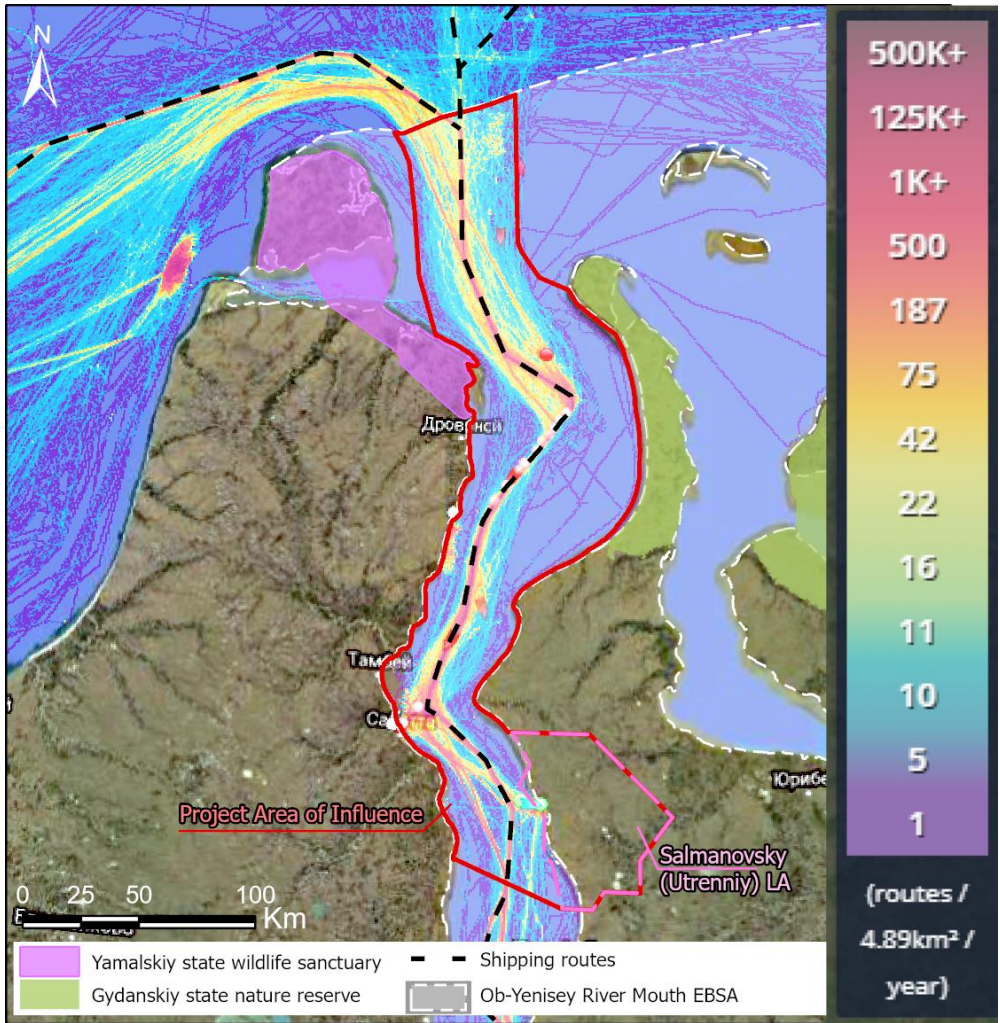


Figure 3.5: Shipping density in years 2019 and the proposed AOI

Source: <https://www.marinetraffic.com>

4 PROJECT AREA OF INFLUENCE IN TERMS OF BIODIVERSITY CONSERVATION

This section of the ESHIA Addendum considers the proximity of the Project to areas of known biodiversity value such as the Kara Sea and areas providing Ecosystem Services and the potential impacts of the Project on such areas.

Impacts on biodiversity will include:

- Transformation of habitats by **direct impacts** from the proposed activities – **localized within the immediate impact area (construction facilities on land, dredging and dumping in the sea, etc.)**.
- **Direct, indirect and cumulative impacts** on biological species on land, in the surface waterbodies and offshore – **assessed based on additional biodiversity analysis including baseline update, Critical Habitat Assessment updated to include extended marine areas in the Kara Sea and land areas in the Gydan Peninsula**.

The impact on individual species of fauna, including population effects, is the least predictable and cannot be represented on maps due to the pronounced seasonality of the presence or activity of most local species: for many of them, the areas in the Gydan tundra and the Ob Estuary represent only a small part of the vast migration path with its characteristic interannual dynamics, including global climate changes. The biological diversity monitoring program will also focus on identifying such effects.

Key results of the analysis are presented below.

4.1 Natural boundaries on landscape / seascape

In terms of biogeographic regionalization, it should be noted that:

- Onshore construction / operation of the project falls entirely within the boundaries of the northern hypoarctic tundra;
- The offshore operations of the project discussed in Section 3 are fully situated within the Ob estuarine system. A large amounts of fresh warm river discharge causes unstable saline regime and high level of primary production. The river runoff affects the entire Kara Sea and the boundaries of the estuarine area differ in different regionalization schemes. However, for practical needs, it is advisable to accept the internationally recognized border of the EBSA 'Ob-Yenisey River Mouth' as the northern border of the estuarine region.

4.2 Hydrobiological Communities of the Ob Estuary

The limits of the impact on hydrobiological communities are determined by:

- water pollution by suspended matter during dredging and dumping, which leads to the degradation of plankton communities and potential negative impacts on benthos;
- silting of the bottom area with a layer of sediments, leading to the degradation of zoobenthos;
- transformation of thermohaline conditions as a result of dredging and construction of onshore facilities.

The boundaries of the impact will be localized in the area of hydrotechnical work and in the zone of distribution of the suspended matter plume, the boundaries of which are determined by the results of hydrodynamic modelling. These conclusions are also confirmed by the results of monitoring studies in 2020¹⁵. According to the data obtained from the results of hydrobiological sampling at 106 stations of a comprehensive study in the water area of the Northern part of the Gulf of Ob, the following conclusions were obtained:

- The anthropogenic cloud of suspended matter with concentrations exceeding the natural background extends 15 km to the north (down in the direction of the general current) from the Terminal, 8.9 km to the south (up in the general current), 5-6 km from the coast of the Gydan Peninsula. In the area of the sea channel, due to different hydrological conditions (higher salinity, weaker flow), the conditions for dispersion of suspensions differ. High concentrations are observed only directly in the dredging area.

¹⁵ Comprehensive studies of the ecological state of the Gulf of Ob in the zone of potential impact of the Arctic LNG 2 project and in the adjacent water area. Final report. JSC "IEPI". 2020.

- Data on the thresholds of suspended substances that cause negative reactions for phytoplankton communities were obtained. According to these data, at the concentration of suspensions up to 50 mg/l, the state of plankton communities is stable, in the range from 50 to 150 mg/l, the variance of the phytoplankton abundance increases, which indicates possible signs of community degradation.
- A statistically significant relationship between the total abundance of the total number of benthic organisms and the concentration of suspensions is shown. High values of the abundance of bottom animals in the freshwater community are observed only when the concentration of suspended particles is less than 100 mg/l.

Figure 4.1 shows the relationship between the values of the total abundance of phytoplankton and the concentrations of suspended substances within the zones of the visual suspension plume.

