БАИМСКАЯ
ГОРНОДОБЫВАЮЩАЯ КОМПАНИЯ

Peschanka Copper Project

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

ESIA Scoping Report

English version

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PESCHANKA COPPER PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

SCOPING REPORT

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This Report shall be written in Russian and in English. Both language versions are considered to be equally authentic. In the event of any discrepancy between the two aforementioned versions, the English version shall prevail in determining the content of the Report.

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LIST OF ABBREVIATIONS

AGP	Acid Generating Potential
AIP	Access to Information Policy
ANP	Acid Neutralisation Potential
AO	Autonomous Okrug
ARD	Acid rock drainage
BAT	Best available techniques
BMZ	Baimka Metallogenic Zone
BFS	Bankable Feasibility Study
Bt	Billion tonnes
CBZ	coastal buffer zone
dmt/a	Dry metric tonnes per annum
EPCM	Engineering Procurement Construction Management
EPT	Ephemeroptera, Plecoptera, and Trichoptera
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Programme
GHG	Greenhouse Gas
GRP	gross regional product
HSE	Health, safety and environment
IDMC	Inter-District Medical Centre
IFC	International Finance Corporation
ILO	International Labour Organization
IP	indigenous peoples
ISBL	Inside Battery Limits
ktonnes	kilotonnes
l/a	litres per annum
LOM	life-of-mine
M	million
MAC	maximum allowable concentration
ML	metal leaching
Mt/a	megatonnes per annum
NAG	non-acid generating

NPP	Nuclear Power Plant
NPR	Neutralization Potential Ratio
OHS	occupational health and safety
OVOS	*Otsenka Vozdejstviya na Okruzhayushchuyu Sredu* (national EIA)
PAX	Potassium Amyl Xanthate
PMF	Probable Maximum Flood
PNA	protected natural areas
PS	performance standards
QA	Quality Assurance
QC	Quality Control
RAC	Russian-American Company
RF	Russian Federation
ROM	run-of-mine
RUR	Russian Ruble
SAG	semi-autogenous grinding
SEP	Stakeholder Engagement Plan
SER	State Environmental Review
SPZ	sanitary protection zone
TEO	Technical-Economic Substantiation [Feasibility Study]
t/a	tonnes per annum
TPP	Thermal Power Plant
TSF	Tailings Storage Facility
VOIP	Voice-Over-Internet-Protocol
WPZ	water protection zone
WRD	waste rock dump

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1. INTRODUCTION

GDK Baimskaya LLC (the Company) owns the license (AND 14673 TR) to survey, explore and mine non-ferrous and precious metals within the Baimka Prospecting Area in the Bilibinskiy Municipal District of the Chukotka Autonomous Okrug (Chukotka AO). Geological exploration continues in the Peschanka Ore Field with a view to developing a mine and processing plant (the Project) for exploitation of copper, molybdenum and gold reserves. It is also intended to create a facility at Pevek that will be used for shipping out the finished product. Fluor Canada Ltd. (Fluor) was awarded EPCM services for the plant and infrastructure on the Peschanka Copper Project. The Owner is directly managing the design of the mine, and all other facilities are designed by third parties.

In parallel with the feasibility study it is necessary to conduct an environmental and social assessment on the Project and all associated infrastructure. Such assessments consist of two major components. The first component is a formalised Environmental and Social Impact Assessment (ESIA) that complies with international lender requirements and the International Finance Corporation (IFC) performance standards in particular. The second component is complying with the Russian regulatory requirements that are needed for approval of the Project, which are made up of the OVOS and the preparation of Design Documentation.

Ecoline Environmental Assessment Centre, a Moscow based consultancy, has been appointed to complete the required environmental and social assessments. The first step in the ESIA process is known as Scoping and this serves to define the scope of the assessment through the identification of potential environmental and social risks associated with the activities needed for the establishment and operation of the mine. In addition, the Project will be presented to parties that may have an interest in or be affected by the Project activities allowing such parties to comment on or question any aspect of the Project. This latter process is known as Consultation and Disclosure and is an essential part of any environmental assessment.

This ESIA Scoping Report serves accordingly to describe the proposed mine and associated infrastructure, the receiving or affected environment and society, the anticipated environmental and social impacts, the comments and issues raised in the consultation process and the resultant scope of work for the assessment that follows. The next step of the assessment process is to execute the scope of work, which would then form the main body of the assessment.

2. OBJECTIVES OF THE SCOPING REPORT

2.1. Overview

The objective of the ESIA Scoping Report is to define the scope of the ESIA. This is effected by:

- Providing an accessible and informative description of the Project, the environment that would be affected by the Project, legislative and other requirements to interested and potentially affected stakeholders;
- Providing a description of the key environmental and social issues identified to date and how these would need to be further assessed in the ESIA;
- Providing opportunities for such stakeholders to raise issues and concerns regarding the environmental and social impacts of the Project and to capture such issues; and,
- Use such stakeholder issues to refine the scope of the assessment.

It should be noted that the stakeholder engagement is detailed in a separate but related Stakeholder Engagement Plan (SEP). An issue often raised by stakeholders is why it is necessary to conduct both an ESIA (of which this ESIA Scoping Report forms part) as well as the assessment required by the Russian regulatory requirements. The two requirements (the ESIA and the OVOS and Design Documentation) seek to achieve the same broad purpose. The reason for the two processes is that the lenders do not always recognise the Russian regulatory requirements as fully subscribing to their requirements. As such an ESIA is conducted separately in accordance with the IFC requirements but draws extensively from the technical assessments done for the OVOS.

2.2. Activities to Date

The following activities have been conducted to date to inform the ESIA Scoping Report:

- Extensive baseline assessment conducted in 2016 that has been updated in 2019 with additional Wintertime and other studies;
- The further development of the design of the mine and concentrator leading up to the completion of a Bankable Feasibility Report (BSF);
- Site visits to the mine and surrounding areas and Pevek; and,
- Preliminary engagements with selected key stakeholders.

2.3. Assumptions and Limitations

- This ESIA Scoping report has been completed in September 2019 and is based on information and the project design available at this time. The further development of the project may introduce changes to the Project described in this document.
- The baseline information used in this report has been mainly sourced between 2015 and 2018. Baseline studies are continuing however, the results of which will be incorporated as appropriate in the ESIA, OVOS and design documentation.
- The ESIA is similarly based on the current project design. Should the designs change materially in future, it may prove necessary to revisit the assessments presented in the ESIA.

3. THE PROPOSED PROJECT

3.1. Project History

The Peschanka gold-copper-molybdenum deposit was discovered in 1972 and explored in the 1970s–1980s. Since then, the property has been investigated and studied by different entities with the Company initiating its involvement in 2009. In 2011, the Company commissioned a TEO (the Russian equivalent of a feasibility study) to determine what would be required to commercially exploit the deposit. The Company under the guidance of the Regional Mining Company LLC, then conducted further exploration. IMC Montan[1] estimated the mineral resources in the Peschanka deposit in October 2011 using 0.40 % copper equivalent cut-off grade and defined a Measured and Indicated Resource of 1.3 billion metric tonnes.

[1] IMC Montan. 2011. Scoping Study for the Development of Peschanka Deposit.

In 2016, a JORC geological model was developed, that indicates 1,428 Megatonnes (Mt) of Measured and Indicated ore and 774 Mt of Inferred and Unclassified ore.

In 2017, the Final Mining Feasibility Study[2] (in Russian 'TEO Postoyannykh Konditsi') was developed. The 2017 TEO estimates 1,237,813.8 ktonnes reserves of sulphide ore (cut-off grade of 0.4% of copper equivalent.

The parameters of the permanent exploration conditions for delineating and estimating ore reserves of the Peschanka deposit, which are planned to be mined using open pit mining and the geological and economic assessment of their development in modern economic conditions, are developed and agreed upon by the State Commission for Reserves. Geological reserves as of 01/01/2017 are presented in Table 1.

Table 1. Geological Reserves of Porphyry Copper Ores from the Peschanka Deposit as of 01/01/2017

Reserves of the ore, ktonnes	Average content of the elements				Reserves of the metal			
	Cu, %	Mo, %	Au, g/t	Ag, g/t	Cu, ktonnes	Mo, t	Au, kg	Ag, t
oxidized ore								
Cut-off grade of 0,2% of Cu equivalent								
54,792.0	0.61	0.0111	0.384	3.134	334.4	6,070.7	21,065.7	171.7
Cut-off grade of 0.3% of Cu equivalent								
46,478.2	0.62	0.0113	0.409	3.185	290.1	5,244.9	19,003.0	148.0
Cut-off grade of 0.4% of Cu equivalent								
38,207.8	0.67	0.0116	0.467	3.458	257.0	4,427.3	17,860.6	132.1
Cut-off grade of 0.5% of Cu equivalent								
33,081.9	0.72	0.0118	0.516	3.580	238.9	3,907.1	17,060.3	118.4
Cut-off grade of 0.6% of Cu equivalent								
29,521.4	0.75	0.0123	0.558	3.733	222.1	3,644.9	16,470.4	110.2
Cut-off grade of 0.7% of Cu equivalent								
24,131.0	0.76	0.0120	0.605	3.829	183.3	2,900.0	14,605.5	92.4
sulphide ore								
Cut-off grade of 0.2% of Cu equivalent								
2,287,844.9	0.46	0.0112	0.243	2.563	10,427.5	255,851.4	556,836.9	5,862.7
Cut-off grade of 0.3% of Cu equivalent								
1,796,234.6	0.52	0.0126	0.285	2.854	9,262.5	226,462.6	511,732.0	5,126.2
Cut-off grade of 0.4% of Cu equivalent								
1,237,813.8	0.61	0.0152	0.343	3.457	7,528.5	187,763.5	424,367.6	4,279.6
Cut-off grade of 0.5% of Cu equivalent								
935,181.3	0.68	0.0165	0.389	3.874	6,379.7	154,724.5	363,990.7	3,622.8
Cut-off grade of 0.6% of Cu equivalent								
616,842.7	0.79	0.0186	0.466	4.358	4,851.3	114,628.7	287,753.6	2,688.0
Cut-off grade of 0.7% of Cu equivalent								
471,945.5	0.86	0.0201	0.510	4.721	4,049.8	95,025.4	240,696.1	2,227.8

Source: TEO approved on 18/05/18

The deposit is also not constrained at depth nor on its flanks and mineralization traced to a depth of 750 m. The data allowed the Company to describe the geology of the deposit and to develop a structural model of the ore mineralization and tectonic conditions. Since that

[2] GIPRONIKEL INSTITUTE. 2017. The Final Mining Feasibility Study [Tekhniko-ekonomicheskoye obosnovaniye (TEO) postoyannykh razvedochnykh konditsiy] for the Peschanka Deposit, Saint-Petersburg, GIPRONIKEL INSTITUTE, 2017.

time there has been further exploration and the development of a mine plan and definition of the process that would be required to extract the minerals from the ore.

3.2. Project Overview

3.2.1. Location of the Deposit and the Project Site

The deposit is located in north-eastern Siberia, Russia, in the Bilibinsky Municipal District of the Chukotka AO (also referred to as Chukotka). The main Project site (also referred to as the Peschanka site) is 187 km southwest of the district centre of Bilibino and 650 km west of the regional capital of Anadyr (Figure 1). The deposit lies in the valley of the Peschanka River at an elevation of +/- 400m.

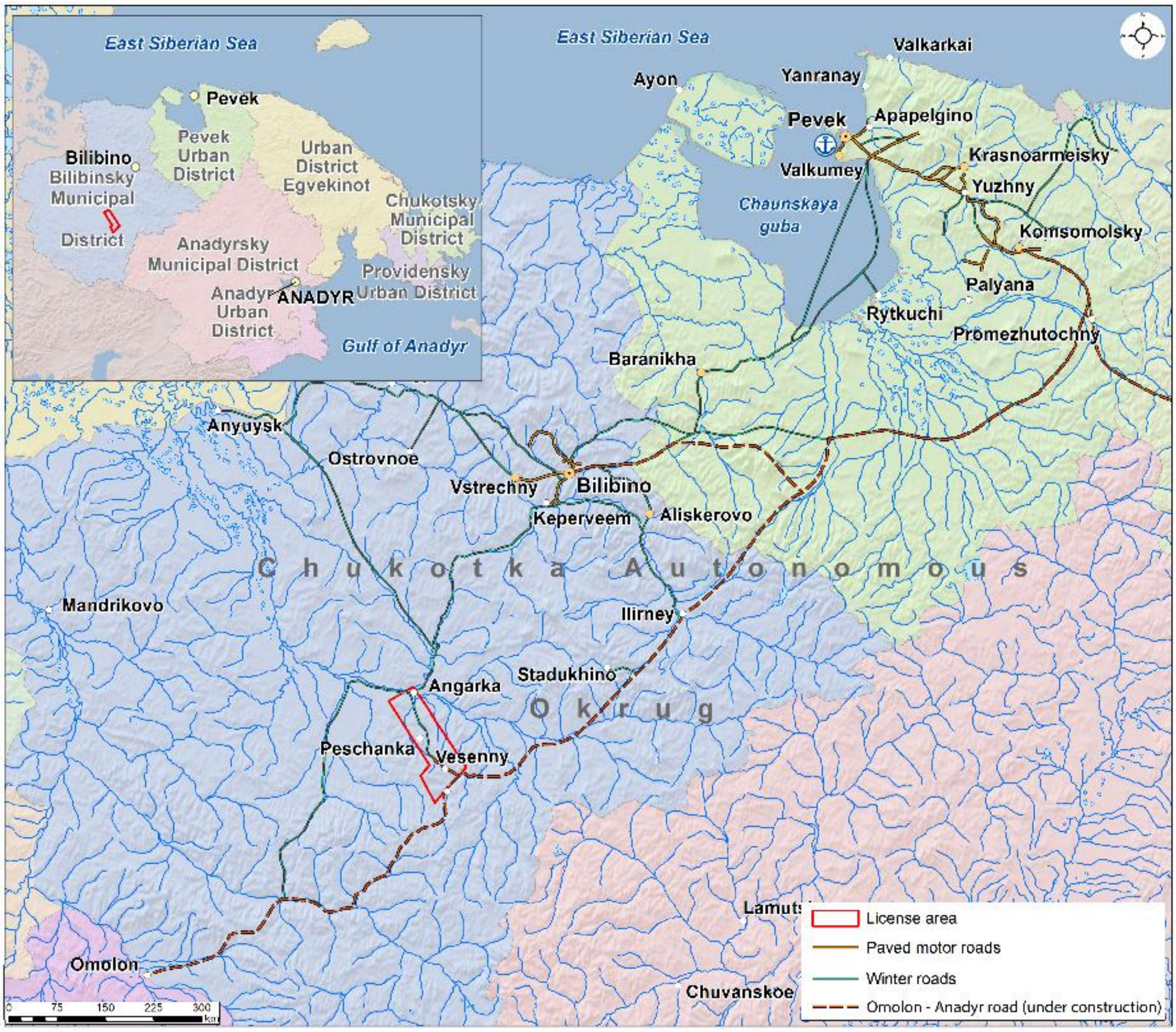


Figure 1. The Location of the Peschanka Copper Project in Northeastern Siberia

3.2.2. Geology

The Peschanka gold-copper-molybdenum deposit is a porphyry type deposit. Porphyry copper deposits are large volumes of hydrothermal alteration centered on porphyritic intrusive stocks. Typical of deep-level copper porphyry systems, Peschanka hosts significant Cu+Au+Mo mineralisation. The Peschanka copper porphyry deposit is located on the Chukotka Peninsula in Russia, at 66° 36’N 164° 30’E in far northeastern Siberia. As one of the largest of a group of deposits that define the Baimka Ore Field, the copper porphyry at Peschanka is confined to a north-south trending, eastward dipping, sheet-like stockwork (a complex system of structurally controlled or randomly oriented veins containing the mineralisation).

Regional Geology

The Peschanka deposit is located in the central part of the Baimskaya metallogenic zone and is genetically related to Late Jurassic – Early Cretaceous intrusive complex that forms a 40 km by 9 km north-north-east trending Yegdegkychsky massif[3]. Localized in the Baimka Ore Field, the Peschanka deposit is controlled by deep faulting that transects the outer part of the Cretaceous Okhotsk-Chukotka magmatic belt. The ore-bearing hydrothermally altered Early Cretaceous intrusive rocks comprise of monzodiorite and monzonite, quartz monzonite, and seyenite porphyries.

Local Geology

The Peschanka deposit is associated with multiphase stockworked quartz monzonite-porphyry, and quartz monzodiorite-porphyry hosted in a monzodionitic stock. It is a typical copper porphyry deposit with associated molybdenum and gold. Mineralisation is hosted in quartz stockworking, within and extending from the causative intrusives with predominantly bornite and chalcopyrite in the quartz stockwork and with potassic alteration extending into the host intrusion. The 7 km long, up to 1.5 km wide stockwork is broken by transverse and diagonal strike-slip faults into three blocks. The porphyry mineralisation is faulted and fractured in orthogonal directions to the regional structure with mineralisation primarily being oriented NW-SE.

The current 2016 JORC geological model indicates 1,428Mt of Measured and Indicated ore. The JORC model also indicates 774Mt of Inferred and Unclassified (IU) ore. A 2019 metallurgical testing program and 2019 supplementary drilling program have been designed to target the IU classified ore.

3.3. <u>Project Schedule</u>

The broad Project schedule is as follows:

- Project commencement: 2021;
- Construction: 2021 to 2026;
- Mine operations: 2023 to 2044; and
- Concentrator operations: 2025 to 2044.

3.4. <u>Project Components</u>

The Peschanka Copper Project is made up of the following components:

- An open pit mine that will consist of three pits;
- Overburden and waste rock dumps;
- Ore stockpiles;
- A concentrator;
- A tailings storage facility (TSF);

[3] IMC Montan. 2011. Scoping Study for Development of Peschanka Deposit.

- Accommodation, site offices, canteen and clinic facilities, vehicle and equipment workshops, stores, recreational facilities and so forth;
- A waste incinerator;
- Electrical power distribution;
- Industrial and potable water supply systems;
- Service roads connecting the various site components;
- An analytical laboratory;
- Sewage treatment plants for both construction and operations;
- A site refuelling facility;
- An aerodrome; and
- An explosives manufacturing and storage facility (for drilling and blasting purposes).

3.5. The Proposed Mine

Given the geology described above, the mine would be established as an open pit operation using a conventional shovel and haul truck operation to mine 1,295Mt of ore over the 20-year life of the mine. The mine has a life-of-mine (LOM) grade of 0.47% and a central core of higher-grade material that will deliver copper content of 0.54% copper over the first ten years. The first activities in establishing the mine pit are pre-stripping which serves to expose the main ore body. Ore recovered during the pre-stripping will be stockpiled for later use as will be lower grade ores, as the mine plan is based on mining the high-grade ores first. This targeting of high-grade ores is done to maximise the revenue generated in the early part of the mine life so as to amortise the capital investment as quickly as possible. That planning for early revenues is reflected in Figure 2. In the first years of establishing the mine it can be seen that there is a relatively low waste content in the ROM and a high copper concentration in the concentrator feed. From 2030, the ROM waste quantities increase, and the copper percentage starts to decrease.

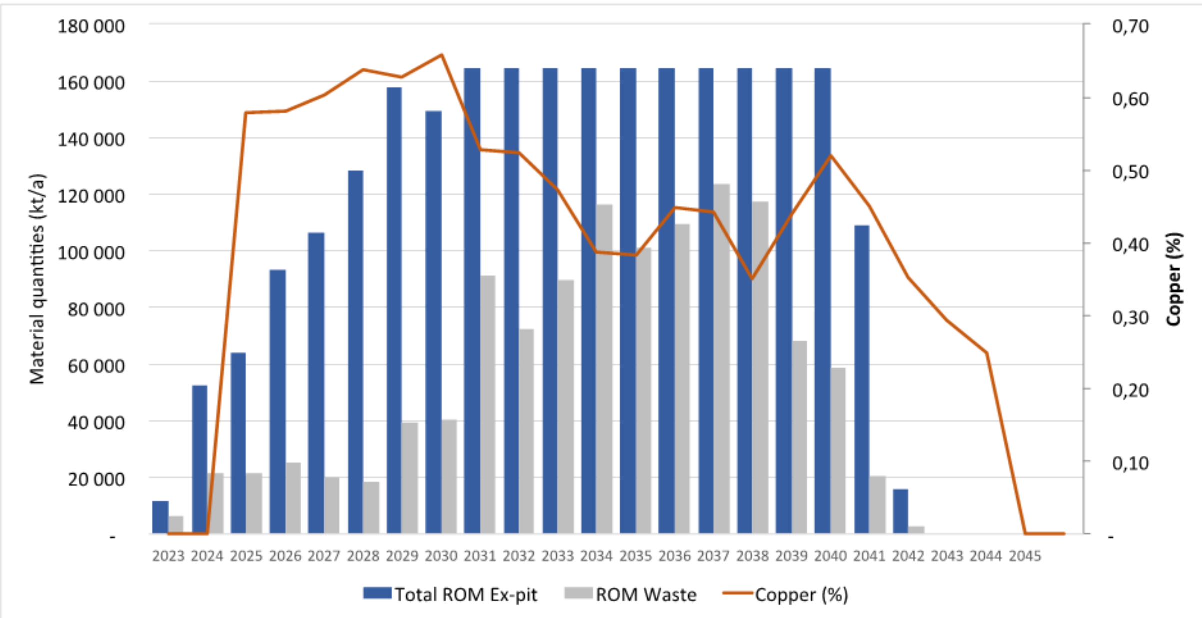


Figure 2. Material Quantities during the Life of Mine (LOM) Showing Total Run-of-Mine (ROM), ROM Waste and the Copper Percentage in the Concentrator Feed

A similar pattern is evident in materials movement that includes stockpiling of ore and subsequent reclaiming of the ore (Figure 3). It can be seen that for the first several years of mine operations while the waste quantities are still relatively low, that direct feed of ore to the concentrator is ramped up to and maintained at 70 megatonnes per annum (Mt/a), whilst also stockpiling ore. In 2030, the direct feed to concentrator is reduced and replaced with reclaimed stockpile. The direct feed to the concentrator continues to reduce towards the end of the 2030s with commensurate reductions in ore to the stockpiles, again maintaining the feed to the concentrator by reclaiming from the stockpiles. From 2039 to 2041 there is again direct feed to the concentrator and ore stockpiling with a marked reduction in the direct feed in 2042, with the balance being sourced from reclaimed stockpiles. In 2043 and 2044 mining ceases and all supply to the concentrator is from reclaimed ore.

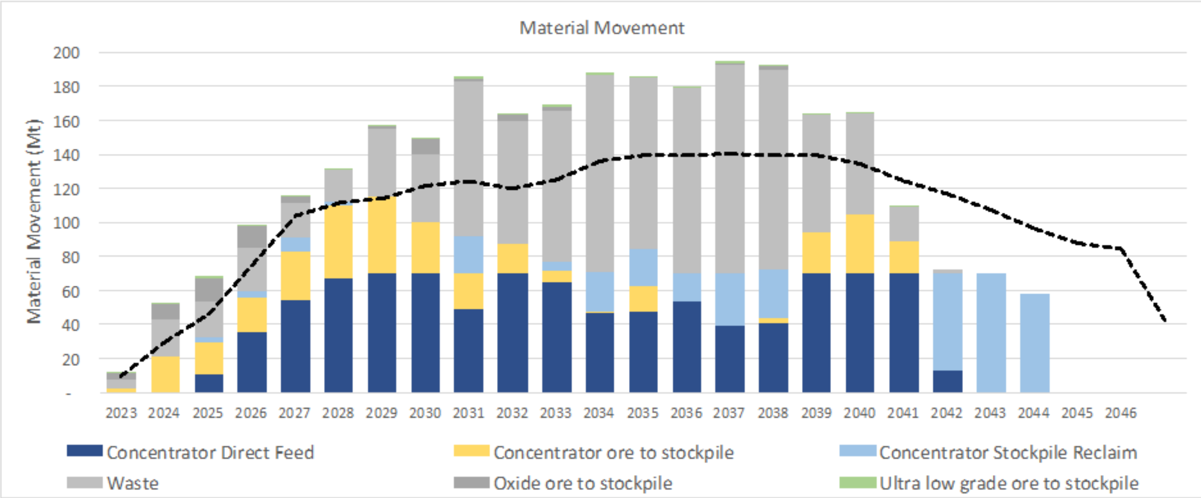


Figure 3. Material Quantities During the Life of Mine (LOM) Showing Ore that is Fed Directly to the Concentrator, and Ore that is Initially Stockpiled and Then Later Reclaimed

The main material movements over the LOM are summarised in Table 2. It can be seen from the table that the deposit has a low strip ratio, which after the first two years of pre-stripping gets as low as 0.2:1 and averages 1:1 over the life of mine. Based on the cut-off grade, 2,533 Mt will be mined of which 1,163.9 Mt will be waste. A portion of that waste will be dumped on the waste rock stockpiles with the remainder ending up as tailings in the tailings storage facility (TSF). The difference between the total movement of materials and the total ROM is the ore that is double-handled through initial stockpiling and later reclaiming.

Table 2. List of Significant Materials Movement Required During the 20-year LOM

Attribute	Unit	Total
Total Concentrator Feed	Mt	1,294.8
Waste	Mt	1,163.9
Total ROM Ex-pit	Mt	2,533.0
Total Movement	Mt	2,883.7
Strip Ratio (ex-pit)	t:t	0.89

The mine layout is shown in Figure 4 showing the three mining pits that will be established (main pit, central and north pit) and the positions of the waste rock dumps and the oxide and low-grade stockpiles. The Company will undertake the mining with activities including pre-stripping, in-pit haul road construction and maintenance, excavation and haulage of ore and waste rock out of the pits. The in-pit works will also include drilling and blasting, loading, hauling, pit dewatering, in-pit dust control, in-pit electrical distribution, and pit slope monitoring. Mine works outside of the open pits will include mine haul roads, waste rock dumps, ore stockpiles and reclaiming and surface water monitoring. Facilities required for operation and maintenance of the mine will be constructed at the concentrator site approximately 2 km from the ultimate open pit limit. A contractor will provide blasting products and services.

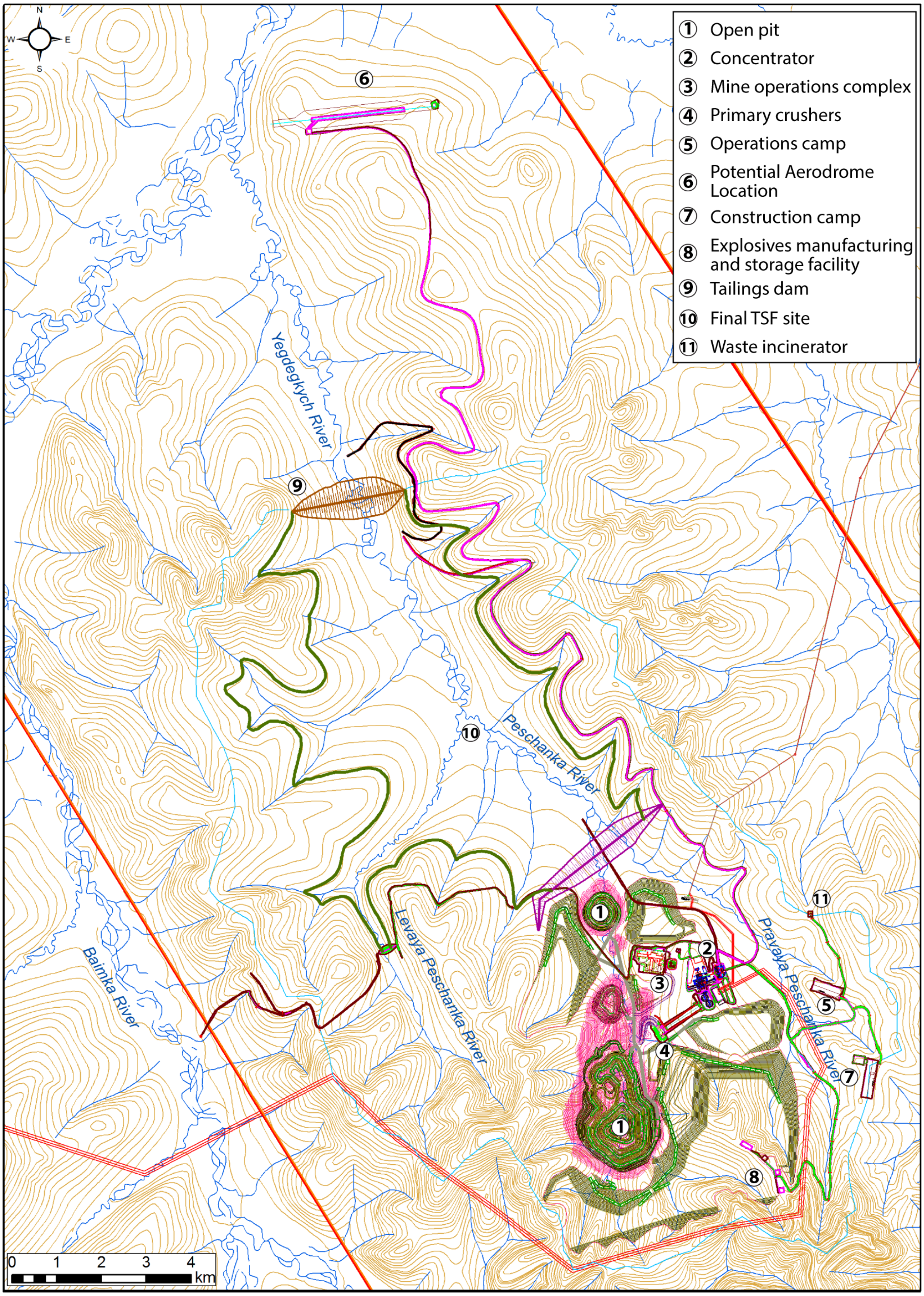


Figure 4. Mine Pits, Stockpiles and Waste Dump Locations for the Peschanka Copper Project

The facilities will be designed in accordance with Russian codes and standards, as well as applicable international standards, as appropriate. Full compliance with Russian regulations will be ensured through the project documentation that will be developed during the detailed engineering. As the main Project site is located at a remote site with harsh climatic site conditions and minimal local infrastructure, simple and time-effective building erection utilising both regional and similar applicable international construction practices will be implemented.

3.6. The Concentrator

3.6.1. Introduction

The minerals processing plant (also referred to as the concentrator) is designed to be capable of processing 70 Mt/a and producing approximately 1.5 M t/a of copper sulphide concentrate at 24% copper along with approximately 13,000 tonnes per annum (t/a) of molybdenum concentrate. This product will be transported by truck and ship to smelters, primarily in China. The process design criteria for the concentrator are summarised in Table 3.

Table 3. Process Design Criteria for the Concentrator Proposed for the Peschanka Copper Project

Parameter	Unit	Value
Ore throughput	dmt/a	70 million (M)
Overall plant availability	%	92
Operating schedule	days/a	365
Annual plant operating hours (considering availability)	h/a	8,059
Design metal head grades	Copper %	0.58
	Molybdenum %	0.014
	Gold g/t	0.36
Overall copper recovery	%	88.92
Overall molybdenum recovery	%	70.32
Overall gold recovery	%	75
Concentrate production	Copper concentrate, tonnes per annum (t/a)	1.53 M
	Molybdenum concentrate, t/a	14,357
Tailings generation	dmt/a	68.5M

3.6.2. An Overview of Generic Concentrator Processing

In general terms, the ore processing is one of crushing and grinding the ore that is mined to grain size sufficient such that a sufficient number of grains will contain the desired mineral only. The undesired grains with no commercial value are known as gangue and are a waste product. Flotation processes are then used to separate out the desired minerals from the gangue by using the hydrophilic (water seeking properties) of the gangue versus hydrophobic (water repelling properties) of the minerals. The crushed material is mixed with water to create a slurry, to which reagents are added to enhance the hydrophobicity of the minerals. The slurry is also aerated, and the minerals then attach themselves to the air bubbles and ultimately end up in the froth that forms on the surface. That froth is a concentration of the required minerals. The flotation process has three stages namely rougher, cleaning and scavenging phases.

The rougher stage is a ‘first pass’ stage and produces a rougher concentrate. Here the principle is to remove as much of the valuable mineral as possible with relatively coarse particles even though the quality of the concentrate may be poor and require further processing. Importantly, the rougher stage separates some but not all gangue from the minerals leaving a smaller mass of material for further grinding without wasting energy on grinding what is ultimately a waste. The principle is then one of trying to maximise the mineral recovery with as coarse a grain as possible so that further grinding targets principally the mineral particles.

The rougher concentrate is then moved on to the next stage, which is the cleaner stage. The rougher concentrate is first passed through a regrind mill to further reduce particle size where after the slurry again undergoes flotation. In the cleaner phase, the principle is one of maximising the quality of the concentrate by removing more of the gangue. The final stage is the scavenging stage, which is applied to the waste from the rougher tailings to try and recover any minerals that may still be contained in the tailings. The minerals are recovered using either further regrinding or more rigorous flotation processes. Similarly, the tailings from the cleaner process may also be put through the scavenger process also to recover minerals that might still be contained in the tailings.