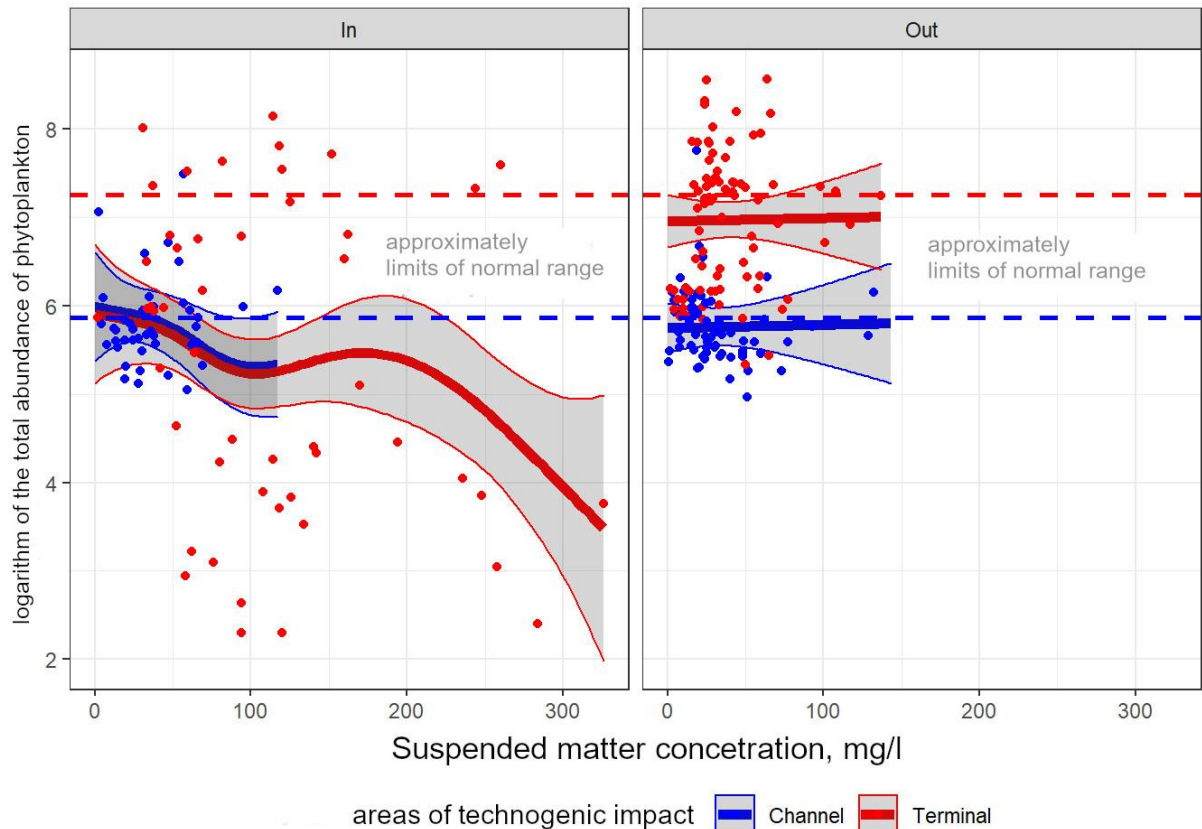


Figure 4.1: The dependence of the total abundance of phytoplankton on the concentration of suspended particles within the suspension plume (In) and outside it (Out) at two sites of active anthropogenic impact. The horizontal dotted lines represent the average phytoplankton abundance in the channel area (blue line) and in the terminal area (red line). Source: JSC "IEPI", 2021

Figure 4.2 visualizes suspended matter concentrations in the area of the Utrenny Terminal with threshold values determined by the degradation of phytoplankton.

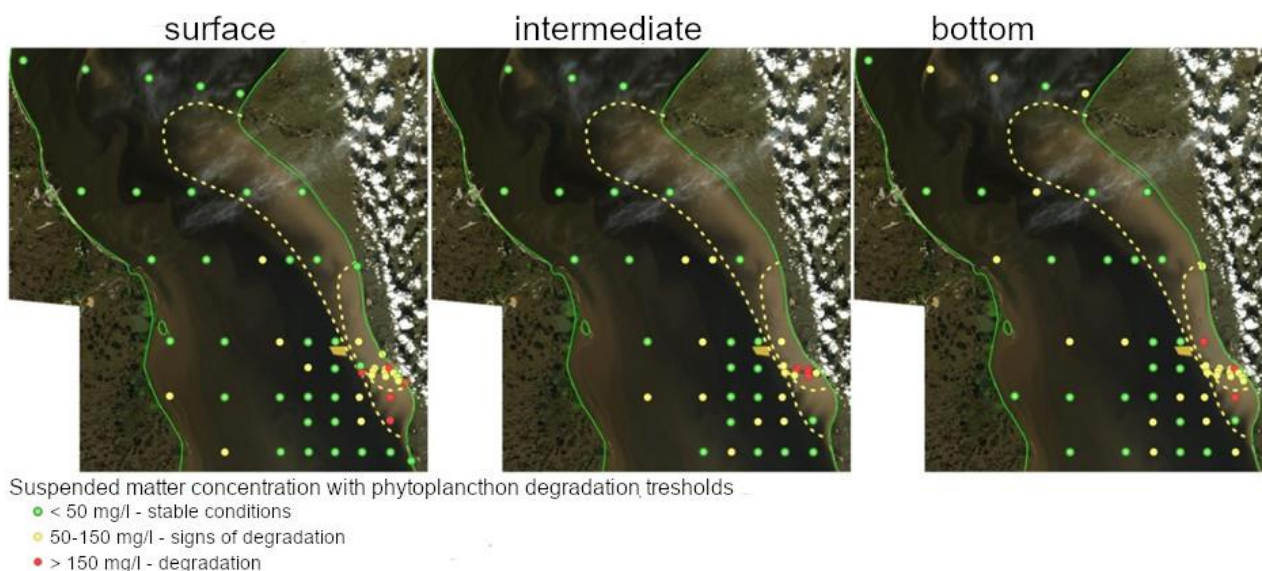


Figure 4.2: The concentration of suspended matter in the area of hydraulic engineering works in the area of the Terminal "Utrenny" according to the results of the expedition work in August 2020. The satellite image Sentinel 2, taken on 28.08.2020, was used as a background. The dashed line shows the plume of suspensions. The inner border is a cloud of anthropogenic origin, the outer one is of unclear genesis, close in brightness to the natural background. The boundaries are given conditionally. Source: JSC "IEPI", 2021

These results show that the degradation of hydrobiological communities is observed only in the area of dredging, the impact does not go beyond the boundaries defined in the ESHIA.

Among the representatives of the ichthyofauna, the Siberian sturgeon (*Acipenser baerii* Brandt), listed in the Red Books of the Russian Federation and the Yamal-Nenets Autonomous District as a threatened species (category I), and also included in the IUCN Red List (2010) with the category EN (endangered species), meets Criterion 1 of PS 6 of the IFC in the area of consideration. The main habitats are indicated for the more southern areas of the Ob Estuary, and in the area of the Project implementation, single extremely rare occurrences of this species are known. According to the results of monitoring studies in the water area and in the water bodies of the LA, the sturgeon was not detected.

There is no reason to believe that the activities associated with the implementation of the Project, which are confined to the northern part of the Ob Estuary, can have a significant impact on the population of this species, whose habitats are concentrated in the southern part of the Estuary. Thus, the southern border of the Project's zone of influence in the water area of the Ob Estuary does not require changes.

The impact of underwater noise from vessels and machinery on fish is not fully understood, although there are a number of extensive reviews on this issue¹⁶. Such an impact can lead to the fact that the fish, avoiding noise, sink to the bottom or leave the area of their location¹⁷. Such a reaction of leaving the feeding areas can be observed at a distance of up to several tens of kilometers from the feeding areas. The greatest potential impact is experienced by fish in the water column (pelagic and anadromous), the least - bottom fish, located at the greatest distance from vessels. Fish "specialists" perceive sound well in a wide frequency range - their inner ear communicates with the swim bladder. This increases the sensitivity of hearing in a wide spectral range. Fish "generalists" do not have specialized anatomical structures that increase the sensitivity of hearing. Species "specialists" include *Pungitius pungitius*, *Lethenteron kessleri*, *Acipenser baerii*, *Osmerus dentex*, *Boreogadus saida*. The last two of them are massive numerous species in the water area of the project's zone of influence. Noise from large vessels affects the distribution of fish stocks and can have a significant impact on fish. However, it is not possible to assess quantitatively and unequivocally how such an impact will affect fish stocks. Further studies of the underwater noise environment, which began in 2020, will be continued on a regular basis, including the ice period.

¹⁶ Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D. A., Bartol, S., Carlson, T. J., ... & Tavolga, W. N. (2014). Sound exposure guidelines. In ASA S3/SC1. 4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI (pp. 33-51). Springer, Cham.

¹⁷ Popper, A. N., & Hastings, M. C. (2009). The effects of anthropogenic sources of sound on fishes. *Journal of fish biology*, 75(3), 455-489.

4.3 Marine mammals

The walrus (*Odobenus rosmarus*) and polar bear (*Ursus maritimus*) are considered among the protected species of marine mammals whose ranges fall within the boundaries of the area of influence.

The number of walrus in the Kara Sea was recently estimated at approximately 3 thousand individuals¹⁸. The Critical Habitat (after Criteria 1c and 3a) for this species was identified at the north-western coast of Yamal and the shallow waters of the Kara Sea with depths of up to 50 m¹⁹. A potential impact on the walrus can come from vessel collisions. Known haul-outs are far from the zones of marine operations and main traffic routes, records of walrus encounters in the AOI are extremely rare, the significance of such impact is assessed as low/negligible.

Polar bears tend to live north of the study area, and the Ob-Yenisei coast is an area with low and medium probability of encountering this animal²⁰. Bears are regularly recorded in the area of the islands of Vilkitsky, Neupokoev, Shokalsky (Rosenfeld et al., 2018²¹). In the Gydan National Park, the presence of several bears is regularly recorded, incl. females with cubs. However, on the Yamal, polar bears were encountered at least twice in the area of the accommodation camp at Sabetta (rusmam.ru).

Information on the location of dens is most important for conservation of polar bear. For the Kara Sea sub-population, this information is scarce. Dens were occasionally found on the Oleniy (in 1976) and Shokalsky (1999) islands. According to unverified information, dens may be also present on the Beliy island to the north of the Yamal peninsula (Figure 3.5) (Boltunov et al., 2015). Total number of bears in the Kara Sea totally unknown. Project impact on polar bears in the Kara Sea is considered as low and the impact will be direct (vessel collisions) and indirect (a possible decrease in the food supply and in-water underwater sound impacts.).

From the point of view of the impact on the species of marine mammals migrating in the Project area, the beluga whale (*Delphinapterus leucas*) was considered. The impact of the project on beluga is possible both direct (acoustic impact as a result of hydraulic engineering works and vessels in the northern part of the Ob Estuary), and cumulative (increase in the intensity of navigation in the northern part of the Ob Estuary due to vessels operating within activities of the ALNG 2 Project). These impacts are localized in the proposed Project area of influence, which covers part of the Ob Estuary water area, the southern boundary of which is drawn along the maximum distribution of suspended substances in the southern direction during dredging/dumping, and the northern boundary is extended to the intersection with the NSR and EBSA's limits.

The expected impacts of the Project on the beluga whale include increased nuisance in the Port and Plant area, a short-term decrease in the forage base productivity during hydraulic works; changes in the routes and timing of migrations, disturbance of the traditional places of accumulation and feeding of marine mammals due increased underwater noise from ships and works in the water area; risk of injury or death from collisions with ships. Hydroacoustic studies in the Ob Estuary were conducted for the first time in 2020 (IEPI JSC, 2021). The measurements in the frequency range of 2 - 15,000 Hz were made using autonomous seabed acoustic monitors developed and manufactured at the Pacific Oceanological Institute of the Far Eastern Branch of the RAS. The experimental studies of the propagation loss of low-frequency (10–200 Hz) acoustic pulse energy showed significant loss of air gun signal on the way through a river section with an average depth of 18 m. The pulse energy decreases by 41.5 dBA at a distance of 1.2 km from the source, and by 55.8 dBA at 2.8 km. Numerical simulations have shown that the bulk of the low-frequency energy is absorbed by the "soft" (by the acoustic properties) bottom. The main sources of underwater noise during the construction of the Utrenny Terminal are dredging and piling operations in the vicinity of the terminal and berth structures. The bulk of energy of acoustic vibrations generated during the works in shallow waters is transmitted in the frequency range of 80-200 Hz. According to the numerical simulations, sound in this frequency band propagating from the Terminal to the coastal zone has minimal losses at the bottom: from -81 to -100 dBA at a distance of 1 km from a potential source of anthropogenic noise, from -98 to -112 dBA at a distance of 2 km and from -110 to -170 dBA at 5 km from the source. Thus, at a distance of 2.6-4.6 km from the source in the construction area of the Terminal, the level of underwater noise will be comparable to the ambient noise.

¹⁸ Basing on survey data in 2019-2020. A. N. Boltunov pers. comm.

¹⁹ for more information see: Critical Habitat Assessment. ARCTIC LNG 2 PROJECT. Ramboll CIS. 2021

²⁰ A. N. Boltunov, Ya. I. Alekseeva, S. Ye. Belikov, V. V. Krasnova, V. S. Semenova, V. N. Svetochev, O. N. Svenocheva, A. D. Tchernetskiy. Marine mammals and polar bear of the Kara Sea: current status. Moscow, 2015. 103 p.

²¹ S. B. Rosenfeld, G. V. Kirtayev, N. V. Rogova, M. Yu. Soloviev, A. A. Gortchakovskiy, M. S. Bizin, S. S. Demyanets 2018. Assessment of population status and habitat conditions for anseriformes in the Gydanskiy state nature reserve (Russia) and adjacent territories, with the use of ultralight aviation. Nature Conservation Research. Conservation Science, 3

The data analysis results were used for drawing up the acoustic profiles of specific vessels, and for estimation of the radius of the acoustic impact of ships on marine mammals. The threshold level of nuisance for white whale at 120 dBA re 1uPa was adopted as the acoustic impact boundary²². Although in reality this threshold varies depending on context and species, especially for Arctic species, the 120 dBA threshold allows for standardized comparisons²³. For example, a ship noise attenuation curve was compiled for LNG tanker Eduard Toll using the field measurements at different distances from the vessel. From the curve, the threshold value of the acoustic exposure radius for the vessel was obtained in the range of 0.8 to 1.3 km (Figure 4.3).

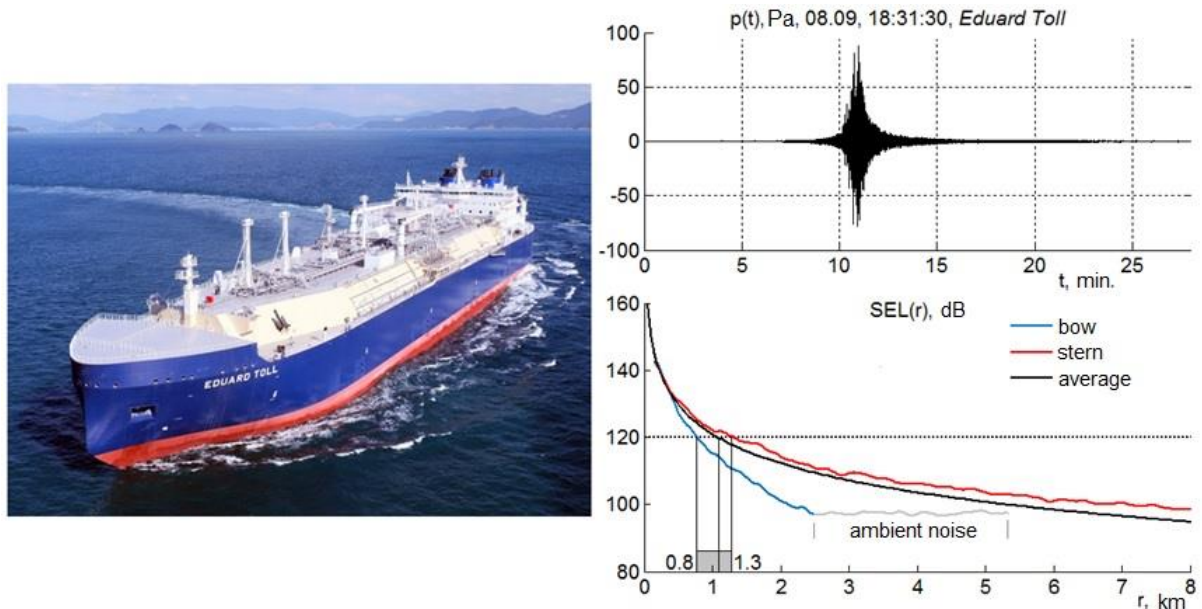


Figure 4.3: Time base of the acoustic noise generated by the tanker Eduard Toll while passing near the station O1-ad, and the plot of the dependence of the energy of ship noise on the radius