3.6.3. The Concentrator Proposed for the Peschanka Copper Project

Parallel Processing Lines

The concentrator is designed with two parallel processing lines of equal capacity that are sufficiently independent to allow for the processing of different ores from different sources. The description that follows is for a single line, but it should be remembered that such a line is duplicated for the project.

Run-of-Mine

Run-of-mine (ROM) ore, which is the unprocessed ore that has been mined, will be transported from the mining area to the concentrator by haulage dump trucks with 350 tonne payloads.

Primary Crushing and Coarse Ore Stockpile

The haul trucks will dump ore into a primary crusher dump pocket enclosure which is open but protected from the wind. The primary crusher will reduce the ore to a size 80 % passing 153 mm. The dump pocket enclosure combined with water sprays will serve to contain dust generated during dumping. The sprays will only be operational in the summer, otherwise the water will freeze. The primary crusher will be enclosed in a heated structure installed to provide maintenance services to the crusher. This subgrade structure will be equipped with a dust collection system.

The stockpile conveyor will then move the crushed ore from the primary crusher to the coarse ore stockpile. This conveyor will be covered to contain dust and spillage as well as provide protection from the elements during maintenance. The conveyor will not be fully covered but will have half-moon covers to provide wind protection. The conveyor discharge point will be equipped with water sprays to minimize dust generation. The sprays will only be operational in the summer, otherwise the water will freeze. The coarse ore stockpile will not be covered. The coarse ore stockpile will have a capacity of 368,000 tonnes.

Coarse Ore Reclaim

Underneath the coarse ore stockpile there will be a chamber (tunnel) holding three reclaim feeders and a portion of the SAG mill feed conveyor. The reclaim feeders will retrieve ore from the stockpile at a suitable rate and deliver it to the semi-autogenous grinding (SAG) mill feed conveyor. The reclaim tunnel will be equipped with dust collection systems. Upon exit of the reclaim tunnel, the SAG mill feed conveyor will have wind protection to contain dust and spillage as well as provide protection from the elements during maintenance.

At the exit of the reclaim tunnel, an above grade structure will provide storage and handling systems for the addition of grinding media (steel balls) and dry pebbled lime to the ore on the SAG mill feed conveyor. The SAG mill feed conveyor will deliver ore, grinding media and lime into the SAG mill located in the grinding area of the main concentrator building.

Grinding

The process of grinding is one of further reducing the size of the ore to physically separate grain sizes for the further processes used to extract the desired elements of copper gold and molybdenum. The grinding circuit will comprise a SAG mill, two ball mills, hydro cyclones, and pebble crushing equipment.

The reclaimed ore and process water will enter the SAG mill (a large rotating drum containing ore slurry and grinding media (steel balls referred to earlier). Upon exiting the SAG mill, the SAG screen will separate oversized particles (pebbles) from the finer slurry. The pebbles will be harder material that has been resistant to breakage. These pebbles will be fed to cone crushers and subsequently to high pressure grinding rolls for breakage as these processes are more energy efficient than milling.

The SAG mill discharge slurry will be combined with crushed pebbles and ball mill discharge in the cyclone feed pump box. The hydro cyclones will classify the solid particles by size. Particles that are fine enough will proceed to flotation while particles that are too coarse will be returned to the ball mill for further grinding. Ball mills operate in a similar fashion to SAG mills except that the grinding media is smaller leading to a smaller grind size. To prepare the ore for flotation, potassium amyl xanthate and dithiophosphate aqueous (collectors), and fuel oil (collector) will be added in the grinding circuit.

As the pebble crushing circuit will operate “dry”, dust collection systems will be used. The conveyors in the pebble handling circuit will be covered to contain dust and spillage as well as provide protection from the elements during maintenance. The grinding and pebble crushing areas will be equipped with containment and area sumps for cleanup. The grinding and pebble crushing circuits will be located in heated buildings.

Rougher Flotation

Product from the grinding circuit will report to the rougher flotation circuit. There will be two banks of rougher flotation circuits per processing line. To enable the flotation process, sodium sulphide, potassium amyl xanthate and dithiophosphate aqueous (collectors), lime slurry, and pine oil (frother) will be added in this step. These reagents are routinely used in concentrators globally. The bulk rougher flotation step will target maximum recovery of target metals into a concentrate stream for further upgrading. The tails (waste stream) from the rougher flotation step will report to the tailings storage facility. The rougher flotation areas will be equipped with containment and area sumps for cleanup, and will be located in the heated main concentrator building.

Rougher Concentrate Regrind

The rougher concentrate will be further ground to a smaller size to increase the degree of mineral liberation and facilitate removal of additional gangue (waste) such that the concentrate can be upgraded to the desired metal concentration (28% copper). The regrind circuit will comprise hydro cyclones and grinding mills. These grinding mills will utilize ceramic grinding media (beads) instead of steel balls. To prepare the ore for subsequent flotation steps, potassium amyl xanthate, sodium sulphide and dithiophosphate aqueous (collectors), fuel oil (collector), and lime slurry will be added in the regrinding circuit. The concentrate regrind areas will be equipped with containment and area sumps for cleanup, and will be located in the heated main concentrator building.

Cleaner/Scavenger Flotation

Re-ground rougher concentrate will report to the cleaner/scavenger flotation circuit for further concentration. Product from this circuit will be concentrate slurry containing approximately 20% copper. It is further concentrated to 28% in the 2nd stage cleaner flotation. Waste from the circuit (tailings) will report to the TSF. To enable the flotation process, potassium amyl xanthate and dithiophosphate aqueous (collectors), lime slurry, and pine oil (frother) will be added in this step. These reagents are routinely used in concentrators globally. The cleaner/scavenger flotation areas will be equipped with containment and area sumps for cleanup, and will be located in the heated main concentrator building.

Concentrate Thickening

Final cleaner concentrate will be pumped the bulk concentrate thickener where a portion of the process water in the slurry will be recovered for reuse within the process water circuit. The thickened slurry will report to the molybdenum flotation circuit. This concentrate is referred to as bulk concentrate because it contains both copper and molybdenum concentrates.

Molybdenum rougher tailings will report to the copper concentrate thickener for recovery a portion of the process water in the slurry will be recovered for reuse within the molybdenum process water circuit. Thickened slurry from the copper concentrate thickener will report to the copper concentrate filters. To facilitate the thickening processes, flocculent will be added to the thickeners. The concentrate thickening areas will be equipped with containment and area sumps for cleanup, and will be located in the heated main concentrator building.

Molybdenum Flotation

The molybdenum flotation circuit will be common to both processing lines – that is to say the two parallel processing lines will supply a single molybdenum flotation circuit. The molybdenum rougher circuit will separate the molybdenum concentrate from the copper/gold concentrate. The concentrate from the molybdenum flotation circuit will be molybdenum concentrate and the tailings will be copper concentrate. The molybdenum concentrate will report to the molybdenum concentrate handling circuit. The tailings (copper concentrate will report to the copper concentrate thickener. To enable the flotation process, lime slurry, fuel oil (collector), sodium hydrosulphide, and pine oil (frother) will be added in this step. The molybdenum flotation area will be equipped with containment and area sumps for cleanup, and will be located in a segregated heated area within the main concentrator building. The area will be equipped with adequate ventilation and air quality monitoring devices to ensure worker safety.

Copper Concentrate Handling

The thickened copper concentrate will be pumped to the copper concentrate filters where it will be dewatered in vertical pressure filter units. The filter filtrate (removed water) will be recycled to the molybdenum process water circuit and the filter cake (concentrate) will be conveyed to the bagging plant. The bagging plant will package the copper concentrate into 2 tonne bulk bags for shipment to Pevek and ultimately to the customer.

The conveyors in the copper concentrate handling circuit will be covered to contain dust and spillage as well as provide protection from the elements during maintenance. The copper concentrate filters will be located in the heated main concentrator building. The bagging plant will be housed in a dedicated heated building equipped with dust collectors.

Molybdenum Concentrate Handling

Molybdenum concentrate will be sent to a two-stage dewatering circuit prior to drying and bagging. The first stage disc filter will be followed by a vertical pressure filter. Filter filtrate will be recycled to the molybdenum process water circuit. Following filtration, the filter cake will be fed to a thermal drying system, cooling screw, and bagging machine. The bagging machine will package the molybdenum concentrate into 2 tonne bulk bags for shipment to Pevek and ultimately to the customer.

Dryer off-gasses will be treated with a wet scrubber system prior to release to atmosphere. A dust collection unit will be used within the bagging system to capture dust. The molybdenum circuit will be housed in a segregated heated area within the main concentrator building.

Tailings Thickening

Tailings from the rougher flotation and cleaner/scavenger circuits will be collected in the tailings thickeners. There will be two high-density tailings thickeners (also called high compression thickeners) per line, producing tailings underflow at 62% solids. At 62% solids, it is likely that the tailings will need to be pumped to the TSF. To facilitate the thickening process, flocculent will be added to the thickeners.

The tailings thickeners will be covered and located outdoors at a lower elevation than the concentrator to facilitate gravity flow of tailings to the thickeners. The thickener cones will be in the ground and subterranean pumping chambers will be located under each thickener. The chambers will be heated and equipped with containment and area sumps for cleanup. The tailings thickeners will recover process water, which will report to the process water tanks by gravity flow. Thickened tailings will be pumped to the TSF.

Containment of Liquids and Slurries

All process liquid and slurry containing vessels will be provided with secondary containment designed according to regulatory requirements. Surface runoff (precipitation) from the concentrator area will report by gravity to the TSF where it will be contained.

Indoor Air Quality

Processing buildings will be heated to maintain a minimum temperature of 5°C. Fresh air exchanges will be supplied per regulations to maintain worker health. Dust collection, tank lids and overflow pipe seal pots, wet scrubbers, partitioning walls and enclosed flotation cells will be utilised to maximize indoor air quality.

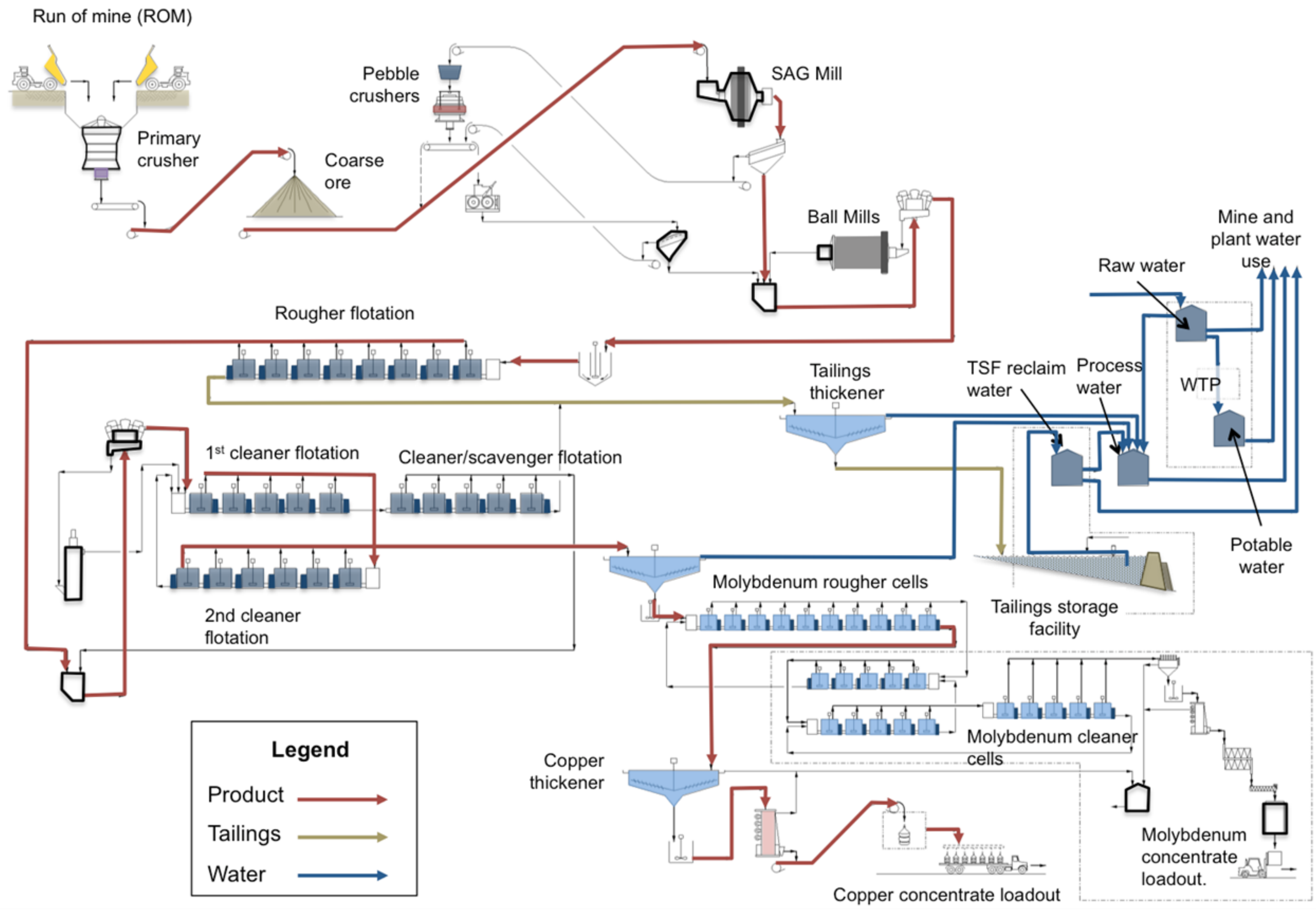


Figure 5. Process Flow Diagram for the Minerals Processing Planned for the Peschanka Copper Project (the process is described in detail in the text)

Reagents

The reagents needed for the concentrator are summarized in Table 4 along with delivery formats and relevant safety precautions that will be taken. The reagents will be mixed and stored in annexes to the main concentrator building. Each processing line will have dedicated reagent systems including separate buildings for the handling of flammable/combustible reagents. Each reagent will have a dedicated secondary containment and spill collection sumps.

Table 4. Chemicals Used at the Concentrator Together with Their Purpose, How They are Delivered to the Site and then Dosed, and Applicable Safety Requirements

Chemical	Purpose	How Delivered and Dosed	Safety Requirements
Antiscalant	To prevent scale formation in pipes, pumps and tanks	Delivered in liquid form in bulk containers, unloaded into storage tanks and then distributed to the process water circuits using pumps	The storage tank will be covered and vented. Safety showers and eyewash stations provided.
Dithiophosphate Aqueous	A secondary collector used in the flotation circuits	Delivered to site in liquid form in bulk containers, unloaded to storage tanks and pumped to the grinding and flotation circuits.	Safety showers and eyewash stations provided.
Potassium Amyl Xanthate (PAX)	A primary collector used in the flotation circuits	Delivered in granular form in 1 tonne bulk bags, dissolved in reclaim water and pumped to the grinding and flotations circuits.	Safety showers and eyewash stations provided. Dust control of the PAX is provided through a dedicated dust collection system
Oxanol (Oxal T-92) and Pine oil mixture	Frother used in the flotation circuits	Delivered to site in liquid form in bulk containers, unloaded to storage tanks and pumped to the flotation circuits.	The storage tanks are covered and vented. Safety showers and eyewash stations provided. Area is classified for fire protection (electrical grounding etc.)
Sodium Sulphide (Na_2S)	Collector used to float the oxide component of the ore	Delivered in 1 tonne bulk bags, dissolved in reclaim water and pumped to the flotation and regrind circuits.	Safety showers, hydrogen sulphide gas detectors and alarms. An independent scrubbing system treats fumes from both the covered and vented mixing and distribution. Safety showers and eyewash stations in area.

Chemical	Purpose	How Delivered and Dosed	Safety Requirements
Flocculent (Tailings)	Used to aid solids/ liquid separation in the thickeners	Dry polymer, supplied in 1 tonne bulk bags, will emptied into a feed hopper and mixed with reclaim water before being added to the tailings thickeners by pump	The flocculent system is contained in independent containment areas with sump pumps and emergency safety shower units Safety showers and eyewash stations in area
Coagulant	Used to aid solids/liquid separation in the thickeners	Dry polymer, supplied in 1 tonne bulk bags, will emptied into a feed hopper and mixed with reclaim water before being added to the tailings thickeners by pump	The coagulant system is contained in independent containment areas with sump pumps and emergency safety shower units Safety showers and eyewash stations in area
Flocculent (Concentrate)	Used to aid solids/ liquid separation in the thickeners	Dry polymer, supplied in 1 tonne bulk bags, will emptied into a feed hopper and mixed with reclaim water before being added to the concentrate thickeners by pump	The flocculent system is contained in independent containment areas with sump pumps and emergency safety shower units Safety showers and eyewash stations in area.
Test Reagent	Unknown	A circuit will be provided for an unknown reagent. The circuit is designed to receive either dry solids or liquids and dosing pumps will be provided. The destination of the reagent is unknown.	Dust control of the test reagent is provided through a dedicated dust collection system and the mixing and storage tanks are covered and vented. Safety showers and eyewash stations in area.
Fuel oil	Collector in molybdenum flotation, regrind mills and the ball mill circuit	Fuel Oil will be delivered to the plant site in bulk tanker trucks. It will be transferred to the concentrator with a fuelling truck. From the holding tank, it will be pumped to the flotation and grinding circuits.	Safety showers and eyewash stations in area. Area is classified for fire protection (electrical grounding etc.)
Sodium Hydrosulphide NaHS	A depressant used in the molybdenum flotation circuit	Delivered in flake form in 1 tonne bulk bags. Sodium hydrosulphide will be dissolved in reclaim water and added to the molybdenum flotation circuit by pump.	An independent NaHS scrubbing system treats fumes from both the covered and vented mixing and distribution. Safety showers, hydrogen

Chemical	Purpose	How Delivered and Dosed	Safety Requirements
			sulphide gas detectors and alarms.
Lime	Increase pH in the flotation process to suppress iron	Delivered in bulk bags and pneumatically transferred into a storage silo. Some of the lime will be added dry and some will be slaked with reclaim water and added to the grinding and flotation circuits as lime slurry by pump.	Safety showers and eyewash stations in area. Dust control of the lime is provided through a dedicated dust collection system

3.7. Other Facilities on the Plant Site

3.7.1. Site Water Facilities

Raw Water

Raw water will only be used for potable water production. Potable water uses will include drinking, bathing, safety showers and the analytical laboratory. Potable water will not be used in the metallurgical process.

Raw water will be sourced from a raw water dam that will collect water from spring melt every year, located in the valley of Levaya Peschanka River. The raw water will be pumped from the water dam and stored in a raw water tank. The raw water tank will supply the potable water treatment plants. Raw water for construction needs will be sourced from taliks (year round unfrozen ground) within the Baimka River valley. Water from taliks will be treated using a potable water treatment plant. The potable water treatment plants will use a calcium hypochlorite system to achieve potable water standards. The mine operations complex, process complex, operations camp and construction camp will each have independent potable water treatment plants.

Process Water

Process water is defined as water that is used in the metallurgical process. The concentrator will maintain two separate process water systems for each parallel processing line. One system is simply referred to as the process water system while the other is referred to as the molybdenum process water system. The molybdenum process water will contain a higher sodium hydrosulphide concentration and be recycled within the molybdenum circuit primarily to conserve reagent. Each processing line will have a dedicated process water tank and a dedicated molybdenum process water tank.

Process water will be used throughout the concentrator for:

- Dilution and slurry density control,
- Flocculent dilution, and,
- Slurry line flushing.

Both types of process water will be recovered at the concentrator using the concentrate and tailings thickeners. The process water is sourced from the tailings storage facility. The process water circuit will be replenished via the reclaim water system as a portion of the process water will report with the tailings to the tailings storage facility. The process water storage tanks will be located outdoors with adjacent heated pump houses. The molybdenum process water tank will be located within the main concentrator building. Both process water tank areas will have secondary containment and spill collection sumps.

Reclaim and Treated Reclaim Water

The Peschanka Copper Project has maximized the use of reclaim water to minimize the consumption of raw water. Reclaim water is defined as water that is pumped from the tailings storage facility to the metallurgical processing facility and the mine operations complex. As such, reclaim water comprises of process water that has been discharged with the tailings to the TSF, and precipitation from the catchment. Reclaim water will be pumped from the tailing storage facility (TSF) to the reclaim water tank where it will be further distributed. A portion of the reclaim water (approximately 15%) will be treated (filtered) and distributed to:

- Gland water
- Reagent mixing,Nf
- Filter cake and filter cloth washing,
- Cooling water service,
- Other uses (dust suppression and wash down)
- Fire water make-up.

The remaining approximately 85% of the reclaim water is used to replenish the process water tanks.

3.7.2. Domestic Sewage Treatment

The mine operations complex, process complex, operations camp and construction camp will each have independent domestic sewage treatment plants. Treated grey water from the sewage treatment plants will be pumped to the tailings storage facility. Solids will be treated by incineration.

3.7.3. Cooling Tower System

The grinding circuit equipment in each parallel processing line will use mechanical draft type cooling towers (one system per line). A glycol water mixture will be circulated in a closed system as the heat transfer fluid. Reclaim water will be used as the evaporating liquid. During winter months, the water sprays and fans in the cooling towers will be stopped, and a heat recovery system will reclaim heat for use in the concentrator to reduce the overall building heating costs. Treated reclaim water is sprayed in the summer over cooling tower coils to utilize evaporative cooling feature and increase cooling capacity of the cooling towers.

3.7.4. Analytical Laboratory

The analytical laboratory will be housed in a standalone building. The laboratory will be equipped to provide chemical and physical analysis of the process materials as well as environmental analysis such as water quality. Various streams from within the concentrator will be analysed for process control and environmental samples will be analysed to ensure compliance with regulations. The laboratory will be equipped with appropriate fume extraction and dust collection, as well as chemical storage.

3.7.5. Transport infrastructure

Road

There is currently no permanent road connection outside of the Project site. There is a long-term state plan to develop a permanent road from Magadan to Anadyr, which will pass close to the main Project site and the mine will then build a connecting road to that new road. The construction of the road has commenced from the port of Pevek and so far approximately 230 km has been completed. The Project is assuming that the permanent road to Pevek and the connection to the plant site to be completed at the start of the operation of the processing facility. During the construction period the Project will use winter roads.

Air

Air transportation to the region is currently available with an existing airport at Keperveem near the town of Bilibino. The company will build an aerodrome for transportation of personnel during construction and operations. The aerodrome will be located in close proximity to the plant site at a suitable topographic location north of the plant site. A helicopter pad will be located near the plant site to provide emergency evacuation to Bilibino until the site aerodrome is built.

3.7.6. Tailings disposal

The disposal of tailings is generally considered to be a significant source of environmental and social risk for any mining operations such as the Peschanka Copper Project. Tailings are the waste product from the concentrator and have negligible economic value. The safe disposal of tailings is key to overall Project sustainability and long-term success of the Peschanka mining operations.

Tailings

Tailings (mineral waste) from the Peschanka concentrator will consist of a crushed rock and water slurry together with any of the reagents from the flotation process that remain in the slurry after the minerals processing. The treatment of up to 70Mt of run of mine ore per year is expected to lead to approximately 68Mt/a of tailings material for a total life of mine disposal requirement of approximately 2.349 Bt. The tailings will be sent to thickeners to reduce the water content and then transported to the tailings storage facility.

Tailings storage facility

The safe, permanent disposal of the tailings requires a purpose built facility that will not only contain all the tailings for the life of the operation, but indeed well into the future after the mine operations cease. The tailings storage facility (TSF) will take the form of a dam on the downslope side of the valley (Figure 6). The tailings are deposited into the TSF on the upslope side and as the tailings flow downhill the solid material settles out of the slurry with the ‘clean’ water (referred to as ‘supernatant’) continuing downhill to where it is contained by the embankment (essentially the dam wall). A large portion of the supernatant is transported back to the concentrator via a water reclaim pumping and pipeline systems. The embankment is progressively raised over time as the TSF fills always maintaining sufficient dam freeboard to avoid any spills. A secondary containment will also be constructed downslope of the embankment to contain seepage that may flow under the main embankment.

Surface runoff from the catchment within which the TSF is situated also flows into the facility, as does precipitation that falls directly over the facility (Figure 7). Water is also lost from the facility as a result of evaporation and sublimation. Since Peschanka is located in a permafrost environment, seepage into the ground is expected to be lower than a typical TSF in non-permafrost environment. The water that is contained by the embankment is also pumped from the TSF back to the concentrator. As such it is necessary to determine a 'water balance' that details the inflows into the TSF, the outflows and the remaining volume of water over the life of the Project so that the TSF can be designed accordingly and provision made for the various safety margins need for safe operation. The water balance also includes probable climatic events especially heavy rainfall events so that the facility is designed for all plausible in- and outflows that could occur during lifetime of the TSF. The amount of make-up water is minimized by maximizing the reuse, recycling, and treatment of process water especially return of the supernatant from the TSF to the concentrator.

For recovery of the supernatant a floating pumping station in the TSF will reclaim water using vertical turbine pumps and direct the water via overland pipeline to a reclaim water storage tank at the concentrator site. The TSF pond will be sufficiently large to allow for proper sedimentation (settlement of the solids from the tailings) operation of the supernatant reclaim system and to ensure the pond volume can sustain winter operations.

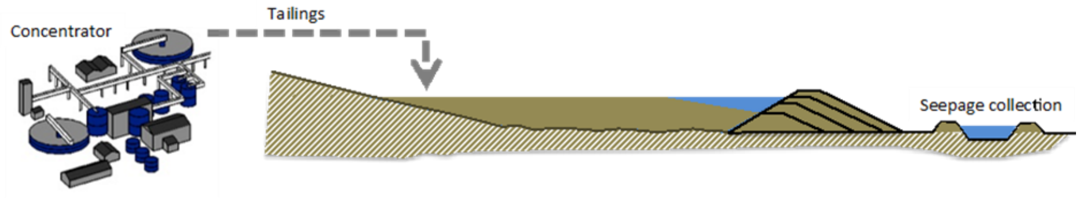


Figure 6. Schematic Presentation of the Major Components of a Tailings Storage Facility (TSF) that Will be Required at the Peschanka Copper Project

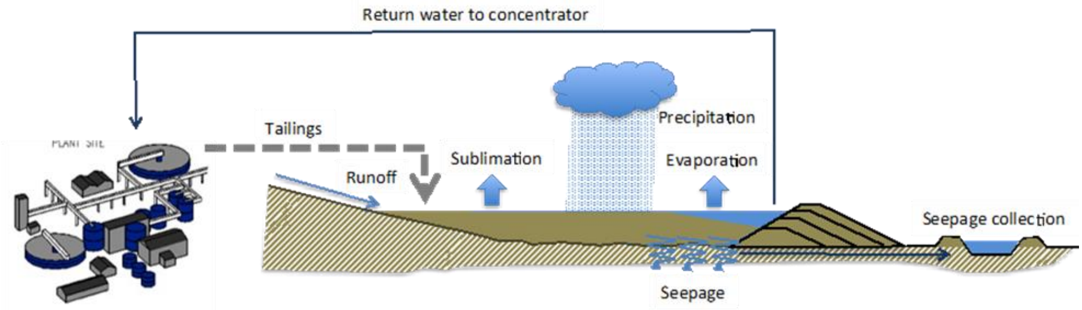


Figure 7. Schematic Presentation of the Major Components of the Tailings Storage Facility (TSF) Together with the Inflows into and Outflows from the Facility

In addition to the water saving requirements, the TSF must comply with two key environmental and social management requirements, namely:

- To ensure that there is no release of contaminated wastewater; and,
- That the facility retains its structural integrity.

The TSF Proposed for the Peschanka Copper Project

The TSF will be formed by an embankment that is approximately 110m high (elevation 330 m) at the end of life of the mine. An initial (starter) embankment will be constructed to contain the initial 4 years of tailings deposition. The facility will be designed to hold runoff from spring melt and inflow from 7-day Probable Maximum Flood (PMF). The TSF will be a zero discharge TSF during operations.

The embankment will be designed as a rockfill structure with an impervious liner on the upstream face to prevent water from percolating through the embankment. A seepage collection pond located downstream of the main embankment will collect seepage that may percolate through the embankment foundation. The embankment will be raised sequentially from the initial starter dam elevation to the final 330 m elevation.

The foundation of the embankment will be excavated to eliminate soils from the footprint allowing the foundation of the embankment to be constructed over sound foundation materials hence significantly improving geotechnical performance and stability. The final impoundment capacity will be able to store 2.349 Bt of tailings.

Water Balance

Water delivered to the facility with the tailings materials will remain partially entrapped with the tailings. A portion of the water will be free and available to be returned to the plant for re-use in the concentration process. Additional water from rainfall run off will be managed within the facility, temporarily accumulating against the main embankment before is pumped back to the plant.

Geothermal Modelling indicates permafrost conditions will not be lost. It is expected therefore that seepage into the ground will be minimal and long-term seepage through the embankment foundation will be minimal if at all and will reduce to zero once permafrost of the foundation materials and the embankment base is re-established.

The TSF pond will be sufficiently large to allow for proper sedimentation, operation of the supernatant reclaim system and to ensure the pond volume can sustain winter operations when there are no natural inputs to the TSF. The runoff from the mine pit and the concentrator will be collected in the TSF.

Location of the TSF

The TSF for the Peschanka Copper Project is proposed to be established in the Egdegkyck River valley and extend in a north northwesterly direction from the mine pits and concentrator. The final area of the TSF will be some 45 km^2 within a total catchment area of some 173 km^2. The TSF design is still under development. The alternative TFS sites with the preferred facility location option are shown in Figure 11.

3.7.7. Waste Rock Dumps

Runoff captured from the waste rock dump (WRD) sites and the surrounding areas will not be allowed to discharge directly into existing natural streams due to potentially elevated suspended solids from the WRDs. The runoff water from each WRD site and their surrounding catchments will be routed to the TSF.

3.7.8. Electrical Power Supply and Distribution

The primary electrical utility (Magadan) will supply a maximum of 350 MW of permanent electrical power for the Project. In addition, a secondary electrical utility of 110 kV from Pevek, will supply 20 MW of construction and emergency electrical power for the Project from a 110 KV power line from Pevek. A 220 kV transmission line from Magadan will deliver the electrical power to the site substation at the concentrator. The transmission line will be delivered by the responsible power authorities, as necessary to support the Project construction and operation, but is not considered part of the Project being assessed here. The plant will have an emergency diesel generating system that will supply 50 MW of power into the plant, when the main source of power from the 220 KV pole line is interrupted.

3.7.9. Fuel Supply

Diesel fuel will be transported from Pevek by tanker truck to tanks located adjacent to the mine operations complex area. Diesel will be trucked to other on-site storage sites as needed. Diesel fuelling stations will be located near the fuel storage tanks for dispensing fuel to light and medium vehicles, and for filling fuel dispensing vehicles used for in-pit fuelling of equipment and other ancillary equipment, such as generators. The fuel storage and dispensing areas will include secondary containment. Construction diesel fuel will be transported from Pevek by tanker truck to fuel storage bladders on the site until the permanent tanks can be fully utilized.

3.7.10. Communications

In general, the communications systems will comprise plant wide fibre optic network with link to Magadan by a digital trunked radio channel; and a plant wide business LAN complete with Voice-Over-Internet-Protocol (VOIP) telephone. The plant site will have Wi-Fi and LTE coverage.

3.8. Marshalling Yard at Pevek

Export of the finished products will take place via the port at Pevek some 550 kms north east of the Peschanka site. There is an existing port at Pevek, but it is understood that there will be a general upgrade to the port facilities independent of the Project export requirements. The mine and processing plant would simply capitalise on the upgraded facilities and will not play a direct role in the upgrade.

To facilitate the export of products via Pevek, a stand-alone marshalling yard will be constructed close to the town, which would include an office, warehouse and segregated storage areas. This facility, which is a direct component of the Peschanka Copper Project, would be established at an early stage of the construction programme to facilitate import of goods and equipment needed for the Project via the port: they will be stored at the yard before before transporting to the site of the mine and processing plant. During the operations phase marshalling yard will be used for storage of incoming goods and equipment and finished products delivered from the Peschanka site.

3.9. Project Execution

3.9.1. Overview

The Owner's Project Management team will manage the Engineering Procurement Construction Management (EPCM) Contractor and various project interfaces; engineering contracts; construction contracts; and coordination of services to complete all project scope Inside Battery Limits (ISBL) of the Project. This will include all project controls, Quality Assurance/Quality Control (QA/QC) and health, safety and environment (HSE) functions to confirm that all contracts and services are controlled and executed in a safe manner.