Figure 4.4 shows a diagram of the frequency of acoustic events in the Project area. The map is based on the assumption of a constant rate of sound attenuation over the entire water area with the calculation of the frequency of acoustic events (ship passes) per square of 2*2 km.

²² Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene Jr., C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J. a, Tyack, P.L., 2007. Marine mammal noise exposure criteria: initial scientific recommendations. *Aquat. Mamm.* 33, 411–521.

²³ Halliday, W. D., Pine, M. K., Citta, J. J., Harwood, L., Hauser, D. D., Hilliard, R. C., ... & Insley, S. J. (2021). Potential exposure of beluga and bowhead whales to underwater noise from ship traffic in the Beaufort and Chukchi Seas. *Ocean & Coastal Management*, 204, 105473.

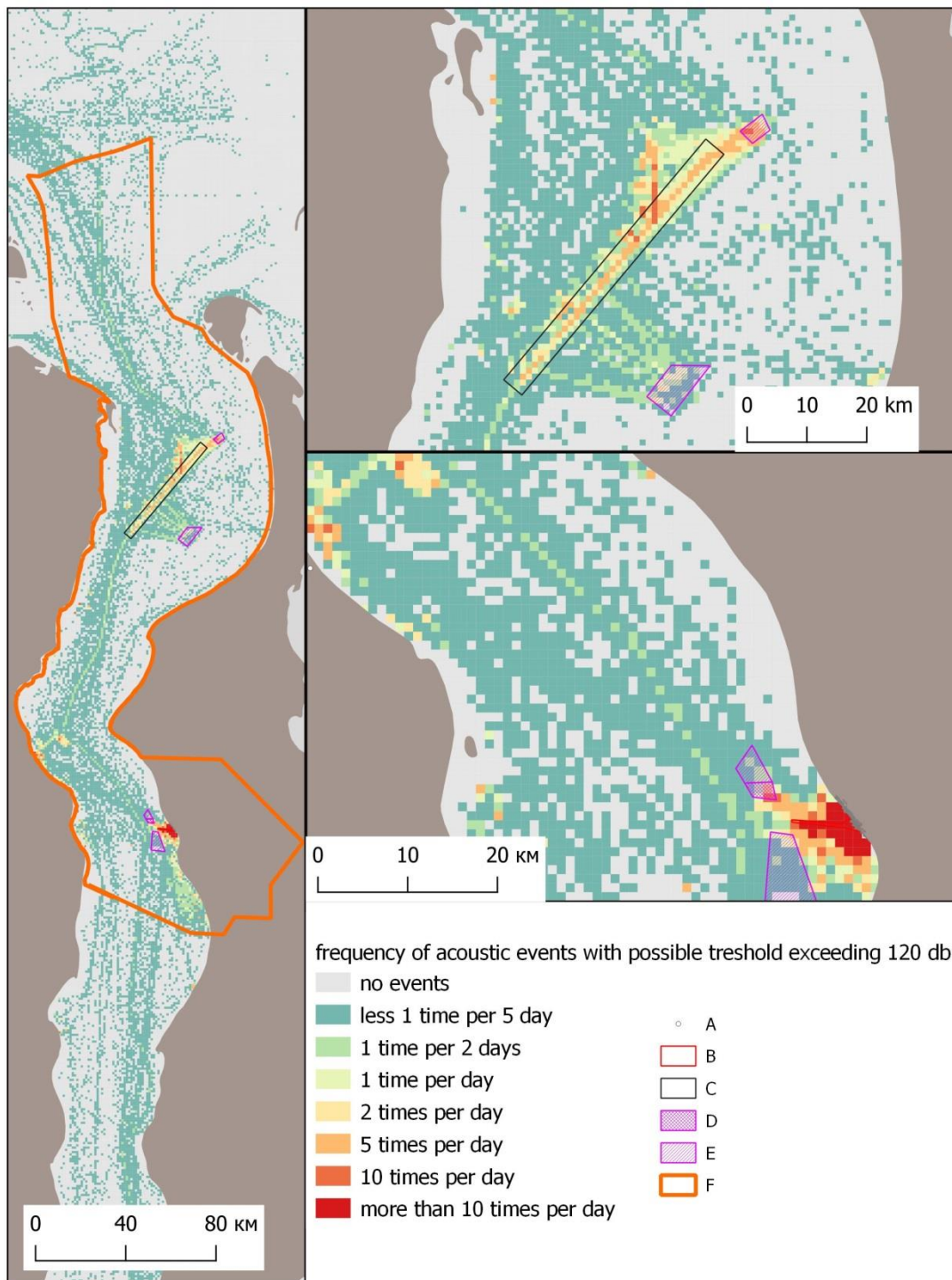


Figure 4.4: The frequency of acoustic events with a possible excess of the threshold level for beluga whales for August-September 2020. The map is based on data on ship traffic from the AIS system. Symbols: A-acoustic bottom stations, B-approach channel, C-sea channel, D-active dumping areas, E-projected dumping areas, F – Project AOI

Analysis of this information shows that a significant part of the water area experiences a relatively low level of acoustic impact with a frequency of acoustic events less than once every 5 days, and extensive highly productive shallow waters that potentially serve as a feeding ground for these animals are not affected by traffic. The results of hydroacoustic studies show that, considering the conditions of propagation of underwater noise in the northern part of the Ob Estuary, a significant part of the water area will not be affected by the hydroacoustic impact from the Project facilities and ship traffic. The projected increase in traffic intensity (and, consequently, the factor of concern for marine mammals) will be timed to the existing ship route in the Ob Estuary.

The northern boundary of the impact, taken along the main ship route of the Northern Sea Route, completely captures the key areas of beluga whale habitat during the summer period identified in the

literature, the northern boundary of which coincides with the northern border of the Ob-Yenisei estuary region.

The Ob-Yenisei polynya is a valuable component of biological diversity. Ecosystems of flaw polynyas are recognised as valuable biological objects of the Arctic seas²⁴. This unique natural phenomenon - areas of open water among the polar ice - is of particular importance for ecosystem processes and biological diversity in the Arctic²⁵²⁶. Flaw polynyas feature an increased biological productivity of hydrobiological communities and provide the base for wintering and concentrations of marine mammals; migratory birds concentrate here in the spring, when most of the water area is still covered with ice. The Ob-Yenisei flaw polynya in the frontal zone of the Ob Estuary falls into the proposed area of influence. This water area is known to be the place of concentration of marine mammals (seals, beluga whale and polar bear) (Spiridonov et al., 2020), and of winter concentration of polar cod²⁷²⁸ (*Boreogadus saida*) being the main food for a variety of predators in the Arctic marine ecosystems: large fish, birds and mammals. In the publication of Spiridonov et al. (2020), the Ob-Yenisei Polynya area is considered as a prospective marine conservation area - "Section of the outer area of the Ob-Yenisei estuary system with the islands of Shokalsky, Vilkitsky, Neupokoev, Oleniy, Sibiryakov (Area 26)". The northern border of the Ob-Yenisei stationary Polynya area falls within the Project impact zone under consideration. a potential but currently not quantifiable decrease in fish stock due to the intensification of ship traffic (discussed in Section 4.2) may also lead to shifts in the number and spatial distribution of higher-order consumers, incl. marine mammals. Thus, as mentioned above, the northern boundary of the AOI is chosen from the precautionary principle in terms of preserving valuable components of biological diversity.