3.9.2. Mining Rights

In accordance with the license agreement on the license for subsoil use AND No. 14673 (license type TR) GDK Baimskaya LLC undertakes to provide for the following:

- Engineering design for development of the Peschanka Copper deposit and its approved reserves in a manner such that the design will be approved by the state expert reviewers;
- Construction of the infrastructure facilities necessary for the support of the mining operations and process facilities;
- Commercial mining of copper and associated minerals in accordance with the approved engineering design and in a manner to achieve full design throughput of the metallurgical operations; and
- A TEO Konditsi and a report with the estimate of resources for the state expertise as per set procedures, which has been completed and approved.

3.9.3. Mineral Resources Conservation and Subsoil Protection

GDK Baimskaya LLC (the subsoil user) is obliged to provide for the following:

- Perform a geological survey to confirm accurate evaluation of the mineral reserves and proper procedures for mining operations
- Compliance with the law and approved standards (rules and regulations) for operation methods related to subsoil use and prevention of subsoil pollution during operations
- Extraction of copper and other associated minerals in accordance with the approved process procedures. Accurate recording of extracted copper and other minerals and reconciliation of those left in the subsoil
- Protection of the license area from flooding or and other situations which might affect the quality of minerals and commercial value of the deposit.

3.9.4. Industrial and Occupational Safety

The subsoil user (the company) undertakes to provide for industrial and occupational safety requirements viz:

- To provide for health and safety of production staff during exploration and construction and operation of the mining facility in accordance with the law;
- Develop guidelines for industrial and occupational safety for the personnel employed at hazardous production facilities and to provide personal protection equipment to persons working there; and
- Control air quality and containment of hazardous and explosive gases and dust over the pits. Provide special measures to ensure safety of mining operations and to protect the environment in case of industrial accidents.

3.9.5. Environmental Protection

In terms of environment protection, the subsoil user undertakes to provide for the following

- Perform a study to provide baseline state of the environment within the license area in accordance with the programme;
- Monitor the environment (atmosphere, subsoil, water bodies, soil) within the license area in accordance with the programme;

- Construction of industrial runoff collection and treatment facilities to prevent industrial pollutants from entering the environment; treatment of pit and mine water prior to discharge;
- Arranging waste rock dumps and processing facilities with minimal effect on the environment; and,
- Using overburden for technical and biological reclamation.

3.9.6. Participation in Social and Economic Development

The Company plans to provide for the following activities for social and economic development of the region:

- Compensate the land (forest or pasture) owners for any losses and damages in the manner and within the terms prescribed by Russian legislation for land and forestry;
- Engage enterprises of the Chukotka AO as contractors or suppliers for manufacture of equipment, facilities and performance of various services; and
- Create employment opportunities for the population of the region in which the mine is located and make maximum use of local labour during development and operation of the deposit.

3.10. Associated Facilities

Associated facilities are those facilities that appear external to the main Project site such as road and electricity supply infrastructure, but which have been established specifically for the Project and would not be established in the absence of the project. The international lender requirements dictate that such associated facilities must be assessed in the same way as the other Project components. For the Peschanka Copper Project the following associated facilities are identified: two dedicated transmission lines will be constructed to supply electrical power to the Peschanka site (a 200kV primary facility from Magadan and a 100kV secondary facility from Pevek), and access road to the site from the all weather road b from Pevek to Magadan (currently being constructed as per the governmental plan), and some upgrade of the Pevek port facilities. For all these facilities there will be subject to specific environmental impact assessments, but these are not included in the scope of this ESIA.

3.11. Environmental and Social Aspects for the Peschanka Copper Project

3.11.1. Environmental and Social Aspects Defined

For each of the identified activities it is necessary to list the associated environmental and social aspects. Environmental and social aspects are defined as 'an element of an organisation's activities, products or services that can interact with the environment', and it is the identification and quantification of the aspects that provides the key to assessing impacts. The environmental and social aspects of the proposed Peschanka Copper Project are presented in Table 5 below.

Table 5. The List of the Principal Environmental and Social Aspects Associated with Construction Activities on the Peschanka Copper Project

Category	Aspect	Aspect	Estimated Construction Quantity	Units
Resource use	Water	Industrial	600 to 650	m^3/annum (m^3/a)
		Potable	25 to 470	m^3/a

Category	Aspect	Aspect	Estimated Construction Quantity	Units
	Energy	Mining	173,400	MWh/a
		Liquid fuels	36	m^3/a
	Raw materials	Explosives	160,000	tonnes per annum (t/a)
		Lubricants	190	litres per annum (l/a)
	Waste	Sewage	69,000 to 1,272,670	m^3/a
		Non-hazardous	2,267,388	kg/a
		Hazardous	1,221	kg/a
		Medical waste	132	kg/a
		Waste oil	4,571	l/a
Outputs	Energy emitted	Maximum noise (from construction machinery)	120	maximum dBA
		Maximum noise (from blasting)	105 to 135	1,000m from blast in dBl
Socio-Economic	Jobs	Jobs	up to 5,000 (peak quantity)	
	Spending	Total Capital Expenditure	4,061	million USD

Note: the environmental and social aspects have been estimated as a function of available information and should be viewed as indicative only

Table 6. The List of the Principal Environmental and Social Aspects Associated with Operational Activities on the Peschanka Copper Project

Category	Aspect		Estimated Operations Quantity	Units
Inputs	Water	Industrial *	57,000,000	m^3/a
		Potable (From River)	25 to 470	m^3/a
	Energy	Mining	191,000	MWh/a
		Concentrator	1,953,000	MWh/a
		Other Infrastructure	256,000	MWh/a
		Tailings storage facility	87,000	MWh/a
		Liquid fuels	140	m^3/a
	Land	Mine pits	497	hectares (ha)
		Stockpile areas	566	ha
		Waste rock dump areas	1,371	ha
		Overall mine area including concentrator	182	ha
		TSF	4,874	ha
		Aerodrome	207	ha
	Raw materials	Explosives	46,000	t/a
		Antiscalant	1,542	m^3/a
		Dithiophosphate Aqueous	6,000	t/a
		Potassium Amyl Xanthate (PAX)	12,000	t/a

Category	Aspect		Estimated Operations Quantity	Units
		Oxanol, Oxal T-92 & Pine Oil Mixture (50:50)	14,000	t/a
		Sodium Sulphide (Na_2S)	41,000	t/a
		Flocculent (Tailings)	3,000	t/a
		Flocculent (Concentrate)	38	t/a
		Test Reagent	12,000	t/a
		Sodium Hydrosulphide (NaHS)	9,000	t/a
		Lime	68,000	t/a
		Lubricants	275	1000 l/a
		Coolant	38	1000 l/a
Outputs	Products	Copper	**632,490**	t/a (dry solids)
		Molybdenum	**13,108**	t/a (dry solids)
	Effluent	Mine water	1,035 to 2,235	m^3/day
		Storm water **	28	Mm^3/a
		Sewage (after 2026)	199,000 to 220,000	m^3/a
	Waste	Waste rock	1,164	million tonnes (LOM)
		Tailings	69,000,000	t/a (dry solids)
		Waste oil	813,000	l/a
		Domestic waste	2,555	t/a
		Sewage sludge	2,400	t/a
		Industrial waste	215	t/a
		Hazardous waste	100	t/a
	Energy emitted	Maximum noise (plant)	105	dBA
		Noise (blasting)	105 to 135	1,000m from blast in dBl
		Maximum vibration	<170	kN
	Atmospheric emissions	Total CO_2 emissions	447,000	t/a
		PM emissions (Mine site)	300	t/a
		NO_x emissions (Mine site)	6,300	t/a
		SO_2 emissions (Mine site)	800	t/a
		PM emissions (Off site)	50	t/a
		NO_x emissions (Off-site)	900	t/a
		SO_2 emissions(Off site)	100	t/a
Socio-Economic	Jobs	Jobs (operations)	200 to 1,000	
	Spending	Total Operating Costs	732.7	million USD

** Reclaim water from TSF to plant at 5,070 m^3/hr*
*** From run-off either diverted as non-contact water or collected in the TSF for process use*
Note: the environmental and social aspects have been estimated as a function of available information and should be viewed as indicative only.

Manpower is expected to grow quickly through 2020 to a level of +/- 1,000 by early 2021, rapidly ramping up thereafter at increments of 1,000 -1,500 per annum to peak at ca. 5,600 during the period 2024/ 2025. The Project is expected to achieve mechanical completion in 2026.

4. LEGAL AND REGULATORY FRAMEWORK

The environmental assessment for the proposed Peschanka Copper Project has two broadly parallel components namely an Environmental and Social Impact Assessment (ESIA) and an *Otsenka Vozdejstviya na Okruzhayushchuyu Sredu* (OVOS) together with Design Documentation, which collectively forms the Russian regulatory equivalent of the ESIA. The key components of the respective processes are shown schematically in Figure 8.

4.1. Applicable International Lenders' Requirements

4.1.1. International Finance Corporation (IFC) Requirements

The International Finance Corporation (IFC) is the private sector component of the World Bank Group and has largely set the benchmark for environmental and social assessment and management for most international lenders. The IFC has a Sustainability Framework that articulates a commitment to sustainable development, and which is an integral part of their risk management. The framework consists of:

- A Policy on Environmental and Social Sustainability[4];
- Performance Standards[5], which define clients' responsibilities for managing their environmental and social risks; and,
- An Access to Information Policy, which articulates IFC's commitment to transparency.

Environmental and Social Sustainability Policy[6]

IFC strives for environmental and social sustainability in the activities it supports in developing countries, and this key objective is the foundation of the policy. The policy itself is an expression of the IFC's commitment to sustainability, with reference to the environmental and social performance standards that must be met by borrowers, investees and other financial institutions).

Environmental and Social Performance Standards

The IFC's environmental and social performance standards (paraphrased as 'the performance standards' or PS) are a series of good practice requirements that highlight various environmental and social risks and detail good practice management of such risks. The performance standards are the gold standard for many lending and investor institutions and so even if the IFC is not approached directly for financing for the Project, it is highly likely

[4] International Finance Corporation (IFC). 2012a. International Finance Corporation's Policy on Social & Environmental Sustainability. Available at: https://www.ifc.org/wps/wcm/connect/7141585d-c6fa-490b-a812-2ba87245115b/SP_English_2012.pdf?MOD=AJPERES&CVID=kiIrw0g.

[5] IFC. 2012b. Performance Standards on Environmental and Social Sustainability January 1, 2012 Available at: https://www.ifc.org/wps/wcm/connect/24e6bfc3-5de3-444d-be9b-226188c95454/PS_English_2012_Full-Document.pdf?MOD=AJPERES&CVID=jkV-X6h

[6] IFC. 2012a. International Finance Corporation's Policy on Social & Environmental Sustainability. Available at: https://www.ifc.org/wps/wcm/connect/7141585d-c6fa-490b-a812-2ba87245115b/SP_English_2012.pdf?MOD=AJPERES&CVID=kiIrw0g.

that the PS would apply. As such the environmental and social assessment conducted on the Project will be based on the risks and good practice obligations detailed in the PS. The PS are:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and,
- Performance Standard 8: Cultural Heritage.

The PS are not detailed here but will be elaborated in the ESIA.

Access to Information Policy

IFC's Access to Information Policy (AIP) requires the provision of accurate and timely information regarding its investment and advisory services activities to its clients, partners and stakeholders. The policy dictates that all projects that apply for financing must be publicly disclosed before a decision can be made on the application. It must also be recognised that the environmental and social impact assessments prescribed in the performance standards also require consultation and disclosure as part of the assessment process.

4.1.2. The Equator Principles

The Equator Principles (EP) are defined as ‘a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making’ (EP, 2019). Stated differently the EP are how commercial banks give effect to the commitment to sustainability espoused by the IFC. Some 96 Financial Institutions (FIs) from 37 countries have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. FI’s that have adopted the EP are known as EPFI’s. A key element of the EP is the adoption of the IFC’s PS and the requirement for borrowers and/or investees to comply with the PS.

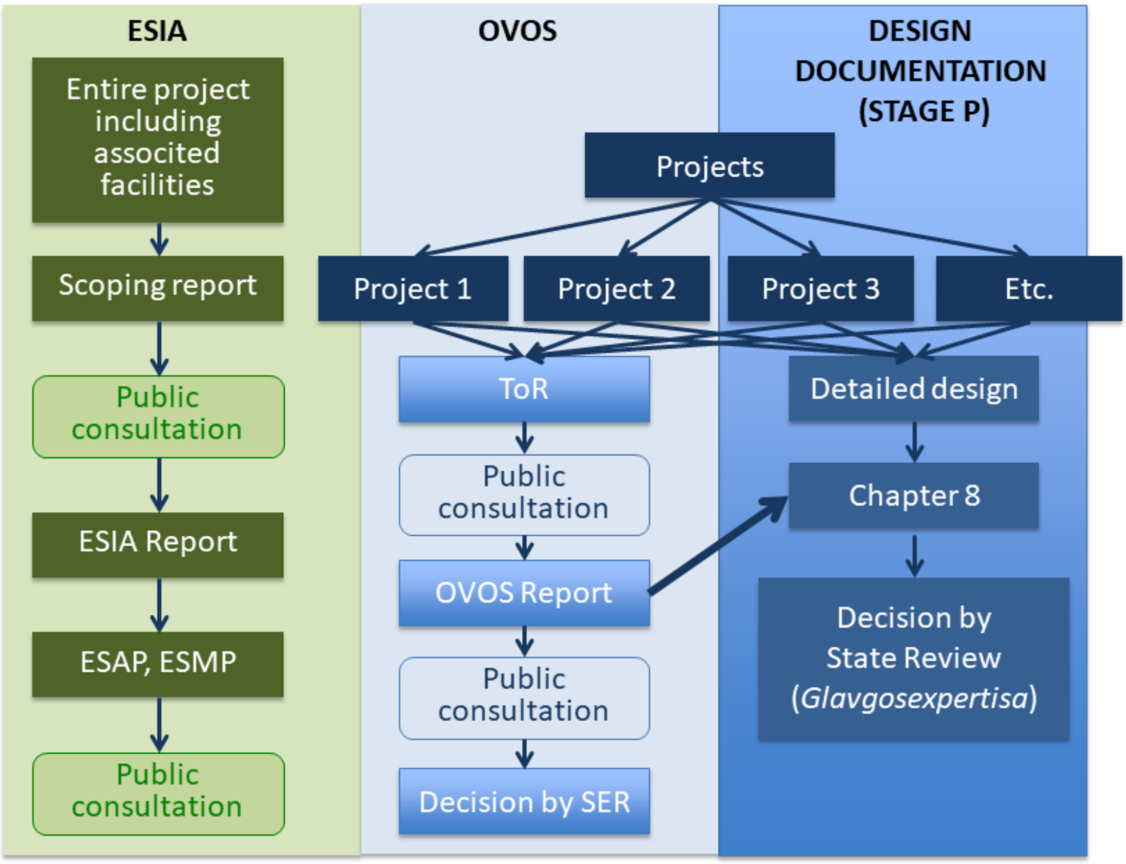


Figure 8. Schematic Presentation of the relationship between the ESIA Process Required by International Lenders (in Green) and the E&S and Technical Project Authorization Process as per the Russian Regulatory Requirements (in Blue)

4.2. Russian Legal Requirements

Russian EHS legislation is very diverse, and will be presented more fully in the Russian OVOS documentation. The brief points below aim to provide general information on the similarities and differences between the Russian legal requirements and the IFC/Equator Principles requirements that is important for the ESIA process.

Environmental Impact Assessment and Public Consultations

- EIA process in the RF

The requirement for conducting an assessment of environmental and related social and economic impacts of a planned economic and other activity is established by the RF Law on Environmental Protection[7]. The Project is subject to the State Environmental Review (SER)[8] provided by the competent authorities and the OVOS (national EIA) provided by the Project

[7] Federal Law No. 7-FZ On the Environmental Protection of 10/01/ 2002 (as amended on 29/07/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=287111&fld=134&dst=1000000001,0&rnd=0.7073980686979353#05402110916301386.

[8] Federal Law No. 174-FZ On Environmental Review of 23/11/1995 (amended as of 25/12/ 2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=304402&fld=134&dst=1000000001,0&rnd=0.05413313127288388#05754386399366245.
Federal Law No. 422-FZ of 28/12/2017 On Amending Article 14 of the Federal Law on the State Environmental Review and Article 12 of the Federal Law on Amending the Federal Law on the Environmental Protection and Certain Legal Acts of the Russian Federation. Available at http://www.consultant.ru/law/hotdocs/52059.html/

Proponent. The Federal Service for the Supervision of Nature Resource Management conducts the SER at the federal level. The national EIA procedure is set out in the 'Regulation on the Environmental Impact Assessment of Planned Activities in the Russian Federation' (the OVOS Regulation)[9]. The OVOS is conducted in three phases:

1. Notification, preliminary assessment and the Terms of Reference for the OVOS (OVOS ToR) formulation;
2. Environmental impact assessment *per se* and preparation of the draft OVOS Report;
3. Finalisation of the OVOS Report.
    - EIA Scope

      The OVOS Regulation (2000) stipulates the need for considering environmental as well as socio-economic impacts of the proposed economic activity.
    - Alternative analysis

      The OVOS Report should include assessment of impacts for all Project alternatives including namely alternative sites and Project technologies, as well as a 'no-go' alternative.

- Impact management

  The OVOS Report must include measures to mitigate or prevent potential adverse impacts of the Project, as well as analysis of their effectiveness and implementation perspectives.
- Stakeholder engagement and information disclosure

  Public consultations and information disclosure are required at Phases 1 and 2 of the OVOS process.

The Project Developer is responsible for conducting the public consultation process; informing the public and ensuring access to information, addressing enquiries, and covering all related costs.

The local (municipal) authorities provide organizational support in conducting public meetings (if applied as a method for public consultations) including *inter alia* public hearings.

Environmental Management

- Environmental Management Systems

While the Russian Federation legislation does not specify compulsory requirements for environmental management systems, their development and introduction on a voluntary basis is encouraged. A set of recommended standards similar to ISO has been developed to include:

- GOST R ISO 14001-2016 Environmental Management Systems. Requirements and Guidance for Use;

[9] RF State Committee on the Environmental Protection Order of 16/05/2000 No. 372 On the Approval of the Regulation on the Environmental Impact Assessment of Planned Activities in the Russian Federation. Available at http://base.garant.ru/12120191/#ixzz5VcOS9Zwy.

- GOST R 54934-2012/OHSAS 18001:2007 Occupational Health and Safety Management Systems. Requirements;
- GOST R ISO 9001-2015 Quality Management Systems. Requirements;
- GOST R 19011-2012 Guidance on Audit of Management Systems.

The list is not exhaustive with a number of other documents adopted that also support the introduction of environmental and social management systems.

Labour and Working Conditions, Occupational Health and Safety

The Russian Federation has signed and ratified virtually all International Labour Organization (ILO) conventions with requirements contained therein reflected in the RF Labour Code[10] in one way or another. However, this applies only to employees hired on a labour contract basis while in many cases the civil law contracts are used as a form of employment (e.g. a contractor agreement). This form of employment is not covered by the provisions of the RF Labour Code.

The legislative provisions regarding child labour are well elaborated, consistent with ILO requirements and complied with. Prison labour is legal under Russian legislation; it is relatively widely used in a number of sectors, and whether it is used or not needs to be verified on a case-by-case basis.

The RF Labour Code is also the backbone legislation on occupational health and safety (OHS). It is supported by a broad range of regulations addressing general aspects and specific issues of occupational health and safety.

The key law on occupational safety is the Law on Occupational Safety of Hazardous Industrial Facilities[11]. The Minerals and Mining Safety Rules are the key regulations applicable to the Project[12].

The RF occupational health and safety legislation is generally consistent with the relevant EU requirements though enforcement practice may vary.

Resource Efficiency and Pollution Prevention

The RF legislation on pollution prevention and resource efficiency is extensive and includes many laws and regulations.

- Pollution prevention

RF legislation requires pollution prevention and abatement. Best available techniques (BAT) is gradually becoming embodied in national legislation. BAT has now been defined in the Law

[10] Federal Law No. 197-FZ Labour Code of the Russian Federation of 31/12/2001 (amended as of 11/10/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=16713056590818349842493367 1&cacheid=C599940A82DD15DCCFA8B2FFBD361052&mode=splus&base=LAW&n=308815&rnd=0.7502925081510683#013047658433739961.

[11] Federal Law No. 116-FZ On Occupational Safety of Hazardous Industrial Facilities of 21/07/1997 No. 116-FZ (as amended on 29/07/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=213198&fld=134&dst=1000000001,0&rnd=0.7502925081510683#05603206920920716.

[12] RosTekhNadzor Order of 11/12/2013 No. 599 (amended as of 21/11/2018) On the Approval of the Federal Industrial Safety Rules "Minerals and Mining Safety Rules". Available at http://www.gosnadzor.ru/industrial/mining/acts/gornorud_object/pr599/.

on Environmental Protection (Article 1)[13]. From 2019 onwards, Category I industries applying for an Integrated Environmental Permit will be required to implement BAT[14]. The development of Engineering and Technology References (ITS documents) is ongoing.

- Protection of water resources

The RF Water Code governs the management and protection of water resources[15]. The term ‘water resources’ refers to surface and groundwater resources contained in natural and man-made water bodies and watercourses. As a general rule, all water bodies are federal property.

- Climate Change and GHG Emissions

The RF has signed (but not yet ratified) the Paris Agreement on Climate Change[16] on 22 April 2016.

Pursuant to the Russian Federation Greenhouse Gas (GHG) Emission Monitoring, Reporting and Verification System Development Concept[17], the mandatory GHG reporting requirement came into effect in 2019 (Phase I) for major industrial and energy installations with direct annual GHG emissions over 150,000 tons of CO_2-equivalent.

From 2024 onwards (Phase III), the mandatory GHG reporting requirement will apply to all organisations whose GHG emissions are over 50,000 tonnes of CO_2-equivalent, and to all air, rail, maritime and river transport organisations.

Community Health and Safety

The Law on the Healthy and Safe Community Environment[18] serves to ensure community health and safety in the country.

A key regulatory mechanism is the sanitary protection zone (SPZ), which is a buffer area, set around an industrial site and which provides additional space for the dispersion of emissions released from that site. Each industry is required to ensure compliance with the specified air quality and noise level guidelines on the SPZ boundary and conduct an assessment of community health risks.

[13] Federal Law on the Environmental Protection of 10/01/2002 No. 7-FZ (as amended on 29/07/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=287111&fld=134&dst=1000000001,0&rnd=0.7073980686979353#05402110916301386

[14] Criteria for Being Qualified as Objects that Have a Negative Impact on the Environment of Categories I, II, III and IV. Approved by the RF Government Resolution of 28/09/2015 No. 1029.

[15] RF Water Code No. 74-FZ of 03/06//2006 (as amended on 27/12//2018. Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=65BDD5C43CB1FC516D935216ED085C75&mode=splus&base=LAW&n=304226&rnd=0.7502925081510683#0127313373856341.

[16] The Paris Agreement on Climate Change official website. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.

[17] Russian Federation Greenhouse Gas Emission Monitoring, Reporting and Verification System Development Concept, approved by the RF Government Resolution of 22/04//2015 No. 716-r. As amended by the Order of the RF Government of 30/04/2018 No. 842-r.

[18] Federal Law No. 52-FZ On the Healthy and Safe Community Environment of 30/03/1999 as amended on 03/08/ 2018. Available at: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=626AC85E0D9DB0CB64A9DDCF469B1503&mode=splus&base=LAW&n=296562&rnd=0.7502925081510683#09325465290645842.

Land Acquisition and Involuntary Resettlement

RF land legislation is very detailed and requires, *inter alia*, that compensation be paid for land acquisition for federal and municipal programmes. The national land acquisition process is generally consistent with the relevant EU requirements. However, significant differences may become apparent in the situations where a formal land title is missing for a plot that has been used for many years.

Cultural Heritage

Russia is a party to the Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)[19];

Russia is not a party to the Convention for the Safeguarding of the Intangible Cultural Heritage (2003)[20] and this is a major source of contradiction with lenders' requirements.

Key national requirements regarding the conservation of tangible cultural heritage are set out in the Russian Federation Law on the Conservation of Cultural Heritage[21].

Indigenous Peoples

The Russian Federation has a well-defined body of legislation concerning the small-numbered indigenous peoples (IP) of the North, Siberia and the Far East (small-numbered indigenous peoples)[22,23]. The federal legislation includes a number of bylaws and regional laws in place in the regions where indigenous peoples are concentrated.

The Russian legislation has distinct features compared to the relevant IFC requirements (including the definition and eligibility criteria that should be met by an ethnic group to be included in the national list of indigenous peoples).

According to Federal Law No. 82-FZ On the Guaranteed Rights of the Small-Numbered Indigenous Peoples of the Russian Federation, Indigenous Peoples[24] are considered as the

[19] United Nations Educational, Scientific and Cultural Organization (UNESCO). 1972. The Convention Concerning the Protection of the World Cultural and Natural Heritage. Available at: http://whc.unesco.org/en/175.

[20] UNESCO. 2003. The Convention for the Safeguarding of the Intangible Cultural Heritage. Available at: http://unesdoc.unesco.org/images/0013/001325/132540e.pdf.

[21] Federal Law No. 73-FZ On the Cultural Heritage (Historical and Cultural Assets) of the Peoples of the Russian Federation of 25/06//2002 as amended on 03/08//2018. Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=304221&dst=0&rnd=0.7502925081510683#011431971479303882.

[22] Federal Law No. 82-FZ On the Guaranteed Rights of the Small-Numbered Indigenous Peoples of the Russian Federation of 30/04//1999. Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=F7FDD86C7E0B7704EFEBA6E5810A58C9&mode=splus&base=LAW&n=301179&rnd=0.7502925081510683#05202292374552007.

[23] Federal Law No. 104-FZ On the General Principles Underpinning the Organisation of Small-Numbered Indigenous Communities of the Peoples of the North, Siberia and the Far East of the Russian Federation of 20/06//2000 as amended on 27/06/2018. Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=D2692A148ECFC2C6208D81708C6DEABD&mode=splus&base=LAW&n=301173&rnd=0.7502925081510683#011285836106578828.

[24] Article 1 of the Federal Law No. 82-FZ On the Guaranteed Rights of the Small-Numbered Indigenous Peoples of the Russian Federation of 30/04//1999. Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=F7FDD86C7E0B7704EFEBA6E5810A58C9&mode=splus&base=LAW&n=301179&rnd=0.7502925081510683#05202292374552007.

nationalities occupying traditional lands of their ancestors and practicing traditional lifestyle, household and economy and having total number of less than 50 thousand people and identifying themselves as ethnic community (Article 1, para 1). The Chukotka AO has it's own legislation on IPs.

5. THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) METHODOLOGY

5.1. Overview

Environmental and Social Impact Assessment (ESIA) is an assessment of possible impacts of a proposed activity such as the Peschanka Copper Project, on the natural environment and society. In some ways ESIA is best understood as an assessment of the unintended or unwanted consequences of a particular project. Development projects have economic growth, wealth creation and even job creation as objectives but these have to be weighed up against the negative effects of the same project. ESIA is a process of identifying impacts, both positive and negative, and determining the significance of such impacts for decision-making on the acceptability of the Project. In assessing the impacts, mitigation that could reduce or prevent negative impacts or enhance the benefits is also identified for inclusion in the implementation of the Project. Last but by no means least, public consultation is a key element of the ESIA process with a particular focus on people who may be directly affected by the Project, especially where such people may be vulnerable as a result of poor socio-economic circumstances.

5.2. Project Categorisation

A key requirement for international lenders is the categorisation of projects as a function of environmental and social risk. The risk categories are as follows:

- Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;
- Category B – Projects with potential limited adverse environmental and 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 and social risks and/or impacts.

Given the nature of the Peschanka Copper Project (viz excavation of large quantities of earth and rock, large quantities of tailings and waste rock and the sensitivity of the receiving environment, which is Tundra and where Indigenous People still live, the Peschanka Copper Project is deemed to be a Category A Project.

5.3. Activities, Aspects and Impacts

The concept of activities, aspects and impacts derives from the early development of the ISO 14001 Environmental Management Systems standard and is conceptually powerful in describing how impacts are assessed. Activities refer to the physical activities that would occur during all Project phases (construction, operations and decommissioning) and are the activities required to implement the project. Environmental and social aspects are defined as 'elements of activities that can *interact* with the receiving environment' and have been defined and quantified in the Project description presented in Chapter3. Finally, impacts are defined as 'changes in the receiving environment that would be brought about by the activities and associated aspects'. In short the ESIA process is one of assessing what would change in the environment and society as a result of the implementation of the Project and what would be the significance of those changes. The concept of activities, aspects and impacts is illustrated in Figure 9.

5.4. Environmental and Social Baseline

It can be seen from the figure that a key part of any ESIA is a detailed characterisation of the environment and society that would be affected by the Project before the Project is introduced. This detailed characterisation is referred to as the 'environmental and social baseline'.

5.5. Consultation and Disclosure

An important element of the ESIA is public consultation, which relies in turn on the disclosure of project information so that stakeholders can comment meaningfully on the Project and highlight concerns they may have. Typically, a Stakeholder Engagement Plan (SEP) is prepared to detail how such consultation would take place.

5.6. Environmental and Social Management Programme (ESMP)

The role of an environmental and social management programme (ESMP) is to detail the mitigation required for the Project and to describe how it will be implemented. The ESMP serves to bridge the ESIA and Project implementation so that mitigation prescribed in the ESIA would be effectively implemented as part of the Project.

5.7. ESIA Scoping Report

The purpose of an ESIA Scoping Report is, as the name suggests, to define the scope of the ESIA. Defining the scope of the ESIA is based on highlighting the key potential impacts that need to be assessed in the ESIA as a function of:

- The environmental and social aspects of the proposed project;
- Sensitivities and vulnerabilities in the receiving environment; and,
- Concerns and questions raised by stakeholders in the consultation process.

As such an ESIA Scoping Report contains a detailed description of the proposed project together with a characterisation and quantification wherever possible, of the environmental and social aspects of the required project activities. The ESIA Scoping Report also contains a detailed description of the environmental and social baseline highlighting specific vulnerabilities and sensitivities. The baseline is typically prepared using literature on the area supplemented with detailed field work to provide both ground truthing of the literature as well as the most up to date characterisation of environmental quality and the state of the society potentially affected by the proposed project. Importantly the ESIA Scoping Report also serves to document the key issues raised by stakeholders in the consultation process.

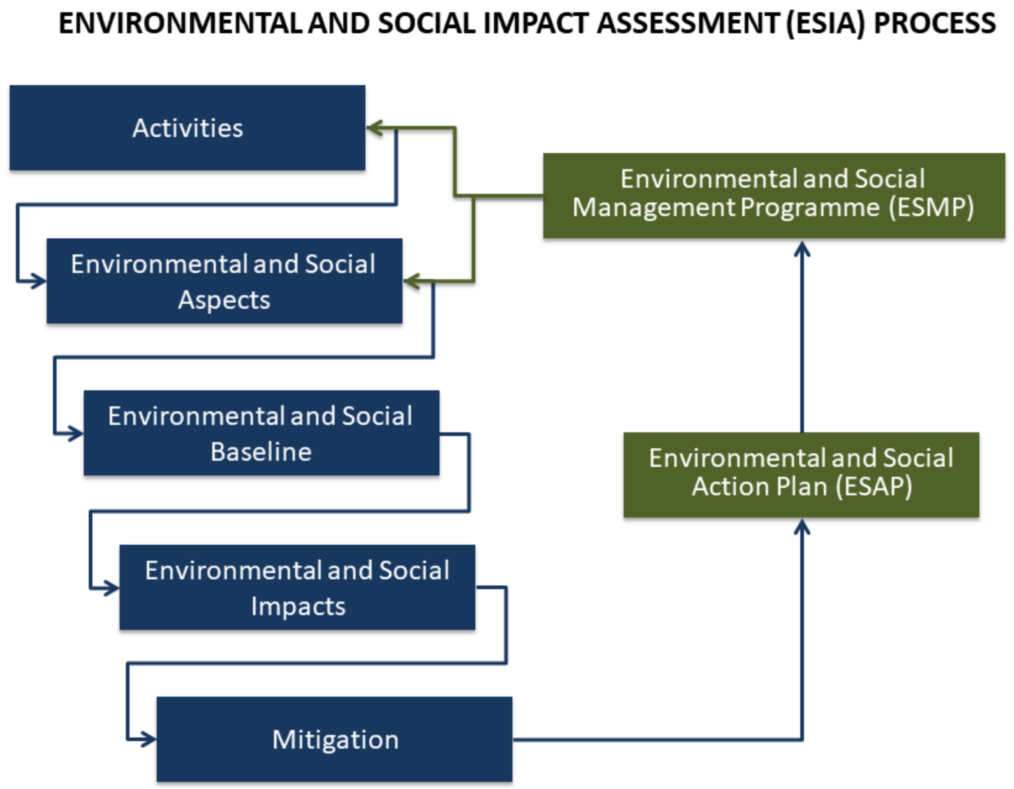


Figure 9. The Concept of Project Activities, Aspects and Impacts where Impacts Are Defined as Changes in the Environment and Society (Negative and Positive) Stemmed from the Proposed Project and the Significance of Those Changes

6. ASSESSMENT OF ALTERNATIVES AND ASSOCIATED PROJECTS

The following alternatives have been considered at this ESIA stage:

- 'Zero' alternative;
- Alternative locations of the mine within the license area and in close proximity to it;
- Alternative technology solutions;
- Energy supply options; and
- Traffic flow options.

Based on the consideration of these options, the optimal project configurations are then selected for detailed design.

6.1. <u>'Zero' Alternative</u>

The 'Zero' option implies that the Project does not go ahead. In the case of non-activity, the negative environmental impacts associated with its implementation will not take place. However, the positive impacts, such as social (related to social and economic development of the area and the Chukotka AO in general) and environmental (associated with the use of land disturbed by large-scale Project-related geological exploration activities and subsequent restoration of this land) will not take place as well. In this case, the disturbed land will recover very slowly, and a progressive decline in socio-economic development of the region will occur (which otherwise could have benefitted from the Project over at least the project lifetime).

6.2. Alternative Locations of the TFS

During the early project feasibility stage GDK Baimskaya LLC considered several options for locating the various project facilities within the license area and its immediate vicinity. A preliminary recommendation was to exclude the areas transferred to the Burgakhachan tribal community, from the layout design. The most significant changes, from an environmental and social point of view, related to the choice of the location of the TFS. Some 18 alternative TFS sites were assessed. During the primary screening, 7 sites (Figure 10) were selected within a radius of 15 km from the concentrator[25]. At this stage, sites ***A, G, and F*** were excluded based on various technological criteria, whereas sites B, C, and E were selected for further screening.

Then the TFS sites were analysed against the following criteria:

- Dam volume (ultimate and starter);
- Dam crest height;
- Distance from the mill to the TSF dam;
- Potential pipeline route;
- Access/haul route for construction;
- Catchment and river diversions; and
- Other proposed considerations.

The locations of sites B, C and E are presented below (Figure 11).

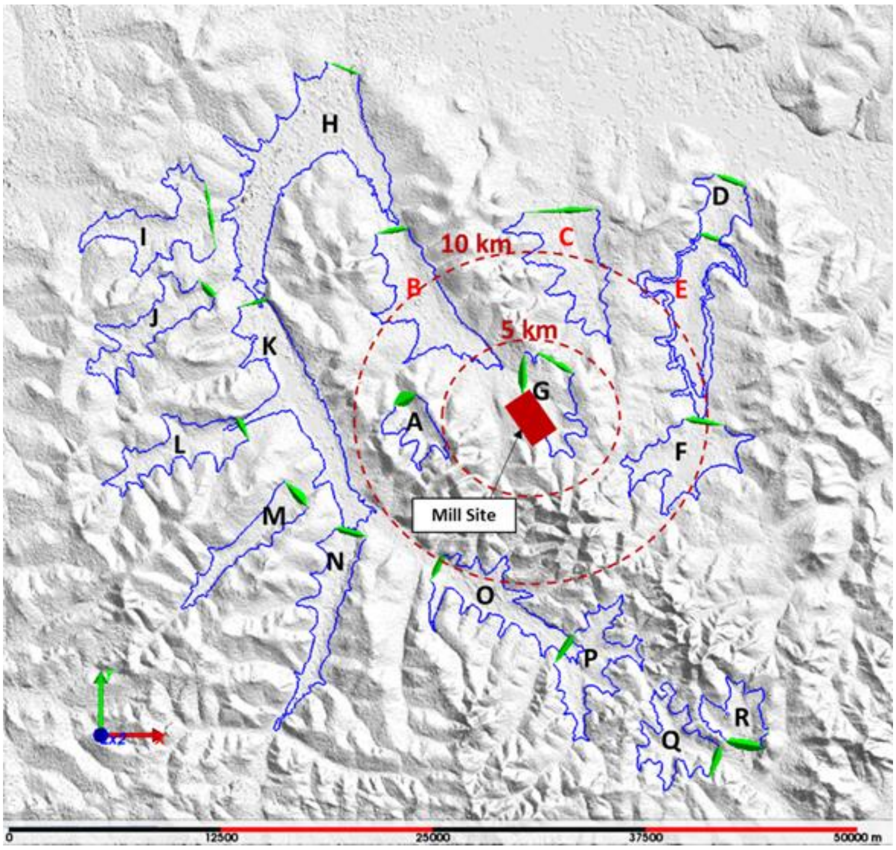


Figure 10. The Site Selection Process for the Tailings Storage Facility: Primary Screening

[25] Klohn Crippen Berger.2016. Peschanka Pre-Feasibility Study - Progress on TSF Site Selection. 10/03/ 2016.

Based on a suite of technical parameters option B was selected as the base case for the design process. It should be noted that only three of the selected technical assessment criteria are directly related to the manifestation of environmental impacts namely:

1. Dam footprint area (land acquisition);
2. Total area of disturbed land; and
3. Energy consumption required to pump tailings from the PP to the TSF dam.

Comparing the proposed TSF location options based on the first criterion appears quite difficult due to the close similarity of estimated areas.

Option B appears preferable based on the second criterion because all planned ore mining and processing facilities will be located within one catchment, namely the Peschanka-Yegdegkych River catchment, while two other options (C and E) feature facilities located in the Chernaya and Agnautala River catchments that are part of the Bolshoy Anyui River Basin. This means that the development of the tailings storage facility would require constructing access roads in the river valleys not affected by previous ore mining and processing activities. Options C and E would also affect the ecosystems of the Chernaya and Agnautala Rivers as a result of the significant alteration of their hydrological and hydrochemical regimes.

Based on all environmental criteria, Option B is considered as the preferred location option for the tailings storage facility (Figure 11) and so the further design of the TSF is based on this location.

6.3. <u>Alternative Technology Options</u>

The selection of optimal technology options has actively continued at the time of writing this document including the flotation process, tailings disposal, and location of ore mining and processing facilities. The assessment of alternative technology options will be therefore undertaken as part of the full-scale ESIA based on applicable criteria.

6.4. <u>Location Options for the Operations Camp and the Construction Camp</u>

Four site location options for the operations camp were considered in the design and preliminary assessment process (Figure 12). Options 0b and 0c were rejected because they are located within the Sanitary Protection Zone (SPZ) of planned Project facilities. According to the Sanitary Standard SanPiN 2.2.1/2.1.1.1200-03, accommodation facilities for rotational staff might be allowed to be located within the SPZ provided that the duration of each rotation does not exceed two weeks. Knowing that the duration of each staff rotation in this Project is definitely more than two weeks, locating the rotational staff camp within the SPZ of planned Project facilities is not allowed.

While Options 0a and 0d have similar ratings based on this criterion, Option 0d appears to be preferred from logistics and site suitability/availability perspectives. Option 0d was therefore selected as the preferred siting alternative for the operations camp.

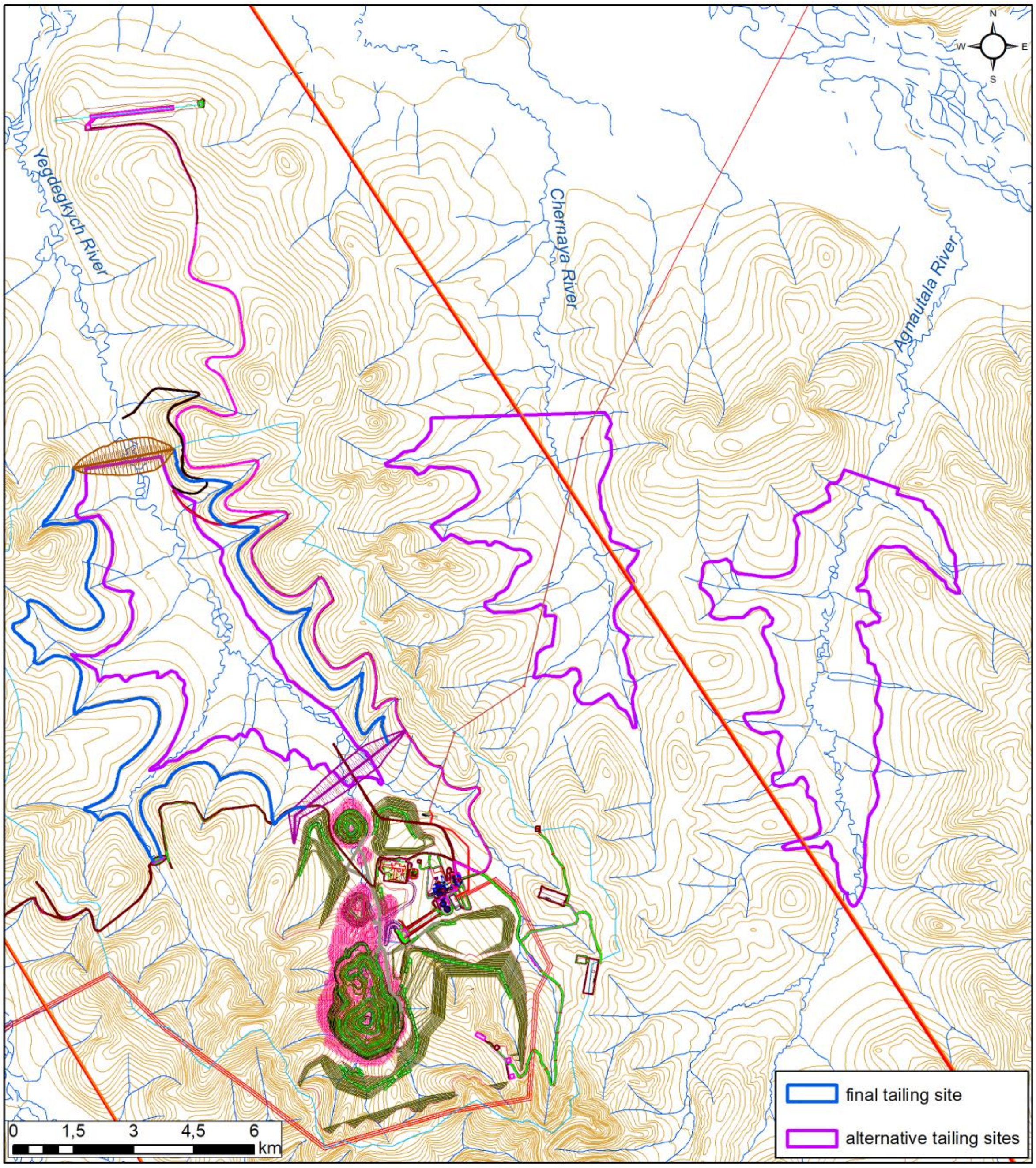
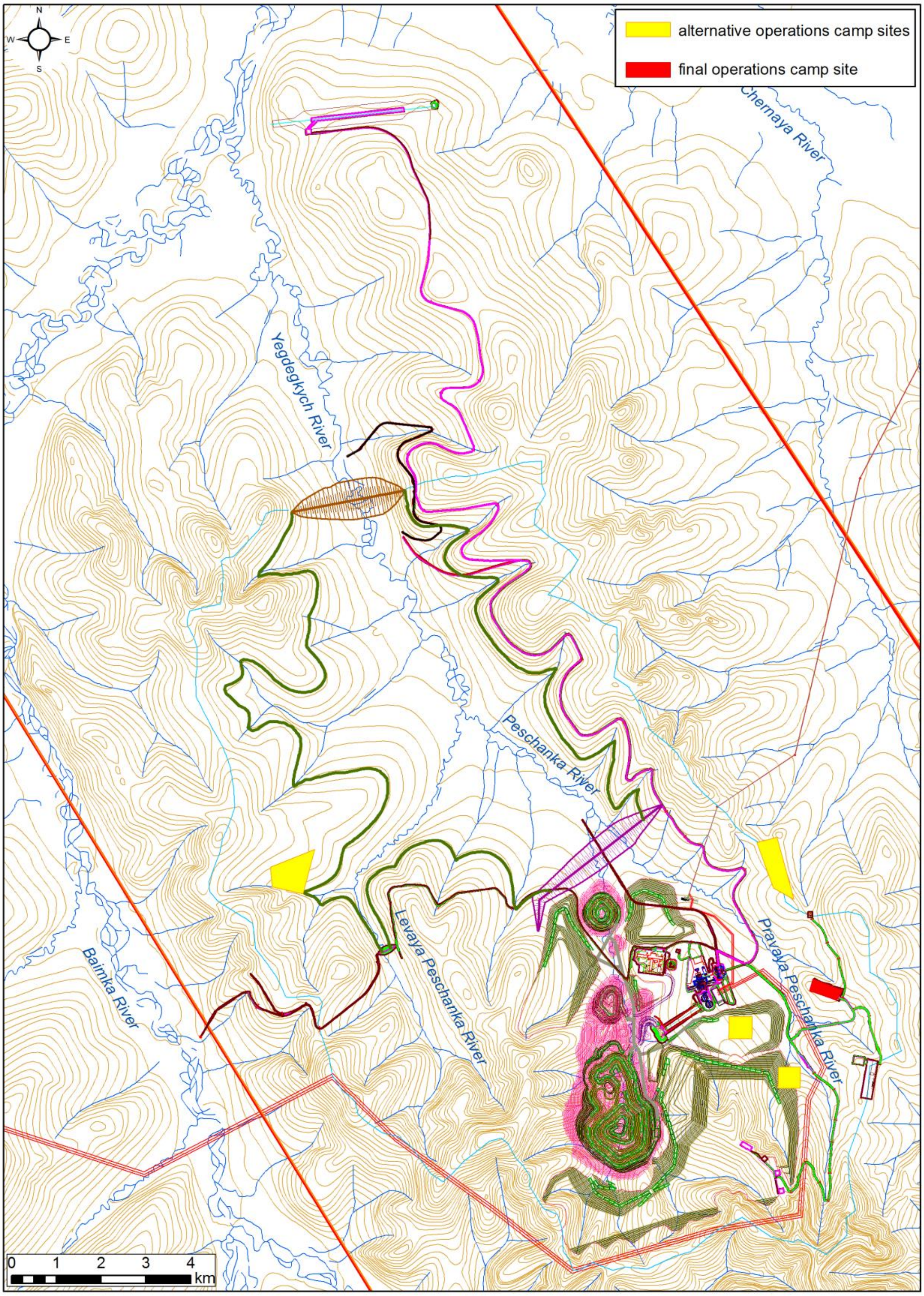


Figure 11. Alternative Sites for Location of Tailings Storage Facility



Note: Option 0d (the preferred location option) is marked with red

Figure 12. Proposed Locations for the Operations Camp

6.5. Preliminary Assessment of the Marshalling Yard at Pevek

The marshalling yard planned for Pevek includes containers and temporary bulk storages for food, reagent containers, products' concentrate (copper and molybdenum); offices, and so forth. The marshalling yard location options are shown in Figure 13 and discussed below.

Options 1 and 3 cannot be further considered, as they are not supported by the local administration. In addition, the only way that Option 2 can currently be accessed is via the town of Pevek. Thus, it makes more sense to use Options 4 or 5 for the marshalling yard as they would allow product delivery from the mine to be marshalling yard with least possible disturbance to Pevek residents. For incoming materials during the construction phase, Option 2 would imply transporting materials from the port to the marshalling yard along the road that is on the western (sea) side of the town and using the same route to bring the materials and products back along that road towards the port and then out through the town. The use of Options 4 or 5 would envision products and materials to be transported from the port and then along the road leading out of the town towards the mine while the marshalling yard would be *en route* to the mine. As such the site deemed to have least impact is Site 6 which is well away from the town and will therefore be the least disruptive to people living in the town.

Figure 13. Proposed Sites for the Marshalling Yard at Pevek

7. ENVIRONMENTAL BASELINE

7.1. Geology and Topography

The Peschanka gold-copper-molybdenum porphyry[26] deposit is one of the twenty largest deposits of that type in the world. A series of lode (minerals contained within rock) and placer

[26] Porphyry is a variety of igneous rock consisting of large-grained crystals, such as feldspar or quartz, dispersed in a fine-grained matrix (groundmass).

deposits (minerals liberated by erosion and deposited in rivers) extends along the deep sub-meridional Baimka (Yegdegkych) Fault to form the Baimka Metallogenic Zone (BMZ) (Figure 14). In 2015, baseline studies were conducted in and around the proposed mining area. The information presented in this baseline draws on the open sources (the general information) together with site-specific data obtained during the 2015 baseline studies.

The Project area lies within the BMZ, which has the following regional structures:

- Geotectonic division: the Aluchinsky Massif within the Oloysky Depression of the Chukotka Fold System;
- Orographic division: Anyuisk Low Mountain Range in the Yano-Chukotka Highlands;
- Engineering and geological division: Oloysky Region of the Alazeysky Fold System; and,
- Geo-cryological division: Yukagir-Anyuisk Region of the Verkhoyan-Chukotka Fold System.

The Peschanka deposit is confined to the central part of the BMZ located in the southeastern marginal zone of the Yegdegkych Pluton in the Peschanka River Basin. The deposit extends north-south for 7 km and is 0.9-1.3 km wide. There are three relatively large ore bodies confined to the Cretaceous Yegdegkych monzodiorite complex. The southern part of the deposit constitutes the main stockwork containing over 78% of ore stock, the central and northern parts form the Central and Northern Ore Runs, respectively.

The Project area comprises the following geological formations:

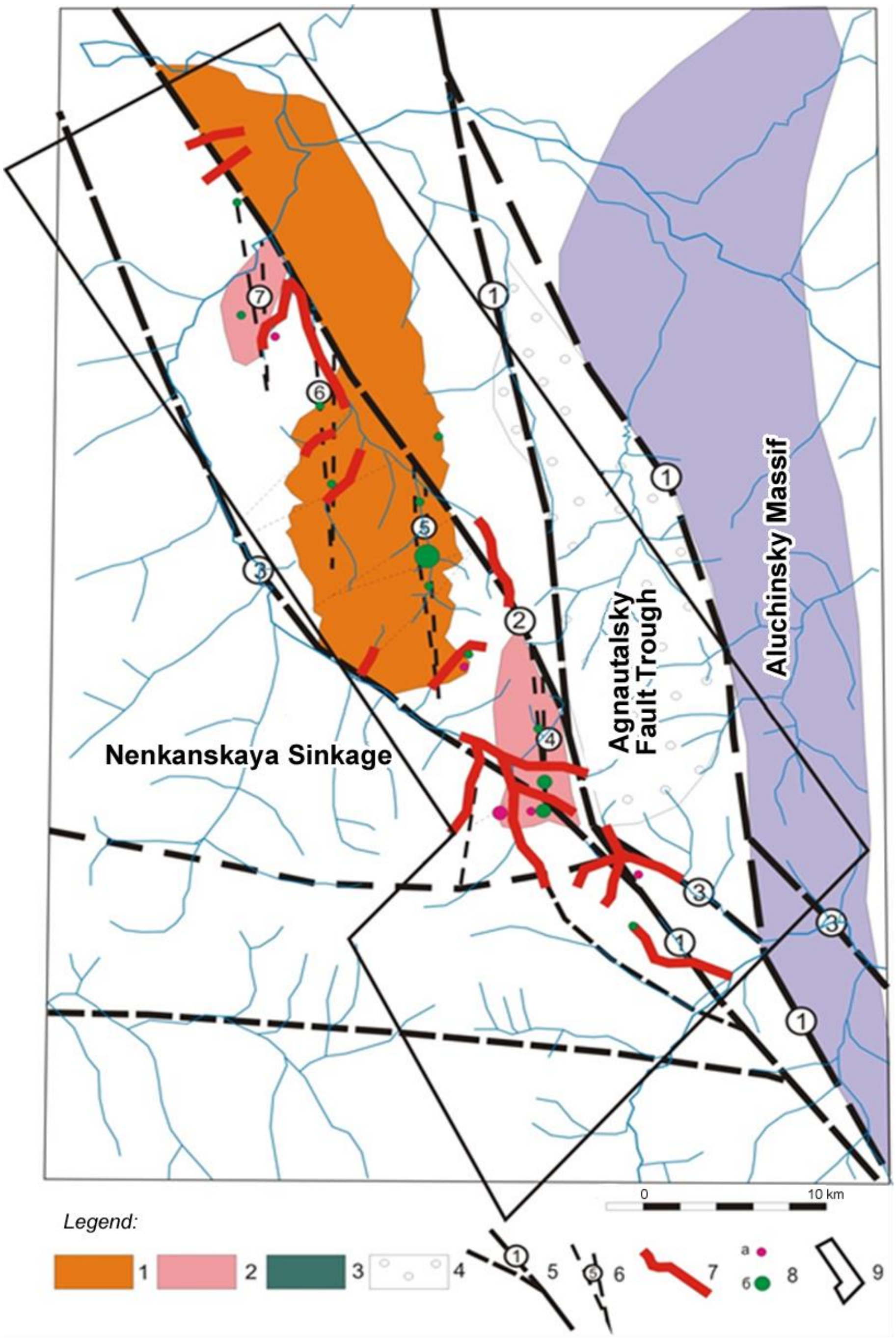
- Late Jurassic (J3) to Early Cretaceous (K1) country/host rocks and soils;
- Late Pleistocene (QIII) to Holocene (QIV) unconsolidated/dispersed rocks and soils.

Within the host rock is a coherent copper/molybdenum/porphyry ore formation with mineralization mainly confined to porphyry bodies. The main ore reserves of BMZ (copper, molybdenum, gold and silver) are concentrated in the Peschanka deposit and adjacent Nakhodka Ore Field and Yuriakhsky Potential Ore Field.

The Peschanka deposit is located in an area of continuous permafrost of mountain type. The significant features of which, with regards to the hydrogeology of the area, are the variation of permafrost thickness with relief and development of non-frozen continuous thaw zones under rivers and streams. The permafrost thickness ranges from approximately 150 m to 280 m, with the elevation of the base of the permafrost between 111 m and 263 m RL.

7.1.1. Orographic Setting and Landforms

The area is part of the Anyuisk Plateau within the Northeast Highlands, which comprises fold and block mountain structures of varying size and height. Typical landforms are alpine and ancient glacial features, barren tundra areas and lava plateau formations with young, extinct volcanoes. The area is medium to slightly dissected with low to moderate altitude mountains.



1-3 Intrusive formations: 1-Yegdegkych Massif (ξK₁e); 2-Baimka Massif (νJ₃-K₁b); 3-Aluchinsky Massif (σT₁a); 4-Cretaceous igneous and sedimentary rocks associated with the Agnautalsky Fault trough; 5-6 Ruptures: 5-magma and ore conduits (1-Anyuisky, 2-Yegdegkych, 3-Baimsky); 6-ore-confining fault structures (4-Nakhodka OF, 5-Peschanka OF, 6-Levaya Peschanka OF, 7-Yuriakhsky OF); 7-placer gold deposits; 8 ore occurrences and deposits: а) gold, б) copper; 9 - Baimka License Area.

Figure 14. The Tectonic Setting of the Baimka License Area

7.1.2. Ore and Rock Composition

The Peschanka deposit contains porphyry-copper ores[27] with low sulphur content (less than 1%). The deposit's resources comprise about 80% sulphide ore and 20% oxide ore. The sulphide ore includes mainly chalcopyrite and bornite with oxide ore resources being

[27] The Conceptual Mining Study of the Peschanka Site within the Baimka Deposit, Bilibino District, Chukotka AO, October 2011.

dominated by malachite and azurite. The mineral composition of sulphide and oxide ores is presented in Table 7. Molybdenum occurs as molybdenite together with fine particulate gold and silver. The sulphide minerals present in the deposit include enargite, gray ores and arsenopyrite.

7.1.3. Assessment of Acid-Base and Metal Leaching Potential of Ore and Rock

Acid rock drainage and metal leaching (ARD/ML) may occur when sulphide bearing minerals in waste rock, tailing waste and cut-off grade ore are exposed to air and water, resulting in acid drainage and subsequent metals leaching[28]. As such an assessment was completed which assessed the ARD/ML risk.

Table 7. Sulphide and Oxide Ore Mineralogy

Sulphide Ore		Oxide Ore	
Ore Minerals	**Other Minerals**	**Ore Minerals**	**Other Minerals**
Bornite	Rutile	Cuprite	Plagioclase feldspar
Chalcopyrite	Anatase	Malachite, azurite	Muscovite, sericite
Pyrite	Sphene	Chrysocolla	Potash feldspar
Sphalerite	Carbonates	Bornite	Biotite
Galena	Zeolites	Chalcopyrite	Quartz
Molybdenite	Barite	Chalcosite	Rutile
Enargite	Fluorite	Covellite	Anatase
Magnetite	Plagioclase feldspar	Fahl ore	Sphene
Hematite	Muscovite	Molybdenite	Carbonates
Marcasite	Potash feldspar	Pyrite, marcasite	Zeolites
Fahl ore	Biorite	Hematite, goethite	Barite
Argentite	Quartz (several generations)	Limonite	Fluorite
Silver sulphides	Sericite	Native gold, silver, copper	
Arsenopyrite		Galena, sphalerite	
Stannite		Magnetite	
Native gold		Pyrolusite	
Native silver		Cassiterite	

Source: IMC Montan. 2011. Scoping Study for the Development of Peschanka Deposit

Static and kinetic tests were conducted on both ore and waste rock samples. Results indicate that waste rock in the Peschanka deposit mainly consists of monzodiorite (~80%) and monzodiorite porphyry (~20%). The Peschanka deposit comprises three primary ores, namely oxide ore, transition (mixed) ore and sulphide ore, accounting for 30%, 10% and 60%, respectively. All these ore types were therefore sampled with the quantity of samples of each of three types of ore adjusted to reflect their distribution in the deposit. The composition of ore processing tailings will be also tested statically and kinetically once these are produced.

The Neutralization Potential Ratio (NPR) = Acid Neutralisation Potential (ANP) / Acid Generating Potential (AGP) is widely used to assess the acid rock drainage risk. The higher the ratio the lower the ARD risk. Static tests on samples revealed the following:

Waste Rock

The NPR estimates are presented in

[28] International Network for Acid Prevention. 2014. The Global Acid Rock Drainage Guide.

Figure 15 indicating that 92% of waste rock samples have NPR>1 and 83% have NPR>2 meaning that the majority of samples are classified as non-acid generating (NAG). The NAG-pH and NPR for each of the waste rock samples is summarised in Figure 16. It can be seen from the figure that 77 samples (including 4 duplicate samples) are classified as NAG. These classification results are consistent with the NPR estimates suggesting that the tested waste rock samples have limited ARD potential.

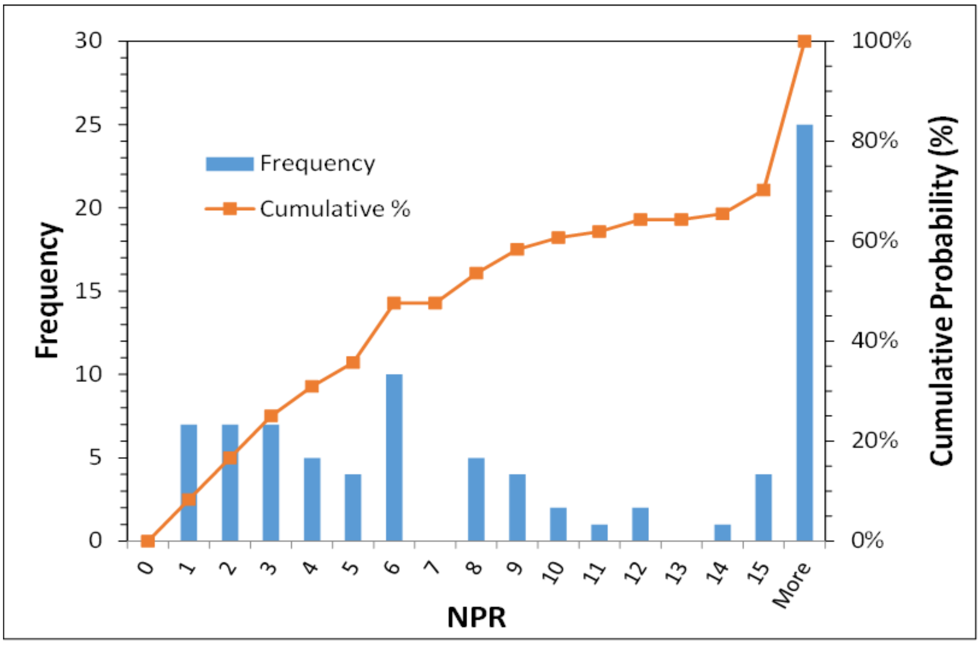


Figure 15. Distribution of NPR for Waste Rock Samples

Ore Samples

Sulphide sulphur content correlates poorly with the total sulphur content likely due to the presence of sulphur oxides in the ore. The average sulphide sulphur to total sulphur ratio is lowest for the oxide ore, increasing through transition ore to sulphide ore samples (Table 8). Sulphate sulphur is highest in the oxide ore samples.

Table 8. Sulphide Sulphur to Total Sulphur Ratio in Ore Samples

Ore Type	Average Sulphide S / Total S, %
Sulphide	131.8
Transitional	69.0
Oxide	27.2

Source: International Network for Acid Prevention (2014). The Global Acid Rock Drainage Guide

The NPR values for the ore samples are shown in Figure 17 and NAG-pH and NPR summarised in Figure 18. It can be seen from the figure that the NAG-pH and NPR values used to classify rock samples indicate (Figure 24) that 33 samples (including 2 duplicate samples) are classified as non-acid generating (NAG). These results correlate well with relatively low NPR values seen in Figure 17.