4.4 Vegetation

Vegetation cover will experience direct impacts where communities will be destroyed or transformed, as well as indirect impacts as a result of atmospheric precipitation and the activation of exogenous geological processes.

Alienation of vegetation, replacement of natural phytocenoses with areas devoid of vegetation or with regenerating vegetation will be within the Project's land allocation. Beyond the boundaries of the land allocation, the impact is expected to occur within the boundaries of the sanitary protection zones of the main sources of emissions, where nitrogen compounds are expected to enter the soil. The total area of such plots will be up to 124 km². Analysing the data on the transformation of vegetation cover in oil and gas fields under similar bioclimatic conditions (Kharasaveyskoye, Bovanenkovskoye, Prudhoe Bay), it can be predicted that the Project impact will be manifested in the area of up to 50% of the total land allocation of the Project, primarily due to the transformation of the thermal-physical properties of the soil. Thus, it can be concluded that the impact on the vegetation cover will not go beyond the boundaries of the LA.

4.5 Terrestrial mammals

The main impact on small land mammals will be reflected in the transformation of their habitats, which will generally correspond to the contours of vegetation transformation. A wider impact is possible on the wild reindeer population. The territory of LA is located outside the summer habitat of wild deer, however, according to the literature, it falls into the area of winter pastures of the Yavai group. According to telemetry data, throughout the year, the animals were on the island of Shokalsky and the northern part of the Yavai Peninsula, without going beyond the borders of the National Park. The fawning pastures of this population are located only on Shokalsky Island and in the very north of the Yavai Peninsula within the Gydan National Park. To study the annual cycle of space use by deer protected in the Gydansky National Park, in June 2019, as part of the Yamal-Arctic expedition, six reindeer were captured and tagged with transmitters on

²⁴ M. V. Gavrilov, A. V. Popov. 2011. Ice biotopes and biodiversity of the north-east areas of the Barents and Kara seas // Atlas of biological diversity of seas and coasts of the Russian Arctic. / V. A. Spiridonov, M. V. Gavrilov, N. G. Nikolaeva, Ye. D. Krasnova. (Ed.) M.: WWF Russia. pp. 34-35.

²⁵ V. N. Kupetsky. 1958. Permanent polynyas in freezing seas. Leningrad, LSU Publishers, Leningrad University Newsletter, Geological and Geographic series, 1958, No.12, issue 2.

²⁶ Brown R.G.B, Nettleship D.N. 1981. The biological significance of polynyas to Arctic colonial sea birds // In: I. Strirling, H. Cleator (eds). Polynyas in the Canadian Arctic. Canadian Wildlife Service Occasional Papers, # 45. Ottawa. Pp.59-65.

²⁷ V. K. Yesipov. 1952. Fish of the Kara Sea. L.: USSR Academy of Sciences. 145 p.

²⁸ V. A. Ulchenko, A. K. Matkovsky, S. I. Stepanov, P. A. Kochetkov, N. V. Yankova, A. N. Gadinov. 2016. Fish resources and their use in the estuaries of the Kara and Laptev seas // Proc. of VNIRO. Vol. 160. pp. 116-132.

Shokalsky Island²⁹³⁰. The reporting materials containing information on the trajectories of the marked individuals during one year were kindly provided by the Federal State Budgetary Institution "Gydansky National Park".

According to telemetry data, throughout the year, the animals were on the island of Shokalsky and the northern part of the Yavai Peninsula, without going beyond the borders of the National Park.

According to available data, on the territory of Salmanovsky (Utrenny) LA wild reindeer has not been recorded in either winter or summer. Since there is an active grazing of domestic deer, the presence of animals of the wild population is unlikely in the form of individual visits. Based on this based, it can be assumed that the boundaries of the terrestrial AOI do not require revision.

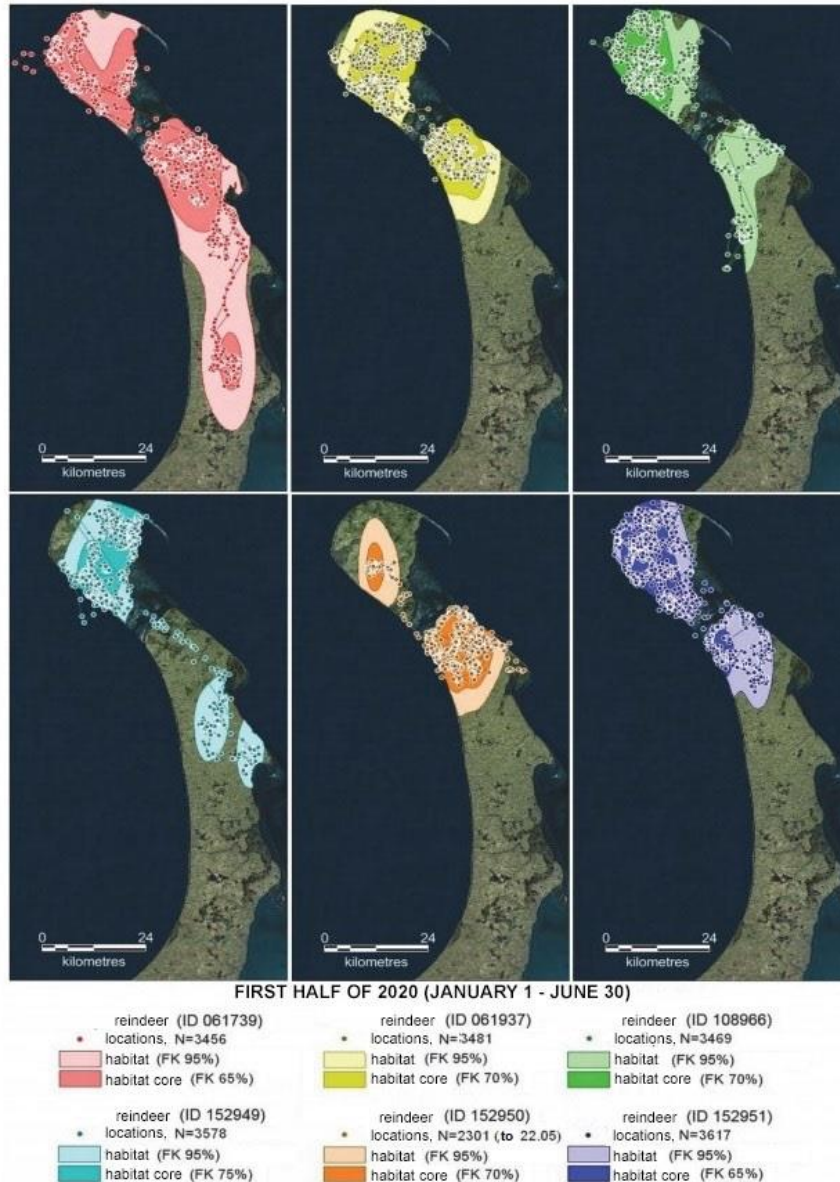


Figure 4.5: Migration of six reindeers at Shokalsky island and Yavay peninsula by satellite telemetry data

Reference: Processing of telemetry data..., 2020

²⁹ Processing of telemetry data from six transmitters (ID 61739, 61937, 108966, 152949, 152950 and 152951) of the ARGOS system for program No. 8950 for the period: July 2019. - December 2019 (6 months), for 6 reindeer (*Rangifer tarandus*) on the territory of the Shokalsky island of the Yamalo-Nenets Autonomous Okrug. Report. Responsible executor J.A. Hernandez-Blanco. Moscow, 2020.13 p.