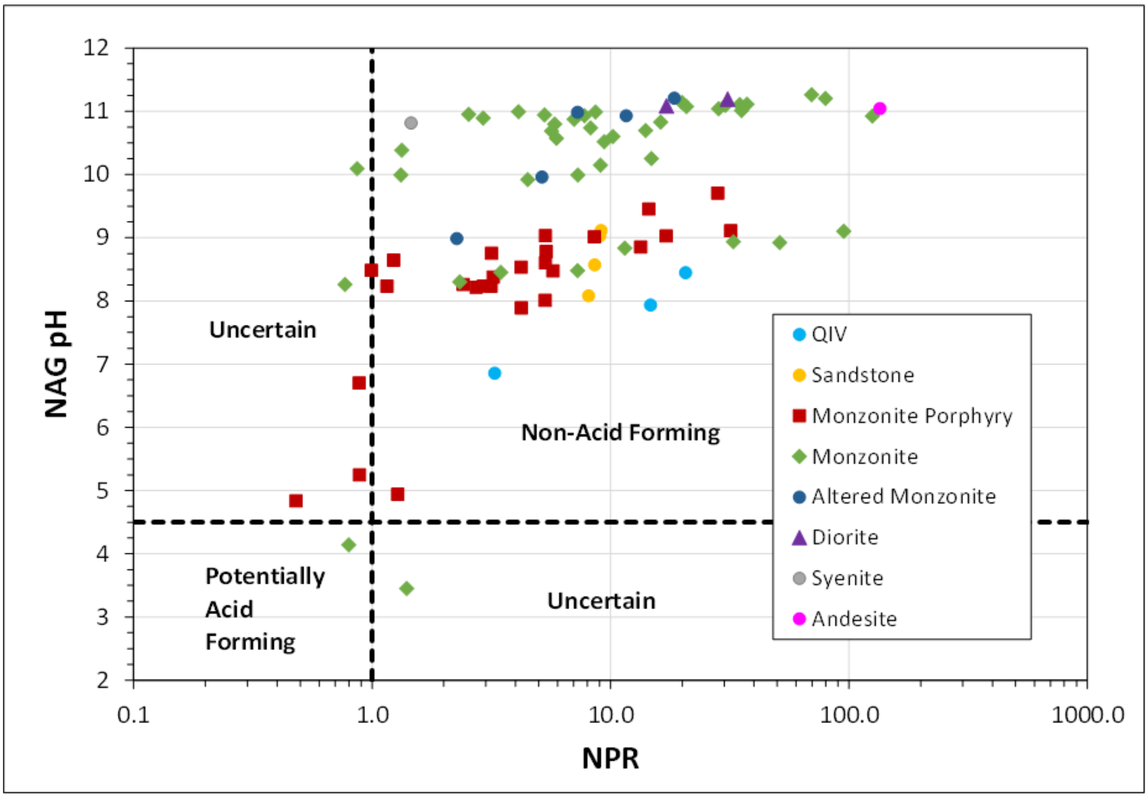


Figure 16. Classification of waste rock from NAG-pH and NPR

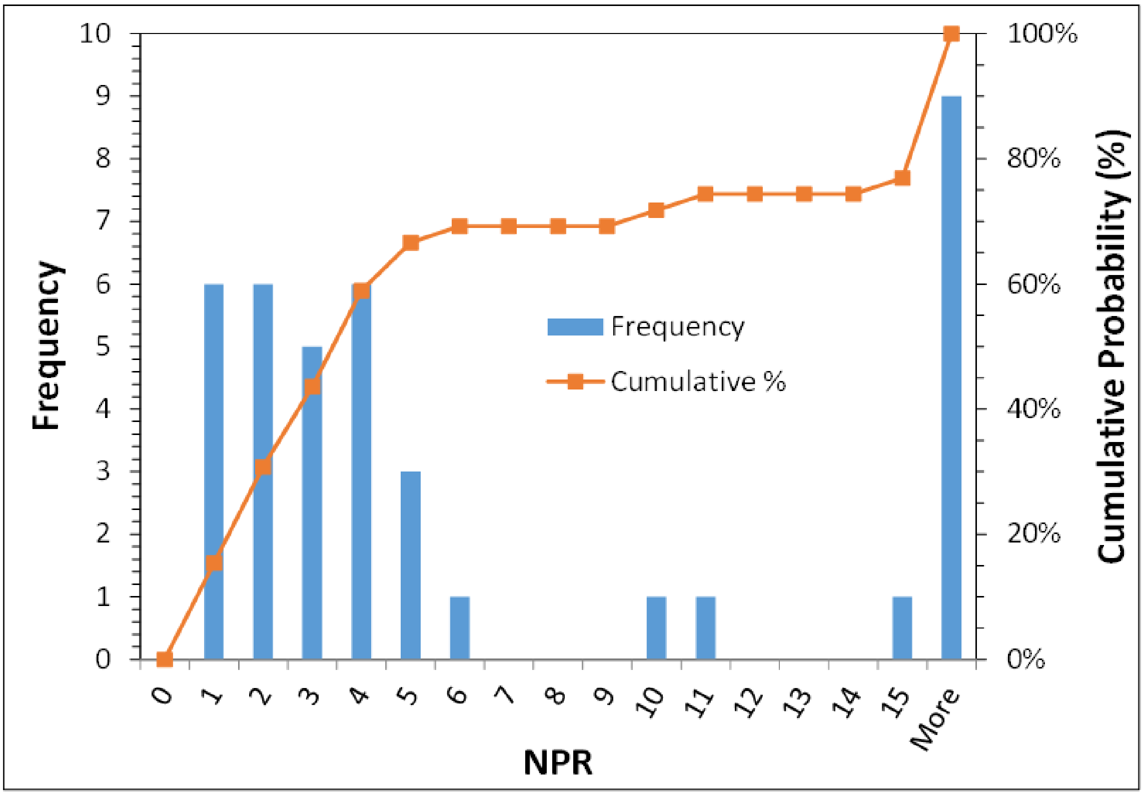


Figure 17. Distribution of NPR for ore samples

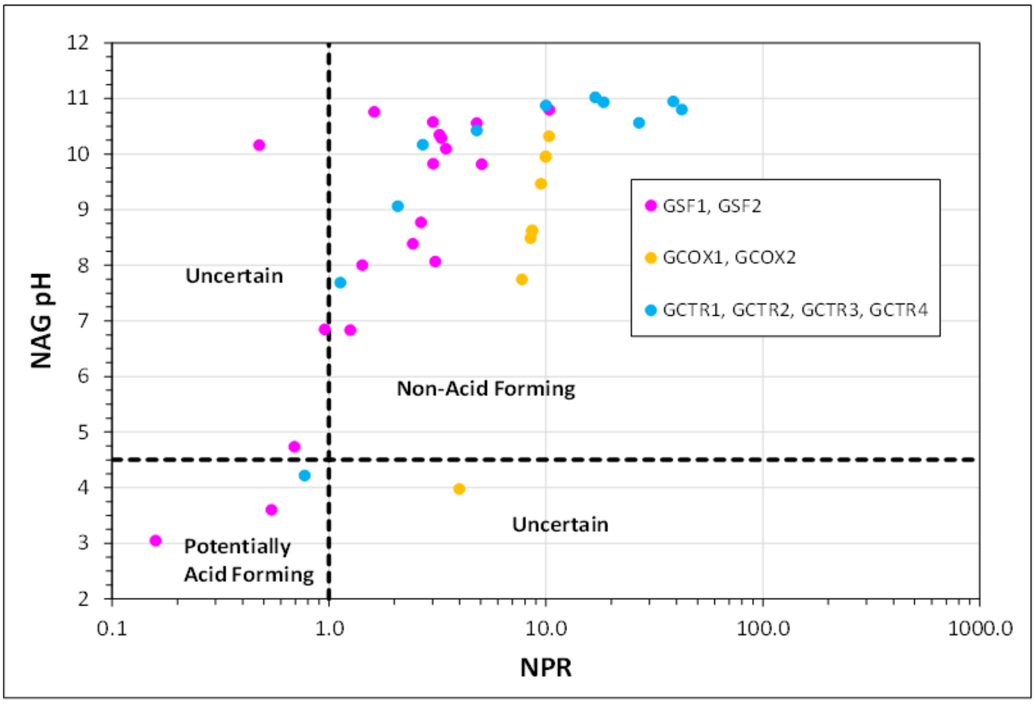


Figure 18. Classification of ore from NAG-pH and NPR

Rapid Leach Test for Rock and Ore Sample

Twenty rock samples and two ore samples were selected for 1-day rapid leach tests. With some exceptions, metal concentrations are generally small. Relatively larger concentrations of Mn, Mo and other metals are evident in oxide ore samples. The elevated metal concentrations could be attributed to the presence of dissolved secondary minerals.

Kinetic Tests of Rock and Ore Samples

Based on the static test results, 6 samples from the Peschanka deposit were subjected to kinetic testing in humidity cells (Table 9). Changes in key acidity and alkalinity properties of samples (pH, alkalinity, electrical conductivity, and concentrations of sulphates, copper and molybdenum) were assessed. The pH values of leaching solutions remained within the near neutral to slightly alkaline range highlighting the presence of compounds promoting alkalinity. Elevated metal concentrations (e.g. Cu, Co, Mo, Ni, Pb, and Zn) were recorded initially which then decreased to below detection limit. These results are consistent with an earlier (2015) assessment conducted by VNII1 that ore materials are potentially acid-generating while waste rock samples are non-acid generating.

Table 9. Acid Base Accounting for Samples Undergoing Kinetic Testing

Sample	DHID	Rock Type	Alteration	Sulphide-S (%)	SO4-S (%)	Total S (%)	AP (kg/t)*	NP (Sobek) (kg/t)*	NP/AP
GCW-36	DHP15-037a	Monzonite	Sulf	0.25	0.18	0.43	7.8	10.9	1.4
GCW-17	DHP15-062	Monzonite porphry	Sulf	0.99	0.37	1.36	30.9	23.8	0.8

Sample	DHID	Rock Type	Alteration	Sulphide-S (%)	SO4-S (%)	Total S (%)	AP (kg/t)*	NP (Sobek) (kg/t)*	NP/AP
GCW-39	DHP15-037a	Monzonite	Sulf	0.37	0.12	0.49	11.6	59.7	5.2
GCW-75	DHP15-051	Altered monzonite	transition	0.26	0.04	0.30	8.1	7.2	0.9
GCW-70	DHP15-1059	Monzonite	OX fin	0.27	0.07	0.34	8.4	35.6	4.2
GCW-30	DHP15-1019	Monzonite porphry	Sulf	0.08	0.27	0.35	2.5	22.7	9.1

Evidence of ARD-ML in Surface Water

Notwithstanding the static and kinetic test results, some surface water in the vicinity of the proposed mine is an unnaturally blue colour suggesting dissolved copper and, potentially, molybdenum, at elevated concentrations. Such blue-coloured streams imply acid rock drainage and metals leaching may occur, but may also indicate other physio-chemical processes such as freeze-thaw. Blue-coloured water samples will collected and tested during the field studies in summer 2019 in order to determine their composition and potential origin (see Annex 1).

7.1.4. Radiological Properties of Bedrock Strata

Airborne and ground-based radiometric surveys were conducted as part of the geological exploration using both methods indicating natural radioactivity was within background levels without any signs of abnormal radioactivity.

7.1.5. Adverse Geological Processes

Seismic Activity

The Peschanka site and adjacent area lies within the area of influence of the Chersky Ridge seismic zone that extends for about 8,000 km. No earthquakes with magnitude of M>5 have been recorded within a 100-km area around the Peschanka site between 1928 and 2015 but a 5.2 degree earthquake occurred to the south east of the Project site in April 2009 at a depth of 10 km. As such provision would need to be made in the design of the mine and associated facilities for earthquake risk and operational procedures developed to protect staff from injury.

Erosion

The extreme climate of the area, results in a variety of erosive processes including fluvial erosion and surface runoff, thermal erosion such as frost heaving, frost fracturing, solifluction and creep processes and bog formation.

7.2. Climate

The Project area belongs to a subarctic zone of the Siberian region. The climate is distinctly continental with long-term severe winter lasting for 7 - 8 months, and short cool summer. The massive melting of snow happens in late May to early June. Breakup of ice at rivers and streams occurs at the same time. In summer, especially in August, fogs and long rains leading to flash floods are often. The first frosts begin in late August and the snow falls in late September. The duration of summer period is 2.5 to 3 months.

The climate information presented below is based on the Baimka Weather Station Daily Data from 1966 to 2017 provided in the report CSA Global: Technical Review: Preliminary Hydrological and Hydrogeological Report from 4 July 2019[29].

7.2.1. Solar Radiation

The Project area is featured by 1,941-2,058 sunshine hours per year; the number of cloudy days is 106-138. Mean monthly albedo values reach their maximum between January to March (77-84%) while the average annual values are around 37-38%.

7.2.2. Temperature

Air temperature values from the Baimka weather station have been used to characterize the Peschanka site conditions. The average annual air temperatures range from -13.5°C to -8.0°C, with an average air temperature for the entire dataset of -11.2°C. The monthly air temperature statistics estimated based on the average daily temperature is presented in Table 10. . The absolute minimum temperature is -57.5°C. The absolute maximum temperature is +33.5°C.

Table 10. Temperature Characteristics

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	-34.9	-32.2	-24.0	-12.9	1.4	11.4	13.6	9.7	2.2	-11.2	-25.3	-32.7
Minimum	-52.5	-53.9	-44.2	-33.4	-18.4	-3.4	1.1	-0.7	-11.1	-33.1	-48.6	-52.1
Median	-35.5	-33.2	-25.3	-13.3	1.6	11.6	13.9	9.7	2.1	-10.5	-26.2	-33.7
Maximum	0.3	0.4	2.5	5.1	16.6	24.8	25.9	21.8	15.4	6.0	30.2	1.5
Low (30%ile)	-40.8	-38.5	-29.6	-17.2	-1.4	9.1	10.9	7.3	-0.4	-15.3	-31.2	-39.3
High (70%ile)	-30.9	-28.4	-19.6	-9.1	4.6	14.1	16.5	12.3	4.6	-6.5	-20.6	-28.0

7.2.3. Humidity

The average annual relative humidity over the extents of the dataset range 69% to 79% with a dataset average of 72%.

7.2.4. Precipitation

The annual total precipitation ranges from 188mm in 1994 up to 469mm in 2016, with an average annual precipitation of 297mm. The wettest months on average occur over the summer period, with average monthly precipitation of approximately 30mm or greater from June to October; average monthly precipitation is typically significantly below 30mm for the months outside this period. The largest monthly precipitation recorded within the data set was 136mm in July 1990.

[29]CSA Global. 2019. Technical Review: Preliminary Hydrological and Hydrogeological Report – Peschanka Copper Project, Russian Federation (CSA/FLU-A9PK-90-K023-002T-A) CSA Global Report № R185.2019, 04/07/ 2019.

The monthly precipitation statistics are presented in Table 11. July and August are the wettest months with the highest average, median, typical wet and dry month precipitation. The driest months are January, February, March, and April with the lowest average, median, maximum and typical wet and dry month precipitation.

Table 11. Monthly Precipitation Statistics (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	14.4	10.7	7.5	8.8	12.5	30.8	55.5	54.3	35.6	29.8	21.2	16.3
Minimum	0.6	0.0	0.0	0.2	1.9	8.0	6.0	15.5	7.1	7.0	4.6	2.6
Median	12.5	10.1	6.6	7.9	10.6	28.8	52.8	51.3	33.3	29.1	17.3	16.3
Maximum	59.9	40.6	19.9	26.3	36.5	69.0	135.7	118.0	89.5	106.8	57.9	40.9
Low (30^{th} percentile)	9.2	6.8	4.4	5.5	8.2	21.8	44.9	37.6	26.5	18.9	13.4	8.4
High (70^{th} percentile)	18.1	12.9	9.7	10.4	15.1	35.8	63.9	68.0	41.7	34.4	23.4	19.9

The 30^{th} and 70^{th} percentile estimates provide typical dry and wet precipitation estimates, respectively, which are likely to occur regularly, representing +/- 20^{th} percentile estimates of the median, and do not represent extreme low and high values, which would be a much rarer occurrence. Approximately 40% of all monthly precipitation in the dataset falls within the range of the typical dry and wet monthly precipitation estimates, while 80% of annual rainfall precipitation in the dataset falls within the range of the annual cumulative typical dry and wet precipitation estimates.

Snow Cover

Snow cover is an important determinant of climate in the area reflecting away the small amounts of solar radiation received during the winter, especially fresh snow which reflects some 70-80% of solar radiation. The thermal insulation of snow protects the soil against overcooling and helps maintain soil moisture. The first (temporary) snow cover sets in late September (Table 12). On average, snow cover lasts for about 8 months (and typically completely disappears by late May.

Table 12. Monthly Snow Cover Height Statistics (cm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	46	49	51	50	21	0	0	0	3	16	31	40
Minimum	21	27	31	19	0	0	0	0	0	0	9	14
Median	45	48	49	50	18	0	0	0	0	15	31	38
Maximum	68	73	73	72	68	11	4	3	30	59	61	66
Low (30^{th} percentile)	40	45	45	46	0	0	0	0	0	9	26	32
High (70^{th} percentile)	49	53	54	55	38	0	0	0	0	21	35	49

The snow cover appearance date varies by 29 days in the dataset, with an average appearance date of the 28th of September, while the snow cover melting date varies by similar amount (28 days) in the dataset, with an average melting date of the 19th of May. The snow cover details are provided in Table 13.

Table 13. Snow Cover Data

Snow Cover Appearance Date			Snow Cover Melting Date			Duration (days)		
Average	**Early**	**Late**	**Average**	**Early**	**Late**	**Mean**	**Min**	**Max**
28-Sep	14-Sep	13-Oct	19-May	02-May	30-May	233	212	252
-	2012	2014	-	2013	2005	-	2009	1993

The snow cover depth grows at the fastest rate between December and March, reaching its maximum in March. The snow is compacted due to the daytime thawing at the end of April and by the beginning of May its height begins to decrease sharply while its density reaches its maximum value (Table 14).

Table 14. Snow Cover Depth

Month	Decade	Avg	Min	Max	Month	Decade	Avg	Min	Max
January	1	45	21	67	July	1	0	0	4
	2	46	28	68		2	0	0	0
	3	47	28	68		3	0	0	0
February	1	48	27	72	August	1	0	0	0
	2	50	35	71		2	0	0	3
	3	50	35	73		3	0	0	0
March	1	51	34	73	September	1	0	0	15
	2	51	35	71		2	2	0	26
	3	50	31	72		3	6	0	30
April	1	51	30	72	October	1	9	0	35
	2	50	29	70		2	16	0	47
	3	48	19	69		3	23	5	59
May	1	40	0	68	November	1	28	9	57
	2	22	0	60		2	32	10	54
	3	3	0	52		3	34	13	61
June	1	0	0	11	December	1	37	14	63
	2	0	0	0		2	40	14	64
	3	0	0	0		3	43	17	66

Snowstorms usually occur with passing fronts when atmospheric pressure gradients increase, which also results in significant increases in wind speeds. Fine grain snow that can be easily transported by wind ends up being blown away to hollows and depressions, resulting in an uneven snow cover.

Fog

Fog has been observed mainly during the cold periods. Ice fog, which is composed of small ice crystals suspended in the air, has been observed during the winter months. Ice fog is most intense during periods with very light or no wind. Horizontal visibility in ice fog is typically 100-150 m but can drop to as low as 10 m. Ice fog tends to last for 5-7 days at a time. The height of the fog cover usually does not exceed 100-200 m. There is no advection fog in the winter. The distribution of fog days throughout the warm season is complex and variable due to the chaotic nature of atmospheric circulation.

7.2.5. Wind

In the winter, the strong cooling of the regions to the West of the Peschanka site creates a high pressure area. The Asian winter anticyclone has a significant influence on the cold season climate. A low pressure area develops at this time in the north part of the Pacific Ocean, causing a powerful movement of cold continental air.

The analysis of the wind direction data indicates that the predominant wind is from the southeast direction, accounting for approximately 24% of the wind direction. At certain times of the year the wind frequently occurs from the northwest, especially during the summer period. The conditions are on average calm for approximately 32% of each year, however this varies seasonally with calm conditions observed for approximately 50% of the time in November, December, January and February, while calm conditions are observed for approximately 20% of the time from April to August. The monthly average wind direction and the percentage calm observations are summarised in Table 15 with monthly and annual average wind rose diagrams provided in Figure 19.

Table 15. Average Wind Direction

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
N	5%	4%	5%	5%	5%	7%	7%	6%	5%	5%	4%	6%	6%
NNE	4%	4%	4%	4%	5%	5%	5%	4%	4%	4%	3%	3%	4%
NE	2%	1%	2%	2%	3%	3%	3%	2%	2%	1%	1%	1%	2%
ENE	1%	1%	1%	1%	2%	1%	1%	1%	1%	1%	1%	1%	1%
E	3%	3%	3%	4%	4%	4%	4%	3%	2%	2%	2%	3%	3%
ESE	11%	9%	10%	11%	10%	7%	8%	7%	7%	9%	10%	11%	9%
SE	28%	31%	30%	27%	21%	18%	18%	19%	21%	27%	31%	29%	24%
SSE	9%	9%	9%	10%	11%	9%	9%	9%	9%	11%	11%	12%	10%
S	5%	5%	5%	5%	8%	8%	7%	6%	6%	6%	6%	5%	6%
SSW	3%	2%	2%	2%	3%	4%	2%	2%	3%	2%	3%	2%	3%
SW	1%	2%	1%	2%	3%	4%	2%	2%	2%	1%	2%	2%	2%
WSW	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%
W	3%	3%	2%	3%	3%	3%	4%	4%	4%	5%	4%	2%	3%
WNW	3%	4%	4%	3%	4%	4%	6%	5%	5%	5%	5%	4%	4%
NW	14%	13%	12%	12%	10%	13%	15%	17%	15%	11%	10%	11%	13%
NNW	7%	7%	9%	8%	7%	9%	9%	11%	9%	8%	6%	6%	8%
Calm	51%	48%	33%	22%	19%	18%	21%	22%	24%	31%	47%	52%	32%

The average mean wind and gust speeds are highest outside the winter season, with the highest monthly average mean wind speed occurring in May, and the highest monthly average gust speed occurring in June. The wind and gust speed statistical summary are provided in Table 16.

Table 16. Wind Speed (m/s)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	1.92	2.05	2.15	2.27	2.43	2.42	2.27	2.18	2.18	2.22	2.09	1.86	2.20
Low (30%ile)	1	1	1	1	1	1	1	1	1	1	1	1	1
High (70%ile)	2	2	2	3	3	3	3	3	3	3	2	2	3
Median	1	2	2	2	2	2	2	2	2	2	2	1	2

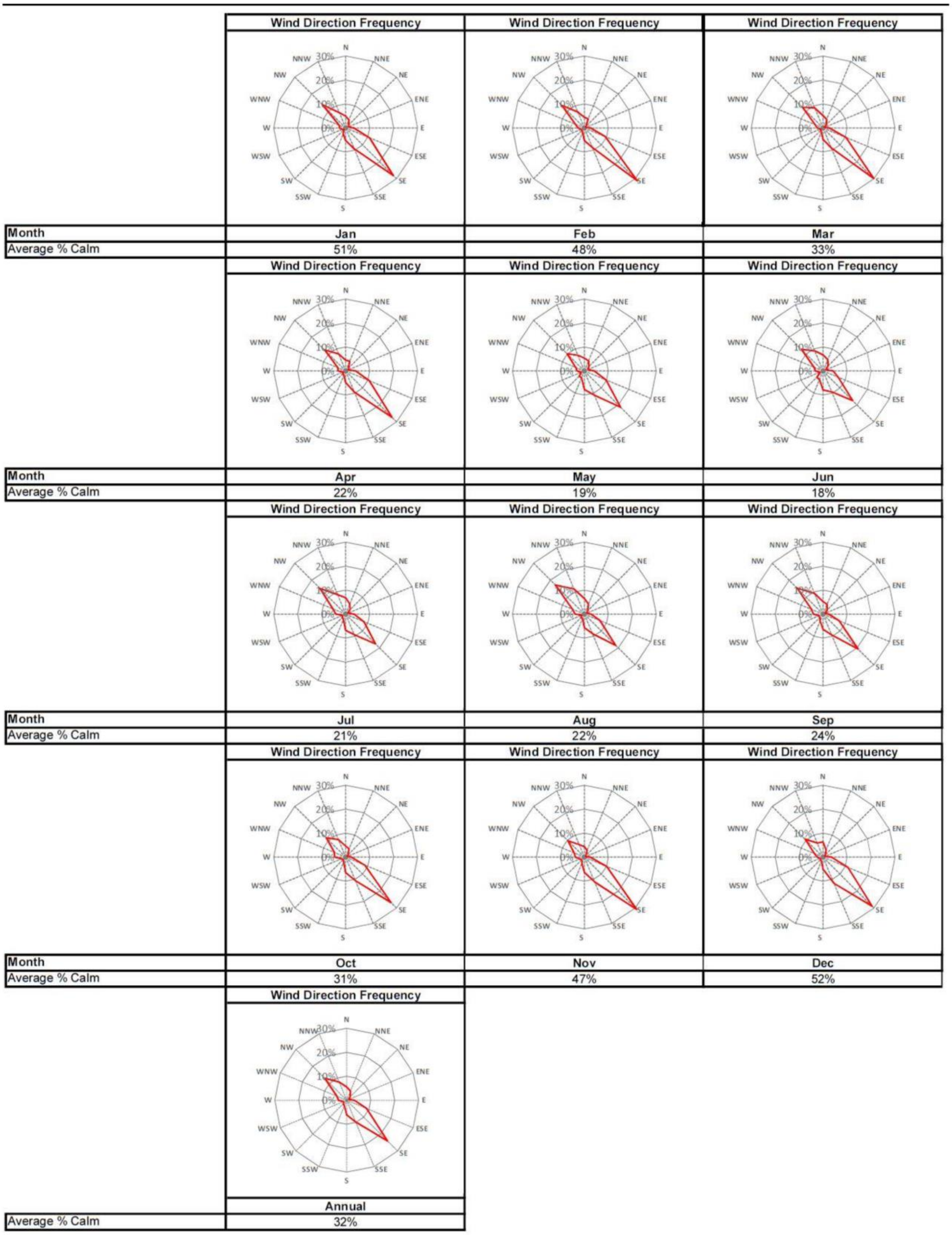


Figure 19. Wind Rose Diagrams

7.2.6. Severe Weather

Chukotka is synonymous with severe weather ranging from strong winds, intense rainfall, blizzards, icing of infrastructure, fog and extremely low temperatures in winter to hot days and high fire risk in summer. Key climatic characteristics of the Project area are presented in

Table 17. These characteristics are being used as the design basis for the proposed mine, concentrator and ancillary facilities.

Table 17. Key Climatic Characteristics in the Baimka Ore Field Area

Parameter	Value
Mean air temperature, ºC	-11.2
Mean warmest month (July) air temperature, ºC	+3.6
Mean coldest month (January) air temperature, ºC	-34.9
Absolute maximum air temperature, ºC	+33.5
Absolute minimum air temperature, ºC	-57.5
*Estimated coldest day temperature, ºC,98%probability	-48.7
*Estimated coldest day temperature, ºC,92%probability	-44.1
*Estimated coldest five-day temperature, ºC,98%probability	-47.2
*Estimated coldest five-day temperature, ºC,92%probability	-42.9
Maximum duration of no-frost period, days	146
Relative air humidity (summer/winter/year), %	70/75/72
Average annual precipitation, mm	297
Maximum total annual precipitation, mm	469
Minimum total annual precipitation, mm	188
Days with precipitationperyear(≥10mm)	4
Recorded maximum daily precipitation, mm	45.9
Maximum monthly precipitation, mm	136
Evaporation from the water surface, mm	280
Evaporation from the land surface, mm	75
Average days with snow cover	233
Average start date of permanent snow cover	28/09
Average end date of snow cover	19/05
Maximum average snow cover thickness over a 10-day period, cm (open space)	51
Maximum highest snow cover thickness over a 10-day period, cm (open space)	73
Estimated snow load, kgf/m^2	320
Average wind velocity, m/s	2.20
Maximum wind/gust velocity, m/s	18/25
Predominant annual wind direction	SE
Standard wind pressure, kPa (m/s)	0.23
Standard icy crust thickness, mm	20

7.3. <u>Ambient Air Quality</u>

No ambient air quality data are available for the Project area but given an almost complete absence of industrial sources is considered to be good. There are no human settlements in the Project area and so the only existing emissions sources are those from the fledgling mine itself from electricity generating power plants, vehicles and dust.

7.3.1. Noise

Again it is only the mine that is a source of noise and there are no immediate human receptors. Fauna occurring in the area may well be affected by noise from the mine. Short-duration (several minutes) noise measurements were conducted during the engineering and environmental investigations in 2018 to characterise noise levels generated by the diesel power plant at the base camp, drilling and blasting works, motor vehicles and off-road transport. The results of those measurements slightly exceeded guideline levels for residential areas and were within the workplace noise guidelines.

7.4. <u>Soil Structure, Composition and Properties</u>

The Project area is part of the marginal zone of the Yana-Kolyma and Kolyma Mountain Cryogenic and Arctic Tundra Soil Provinces (Figure 20).

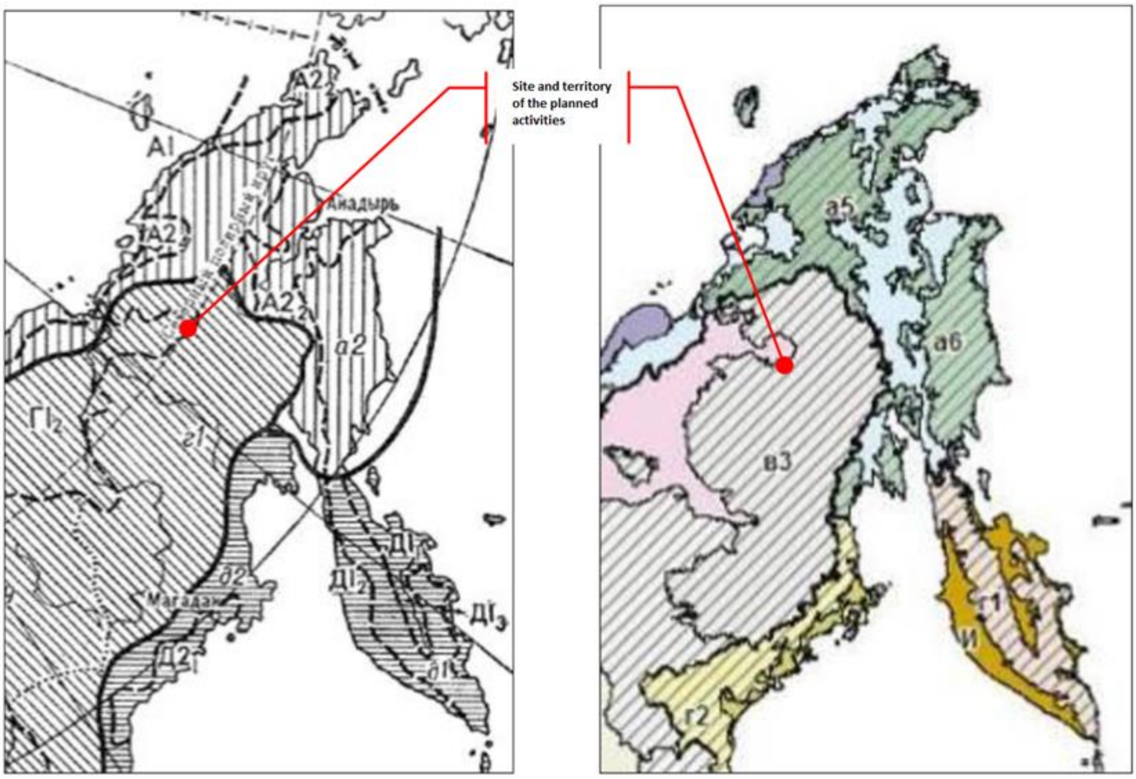


Figure 20. The Location of the Project Area on the USSR Soil Geography Division Map (1979) and Russia Soil Ecology Division Map (2014)

East Siberian Taiga Region

Г12 - Yana-Kolyma Mountain Gley Cryogenic Taiga Semi-bog and Cryogenic Bog Soil Province

Г1г1 (в3) – Kolyma Mountain Tundra, Mountain Cryogenic Taiga, Mountain Deep Cryogenic Taiga and Cryogenic Bog Soil Province

Cryogenic podzolised brown peat and humic soil; cryozem peat gley tundra soil; and peaty and humic embryozem soils occur in the area. Apart from the areas occupied by watercourses and water bodies and those covered with rubble and pebble scatterings, these soil combinations cover an area of 14,200 ha (87% of the total mapping area of 16,500 ha). Concentrations of toxic compounds in soil samples are generally negligible, but the guideline levels for lead and chromium (VI) and baseline levels for some other substances were exceeded in the Peschanka valley. No waste materials that could cause parasitic contamination of soil exist in the area but there are remnants of now abandoned mining operations.

Additional soil sampling will be carried out during the engineering and environmental investigations in summer 2019 in those areas that were not covered during the 2015 and 2018 surveys. This include the accommodation camp, aerodrome, and marshalling yard at Pevek (see Annex 1).

7.5. Water Resources (Surface Water and Groundwater)

Surface water is principally the Anyui River Basin of the Anadyr-Kolyma River Basin and groundwater, the Mesozoic Oloy Artesian Basin System within the Kolyma-Omolon Hydrogeological Massif of the Omolon Hydrogeological Folded Region and are typical of Northeast Asia.

7.5.1. Hydrological Conditions

The Project area is located within the catchments of the Peschanka, the Levaya Peschanka and the Baimka Rivers, which form part of the Bolshoy Anyui River basin[30]. The Levaya Peschanka River inflows the Peschanka River and the downstream part of the river is named named the Yegdegkych River.

River flow surveys were undertaken in the Project area in 2010, 2015 and 2016 and include flow monitoring measurements from the Yegdegkych River, Levaya (Left) Peschanka River, Pravaya (Right) Peschanka River, Baimka River, Sokhatinskiy Stream, and Meteo Stream. Flow measurements and river condition observations from the various rivers across the Project area from May/June 2015 and August 2015[31], and in April and July 2016[32]) show actual flow measurement data from specific points at specified date/times. These data provide useful insight into the hydrological characteristics and flow regimes of the various water courses at the time of survey but unfortunately can not be used to generate probabilistic flow data required for appropriate surface water management design purposes.

The characterisation of hydrological conditions will be updated based on the results of the survey conducted by CSA Global in 2019.

7.5.2. River Network

The river network from the Peschanka River to the East Siberian Sea is illustrated schematically in Figure 21.

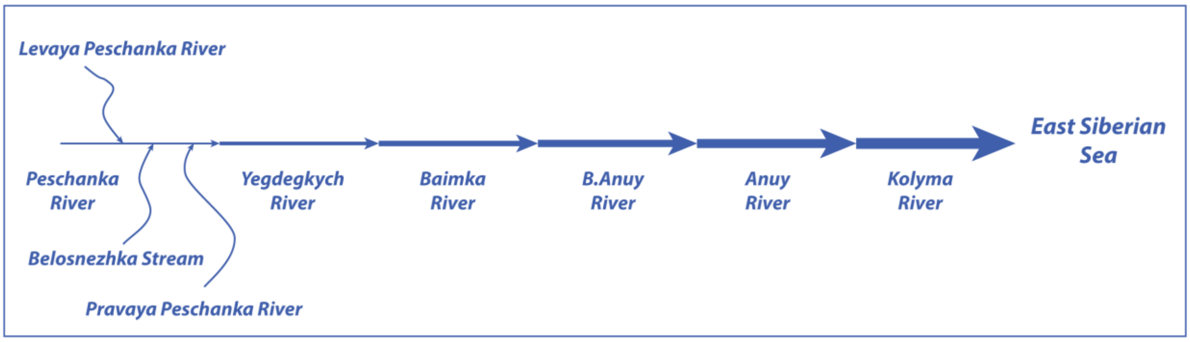


Figure 21. The Network of Rivers from the Peschanka Stream to the East Siberian Sea

7.5.3. River Morphology and Water Regime

Watercourses are classified as typically very small and small (in terms of both catchment area and river flow) mountainous rivers[33] rising at altitudes ranging from 650 m to 800 m. Key

[30] CSA Global. 2019. Technical Review: Preliminary Hydrological and Hydrogeological Report – Peschanka Copper Project, Russian Federation (CSA/FLU-A9PK-90-K023-002T-A) CSA Global Report № R185.2019, 04/07/2019.
[31] HYDEC. 2016a. Investigation of the Hydrogeological Conditions of the Peschanka Deposit, the Baimka License Area in 2015 (Chukotka Autonomous Okrug). Report on Findings of the Study. HYDEC Hydrogeological and Geo-ecological Company (HYDEC) CJSC, Moscow, 2016.
[32] HYDEC. 2016b. Hydrogeological Substantiation of the Development of the Peschanka Deposit, the Baimka License Area (Chukotka AO). HYDEC Hydrogeological and Geo-ecological Company (HYDEC) CJSC, Moscow, 2016.
[33] GOST 17.1.1.02-77. Water Body Classification.

hydrological characteristics of the surface watercourses in the project area are presented in Table 18.

Table 18. Key Hydrological Characteristics of Surface Watercourses in the Project Area

Watercourse	Catchment Area, km^2	Length, km	Watercourse Order (Horton-Strahler-Filonov)
Pravaya Peschanka River	29	12	II
Peschanka River	51	16	III
Belosnezhka Stream	8	6	I
Lenivy Stream	11	5	I
Levaya Peschanka River	34	13	III
Yegdegkych River	223	42	IV
Baimka River	1,172	80	V

The water regime of these watercourses is snowmelt-dominated (65% of annual river flow). Rain and groundwater account for 25-30% and 5-10% of the total annual river flow, respectively. There are obvious seasonal changes in the prevailing sources of river flow with spring and summer flow accounting for over 90% of the total annual flow with spring floods contributing over 55%. Estimated maximum Spring flow conditions are presented in Table 19.

Table 19. Probability-Weighted Estimated Maximum Spring Flood Flows in the Peschanka Stream (the Pravaya Peschanka Stream Inflow)

Probability, P(%)	0,1	1	5	Average
Q, m^3/s	105,6	69,5	47,4	21,3

7.5.4. Surface Water Quality

Water quality is driven by the geochemistry of the Peschanka ore field, current geological exploration activities, and historical placer mining operations. Water is predominantly hydrocarbonate-chloride calcium-sodium-magnesium and calcium-magnesium-sodium with pH values ranging from 5.7 to 7.1 (slightly acidic to neutral). Mineralisation levels vary from 39 mg/l to 1292 mg/l (175 mg/l on the average), i.e. from sweet to brackish water.

Surface water not affected by anthropogenic activities has high dissolved oxygen levels ranging from 9 to 13 mg/l and BOD_5 values not exceeding 1.4 mg/l. Water turbidity varies broadly from 1 to 1890 NTU units as do suspended solids levels (from 0 to 560 mg/l). Ammonium, total iron, aluminium, copper, zinc and manganese concentrations exceed the maximum allowable concentrations (MAC) for fisheries together with elevated concentrations of sulphates, calcium, lead, strontium, nickel, cobalt, vanadium, mercury, molybdenum and tungsten being seen in various samples.

Additional surface water quality sampling will be conducted during the field studies in summer 2019 to cover those surface watercourses that have not been sampled before. These include the Chernaya and Bolshoy Anyui Rivers (see Annex 1).

7.5.5. Hydrogeology

The hydrogeology is shaped by faults and fractures in aquifers, presence of permafrost and river morphology. Groundwater dynamics are driven by water table levels in the talik (unfrozen ground), zones confined to the major river valleys and faults and the Bolshoy Anyui River that controls the regional drainage network.

Supra-permafrost Taliks

Supra-permafrost water occurs widely within the active seasonally thawed layer and in the talik zones of river valleys. The water is associated with unconsolidated Quaternary deposits covering watersheds, slopes and river valleys, confined to porous zones in the alluvial strata and fractured bedrock aquifers under the river channels. The top of the permafrost forms the base of the supra-permafrost water layer and generally follows the shape of the surface topography. Water levels within the supra-permafrost aquifer were measured in the Baimka River valley. Groundwater levels were generally less than 1m below ground level for the period July to November 2016 and showed no significant fluctuation over that period

Sub-permafrost Groundwater

Sub-permafrost aquifers are associated with bedrock having varying fracture density and underlying the permafrost layer[34]. Water level is at an elevation of between 208 to 366mRL across the site. The water level is between 60 to 212m below ground level. The water level is between 30 to 200m above the base of the permafrost, indicating that the sub-permafrost aquifer is confined by the permafrost within the project area. There is no significant seasonal fluctuation in the groundwater level in the sub-permafrost aquifer.

Locally the sub-permafrost groundwater flow follows topography with flow from high elevations to low elevations. The regional groundwater flow is from the south to the north and north-east, towards the regional drainage basin of the Bolshoy Anyui River.

Groundwater Quality

Supra-permafrost Aquifer:

The water quality of the supra-permafrost aquifer is reported to be fresh, very soft and soft with the salinity and total hardness values ranging within 0.03 - 0.32g/l and 0.24 - 2.2 Hardness units, respectively. The pH of the water is in the range pH 5.8-7.3. The water ranges from sulphate-hydrocarbonate to sulphate and from calcium- magnesium to calcium type. Comparison of the water quality results with SanPiN 2.1.4.1074-01 “Potable water. Hygienic requirements for water quality of centralized drinking water supply systems. Quality control” indicates exceedances of the maximum permitted concentrations for ferrous iron, manganese, aluminium, lead, copper and tungsten (in some instances).

Sub-permafrost Aquifer:

Water within the sub-permafrost aquifer ranges from fresh to brackish. Salinity increases with depth with the deeper aquifer (500-700m) having salinity of more than 5g/l (HYDEC 2016). The groundwater is sulphate-chloride calcium type with pH 6.8. The maximum value of total hardness is 27.1 Hardness units and the highest salinity value was 1.83g/l. Comparison of the water quality results with SanPiN 2.1.4.1074-01 “Potable water. Hygienic requirements for water quality of centralized drinking water supply systems. Quality control” indicates exceedances of the maximum permitted concentrations for ferrous iron and

[34] Kalabin A.I. 1960. Permafrost and Hydrogeology of the Northeast USSR. - Magadan, VNII1, 1960.

manganese. The concentrations of boron, bromine, strontium, lithium, beryllium, tungsten exceed the rated values; and the total salt content and hardness are elevated. The results of the groundwater well drilling and groundwater quality testing carried out in 2019 will be reflected in ESIA (see Annex 1).

7.6. Landscape and Biological Diversity of the Project Area

7.6.1. Natural and Anthropogenically Transformed Landscapes

The Peschanka Project site and surrounding areas comprise a mix of landscape and vegetation features that are typical of the Anyui-Chukotka barren tundra upland area extending along the border between the low-mountain Southern Anyui (Anyui-Chukotka Upland) and Northern Kolyma (Okhotsk-Kolyma Tundra/Sparse Wood Upland) Physiographic Provinces. The topography of the Anyui Upland is medium-altitude mountains with prominent cones of young, extinct volcanoes.

Mountain and valley glacier features including glacial troughs and deep valleys, cirque glaciers, karsts and moraine ridges intersect the Anyui Upland ridges. The landscape morphology is shaped and governed by latitudinal mountain ridges and heavily dissected low/medium altitude mountains that are part of the Mesozoic Anyui Fold Zone. Mountain ridges and mountains extend along anticlines while various river valleys are associated with synclines. The mountainous topography determines the altitudinal zoning of physiographic conditions and rock weathering processes caused by water and physical factors resulting in three altitudinal landscape belts:

- 500-750 m: Arctic-mountain desert and tundra belt lying on cryostructured rubble/stone ridge-top primary deposits with little or no vegetation (Figure 22);
- 400-500 m: Larch forest tundra belt extending over primary slopes, fluvioglacial trails, upland terraces, and loose Quaternary deposits of various origin (Figure 23);
- 200-400 m: River valley bottom belt composed of pebble/stone and sand/pebble alluvial deposits (Figure 24).

The topographic setting and morphology of each landscape belt promotes the development of the following landscape types and groups:

- Zonal (eluvial and trans-eluvial);
- Eluvial-accumulative;
- Intrazonal-alluvial (floodplain).

A characteristic feature of natural landscapes in the study area is widespread burnt areas in the dwarf cedar and larch communities (Figure 25). The area is dominated topographically by the main river valleys (the Baimka and Bolshoy Anyui Rivers) and mountain summits (Vesennyaia Mountain (1,134 m) and Zesyunia Mountain (869m).

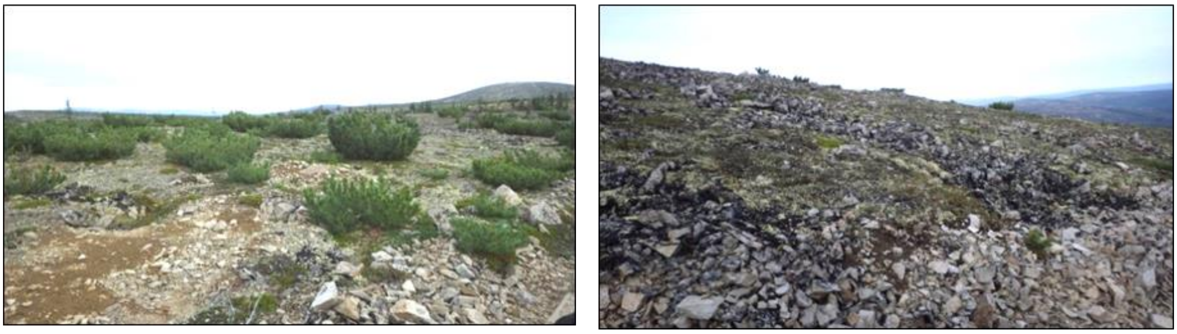


Figure 22. Arctic-Mountain Desert and Tundra

Figure 23. Larch Forest Tundra

Figure 24. River Valley Bottom Areas

Figure 25. Disturbed Natural Landscapes and Vegetation Cover due to Pyrogenic and Anthropogenic Activity (Burnt Areas)

7.6.2. Characterisation of Anthropogenic Landscapes

Landforms as a result of previous geological exploration and placer mining activities that took place in the 1960-1970s occupy a total area of about 160 ha (Figure 26). Natural vegetation of varying intensity occurs in all transformed areas.

Figure 26. Historical Placer Mining Sites (Without Restoration)

7.7. Hazardous Events and Processes Affecting Landscapes

Tundra fires have a relatively high likelihood. The fire danger period lasts from June through October and can be as long as 150 days in some years. Taxa representing different landscape types identified in the Project area and having varying ability to recover are described below.

Water divides and foothill areas: the major part of the area occupied by the mineral deposit is classified as ***vulnerable*** to anthropogenic impacts. Processes and factors that are actively shaping the landscapes of the area include water and Aeolian deflation, little or no soil cover, extremely scarce vegetation (10-30% coverage), and downslope alignment of denudation processes (Figure 22, Figure 25). The geo-cryological processes in these taxa are much more intensive and could be irreversible. These trans-eluvial taxa take ***a very long time to restore*** (50-100 years and even more).

Larch forest tundra are classified as sensitive to soil cover transformations (Figure 23). Topsoil stripping and excavations promote permafrost thawing and deformation; reduce soil viscosity, and trigger denudation processes. These taxa could be able to ***recover in 15-35 years***.

Intrazonal alluvial (floodplain) taxa are associated with river valleys and their depressed sections and can be classified as ***relatively resistant*** in the natural environment. While Aeolian erosion processes are weak, placer mining activities have caused profound transformation of these taxa. After the completion of post-mining restoration, vegetation cover restores itself in 25-30 years.

7.8. Plant Life

Based on the geo-botanical division of the Northeast Asia, the Peschanka site and surrounding areas can be grouped into the following geo-botanical areas:

- Mountainous Anyui-Chukotka Geo-Botanical District of the Arctic Tundra Region characterized by widespread occurrence of Arctic and typical tundra vegetation;
- Chaun Floristic District of Arctic Province within the Circumboreal Region of the Holarctic Kingdom.

Local plant life comprises 251 plant species, broken down by association as follows:

- Lichen species – 19;
- Moss species – 7;
- Herb species – 180;
- Bush and shrub species –41; and,
- Tree species – 4.

No rare and/or protected plant species listed in the Red Data Books of the Russian Federation[35] and the Chukotka AO were found in the Project area[36]. A special geo-botanical survey is to be undertaken during the blooming period to facilitate more accurate identification of some plant species including those listed in the Red Data Book. The distribution of key plant associations has been estimated as a percentage of the total mapping area (16,500 ha) occupied by each vegetation type (Table 20).

Table 20. Vegetation type and percentage occurrence

Vegetation type	Percentage
Sparsely standing larch woods, dwarf birch thickets, moss mats and burnt areas	26
Dwarf cedar trees, shrubs and lichens with sparsely standing larch tree inclusions and burnt areas	19
Crustaceous lichens	15
Sparsely standing larch woods with green moss mats	14
Sparsely standing hummocky larch woods	9
Larch woods with green mosses and shrubs	7
Dwarf cedar trees, lichen-covered stones, grass/lichen spots and stand alone larch trees	5
Park-like larch woods comprising poplar trees and chosenia plants with meadow willow shrubs	3
Ruderal vegetation covering disturbed areas	0.4

Sparse larch woods dominate the area depending upon the soil moisture levels with dwarf cedar woods playing a secondary role. The least commonly occurring are plant communities associated with the bottom sections of river valleys. Areas with no vegetation or those covered by ruderal vegetation and concentrated in the disturbed sections of river valleys account for less than 1.5% of the total mapping area.

7.9. Animal Life

The Project site and surrounding areas are part of the Euro-Siberian Subregion of the Forest Tundra Zone. The bird and mammal fauna belong to the Chukotka District of Bering Province and Arctic Tundra Sub-province in the Arctic Subregion of the Holarctic Region. The bird and mammal fauna of the main Project site itself and its surrounding areas were surveyed as part of the 2015 field survey. Overall, 40 bird species representing 6 orders (Figure 27) and 12 terrestrial mammal species from 4 orders (Figure 28) were identified in the study area.

7.9.1. Terrestrial Species Composition and Distribution

Bird Fauna

Bird species identified in the Project area during the engineering and environmental survey represent the following orders (Figure 27):

- Passeriformes - 21 species 52.5%
- Charadriiformes - 10 species 25.0%
- Galliformes - 3 species 7.5%

[35] RF Red Data Book. Volume 2. Plants. – M., ROSAGROPROMIZDAT, 1998.

[36] Chukotka Autonomous Okrug Red Data Book. Red and Endangered Plant Species (Angiospermae, Filiciformis, Lycopodiophyta, Bryophyta, Lichenes, Fungi) / Chukotka Autonomous Okrug Department of Industrial and Agricultural Policy, IBPS DVO RAN. – DIKIY SEVER, 2008.

- Anseriformes - 2 species 5.0%
- Falconiformes - 2 species 5.0%
- Gruiformes - 1 species 2.5%
- Strigiformes - 1 species 2.5%

Bird species include wood sandpiper, common sandpiper, Siberian gull, house martin, Bering Sea yellow and white wagtail, tree pipit, stonechat, dusky leaf warbler, yellow-browed leaf warbler, arctic warbler, little bunting, and nutcracker. The following bird species are also likely to occur in the study area: ptarmigan (Lagopus mutus), hawk-owl (Surnia ulula), common cuckoo (Cuculus conorus), black woodpecker (Dryocopus martius), as well as some Falconiforme species. In addition, some representatives of Anseriforme and Passeriforme species are likely to visit the area during seasonal migrations.

Rough-legged buzzard

Common ringed plover

Long-tailed jaeger

Heuglin’s gulls

Common house martin

Eastern yellow wagtail

Dusky warbler

Field sparrow

Figure 27. Types of Bird Habitats Identified During the Survey

Mammal Fauna (Mammalia)

Mammal species recorded in the Project area and its surroundings represent the following orders (Figure 28):

- Carnivora - 5 species 41.6%
- Rodentia - 3 species 25.0%
- Lagomorpha - 2 species 16.7%
- Artyodactyla - 2 species 16.7%

The results of the field survey and interviews with the base camp staff indicate that the following predator (Carnivora) species occur in the Project area: common fox (Vulpes vulpes), wolf (Canis lupus), brown bear (Ursus arctos), glutton (Gulo gulo) and ermine (Mustela erminea). Tundra shrew (Sorex tundrensis), masked shrew (Sorex caecutiens), grey-sided vole (Clethtrionomys rufocanus), northern red-backed vole (Clethtrionomys rutilus), large-eared vole (Alticola macrotis) and least weasel (Mustela nivalis), are also likely to occur in the project area. Game animal species occurring in the Bilibinskiy MunipalDistrict, their populations and distributions are presented in Table 21.

Northern pika

Arctic ground squirrel

Ermine (female)

Bear droppings

Elk droppings

Elk horn

Figure 28. Terrestrial Fauna Habitats Identified During the Survey

Table 21. Game Animal Species Populations and Densities in the Bilibinskiy MunicipalDistrict

Game Species	Average Population, Individuals	Density, individuals per 1000 ha
Wild reindeer	38 640	1,36
Brown bear	1 487	0,04
Wolf	2 161	0,17
Fox	2 363	1,00
Glutton	1 221	0,26
White fox	3 191	0,12
Ermine	34 508	4,84
Polar hare	156 049	28,87
Partridge	106 073	264

Bird and Mammal Habitats

Bird habitats are associated with the following particular landscape types:

- River floodplains and first-level terraces (30 species);
- Lower sections of slopes and dry shrub tundra terraces (6 species);
- Anthropogenic habitats (abandoned settlements) (4 species).

Habitats of 10 terrestrial mammal species are associated with river floodplains and first-level terraces.

7.9.2. Aquatic Fauna

Fish habitat in the Yegdegkych and Baimka River Basins belong to the Circumpolar Subregion of the Holarctic Region. Northern Palaearctic species dominate with minor influence of

American fish fauna[37]. Key fishing areas are located in the lower and middle sections of the Omolon, Bolshoy Anyui and Malyi Anyui Rivers[38]. There is no official information on the present species composition, status and habitat conditions of fish fauna in the middle section of the Bolshoy Anyui River and in the Baimka and Yegdegkych Rivers. Fish identified in an aquatic ecosystem survey conducted in summer 2015 in the Peschanka Stream and Baimka River are shown in Figure 29.

Bottom Fauna (Zoobenthos)

During the field survey, 10 zoobenthic species and groups were recorded in the watercourses, dominated by Ephemeroptera, Plecoptera, and Trichoptera species (EPT index). The values of the Oligochaeta and Chironomid indices were estimated[39]. The absence of Oligochaeta cells and zero value of the Oligochaeta index recorded in the Baimka River Basin indicate that water can be described as 'very clean' (Table 22).

Table 22. Zoobenthos Development Indicators for Local Watercourses

Indicator	Peschanka Stream Basin		Baimka River Basin	
	Range of Values	Mean Value	Range of Values	Mean Value
Density, cells/m^2	227 - 747	385	12 - 773	304
Biomass, g/m^2	0.59 - 4.54	2.15	0.75 – 7.86	2.51
Number of EPT species	6 - 10	8	4 - 10	7
EPT index	0.14 - 0.89	0.37	0.25 – 0.75	0.35
Oligochaeta index	0 - 11	6	0	
Chironomid index	0.00 – 0.26	0.12	0.00 - 0.15	0.09

Fish (Ichthyofauna)

The lower sections of the Kolyma River and its right-bank tributaries (Malyi Anyui, Bolshoy Anyui, and Omolon Rivers) are home to more than 20 fish species representing at least 10 families[40,41],[42] but only 3 salmon species, namely lenok (Brachymystae lenok), East Siberian grayling (Thymallus arcticus pallasi) and round whitefish (Coregonus cylindraceus).

[37] Berg L.S. 1933. Freshwater Fish Fauna of the USSR. V. 2, 1933.

[38] Kischinsky A.A. 1970. Freshwater Fauna / In: Northern Far East. - M., Nauka, 1970.

[39] EPT index is a water quality index based on the abundance of Ephemeroptera, Plecoptera, and Trichoptera species relative to the total abundance of zoobenthos.
Oligochaeta index is a water quality index based on the abundance of oligochaeta species relative to the total abundance of zoobenthos.
Chironomid index is a water quality index based on the abundance of chironomid species relative to the total abundance of zoobenthos.

[40] Makoyedov A.N., Kumantsov M.I., Korotayev Yu.A., Korotayeva O.B. 2000. Commercial Fish Species Inhabiting Inland Water Bodies in Chukotka. - M., UMK Psychologia, 2000.

[41] Chereshnev I.A. 1996a. Biological Diversity of Freshwater Fish Fauna in the Northeast Russia. - Vladivostok, DALNAUKA, 1996.

[42] Chereshnev I.A. 1996b.Vertebrate Species in the Northeast Russia. Vladivostok, DALNAUKA, 1996.

Lenok 1+ and East Siberian grayling 1+.
Baimka River upstream of the Yegdegkych River inflow

East Siberian grayling.
Baimka River upstream of the Yegdegkych River inflow

Round whitefish and East Siberian grayling.
Baimka River upstream of the Yegdegkych River inflow

East Siberian grayling 0+ (fingerling individuals).
Lower Section of the Yegdegkych River

Round whitefish and East Siberian grayling.
The Peschanka River and Yegdegkych river.
Technogenic water bodies at the historical placer mining locations

East Siberian grayling 0+.
Lower section of the Levaya Peschanka River, downstream of a historical placer mining site

Figure 29. Fish Species Inhabiting Water Bodies in the Project Area and Identified During the Engineering and Environmental Survey

Watercourses in the Baimka River Basin have low capacities as food sources due to small populations of amphibiotic insects (Ephemeroptera, Plecoptera, and Trichoptera species). Watercourses in the Baimka and Yegdegkych River Basins can be classified as Category 1 water bodies designated as fisheries. The water bodies surveyed are not inhabited by any rare or protected species listed in the RF and the Chukotka AO Red Data Books and neither do these water bodies have official riparian protection areas.

Additional fauna studies will be conducted in those areas that have not been covered by the previous field investigations (i.e. the Chernaya River catchment and planned warehouse facility site near Pevek). Special focus will be placed on avifauna within the area of influence of the aerodrome's runway (see Annex 1).

7.10. Key Environmental Constraints

7.10.1. Protected Natural Areas

As of 2014 the Chukotka AO had 24 protected natural areas (PNAs) of regional significance[43] and two PNAs of federal significance:

1. The Wrangel Island state nature reserve is located in the Iultinsky Municipal District. It comprises the Wrangel and Herald islands and surrounding water area and occupies 7,670 km².
2. The Beringia National Natural and Ethnic Park extends into the territory of Providensky, Chukotsky and Iultinsky Municipal Districts where it occupies over 3 million ha.

The Project area and its surroundings does not include any PNAs, and all PNAs established in the Chukotka AO lie well outside the Project's likely area of impact.

7.10.2. Areas with a Special Conditions of Natural Land Use

Water Protection Zones and Coastal Buffer Zones

On the project site, including the warehouse complex, more than 20 water bodies flow. According to the laws of the Russian Federation[44], the width of the coastal buffer zone (CBZ) of water bodies ranges from 30 to 50 m (depending on the slope of shore of a water body), the width of water protection zone (WPZ) of rivers or streams is set for the rivers or streams with a length of:

1. up to ten kilometers – in the amount of 50 meters;
2. ten to fifty kilometers – in the amount of 100 meters;
3. fifty kilometers or more – in the amount of 200 meters.

Information on the size of WPZ of water bodies on the Project site is summarised in Table 23.

[43] Protected Natural Areas of the Chukotka Autonomous Okrug // Chukotka Autonomous Akrug: official website. Available at http://xn--80atapud1a.xn--p1ai/o-regione/oopt-chao/index.php?sphrase_id=9241.
[44] Article 65 of the Water Code of the Russian Federation of 3/06/2006 No. 74-FZ (as amended on 27/12/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=65BDD5C43CB1FC516D935216ED085C75&mode=splus&base=LAW&n=304226&rnd=0.7502925081510683#0127313373856341

Table 23. Sizes of Water Protection Zones of Water Bodies in the Project Area

Water body	Length of water body, km	WPZ width, m
Unnamed stream №1	< 10	50
Peschanka River	16	100
Pravaya Peschanka River	12	100
Unnamed stream 2	< 10	50
Unnamed stream 3	< 10	50
Losiniy Stream	< 10	50
Yegdegkych River	24	100
Unnamed stream 4	< 10	50
Gnom Stream	< 10	50
Unnamed stream 5	< 10	50
Unnamed stream 6	< 10	50
Belosnezhka Stream	< 10	50
Unnamed stream 7	< 10	50
Unnamed stream 8	< 10	50
Levaya Peschanka River	< 10	50
Unnamed stream 9	< 10	50
Unnamed stream 10	< 10	50
Unnamed stream 11	< 10	50
Chernaya River	38	100
Mleluveem River	133	200

In accordance with the RF laws the bans are set to perform the following types of works within WPZ and CBZ:

- placement of cemeteries, landfills for production and consumption waste, radioactive, chemical, explosive, toxic, toxic and poisonous substances;
- use of vehicles (except for special vehicles), except on the roads and parking lots in specially equipped places with hard surface; and
- land plowing, placement of dumps of eroded soil, grazing of farm animals.

Within the boundaries of water protection zones, it is allowed to design, construct, reconstruct, commission, operate commercial and other facilities provided that such facilities are equipped with structures ensuring the protection of water bodies from pollution, contamination and depletion of water in accordance with water laws and laws in the field of environment protection. Protected water bodies with special environmental, scientific, cultural, aesthetic, recreational and curative value in the territory of the proposed activity are absent.

Sanitary Protection Zone of the Drinking Water Reservoir

The source of utility and drinking water supply to the designed GOK will be the designed reservoir in the Levaya Peschanka riverbed. In accordance with the RF Water Code the width of the water protection zone of the reservoir located on the watercourse is set equal to the WPZ width of such watercourse. Consequently, the WPZ width of the reservoir will be 50 m.

Aerodrome Environs and Sanitary Protection Zone

In accordance with RF requirements the location of the proposed aerodrome has the following restrictions:

- Size of sanitary protection zone (SPZ); and,

- Dimensions of airdrome environs and its subzones.

Sanitary Protection Zone

An aerodrome SPZ should be established taking into account the total emissions of all air pollution sources and the levels of physical impacts of facilities located on the land plot of aerodromes, as well as in the zone of sanitary gap. The calculation of the SPZ size and the sanitary gap zones will be carried out as part of OVOS development according to the requirements of the Russian laws[45.]

Aerodrome Environs and Its Subzones

Aerodrome environs and its subzones should be established according to the requirements of the RF laws[46]. On the aerodrome environs, the following subzones can be distinguished, for which restrictions are set on the use of immovable property items and performance of certain types of activities:

- the fifth subzone – on the boundaries established on the basis of requirements of flights safety and industrial safety of hazardous production facilities, taking into account the maximum radius of affected areas in cases of man-made incidents at hazardous production facilities;
- the sixth subzone – on the boundaries established at a distance of 15 kilometers from the control point of the aerodrome, in which it is prohibited to place facilities that contribute to attraction and mass aggregation of birds.

Such facilities include waste landfills, livestock farms, slaughterhouses, etc.

- the seventh subzone – on the boundaries established according to the calculations, taking into account the following factors:
    - electromagnetic exposure of radio aids to aircraft flight support and aeronautical telecommunication means;
    - air pollution and noise exposure due to take-off, landing and maneuvering of aircrafts in the vicinity of the aerodrome.

Protection Forests

Property on the Peschanka site belong to the forest fund (quarter No. 350) and the economic activity on them is carried out in accordance with the forest property lease contracts. In accordance with the forest site zoning of the RF territory[47,] the lands belong to the Far Eastern region of sub-tundra forests and sparse taiga. The Peschanka site includes forest land

[45] Federal Law № 135-FZ On Amendments to Certain Legislative Acts of the Russian Federation Regarding Improvement of the Procedure for Establishing and Using the Aerodrome Environs and Sanitary Protection Zone of 01/07/2017.

[46] Water Code of the Russian Federation of 3/06/2006 No. 74-FZ (as amended on 27/12/2018). Available at http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=167130565908183498424933671&cacheid=65BDD5C43CB1FC516D935216ED085C75&mode=splus&base=LAW&n=304226&rnd=0.7502925081510683#0127313373856341..

Federal Law № 135-FZ On Amendments to Certain Legislative Acts of the Russian Federation Regarding Improvement of the Procedure for Establishing and Using the Aerodrome Environs and Sanitary Protection Zone of 01/072017.

RF Governmental Decree of 11/03/2010 No. 138 (as amended on 13/06/2018) On Approval of the Federal Rules for the Use of Airspace of the Russian Federation

[47] Order of the RF Ministry of Natural Resources of 28/03/2007 No. 68 On Approval of the List of Forest Site Zones and Forest Regions of the Russian Federation.

plots related to protection and valuable forests: forecast sub-compartments №№ 2, 43, 44, 52, 50, 52, 53,54, 59, 60.

According to the RF classification[48], protection forests are the forests that are natural objects of particular value and in relation to which a special legal regime is established for the use, conservation, protection, and reproduction of forests. The following categories of protection forests are distinguished:

1) forests located in natural protected areas;
2) forests located in water protection zones;
3) forests performing the functions of protection of natural and other objects;
4) valuable forests;

In the protection forests it is prohibited to conduct activities that are incompatible with the intended purpose and useful functions of protection forests; limiting of clear felling; a ban on processing of wood and other forest resources, the cultivation of forest fruit, berries, ornamental plants, medicinal plants, the creation of forest plantations and their operation. Permits for cutting of protection forests and mine development are issued by the executive authorities.

8. SOCIO-ECONOMIC BASELINE

8.1. Chukotka Autonomous Okrug

8.1.1. General Information

The Chukotka AO (Chukotka) is a constituent member of the Russian Federation. Geographically, it occupies the most northeastern part of Eurasia including the Chukotka Peninsula (washed by the East Siberian Sea, Chukchi Sea, and Bering Sea), part of the mainland and the islands of Wrangel, Herald, Kruzenshtern, Ratmanov, Aion and others (Figure 1).

The entire area of the Chukotka AO is part of the Far North whose residents are entitled to special privileges to compensate for the hardship of living in extreme climatic conditions. The administrative centre of the Chukotka AO is based in Anadyr located at the mouth of the Anadyr River where it forms an estuary (Anadyrsky Liman) connected to the Bering Sea. Anadyr has a population of 15,639 people[49]. Chukotka is administratively divided into the following six administrative units (in descending order in terms of area): Anadyrsky, Bilibinsky, Chukotsky Municipal Districts, and Pevek, Providensky, , and Egvekinot Urban Districts.

The Chukotka AO has had a violent history with more than a century of conflict in the 16th and 17th centuries between Russians and various tribes that later received a common name ‘Chukchi’. When the wealth of mineral resources was discovered in the 20th century, extensive mining activities began in the area with many placer and lode gold deposits explored and developed. The Russian-American Company (RAC) was established in the early

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[48] Forest Code of the Russian Federation N 200-FZ of 04/12/2006 (as amended on 27/12/2018).

[49] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Preliminary Population figures for Chukotka Autonomous Okrug and its Municipalities as of 01/01/2019. Available at: http://habstat.gks.ru/wps/wcm/connect/rosstat_ts/habstat/ru/municipal_statistics/chukot_stat/main_indicators/

19th century to colonize the area with activities continuing till 1867 when Alaska was sold to the USA. GULAG prisoners were also used to exploit the mineral wealth during the Soviet era.

8.1.2. Infrastructure and Human Settlements

There are five urban settlements and a number of rural settlements in Chukotka. Municipal services including water, sewerage and heating are widespread but obsolete and derelict. The majority of people live in apartment blocks. Drinking water quality is poor despite abundant water resources in the region.

8.1.3. Energy Sector

Chukotka AO's energy system in its present form is a technically isolated territorial system which has no connection with other regional energy systems of the Russian Federation. It comprises three energy hubs, which operate independently of each other – Chaun-Bilibinsky, Anadyrsky and Egvekinotsky energy hubs (Figure 30).