³⁰ Processing of telemetry data from six transmitters (ID 61739, 61937, 108966, 152949, 152950 and 152951) of the ARGOS system for program No. 8950 for the period: January 2020 - June 2020, for 6 reindeer (*Rangifer tarandus*) on the territory of the Shokalsky Island of the Yamalo-Nenets Autonomous Okrug. Report. Responsible executor J.A. Hernandez-Blanco. Moscow, 2020.15 p.

4.6 Avifauna

The impact on avifauna is expected due to the transformation of habitat conditions, a disturbance factor due to the presence of personnel and the operation of equipment, local pollution of water bodies used by birds for migration stops. Light exposure is considered an important factor in the impact on migratory bird species. It is indicated that migratory bird species may experience impacts within a radius of up to 15 km³¹. According to the data on the radius of artificial illumination on the similar plant "Yamal LNG" (www.lightpollutionmap.info) radius up to class 1 on the Bortl scale "ideal-dark sky" (no light exposure) will be about 15 km. The radius of impact on migrating species, in fact, will not go beyond the Salmanovsky (Utrenny) LA.

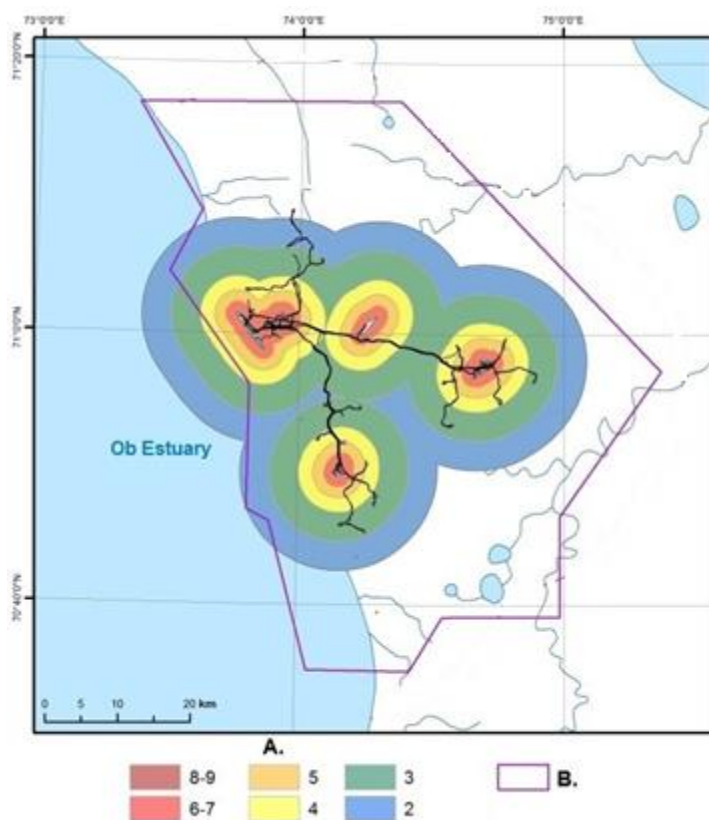


Figure 4.6: The radius of light exposure from the Project facilities

Legend:

A: Luminosity on the Bortl scale: 2 - true-dark sky, 3 - country sky, 4 - country-suburban sky, 5 - suburban sky, 6 - backlit suburban sky, 7 - suburban / city sky, 8 - city sky, 9 - intracity sky.

B. Salmanovsky (Utrenny) LS boundary

Source: JSC «IEPI», 2021

Long-tailed ducks gather in the Ob Estuary for molting and before migration. Based on analysis of published materials and records of the field surveys in the water area, it is estimated that the Ob Estuary supports more than 5% of the global and 17% of the Russian population of long-tailed duck (more detail in the CHA report). Shallow waters with the depth up to 10 m in the north of the Ob Estuary accounts up to 5% of the global population. These habitats were identified as the critical habitat after Criterion 3a for long-tailed duck.

The potential impact of the Project on migratory birds may primarily be related to the disturbance of resting places on the fly, which may be identified in the vicinity of the Project facilities and is included in the area of influence within the boundaries of the LA and the Ob Estuary water area, as well as due to pollution of the Estuary water area as a result of accidental spills of liquid hydrocarbons, is included in the extended AOI.

4.7 Ecosystem services

Customary occupations of tundra Nenets are reindeer herding, fishing, hunting, and harvesting of wild crops. Chapter 8 of the ESHIA gives a detailed description of the traditional activities of the Nenets people

³¹ Commonwealth of Australia 2020. National Light Pollution Guidelines for Wildlife. (January). 1–7. Retrieved from https://www.cms.int/sites/default/files/document/cms_cop13_doc.26.4.9.1_rev.1_australia-light-guidelines_e.pdf

in the territory of LA and neighbouring areas, including reindeer herders migration routes and fishing areas, based on the ethnographic survey and consultations with IP performed in 2015-2020³².

Further update on these materials is based on the results of the socioeconomic survey of 65 indigenous families potentially conducting nomadic practices within the LA, initiated by Ramboll in December 2020. The survey is held by Ramboll's local partner, an indigenous non-governmental organization 'Yamal – Potomkam!' (Tazovsky branch). Based on the survey results the following conclusions may be made.

4.7.1 Reindeer herding

The key conclusions are:

- Direct impacts on pastures caused by allocation of Project land plots will be within the license area.
- Impact on traditional reindeer herding (particularly, limitations imposed on use of traditional migration routes) will be predominantly limited by LA boundaries and will be mitigated by installation of reindeer crossings over the linear facilities. Crossings' locations are consulted with representatives of IP families and MUE 'Sovkhoz Antipayutinskiy'; if necessary, installation of additional crossings will be considered in the areas where the affected families have obstacles with herding on the basis of regular consultations with such families.
- There is a low probability of indirect impact on pasture resources outside of the LA within Gyda tundra and Antipayuta tundra. Such indirect impact is possible if suggested mitigations (namely, reindeer crossings) do not ensure sufficient access to pastures within the LA, which, in turn, may trigger migration routes shift outside of the LA. Particularly, such indirect impacts may be potentially imposed on pastures used by families outside of LA but within Gyda tundra (including its northern part) and Antipayuta tundra. Nevertheless, practice of Yamal LNG implementation allows to conclude that effective implementation of mitigation measures, including installation of crossings, will help avoid such alteration of the routes. Therefore, the probability of cumulative impacts on pastures outside of the LA is considered as low. However, taking into account high level of uncertainty regarding potential impacts from development of neighbouring Arctic LNG 1 field and related linear infrastructure to Utrenny Terminal, as well as uncertainty regarding implementation of related mitigation measures, a conservative approach needs to be taken and the broader AOI needs to be considered as suggested in the Section 4 Social Area of Influence of the Project. The Project will ensure monitoring of the direct impacts on reindeer herders within the LA in order to closely monitor whether the established mitigations are effective in managing the impacts and the herders' routes remain unchanged. Such monitoring activities will be taken as part of indigenous peoples development plan. In case monitoring activities demonstrate the shift of the herders' customary migration routes provoking shift indigenous families' routes outside of LA, the Project will closely cooperate with the indigenous families and a local indigenous non-governmental organization to identify additional mitigations necessary to address the impacts, including those on the pastures outside of the LA.

4.7.2 Fishing

The socioeconomic survey of 65 indigenous families potentially conducting nomadic practices within the LA did not reveal additional areas that can be recognized as important for IPs' fishing activities compared to those identified in the ESHIA. Main fishing grounds within the Salmanovsky (Utrenny) LA are shown in Figure 4.3. The Project impacts on fish resources will be localized within the LA (see the above).