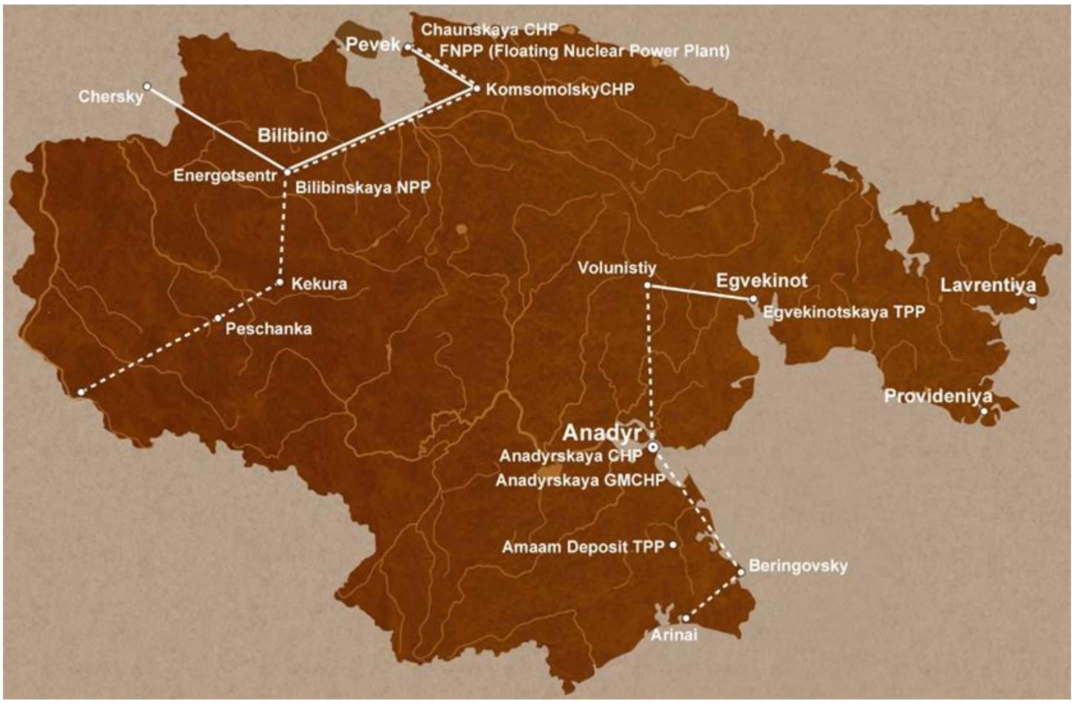

Figure 30. Chukotka's Energy System[50] with Planned Facilities

The total energy output of major power generating facilities in Chukotka is about 256.65 MW. Part of the energy produced in Chukotka is currently supplied to Yakutia. However, a plan to phase out the existing power generation units at the Bilibinskaya Nuclear Power Plant (NPP) in 2019-2025, along with the construction of large mine and processing plants including those within the Baimskaya Prospecting Area, Kekura and so forth.), is expected to create an electricity supply deficit. The existing Energy Bridge Project will address this issue by connecting two isolated energy systems of the Magadan Region and Chukotka AO (Figure 31). In addition, it is planned to develop the Bilibinsky Energy Centre comprising the Bilibinskaya Thermal Power Plant (TPP) (whose design capacity is 24 MW of electricity and 83.2 MW of heat).

The Energy Bridge and Bilibinsky Energy Centre Projects will provide capacity required to replace the retiring power generation units at the Bilibinskaya NPP and meet energy demands of the Peschanka Copper Project and other mining operations.

[50] Chukotka is Open to the Pacific Region and the Rest of the World. Information Brochure. – Anadyr, 2015.

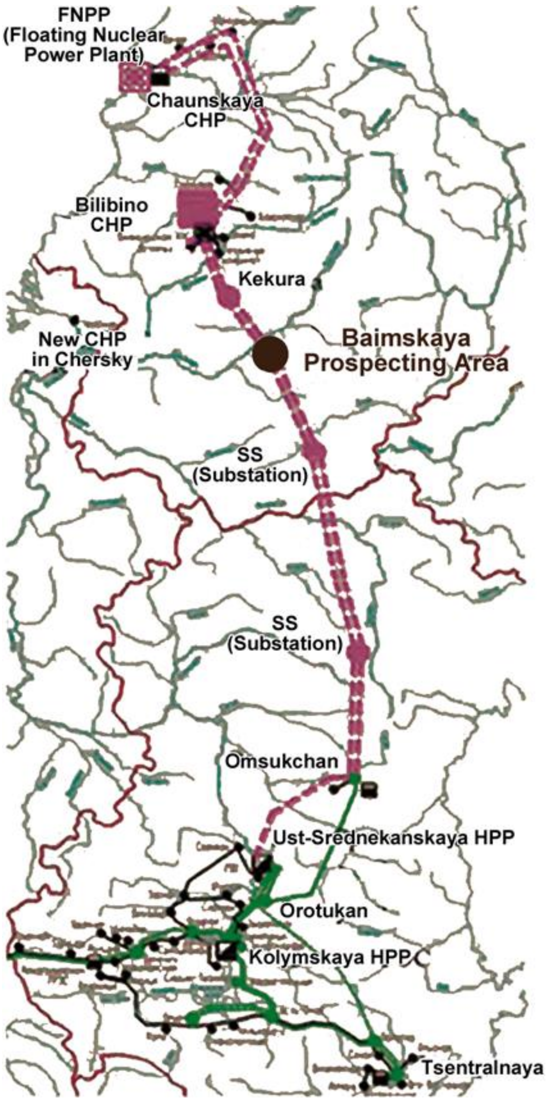

Figure 31. Schematic Plan of the Energy Bridge Connecting the Magadan Region and Chukotka[51]

8.1.4. Transport and Communication Infrastructure

Chukotka's transport system comprises air, maritime, and road transport. Its important distinction is the absence of railroads. Chukotka has 8 airports that are part of the Aeroporty Chukotki Federal Treasury Enterprise (Beringovsky, Zaliv Kresta, Keperveem, Lavrentiya, Markovo, Pevek, and Provideniya). The airport in Pevek has a paved runway and operates regular flights to Moscow, Khabarovsk, Magadan, district centres and ethnic rural communities in Chukotka. Two airports (Anadyr and Provideniya) operate international flights. In addition, there are seven runways of local significance.

There are 5 seaports in Chukotka (Anadyr, Beringovsky, Pevek, Provideniya, and Egvekinot). Cargo ships transport goods both eastward and westward; eastward is the dominant direction. There is no reliable road transport system with paved road network in Chukotka. The paved road density is 2.5 km per 1,000 km^2, which is 13 times less than the country average. The total length of regional motor roads is 2,813.5 km with only 544.6 km being all-season roads with basic paving.

The ongoing road construction and renovation project covering the Kolyma-Omsukchan-Omolon-Anadyr sections is funded by the federal government. The Omolon-Anadyr

[51] Chukotka is Open to the Pacific Region and the Rest of the World. Information Brochure. – Anadyr, 2015.

component of this project lies within Chukotka and includes the construction of access roads to Bilibino, Komsomolsky and Egvekinot. The implementation of this project will provide a reliable road transport connection linking the Baimskaya Prospecting Area with human settlements and logistic centres.

8.1.5. Demography

Historical Changes in Population Growth

During the Soviet era, the Chukotka population showed rapid growth, followed by a dramatic population decline in the first post-Soviet years due to large-scale migration to other regions of Russia. The rural population has also decreased dramatically (Table 24).

Table 24. Population Statistics Based on the Historical Census Data[52]

Year	Population	Percentage Change	Including		Percentage of the Total Population	
			Urban	Rural	Urban	Rural
1897	12,900	-	-	12,900	-	100
1926	13,500	104.6	-	13,500	-	100
1939	21,456	158.9	3,256	18,200	15.2	84.8
1959	47,231	219.7	26,960	20,271	57.1	42.9
1970	103,235	218.7	70,933	32,302	68.7	31.3
1979	139,944	135.6	96,356	43,588	68.9	31.1
1989	163,934	117.2	118,986	44,948	72.6	27.4
2002	53,824	32.8	35,869	17,955	66.6	33.4
2010	50,526	93.9	32,734	17,792	64.8	35.2

Current Population Structure (Urban/Rural, Gender and Age)

As of 2019, the population of the Chukotka AO was 49,663 people with the Chukotsky municipal district being made up only of rural dwellers including nomadic reindeer herders (Table 25). Unlike the rest of Russia, men outnumber women in Chukotka (Table 26).

Table 25. Estimated Number of Urban and Rural Population as of 1/01/2019[53]

Estimated Permanent Population Number as of 1 January 2015	Total Number (People)	Including:	
		Urban	Rural
Chukotka AO	49,663	35,193	14,470
Urban District – Anadyr Town	16,338	15,849	489
Anadyrsky Municipal District	8,161	4,531	3,630
Bilibinsky Municipal District	7,379	5,319	2,060
Egvekinot Urban District (Iultinsky Municipal	5,038	3,276	1,762

[52] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Population // Official Statistics for Chukotka Autonomous Okrug. Available at http://habstat.gks.ru/wps/wcm/connect/rosstat_ts/habstat/ru/statistics/chukot_stat/population/.

[53] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Preliminary Population figures for Chukotka Autonomous Okrug and its Municipalities as of 01/01/2019. Available at: http://habstat.gks.ru/wps/wcm/connect/rosstat_ts/habstat/ru/municipal_statistics/chukot_stat/main_indicators/.

Estimated Permanent Population Number as of 1 January 2015	Total Number (People)	Including:	
		Urban	Rural
District before 2016)			
Providensky Urban District (Providensky Municipal District before 2016t)	3,678	2,165	1,513
Pevek Urban District (Chaunsky Municipal District before 2016)	5,038	4,053	985
Chukotsky Municipal District	4,031	-	4,031

Table 26. Gender and Age Structure of Population (2014)[54]

Year	Total Population		Urban		Rural	
	Male	Female	Male	Female	Male	Female
Total population	25,737	24,818	17,443	16,667	8,294	8,151
Number of Population in the Following Age Categories:						
Below the working age	5,761	5,495	3,331	3,192	2,430	2,303
Working age[1)]	18,206	15,073	12,873	10,477	5,333	4,596
Above the working age	1,770	4,250	1,239	2,998	531	1,252

[1)] 16-59 years for men and 16-54 years for women

Ethnic Composition

Russians (49.6%) and Chukchi (25.3%) dominate the Chukotka population, followed by Ukrainians (5.7%). According to the latest census data, the following indigenous minorities of the North are present in the region: Eskimo (3%), Even (2.8%), Chuvan (1.8%), Yukaghir (0.4%), and Koryak (0.1%) (Table 27).

Table 27. Ethnic Composition of Chukotka Population (Only Groups Accounting for Over 1% of Total Population) Based on the 2010 Census[55]

Ethnic Group	Number of People	As a Percentage of Total Population. %	As a Percentage of Those Who Indicated the Ethnicity. %
Total	50,526	100.00	
People who indicated their ethnicity	47,756	94.52	100.00
Russians	25,068	49.61	52.49
Chukchi	12,772	25.28	26.74
Ukrainians	2,869	5.68	6.01
Eskimos	1,529	3.03	3.20

[54] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Population // Official Statistics for Chukotka Autonomous Okrug. Available at http://habstat.gks.ru/wps/wcm/connect/rosstat_ts/habstat/ru/statistics/chukot_stat/population/.

[55] ChAO Demography // Wikipedia. Available at https://ru.wikipedia.org/wiki/%D0%9D%D0%B0%D1%81%D0%B5%D0%BB%D0%B5%D0%BD%D0%B8%D0%B5_%D0%A7%D1%83%D0%BA%D0%BE%D1%82%D1%81%D0%BA%D0%BE%D0%B3%D0%BE_%D0%B0%D0%B2%D1%82%D0%BE%D0%BD%D0%BE%D0%BC%D0%BD%D0%BE%D0%B3%D0%BE_%D0%BE%D0%BA%D1%80%D1%83%D0%B3%D0%B0.

Ethnic Group	Number of People	As a Percentage of Total Population. %	As a Percentage of Those Who Indicated the Ethnicity. %
Evens (Lamuts)	1,392	2.76	2.91
Chuvans	897	1.78	1.88
Other	608	1.20	1.27

Population Growth/Decline Due to Natural Causes and Migration

Following the large outmigration during the first post-Soviet decade (c 76%), Chukotka has since sustained population growth, which is also atypical for Russia.

8.1.6. Population Health and Disease Incidence

Disease incidence rates are generally very high in Chukotka. Communicable disease incidence rates for the Chukotka AO are compared to the country's average rates in Table 28. Tuberculosis rates are very high while HIV and syphilis rates appear to the relatively low thought to be as a result of strict control of migrant workers.

Table 28. Socially Significant Disease Incidence Rates[56]

Socially Significant Disease Incidence Rates per 100.000 People	Chukotka AO		RF	
	2014	2015	2014	2015
Newly detected active tuberculosis cases	136.5	156.3	59.4	57.8
Total number of registered individuals with active tuberculosis	324.5	332.4	137.3	129.3
Newly detected HIV-positive individuals	33.6	37.6	63.3	68.5
Including children of age 0-17	-	-	4.5	4.7
Syphilis	7.9	15.8	25.0	23.5
Malignant tumours	330.4	271.1	387.6	402.9

8.1.7. Employment and Unemployment

Employment rates in Chukotka AO have been consistently high and indeed, higher than Russia's average rate (64.8% in 2013) (Table 29). Female employment rates are somewhat lower than those among men Apart from low population density, weak migration within the region and so forth, one of key issues faced by the regional labour market is a shortage of qualified staff[57]. State budget-funded enterprises and mining industries are key employers in the region (Table 30).

[56] Socially Induced Diseases among Russia's Population in 2015 (Statistic Data): RF Ministry of Health and FGBU Central Scientific Research Institute for Healthcare System Management and Information Support. Moscow 2016.

[57] Kulik I.N. 2012. Issues Affecting the Development of the Regional Labour Market in Chukotka Autonomous Okrug // Issues of Economics and Law. 2012. No. 5. P. 47–50. Available at: http://law-journal.ru/files/pdf/201205/201205_47.pdf.

Table 29. Labour Force Participation Rate, Employment and Unemployment Rates in the 15–72 Age Group as of January 2015[58]

	Economically Active Population	Including		Economically Active Population	Labour Force Participation Rate	Employment Rate, %	Unemployment Rate, %
		Employed	Unemployed				
Total	32734	31766	968	6697	83.0	80.6	3.0
Male	17237	16511	726	2883	85.7	82.1	4.2
Female	15497	15255	242	3814	80.3	79.0	1.6

Table 30. Number of Employees by Sector in May 2015 (People)[59]

Total	27,226
Agriculture, hunting and forestry	1,302
Fisheries and fish farming	50
Mining	5,266
Processing industries	272
Electricity, gas and water generation and distribution	3,422
Construction	466
Wholesale and retail trade; repair of vehicles, motorcycles, home appliances and personal appliances	1,673
Hotels and restaurants	311
Transport and communications	2,652
Financial sector	408
Real estate operations and services	1,104
State governance, military security; social insurance	4,350
Education	2,899
Healthcare and social services	2,296
Other communal, social and individual services	755

8.1.8. Economy

Gross Regional Product and Key Sectors of Regional Economy

Mining is a core sector of the regional economy while indigenous people are engaged in traditional crafts and activities. The Chukotka AO has amongst the highest gross regional product (GRP) per capita after the oil-producing Tyumen and Sakhalin regions, with gold mining being especially prominent (the Chukotka AO has about 10% of Russia's gold reserves). The largest industrial enterprises in the Chukotka AO[60] are depicted in Figure 32. Enterprises engaged in reindeer husbandry and marine mammal hunting receive subsidies as do other food producers.

[58] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Official Statistics for Chukotka Autonomous Okrug. Available at https://habstat.gks.ru

[59] Ibid

[60] RF Ministry of Industry and Trade 2015. Chukotka Autonomous Okrug Passport. Available at. http://minpromtorg.gov.ru/common/upload/files/docs/pasregions/5_12_CHukotka.pdf

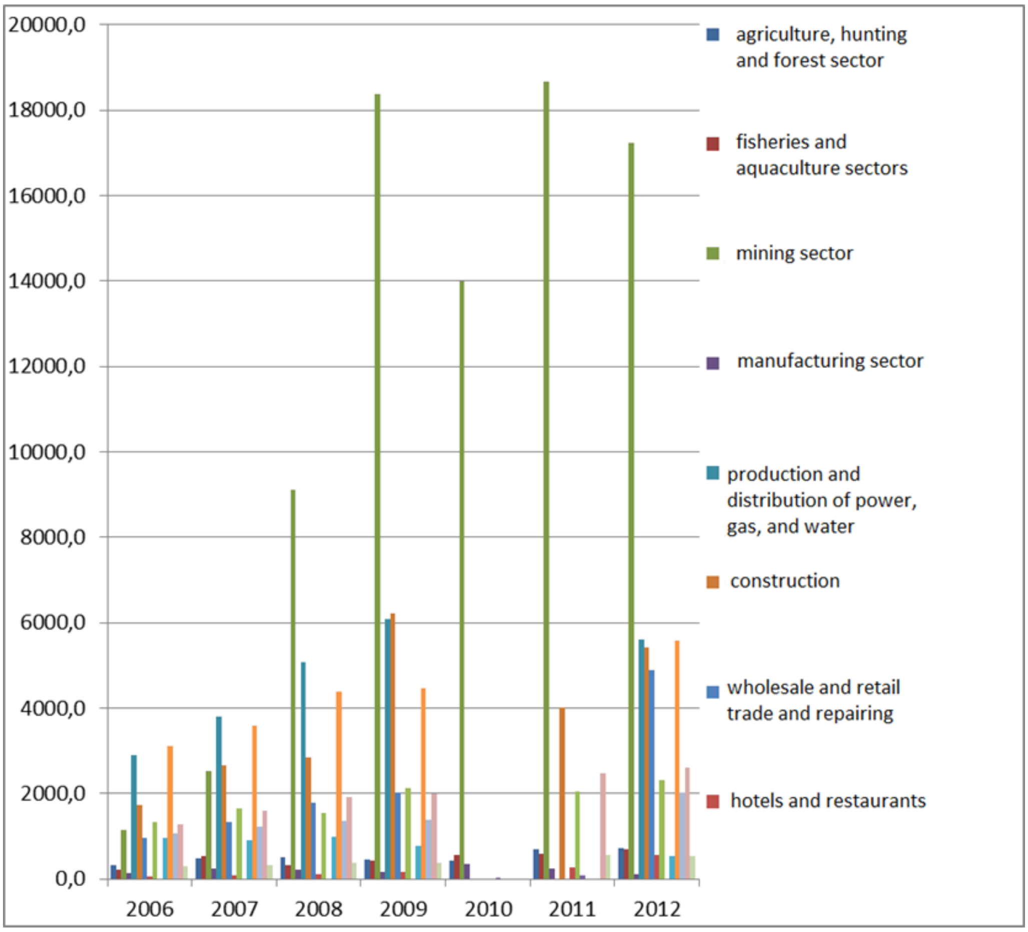

Figure 32. GRP by Sector, 2006 – 2012 for the Chukotka AO[61]

Living Standards

<u>Wages and Salaries</u>

Apart from the financial sector, the highest wages are paid to state employees where even in the mining sector, wage levels are often lower than in the public sector. Other sectors where higher than average wages are paid include transport and communications, power and water supply, fisheries and fish farming. Despite state subsidies, agricultural workers are among the lowest paid employees in the region.

<u>Household Incomes and Expenditures</u>

Incomes and expenditure have grown relatively steadily, notwithstanding a small decline in 2014 over the last several years. The average disposable income (mainly received in the form of cash income) grew across all households from 18,400 Roubles in 2009 to 26,700 Roubles in 2014 with urban residents enjoying generally more disposable income than those in rural areas.

8.1.9. Cultural Heritage

In Chukotka AO, archaeological sites constitute the overwhelming majority of historical and cultural heritage sites that are protected by the state. Overall, 249 historical and cultural

[61] Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Official Statistics for Chukotka Autonomous Okrug. Available at https://habstat.gks.ru

monuments (including 144 archaeological heritage sites) have been registered in the Chukotka AO, with 87 having state protection status (data as of 2001).

8.2. Bilibinsky Municipal District

8.2.1. General Information

The Bilibinsky Municipal District, established in 1930 is the second largest district in Chukotka, occupying 174,652 km^2 or 23.7% of the region's total area (Figure 33); it has a population density of 0.043 people per km^2. The administrative centre of the Bilibinsky Municipal District is Bilibino Town located in the Bolshoy Keperveyem River valley. Bilibino and Keperveyem rural settlement were merged into the Bilibino Urban District with the administrative centre in Bilibino.

Figure 33. Bilibinsky Municipal District

The Bilibinsky Municipal District is rich in mineral resources including lode and placer gold, silver, and platinum group metals. A number of promising deposits of tin, zinc, copper, antimony, tungsten, mercury, lead, and coal have been discovered. Key industrial sectors are mining (gold mining) and electricity generation (Bilibino NPP), while the agricultural sector is made up of reindeer hunting, fisheries, and greenhouse farming. The Bilibino NPP became operational in 1976 and is the first and the only nuclear power plant built within the Polar circle in the permafrost zone. The NPP is in the centre of the isolated Chaun-Bilibinsky energy system, accounting for 75% of its electricity generation. The Bilibinsky Municipal District has 10 human settlements (Table 31).

Table 31. Urban and Rural Settlements in the Bilibinsky Municipal District as of the Beginning of 2018[62]

No.	Urban and Rural Settlements	Administrative Centre	Number of Settlements	Population
1	Bilibino Urban Settlement	Bilibino Town	2	5560
2	Anyuisk Rural Settlement	Anyuisk Village	1	396
3	Ilirney Rural Settlement	Ilirney Village	1	252
4	Omolon Rural Settlement	Omolon Village	1	785
5	Ostrovnoye Rural Settlement	Ostrovnoye Village	1	376
6	Area lying between the settlements		4	

8.2.2. Demography

As of 1 January 2018, the permanent population in the Bilibinsky Municipal District was 7,369 with 5,292 residing in urban areas, and 2,077 people in rural areas (Table 32). The District's population showed positive natural growth in 2014 when the number of births exceeded the number of deaths by 9. The average age is 33.3 years (32.8 years for men and 33.9 years for women).

Table 32. Bilibinsky Municipal District Population Dynamics in 2002 – 2018[63]

	Year								
	2002	2010	2012	2013	2014	2015	2016	2017	2018
Population, people	8,820	↘7,866	↘7,801	↘7,738	↗7,855	↘7,825	↘7,609	↘7,464	↘7,369

8.2.3. Ethnic Composition

The Bilibinskiy Municipal District is home to 43 ethnic groups with Russians being the largest group accounting for 60% of the total population and indigenous Chukotka people (Chukchi, Evens, Yukaghirs and so forth) accounting for 20%. The remaining 20% include Ukrainians, Belarusians, Tatars and other ethnic groups. The Bilibinsky Municipal District is included in the list of areas where indigenous minorities live and maintain their traditional lifestyles in the Russian Federation[64]. Indigenous minorities account for 24.6% of the total population of the District. Traditional nature resource use practices include nomadic reindeer herding, fishing and hunting but overgrazing by unsustainable reindeer numbers has denuded large parts of reindeer pastures in the District.

8.2.4. Population Employment

As of 1 January 2017, the number of economically active people in the District was 4,423 people, or 59.3% of the total population. Some 4,291 people are employed and of the 132 unemployed persons 107 (2.4% of the economically active population) are officially registered with the employment service.

[62]Federal Service on State Statistics, Department for the Khabarovsk Kray, Magadan Oblast, Yevreyskaya Autonomous Oblast, and Chukotka Autonomous Okrug. 2019. Municipal Statistics for Chukotka Autonomous Okrug. https://habstat.gks.ru/folder/23556.

[63] Bilibinskiy Municipal District. Available at https://ru.wikipedia.org/wiki/Билибинский_район.

[64] RF Government Resolution of 08/05/2009 No. 631-r. On Approval of the List of Areas Traditional Residence and Economic Activities of Small-Numbered Indigenous Peoples of the Russian Federation and the List of Their Traditional Economic Activities.

8.2.5. Industry and Agriculture[65]

The Bilibinsky Municipal District is among the most economically developed districts in Chukotka AO with key economic activities including upgrading energy and transport infrastructure to support mining. Key industrial sectors in the District are mining, electrical power, food processing; and agriculture (reindeer husbandry and crop farming). Russia's largest copper deposit is located on the boundary of the Bilibinsky and Anadyrsky Municipal Districts. All economic activities have exhibited growth in recent years.

8.2.6. Budget[66]

The main budget expenditure is education (44.8%), followed by public utilities (22.0%) and national economy (15.1%). The socio-economic development indicators estimated for the Bilibinsky Municipal District over the past several years show that the economic situation has remained stable.

8.2.7. Public Health[67]

Public healthcare services are provided by the Inter-District Medical Centre (IDMC) based in Bilibino town and comprising a district hospital for 105 patients, a local hospital in Omolon village for 15 patients, a local hospital in Anyuisk Village for 5 patients, 3 medical stations in Ostrovnoye, Ilirney, and Keperveyem villages, and 5 mobile medical stations. The district hospital is well maintained, equipped, and staffed with trained medical specialists.

8.2.8. Housing Assets

Housing assets in the Bilibinsky Municipal District had a total floor area of 286.2 thousand m^2, including 242.2 thousand m^2 of housing located in Bilibino town (2012 figures) (Table 33). The housing today is generally in a state of disrepair.

Table 33. Bilibinsky Municipal District Housing Assets in 2012[68]

Settlement	Total Floor Area, m^2	Floor Area by Ownership Type			Total Occupied Housing Floor Area	Total Unoccupied Housing Floor Area
		Municipal	State	Private		
Bilibino Urban Settlement						
m^2	242,223.5	117,168.6	1,658.8	107,285	190,428.4	7,667.3
%	100	48.4	0.1	44	x	3.2
Rural Settlements						
m^2	44,011.2	35,684	-	4,979.3	40,663.3	3,374.7
%	100	81		11	x	0.1
Including:						
Ilirney	5,564.2	4,805.9	-	269.1	5,075	237.5
Ostrovnoye	6,455.3	5,447.2	-	536.1	5,983.3	414.3
Omolon	10,410	8,265.2	-	1,333	9,598.2	1,156.3

[65] Bilibinsky Municipal District Administration. 2019. District Economy: General Description // Bilibinsky Municipal District Administration official website. Available at http://www.bilchao.ru/index.php?newsid=120.
[66] Bilibinsky Municipal District Administration. 2019a. District Economy: General Description // Bilibinsky Municipal District Administration official website. Available at h http://www.bilchao.ru/index.php?newsid=27
[67] Bilibinsky Municipal District Administration. 2019b. Public Health and Healthcare // Bilibinsky Municipal District Administration official website. Available at h http://www.bilchao.ru/index.php?newsid=23.
[68] Bilibinsky Municipal District Administration. 2012. Feasibility Study for the Proposed Bilibinsky Municipal District Spatial Planning Scheme. Volume 1. 2012. // Available at http://www.bilchao.ru/index.php?newsid=120.

Settlement	Total Floor Area, m^2	Floor Area by Ownership Type			Total Occupied Housing Floor Area	Total Unoccupied Housing Floor Area
		Municipal	State	Private		
Kiperveyem	11,372.1	8,646.4	-	1,831.5	10,477.9	1,104.5
Anyuisk	10,209.6	8,519.3	-	1,009.6	9,528.9	462.1
Total in the District						
m^2	286,234.7	117,168.6	1658.8	112,264.3	231,091.7	11,042
%	100	40.9	0.6	39.2	x	3.9

8.2.9. Education and Culture

There are 11 municipal budget-funded educational institutions in the Bilibinsky Municipal District, as well as the Central Library, Local History Museum, Hobby, Arts and Crafts Centre, and the BI-TV Television and a radio studio. As of 1 June 2016, the District had 47 identified archaeological sites of federal significance including ancient encampments and burial sites[69].

8.3. Pevek Urban District

8.3.1. General Information

The Pevek Urban District (known as the Chaunsky Municipal District before 2016) established in 1933 occupies 67,091 km^2 and has a population density of 0.075 person per km^2. The Pevek Urban District comprises the following settlements: Pevek town, Baranikha, Valkumei, Bystry, Komsomolsky, Krasnoarmeisky, and Yuzhny townships that are undergoing dissolution; and Ayon, Apapelgino, Billiings, Rytkuchi, and Yanranay (Figure 34).

The Pevek Urban District is the most industrialised district in the region and one of the major transport hubs in Chukotka. The Pevek Airport is the second largest airport in Chukotka connected with Moscow and Anadyr by regular flights. Pevek is one of Russia's monotowns (a town whose economy is dominantly a single industrial activity).

The Pevek Commercial Port is the largest seaport in Chukotka, and one of the few ports on the Northern Sea Route receiving all types of vessels. Pevek's development as a seaport is part of the country' maritime transport strategy aiming to revive trade and other activity by the Northern Sea Route. Other large-scale economic activities in the Pevek Urban District include the ongoing development of the Kupol, Dvoynoye and Mayskoye deposits; it has resulted in a steady increase of freight turnover since 2012. The development of Peschanka deposits will play an important role in the regional economy and port operations. The exploration of oil and gas deposits in the coastal shelf area will also set the scene for the development of oil and gas sector with an oil/gas terminal in the Pevek Sea Port. Urban population living in Pevek accounts for 81.27% of total population of the Pevek Urban District (Table 34).

[69] Government of the Chukotka AO Resolution of 23/05/2013 On Approval of the Aggregated List of Cultural Heritage Sites of Federal, Regional, and Local Important within the Chukotka Autonomous Okrug (as amended on 01/06/2016). Available at http://docs.cntd.ru/document/424073084 (currently not in force).

Figure 34. Pevek Urban District

Table 34. Urban and Rural Settlements in Pevek Urban District as of the Start of 2018

Urban and Rural Settlements	Total Population	Urban Population, persons	Rural Population, persons
Pevek Urban District	5327	4329	998
Pevek Town	4329	4329	

Source: Pevek Urban District Investment Passport

8.3.2. Demography

As of 1 January 2018, the permanent population in the Pevek Urban District was 5,327 people, with 4,329 residing in urban areas, and 998 people in rural areas (Table 34). The Urban District's population showed positive growth in 2012 and 2013.

Table 35. Pevek Urban District Population Dynamics in 2002 – 2018[70]

	Year								
	2002	2010	2012	2013	2014	2015	2016	2017	2018
Population, people	6,962	↘5,359	↗5,927	↗6,081	↘5,800	↘5,774	↘5,747	↘5,551	↘5,327

[70] Chaunskiy District// Wikipedia. Available at https://ru.wikipedia.org/wiki/Чаунский_район#cite_note-2015DS-23.

8.3.3. Ethnic Composition

The Pevek Urban District is home to 44 ethnic groups with Russians being the largest group accounting for 61.9% of total population. Indigenous people (the Chukchi, Eskimos, Chuvans, Evens, Koryaks, and Yukagirs) account for 18.3%. The remaining 19.8% comprises Ukrainians, Tatars, Belarusians, Moldovans, and Kalmyks. The Pevek Urban District is one of the areas inhabited by indigenous minorities maintaining a traditional lifestyle in the Russian Federation with indigenous minorities accounting for 18.3% of the total population.

8.3.4. Population Employment

As of 1 January 2018, the number of economically active people in the Pevek Urban District was 3,993 people, or 75% of the total population. Some 3,943 people are employed and of the 50 unemployed persons 47 (0.88% of the economically active population) are officially registered with the employment service.

8.3.5. Industry and Agriculture

The Pevek Urban District (the former Chaunsky Municipal District) is the most industrialised district in Chukotka. Precious and rare metals mining is the most significant economic activity, and the mining industry contributes over 70% to the total industrial output. As the placer gold deposits have become depleted, gold continues to be extracted from its source, i.e. from primary gold and silver bearing deposits. Large-scale precious and rare metals mining operations are now underway at a number of sites including Dvoynoye and Mayskoye deposits.

The Pyrkakay Stockworks is the most promising project for the local economy with Pyrkakay being Russia's largest and world's fourth largest tin deposit whose reserves are estimated at 5 billion USD. The deposit contains about 350 thousand tonnes of tin and 21 thousand tonnes of tungsten. The concentration of tin in ore is 0.29%. Other valuable components reflected in the State Records of Mineral Resources include copper, silver and gold. The deposit comprises four large stockwork bodies and has a total mining area of 8.2 km^2.

The large-scale modernisation of the Chaun-Bilibinsky Power Hub is underway to ensure sustainable long-term economic development. As part of this modernisation, the Pevek Urban District will host the world's first floating nuclear power plant starting from 2019, and the construction of new power lines is expected to start soon to meet growing power demands of mining sector.

The port of Pevek is a major sea commercial port along the Northern Sea Route, located in the Chaunskaya Bay which is part of the East Siberian Sea. The strategic significance of the Pevek sea port for the Chukotka AO and the entire Northern Sea Route stems from the fact that it provides the deepest berths and is the most mechanised port in Chukotka and along the Northern Sea Route, being the centre of Chukotka's gold mining operations. Pursuant to the Federal Law of 3 July 2016 No. 252-FZ "On Amending the Federal Law on the Proactive Socio-Economic Development Areas in the Russian Federation and Federal Law on the Free Port of Vladivostok", the Pevek Urban District and its water area are part of the free port of Vladivostok.

Governmental policy supports the development of the agricultural sector in the region which offers various incentives to reindeer breeders, hunters, fishermen and other people engaged in agricultural activities.