Given that the Project facilities and activities are located within the watersheds of the rivers that traditionally are seldom used for fishing by the IPs (as the survey has indicated), **the impact on fishing resources important for the studied Nenets families will be low.**

Based on the results of the conducted survey it can be concluded that the main fishing grounds located outside the Salmanovsky (Utrenny) LA will not be directly affected by third-party activities (as located far from the license areas planned for future development); therefore, the cumulative impacts on these water bodies are not anticipated.

³² - Ethnographic Survey conducted by Purgeocom LLC in 2015 within the Salmanovsky (Utrenny) LA;
- Socio-economic survey performed by Ramboll in 2018 during interviews with representatives of indigenous families migrating within the Salmanovsky (Utrenny) LA;
- Information provided by the Administration of Tazovsky Municipal District on 10.06.2020 under request.

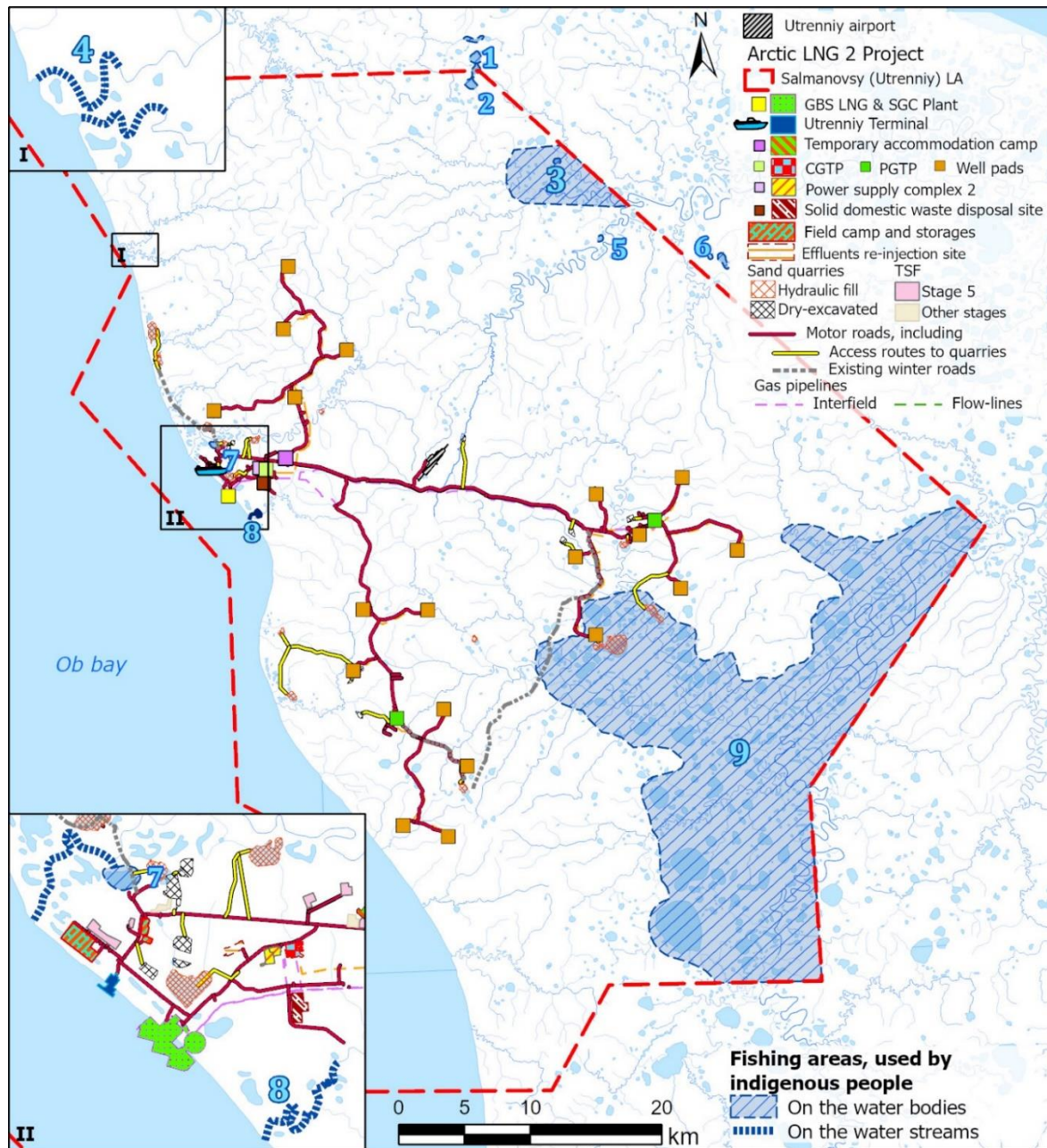


Figure 4.7: Fishing areas within the Salmanovsky (Utrenniy) LA

The customary fishing areas of indigenous communities within the license area and nearby are:

- Section of the Khatlsyney-Yakha River near the estuary and floodplain Lake Khatlseyakha-Khasre (No.7 in Figure 3.3) – located nearby the designed GBS LNG & SGC Complex – this area is mentioned by four families as fishing area in the survey 2020;
- Section of the Nyaday-Pynche River near the estuary (No.8) – located nearby the designed GBS LNG & SGC Complex – this area was mentioned twice as fishing area during the survey;
- Sections near the estuaries of Syabuta-Yakha Rivers 2 and 3 (No.4);
- Lek-Lempto – three lakes in the upper reaches of the Mangty-Yakha River (No. 2);
- Yara-Yakha River and the lake on the right side of the Lekseda-Yakha River (No.3);
- Khalya-To Lake to the north of the Right Yara-Yakha River (No.5);
- Netai-Yakha River, its tributaries and floodplain lakes (No.9);
- Lekjambto (Yambale) Lake to the north of the license area boundary (No.1); and
- Two lakes on the right side of the Syabire-Yakha River, to the east of the license area boundary (No.6).

4.8 Conclusion

Considering the impact on biological diversity, it should be noted that the types of impacts as previously assessed and as identified during the monitoring will be concentrated within the boundaries of the AOI for the terrestrial part. Extending the AOI boundary to the north For marine part to the limits of the ESBA makes it possible to fully include valuable biological components, including those identified as critical habitats.

5 SOCIAL AREA OF INFLUENCE OF THE PROJECT

The social area of influence encompasses territories and communities (including indigenous communities, who are the primary users of ecosystem services) which may be affected either by beneficial or by adverse impacts of the planned activity (Figure 3.2).

In view of special nature of social impacts and of the fact that geographic boundaries of the social area of their influence may be different from the area of influence on natural environment³³, the social area of influence is defined separately. The social area of influence of the Project includes the following recipients potentially exposed to direct and indirect impacts of the planned activity:

Recipients potentially exposed to direct impacts

- Indigenous population migrating and practicing customary activities (reindeer herding, fishing, gathering, hunting, etc.) within the boundaries of construction sites of the Project and associated facilities;
- Agricultural enterprise Antipayutinskiy State Farm that can be a recipient both of positive and of negative impacts of the Project and associated facilities (refer to Chapter 10 of the ESHIA Report);
- Personnel of contractors employed for implementation of the planned activity.

Recipients potentially exposed to indirect impacts

- Gyda and Antipayuta (170 km and 240 km from the LNG Plant, respectively). Relatively large settlements located nearest to the Complex, where indigenous people migrating in the territory of the Salmanovsky (Utrenny) LA are often registered, use medical services, come for shopping, etc.;
- Yuribey and Tadebya-Yakha (115 km and 70 km from the Complex, respectively). These small villages are also located relatively close to the Project, and here may also live indigenous nomadic people migrating within the Salmanovsky (Utrenny) LA. Additionally, nomads visit shops in the two villages and a medical and obstetric station (MOS) in Yuribey;
- Indigenous communities in Gyda Tundra, Antipayuta Tundra and Yavay Peninsula in general who hold on to customary lifestyle. The Project and associated facilities may entail a change in customary migration routes of reindeer herders within the Salmanovsky (Utrenny) LA. This may in turn affect economic activities of other indigenous communities in Gyda Tundra and Yavay Peninsula, and, to a less extent, in Antipayuta Tundra;
- Agricultural Enterprise GydaAgro LLC. The planned activity may affect operations of the company, in case personnel of the Project and associated facilities unofficially buy products (fish) from employees of GydaAgro;
- Companies that run fishing operations in south of the Ob Estuary.

³³ As per definition of the Social Area of Influence provided by International Association for Impact Assessment in their *Social Impact Assessment: Guidance for assessing and managing the social impacts of projects* (p. 35): "The location of affected people frequently does not neatly align with the geographic boundaries or the area of influence determined by the environmental impact of a project".

6 CONCLUSIONS

The ALNG2 Project's AOI is defined in full accordance with IFC's PS1 and PS6. It is determined taking into account direct and indirect impacts. The boundaries of the Project impacts that determined the proposed contour of the area of influence correspond to the results of numerical (mathematical) simulation of the spread of pollutants and physical effects in the air and water environment. Validation of the simulation results was already partially justified by monitoring data. Implementation of planned monitoring program will provide with further justification. The social area of influence encompasses territories and communities, which may be affected either by beneficial or by adverse impacts of the planned activity.

The issues discussed in this Addendum give reason to consider the configuration of the AOI as follows:

1. Direct and indirect impacts on land do not go beyond the boundaries of the LA;
2. The impact zone in the water area is determined by ship operations (dredging and dumping) and vessel traffic and extended to water area of the Ob Estuary and Southern part of the Kara Sea.

The southern boundary of the Project's AOI within the Ob Estuary is defined considering the following factors:

- Boundaries of the offshore part of the license area;
- Natural asymmetry of hydrochemical (including thermohaline) structure of water, bottom relief and flow field in the examined section of the Ob Estuary, which results in transport of impacts in water along the shore line;
- Configuration of drainage basins of rivers on the Gydan Peninsula that are affected by the Project;
- Specific features of the western shoreline of the Ob Estuary: shore sections protruding far into the water will be most affected by the Project.

North of the Sea Channel, the source of impact on ecosystems will be ship traffic along the transportation routes, and the main impacts will be underwater noise and collisions with marine mammals. According to the available data, the radius of underwater noise impact for marine biota from large vessels will be in the range of 1-5 km. Taking into account the possible deviation of vessels from the course, based on the precautionary principle, it is proposed to establish the AOI in the south of the Kara Sea as a radius of 25 km from the ship route. Having consideration of additional data regarding areas highly valuable for biodiversity conservation, identified in the Kara Sea in recent publications and during the ESHIA, it would be appropriate to extend the Project AOI up to the divergence point towards the western and eastern shipping routes of the NSR, where a greater (in comparison with the NSR) impact of the Project related shipping activities on the total volume of shipping in this area is anticipated. As the **northern boundary** of the Project's AOI it is considered to apply the northern limit of biodiversity significant area the 'Ob-Yenisey River Mouth' EBSA. This important natural border includes all direct/indirect and cumulative effects of the Project.

Total AOI is equal to approximately 23,100 square kilometres. About 80 % of the marine part of the contour overlaps with the Yamal LNG area of influence – the region's largest integrated project for the production, liquefaction and supply of natural gas, part of which is the Yuzhno-Tambeyskoye gas condensate field, the LNG plant, the seaport and the Sabetta airport, and associated facilities are the sea channel at the intersection with the Ob bar and the sea vessels that define its dimensions, including the tanker and icebreaker fleet.

The proposed contour of the Project's area of influence, taking into account all of the above, is shown at Figure 6.1.

The composition of the Project's AOI may be subject to revision in the future upon conclusion of already ongoing and planned activities and those expected during the monitoring phase.

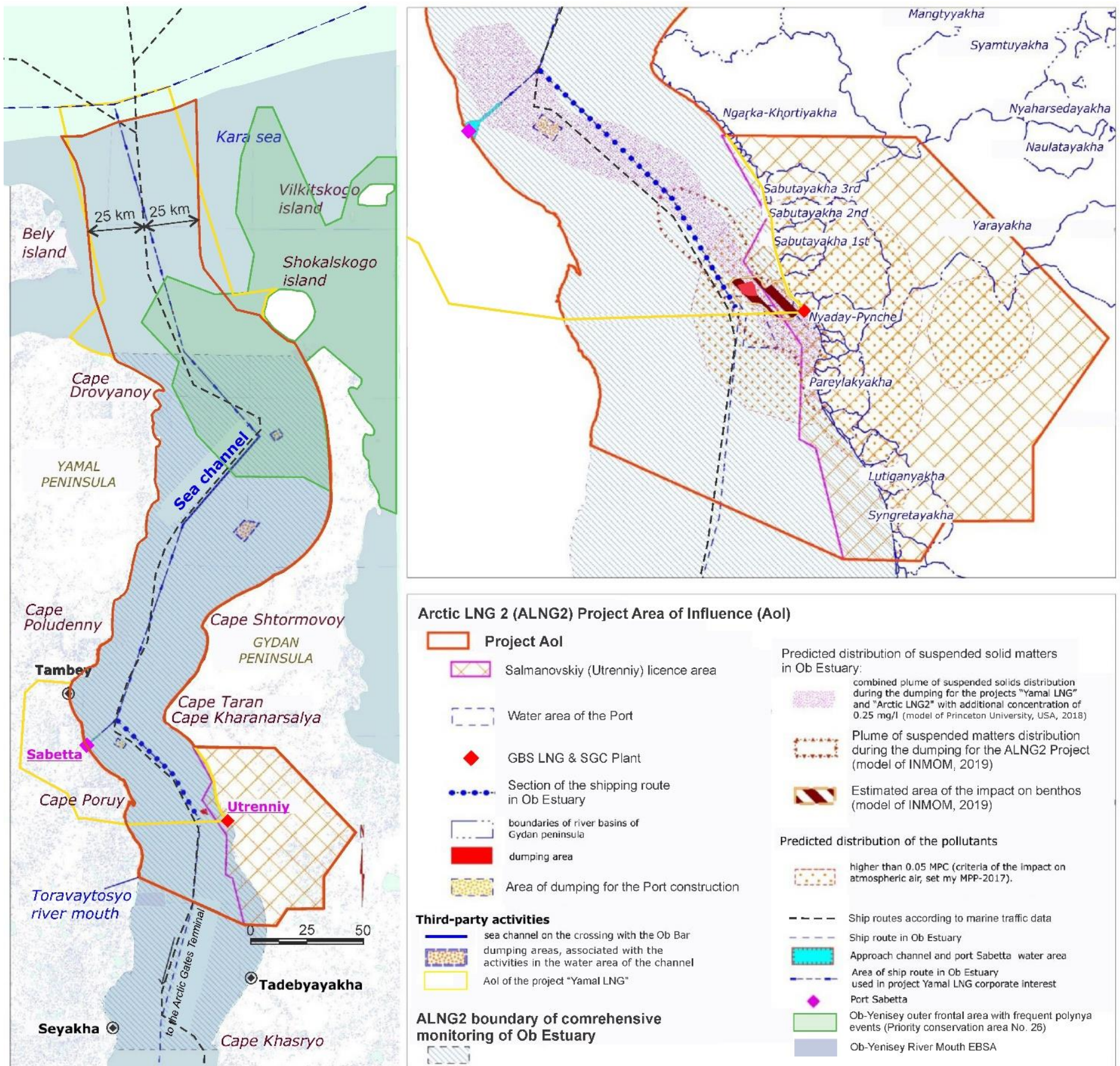


Figure 6.1: Project Area of Influence