8.3.6. Budget

The main expenditure items in the local budget are education (34%), public utilities (23.75%) and national economy (15.38%)[71]. Socio-economic development indicators estimated for Pevek Urban District show that economic situation has remained stable over the past several years.

8.3.7. Public Health

Public healthcare services are provided by the Chukotka Okrug Hospital and its branch – Chaun District Hospital based in Pevek, which is in good condition, properly equipped and staffed.

8.3.8. Housing Assets

The total floorage available in the residential buildings in the Pevek Urban District is 144,600 m^2, none being in poor condition or requiring urgent repair. The major proportion of housing assets is privately owned (Table 36).

Table 36. Ownership of Housing Assets in Pevek Urban District[72].

Municipality ownership, no. of housing assets	1200
Private ownership, no. of housing assets	1606

The current list of households, which need improvement of their housing conditions includes 82 families.

8.3.9. Education and Culture

Education infrastructure in the Pevek Urban District comprises 8 educational institutions including 2 comprehensive secondary schools, 2 comprehensive pre-school and primary school establishments, 2 pre-school establishments, and 2 extended education establishments. As of 1 June 2016, there was 1 archaeological site of federal significance in Pevek Urban District (Chaunsky District)[73].

8.4. Baimka Prospecting Area and Surrounding Territory

The Baimka Ore Field is located in an unpopulated area near the abandoned Vesenny Settlement (Figure 37, Figure 36). The nearest populated settlement is Anyuisk Village.

8.4.1. Burgakhchan Community

A small Even community has a regular place of residence (station) in the Burgakhchan area near the Peschanka Ore Field, where they are engaged in reindeer husbandry, fishing and hunting activities (Figure 35, Figure 36,). The community settlement consists of residential houses, backyard structures, a garage, stationary reindeer corral and cemetery. Some 16 adult members of the community (excluding children) are living in the area. In the past, a

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[71] DECISION (LIII Session, V Convocation) on the Pevek Urban District Budget Performance in 2017. Available at: https://go-pevek.ru/меню/открытый-бюджет/решения-о-бюджете.

[72] Pevek Urban District Investment Passport. Available at: https://go-pevek.ru/о-городском-округе-певек/инвестиционная-деятельность.

Government of the Chukotka AO Resolution of 23/05/2013 On Approval of the Aggregated List of Cultural Heritage Sites of Federal, Regional, and Local Important within the Chukotka Autonomous Okrug (as amended on 01/06/2016). Available at http://docs.cntd.ru/document/424073084 (currently not in force).

settlement of Burgakhchan existed but in 1990s the official status of the settlement has been canceled. Still this is a traditional residential area of the Burgakhchan Community.

In 2010, the community has been legally registered as Burgakhchan Territorial Neighborhood Community. This status allowed the community to operate as a non-profit organization, for example, to receive grants, implement projects, and so forth. Economically, the community consists of brigades 7 and 8 of Ozernoye Agricultural Municipal Unitary Enterprise (further referred to as Ozernoe). All reindeer are owned by Ozernoye. The attempts of the Burgakhchan Community to acquire ownership rights for part of the reindeer herd were not successful. The traditional use of pastures is also not legally registered.

The community maintains a traditional lifestyle and from 2010 to 2015 sold agricultural products for a total value of 16,144 thousand Russian Roubles (RUR) (Table 37). Other traditional activities practiced by the Burgakhchan Community members include plant and berry harvesting, hunting, and fishing[74].

Table 37. Agricultural Product Output in the Burgakhchan River Basin

Year	2010	2011	2012	2013	2014	2015 (End-of-Year Estimate)
Product output, thousand RUR	1,028.0	4,904.0	2,835.0	1,761.0	4,262.0	7,778.7

Figure 35. The Burgakhchan Settlement

[74] The issue whether there are other traditional activities maintained by the community members requires further clarification during focused consultations.

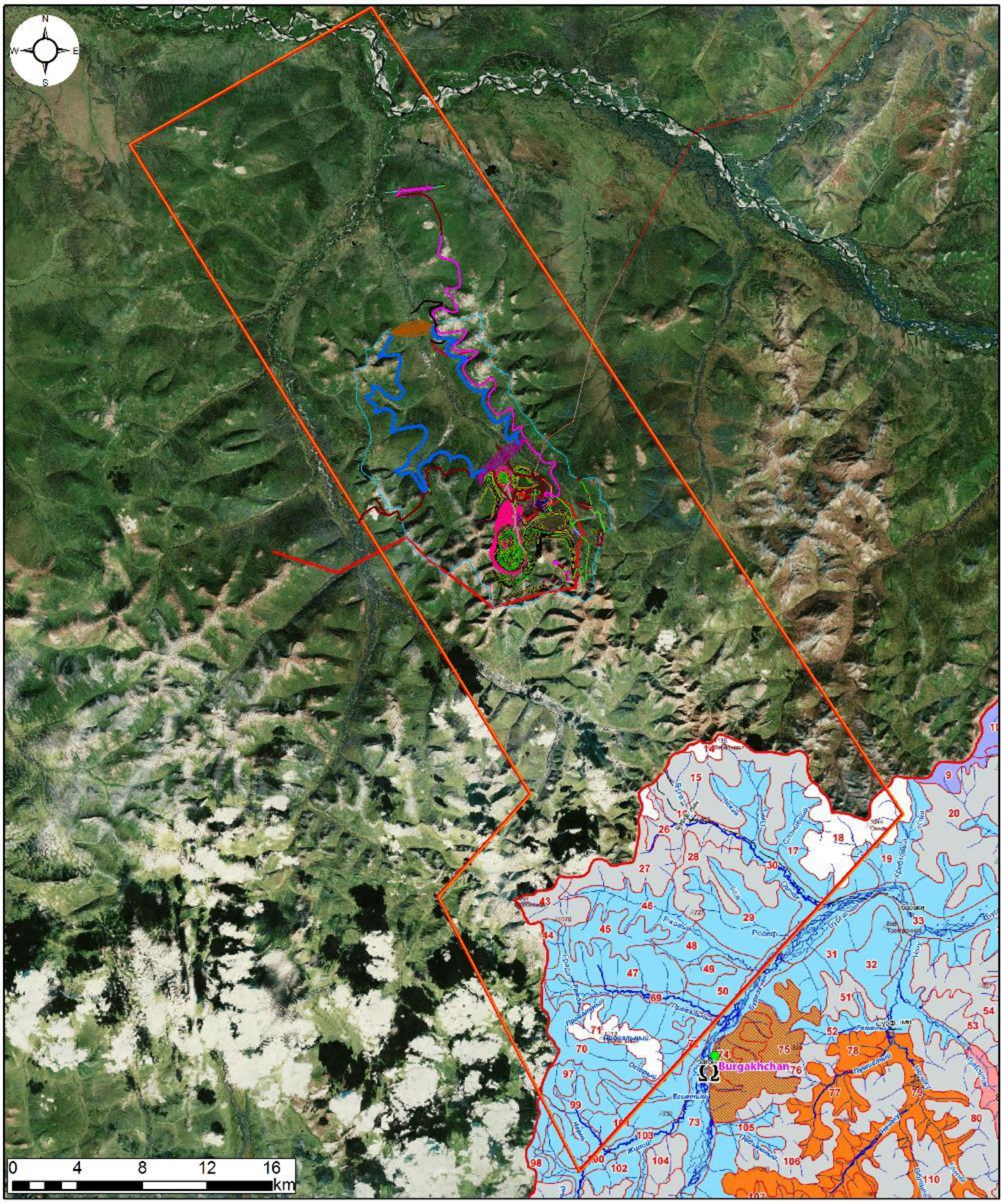

Figure 36. Location of the Baimka License Area and Facilities, Pastures and Base Housing of the Burgakhchan IP Community

8.4.2. Luch Free Miners' Crew

Luch Free Miners' Crew (Luch LLC) is engaged in placer gold mining bordering the Baimka license area. Luch LLC registered in 1992, and employs about 80 people including 4 Evens[75]. The Luch LLC production site including all repair and maintenance works, vehicles and mobile plant, and employee accommodation is located in the Vesenny Village (Figure 37). Luch LLC has acquired the infrastructure remaining in the village and ownership of land on which this infrastructure is located. There are 1-2 permanent residents in the village including a site attendant and a site manager.

Figure 37. Vesenny Settlement

8.4.3. Transport

The Peschanka Ore Field is located 265 km south west of Bilibino. Goods can be delivered to the area from Bilibino on a recently built winter road[76] using cross-country and tracked vehicles. Larger freight can be delivered from seaports using the Zeleny Mys – Bilibino (255 km) and Pevek–Bilibino (378 km) winter roads. Helicopter transport is also used to deliver freight and staff to/from the Project site. The Kolyma–Omsukchan–Omolon–Anadyr federal road is being constructed to provide an all year connection between Chukotka and the Russian Far East. The road will run in the immediate vicinity of the Peschanka site; in addition, the road construction project envisions construction of an access road to the site.

9. POTENTIAL ENVIRONMENTAL IMPACTS AND HOW THEY WILL BE ASSESSED

9.1. General

The proposed Peschanka Copper Project gives rise to a series of potential impacts on the environment within the Project area of influence, but not all of these impacts would be assessed within the ESIA. Table 38 lists potential impacts and indicates if a particular impact is scoped in/out the ESIA. For the scoped out impacts reasons for their excluding from the ESIA are provided.

[75] Information obtained during the interview with R.M. Skorik, General Director of Luch LLC
[76] This winter road is part of the motor road No. 77К-010 Access to Omolon Village (starting at the 199 km point of the Bilibino–Vstrechny–Anyuisk road with a connection road to the Peschanka Site).

Table 38. Specialised Impact Assessments Being Part of in the ESIA

<table>
<tr><th>Component of the Environment Covered by the Impact Assessment</th><th>Included</th><th>Discussion</th></tr>
<tr><td>Air quality</td><td>Yes</td><td>9.2.1</td></tr>
<tr><td>Ambient noise</td><td>Yes</td><td>9.2.1</td></tr>
<tr><td>Climate change</td><td>Yes</td><td>9.2.2</td></tr>
<tr><td>Surface water quality</td><td>Yes</td><td>9.3</td></tr>
<tr><td>Ground water quality</td><td>Yes</td><td>9.4</td></tr>
<tr><td>Waste</td><td>Yes</td><td>9.5</td></tr>
<tr><td>Biodiversity</td><td>Yes</td><td>9.6</td></tr>
<tr><td>Soil</td><td>Yes</td><td>9.7</td></tr>
<tr><td>Economy</td><td>Yes</td><td>10.1</td></tr>
<tr><td>Cultural Heritage</td><td>Yes</td><td>10.2</td></tr>
<tr><td>IP communities and reindeer farming</td><td>Yes</td><td>10.3</td></tr>
<tr><td>Community health and safety</td><td>No</td><td>Not considered to be a significant risk given the remoteness of the mine</td></tr>
<tr><td>Labour and working conditions</td><td>No</td><td rowspan="2">Will not be assessed as such but recommendations will be made regarding requirements that must be met</td></tr>
<tr><td>Occupational health and safety</td><td>No</td></tr>
</table>

9.2. Cumulative Impacts

Given the extreme remoteness of the Peschanka Copper Project cumulative impacts are considered to be unlikely, however, there are some circumstances where such impacts my occur such as the combined impacts of the various mining activities on IP. Potential cumulative impacts will be assessed in the ESIA to determine where they may occur and to assess the significance of the same.

9.3. Atmospheric Emissions

9.3.1. Impacts on Ambient Air Quality

There are two principal emissions sources from the mine and these are dust from the tailings storage facility and emissions from blasting. There are a variety of other emissions such as tailpipe emissions from the mine vehicles, dust from ore and waste rock handling, various sources of the processing plant, fuel burning appliances across the mine site, the aerodrome and the incinerator all of which would result in changes in prevailing ambient air quality. In order to assess potential air quality impacts as a result of Peschanka Copper Project activities, the following will be done:

1. Atmospheric emissions control systems will be described and reviewed for compliance with BATs;
2. All emissions sources will be described and emissions quantified or estimated;
3. The dispersion climatology of the area will be reviewed and described;
4. Air pollution dispersion modelling will be conducted to predict ambient air pollution concentrations of pollutants of concern;

5. Sensitive receptors will be identified that could be affected by emissions from the mine;
6. Predicted concentrations will be compared to damage thresholds and/or air quality standards to assess the risk of adverse impacts;
7. Suitable mitigation will be identified where such may be required if existing emissions control is inadequate; and,
8. A monitoring programme will be proposed for ambient air quality.

9.3.2. Greenhouse Gas (GHG) Emissions

Emissions of greenhouse gases (mainly water vapour, carbon dioxide and methane) will arise from various mining and ore processing activities both directly and indirectly, through the emissions from fuel burning in vehicles and equipment, consumption of electricity required to operate the facilities. In addition, the removal of topsoil and the thawing of permafrost at sites of the Project facilities may also result in GHG emissions. The TSF and the water reservoir will be also sources of GHG emissions. In order to assess GHG emissions as a result of the Peschanka Copper Project activities, the following will be done:

1. Characterise and define the carbon footprint for the Peschanka Copper Project;
2. Assess the significance of these changes;
3. Summarise key international policy developments in respect of greenhouse gas emissions and the implications of the same for the project;
4. Summarise key national policies for GHG;
5. Suitable mitigation will be defined where this may be required; and,
6. A monitoring programme will be proposed for GHG.

9.4. Impact on Surface Water

The Peschanka deposit area and main Project site are intersected by a number of watercourses including the Peschanka River and its tributaries (the Pravaya and Levaya Peschanka Rivers, and the Gnom, Belosnezhka and Lenivy Streams). The establishment and operation of the TSF poses a risk of impact on these watercourses in addition to the direct impact on the Peschanka-Yegdegkych River. In order to assess surface water impacts as a result of Peschanka Copper Project activities, the following will be done:

1. Define a total water balance for the entire Peschanka Copper Project;
2. Assess the proposed water management options for the different individual projects to determine how process water, rain water and spillages of possible contaminants will be managed;
3. Identify any sensitive surface water resources in the vicinity of any of the individual projects and determine possible mechanisms for direct or indirect impact on the same (include wetlands in this process);
4. Describe and quantify water quality and quantity requirements for different uses (e.g. process water, cooling water and domestic water);
5. Detail options for the supply of the water (augmentation schemes specifically) and confirm availability and sustainability of supply for different project phases;

6. Detail the likely quality of the incoming water and assess the implications of the same for the various water supply requirements of the Peschanka Copper Project;
7. Detail options for minimising water use;
8. Detail on-site water treatment requirements, assess available alternatives and characterise waste water volumes and quality differentiating between waste process water and stormwater;
9. Ascertain routes of potential impact on surface water including waste water discharge, spillages of product and/or other hazardous materials, atmospheric emissions, sedimentation etc.

9.5. Impact on Groundwater

The groundwater aquifers associated with the Peschanka deposit are likely to be affected by:

- Groundwater abstraction for domestic purposes;
- Migration and seepage of contaminated water to groundwater aquifers underlying areas where key process facilities are located:
    - Tailings storage facility: flotation tailings:
    - Bottom seepage from the TSF site;
    - Storage areas for ore and cut-off grade ore;
    - Waste storage areas;
    - Auxiliary facilities (boiler house, garage, repair and maintenance shops, fuel and lubricant storage etc.)
- Open pit dewatering (mine pit water drainage to divert suprapermafrost and subpermafrost water, storm and snowmelt runoff).
- Groundwater inflows to the open pit from subpermafrost aquifers intesected by mining operations.

In order to assess groundwater impacts as a result of Peschanka Copper Project activities, the following will be done:

1. Coordinating with other specialists identify all forms of potential impact on groundwater quality and quantity for the different project phases;
2. Characterise the groundwater regime in the site area in terms of quantity, quality and dynamics (groundwater flows, recharge and decant), highlighting specific sensitivities/vulnerabilities;
3. Conduct a hydrocensus across the Peschanka Copper Project area including (as far as the information is available):

3.1. Borehole locality;

3.2. Borehole depth;

3.3. Rest water level;

3.4. Borehole installation date;

3.5. Borehole construction;

3.6. Borehole status and equipment;

3.7. Groundwater strike depth, abstraction rates and use; and,

3.8. Record field measurements: Electrical conductivity, pH, dissolved oxygen, redox potential, temperature and groundwater sample chain of custody details;

3.9. Determine yields and hydraulic properties of the aquifers;

4. Develop a conceptual site model of the regional and local hydrogeology Conduct tests which will determine the type, thickness, permeability and confining units of the aquifer;
5. Develop a numerical (steady-state) model that determines groundwater inflow rates and volumes into the open pit and determine a mine water balance. All values for parameters used (such as recharge, transmissivity, storativity, etc.) must be substantiated;
6. Determine the groundwater flow direction(s);
7. Indicate the localities of dykes, sills, faults, etc. that might serve as preferential groundwater flow paths and hence have an impact on the siting of certain infrastructure;
8. Define geohydrological boundaries (also referred to as boundary conditions), which control the rate and direction of movement of groundwater;
9. Simulate potential groundwater contaminant plumes emanating from the TSF and determine the associated risk thereof;
10. Assess and simulate different mitigation options related to water impacts, including liners, hydraulic barriers, and chemical barriers; and,
11. Assess relationships with surface water bodies and define resultant effects.

9.6. Waste Generation

Authorities and lenders require that waste intended for disposal be minimized by ensuring that waste materials are efficiently reused/recycled as much as possible as secondary resources. In order to assess waste impacts as a result of Peschanka Copper Project activities, the following will be done:

1. Review the identified waste classes and volumes that will be generated during the different phases and for each of the individual projects;
2. Highlight sources or streams not identified but which are suggested by input materials or analogous activities;
3. Review the options presented by the technical teams on these options and evaluate further opportunities for waste minimisation as per the waste minimisation hierarchy;
4. Ascertain the planned disposal options for each waste types relative to good practise requirements;
5. Describe the waste management facilities, infrastructure requirements or processes that will be required for each of the major waste streams;
6. Ascertain whether such facilities are available locally and whether these will be able to accept the waste;

7. Characterise all waste handling across Peschanka Copper Project, especially in respect of intermediate storage, transport and other handling prior to final treatment and disposal;
8. Characterise the waste rock that will be generated at the mine and assess the planned disposal of the same.

9.7. Impact on Biological Diversity

Vegetation in the tundra and permafrost areas is primarily affected by geological exploration and construction activities which are likely to cause the following impacts:

- Complete degradation of vegetation cover over the entire Peschanka Mine Site;
- Tree removal during the construction of roads, trenches and other linear structures;
- Dust deposition and inhibition of plant growth in and around the areas where excavations take place;
- Distortion of natural succession processes in plant communities and associations;
- Increased risk of anthropogenic fires at construction and mining sites (due to the dried up topsoil cover) and in the surrounding areas.

Animals inhabiting the Project area are able to migrate and thus avoid areas where construction and production activities take place, being scared away by noise, odour, illumination in the night etc. Most animals have already moved to other habitats and left the Project area. The geological exploration and construction activities are expected to cause the following impacts:

- Degradation of traditional habitats (transformation of aquatic and terrestrial habitat conditions);
- Deterioration of habitat conditions due to dust generation and deposition;
- Creation of barriers (linear structures) impeding natural migration patterns;
- Fragmentation of natural ecosystems;
- Creation of traps (gullies, holes, pits etc.) on the animal migration routes;
- Disturbance caused by night construction and production activities (noise and vibration generated by machinery, mobile plant and vehicles; odour, and light);
- Surface runoff entering water bodies (from eroded areas in the river floodplains; from existing geological exploration sites; from unorganized river crossings used by mobile plant and vehicles) and increased turbidity to levels that are critical for aquatic biota.

The operation phase would give rise to other impacts associated with new aspects of human activities:

- Unregulated wild plant harvesting and illegal hunting activities in the adjacent areas;
- The development and operation of tailings storage facility and waste rock dumps would result in the irreversible loss of directly affected habitats;
- Deterioration of surface water quality due to increased turbidity and changes in chemical composition;
- Persistent deterioration in air quality (contamination, dust generation);
- Provoking forest and tundra fires;
- Birds and large predators could be attracted to household waste disposal areas where they may encounter lethal risks (poisoning and serious injury).

In order to assess biodiversity impacts as a result of Peschanka Copper Project activities, the following will be done:

1. Define the area of influence of the Peschanka Copper Project;

2. Characterise the biodiversity within these footprint areas in terms of conservation status and importance;
3. Highlight biodiversity systems that exist in the area and that might be affected directly by the loss of the land area;
4. Ascertain for the region, areas of sensitive or conservation worthy biodiversity that might be affected indirectly by the project e.g. atmospheric emissions, waste water discharge and so forth;
5. Ensure that the information required to assess indirect impacts is sourced as appropriate from the other specialists;
6. Evaluate and assess the principle of biodiversity off-sets as it pertains to Peschanka Copper Project and make clear recommendations on the feasibility of biodiversity off-sets for the project;
7. Assess potential toxicological impacts on biodiversity.

9.8. Impact on Soil

High-risk environmental aspects that pose a risk to soil in and around the Project site are land transformation and spillages. By land transformation is meant that the land is changed and so no longer retains its original use or function (Section 4.1.12) and from that point of view is 'lost' as a resource. Spillage risk derives from the use and handling of hazardous materials that are used during the mining operation and associated activities with hydrocarbons (fuels, oils and grease), explosives, and final products (copper and molybdenum concentrates) and resultant contamination of the soil where these materials might be spilled. A large-scale spill could also result in a potential threat to surface water and groundwater.

9.9. Ecosystem Services

The world’s environmental economics has embraced a so-called ‘ecosystem approach’ to the natural capital accounting. Under this approach, ecosystems are considered as a renewable component of the natural capital. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes their conservation and use in an equitable manner.

Ecosystem services are benefits people receive from ecosystems in the form of products of environmental and economic value. The conceptual framework for the economic valuation of ecosystem services has actively evolved over the last decade and is increasingly applied in real industrial and socio-economic development projects.

In the ESIA, the following will be undertaken:

1. Describe ecosystem services provided by the ecosystems of the Project area based on the field investigations conducted earlier;
2. Identify beneficiaries of the ecosystem services;
3. Assess the significance of ecosystem services in the Project area;
4. Identify and assess of the Project’s impact on the ecosystem services; and
5. Define suitable mitigations and compensation measures where this may be required.

9.10. Mine Closure and Restoration

The mine closure and restoration phase is extremely important in terms of ensuring that potential environmental risks, however long they may continue after the completion of mining and processing operations, are effectively minimized. In line with the requirements of the international lenders and the Russian legislation, the Conceptual Mine Closure and Restoration Plan should be developed as part of the design process. This Plan will be regularly updated and amended as the detailed design process moves forward. The Mine Closure Plan shall be discussed with stakeholders including government authorities at the district and regional level.

The Conceptual Mine Closure Plan includes:

- Complete dismantling equipment and structures and removing as much demolition waste as possible from the mine site or ensuring that it is disposed of safely at the site where existing voids of natural or technogenic origin could be potentially used for this purpose;
- Water diversion ditches and seepage collection systems at waste rock dump sites, ore storage areas and low-grade stockpiles should be maintained in operational condition to collect and divert water to the tailings storage facility and monitor the quality of generated seepage and runoff;
- Water from the tailings storage facility will be removed and an engineered barrier system will be provided to intercept and divert surface runoff in the river;
- Open pits will eventually fill up with water via groundwater inflows, precipitation, surface runoff etc.;
- All reagents and hazardous materials will be removed offsite for subsequent reuse/recycling at the licensed waste management facilities; and
- Fencing and warning signs will be installed to prevent access to dangerous areas.

10. POTENTIAL SOCIAL IMPACTS AND HOW THEY WILL BE ASSESSED

The most significant social aspects of planned activity include:

- Construction and operation:
    - Creation of new jobs, new career opportunities and improved human resource capacity;
    - Development of infrastructure and implementation of associated projects of social significance;
    - Land acquisition;
    - Tax revenues;
    - Procurement of goods and services;
- Project wrap-up and closure:
    - Restoration of disturbed land;
    - Job reductions;
    - Reduced tax revenues at all levels.

10.1. Impacts on Economy

The Peschanka Copper Project is a major investment project focused on the development of the Baimka Ore Field that is part of the Chaun-Bilibino Industrial Zone comprising Russia's largest Mayskoye and Kupol gold deposits, and the Pyrkakay Stockworks tin deposit also largest in Russia. Generally, from a longer-term perspective, this industrial zone is considered as a major non-ferrous metallurgy development area of both national and global scale. The 2017 TEO estimates 1,237,813.8 ktonnes reserves of sulphide ore (cut-off grade of 0.4% of copper equivalent) (see Section 3.6.1). . The proposed process plant will have a capacity of 70 million tonnes of ore per annum.

Tax revenues and other socio-economic effects will be estimated at later stages of the assessment process. However, even very rough estimates provided by the Chukotka AO Duma (Parliament) indicate that the projected annual growth of Chukotka's gross regional product of 45 billion RUR per year (or 90% of the current GRP value) will help Chukotka become self-sufficient, create 3,500 jobs, and increase the total turnover of goods by 500,000 tonnes per year[77]. The total growth in tax revenues collected at all levels is estimated at 9 billion RUR per year[78]. These estimates, although being only preliminary and requiring further elaboration, demonstrate the scale and significance of the Project. The Project will obviously have a profound impact on the Bilibinskiy Municipal District economy through both taxes paid (which should be estimated as part of the full-scale ESIA) and associated and auxiliary projects/activities including procurement of goods and services. In order to assess social and economic impacts as a result of the Peschanka Copper Project activities, the following will be carried out:

1. Characterise the financial costs that can be ascribed to the establishment and operation of the Peschanka Copper Project;
2. Identify and characterise relevant macro-economic parameters for the different Project phases and describe how these will be affected both positively and negatively by the Peschanka Copper Project;
3. Determine the extent of local spending and assess how this will translate into benefits;
4. Propose mitigation measures that would serve to reduce the significance of identified negative impacts as appropriate;
5. Define the number of jobs and characterise the working conditions that would need to be upheld;
6. Characterise the reduction in unemployment that would occur as a result of the Project implementation at a regional level;
7. Characterise the likely growth in income and affluence;
8. Characterise potential spending growth;
9. Define new career opportunities and improved human resource capacity;
10. Characterise impacts related to the procurement of goods and services by the Peschanka Copper Project activities;
11. Assess impacts related to labour migration with a specific focus on:

11.1. Increased pressure on the social infrastructure;

[77] https://profile.ru/news/economy/bolee-0-5-trln-budet-vlozheno-v-razvitie-chukotki-154967/

[78] http://duma.chukotka.ru/index.php?option=com_content&view=article&id=481:kruglyj-stol-komiteta-po-byudzhetu-po-teme-obsuzhdenie-proekta-zakona-o-nalogovykh-lgotakh-i-stimulirovanii-predprinimatelskoj-i-investitsionnoj-deyatelnosti-v-chukotskom-avtonomnom-okruge&catid=10:novosti&Itemid=123

11.2. Potential for conflicts;

11.3. Potential Increase in social disease incidence rates;

11.4. Impact on traditional nature resource use practices;

12. Ascertain and assess impacts on the Burgakhchan Community's pastures including possible contamination of pasture areas;

13. Ascertain and assess impacts on land use by Luch Free Miners' Crew.

10.2. Impact on Cultural Heritage

A survey of archaeological sites over an area of 5,046.6 ha including the deposit site itself and planned TSF area did not discovered any archaeological heritage. Within the full-scale ESIA it will be necessary to characterise and assess the cultural heritage impacts of the associated projects/facilities.

10.3. Impacts on Indigenous Peoples (IP) Communities and Reindeer Farming

Both the Peschanka and Pevek facilities do not affect the indigenous communities:

- As presented in Figure 36, the Baimka License Area is overlapping with the area of the traditional nature use being used by the Burgakhchan Community; at the same time, one of the Project's design criteria is avoiding the area of the traditional nature use; no facilities proposed for the Peschanka Copper Project occur in the area currently used by the Burgakhchan Community;
- No IP communities have been identified in the vicinity of the proposed site of the marshalling yard at Pevek (Figure 13).

The only Project activity that can potentially impact the reindeer farming is transportation of products and materials. The preliminary assessment and focused consultations resulted on the following findings:

- Within the Pevek Urban District the existing winter road does not cross the domestic reindeer pastures but slightly touch the migration ways (to be verified during future consultations with the Chaun IP Association and Chaunsky Agriculture Unitary Enterprise);
- In the Bilibinsky Municipal District:
    - the existing winter road doesn't cross both the domestic reindeer pastures and the migration ways;
    - the proposed federal motor road will affect the wild reindeer migration pathways but not those of domestic reindeer herds; at the same time as shown in the map (Figure 39) the road route goes in the vicinity of Ilirney Village that is a well-recognised center of the reindeer farming; the information about the reindeer pastures and the migration ways in the Bilibinsky Municipal District should be verified and further elaborated within the full-scale ESIA;
    - the access road from the proposed federal motor road to the Peschanka site will cross the Burgakhchan Community's pastures (see Figure 36).

The broad consultations with the IP communities and representatives (reindeer farming enterprises, IP associations, the Burgakhchan Community) are planned as part of the stakeholder consultation within the full-scale ESIA.

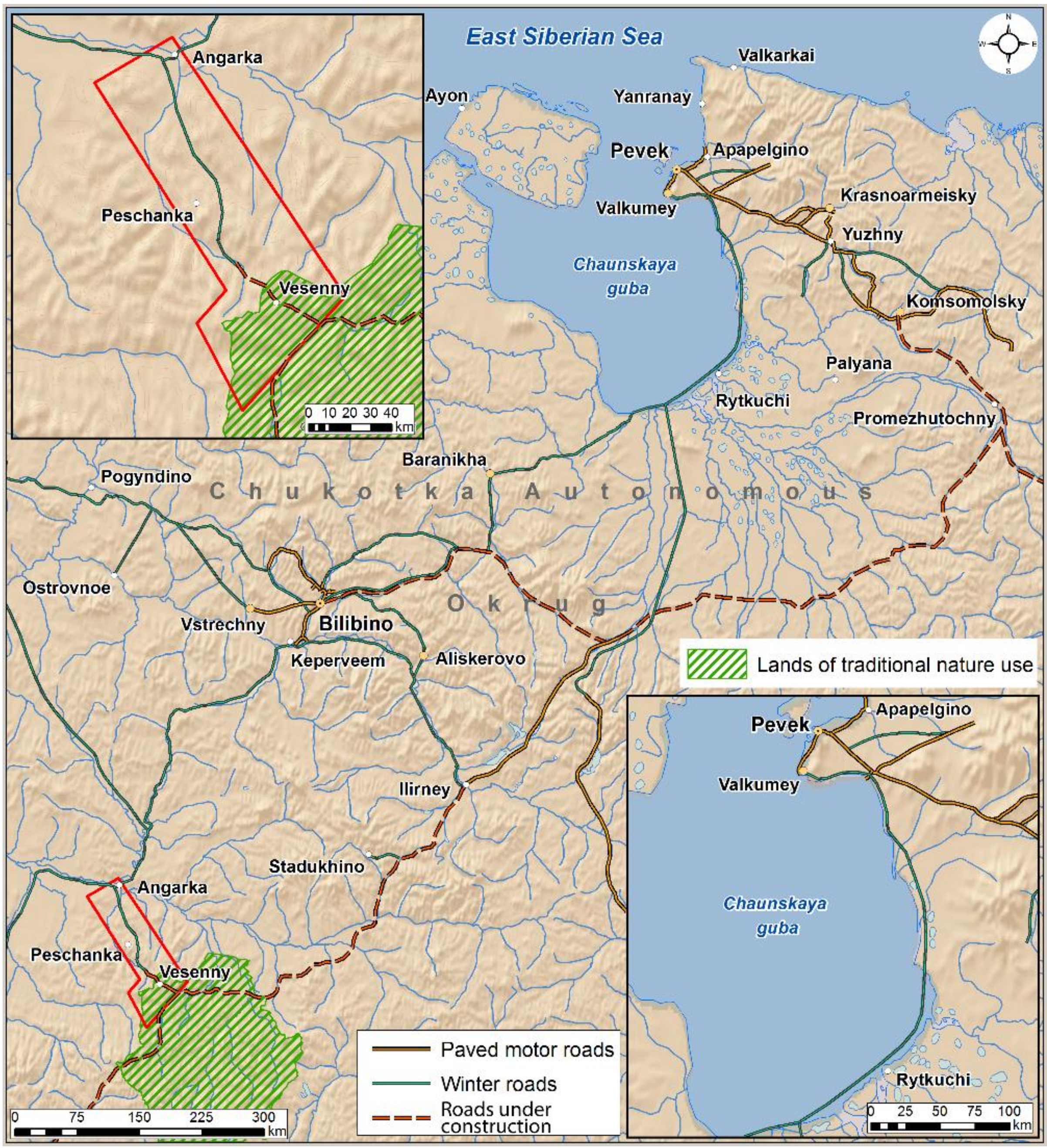

Figure 38. Transportation Route between the Pevek Port and the Baimka License Area

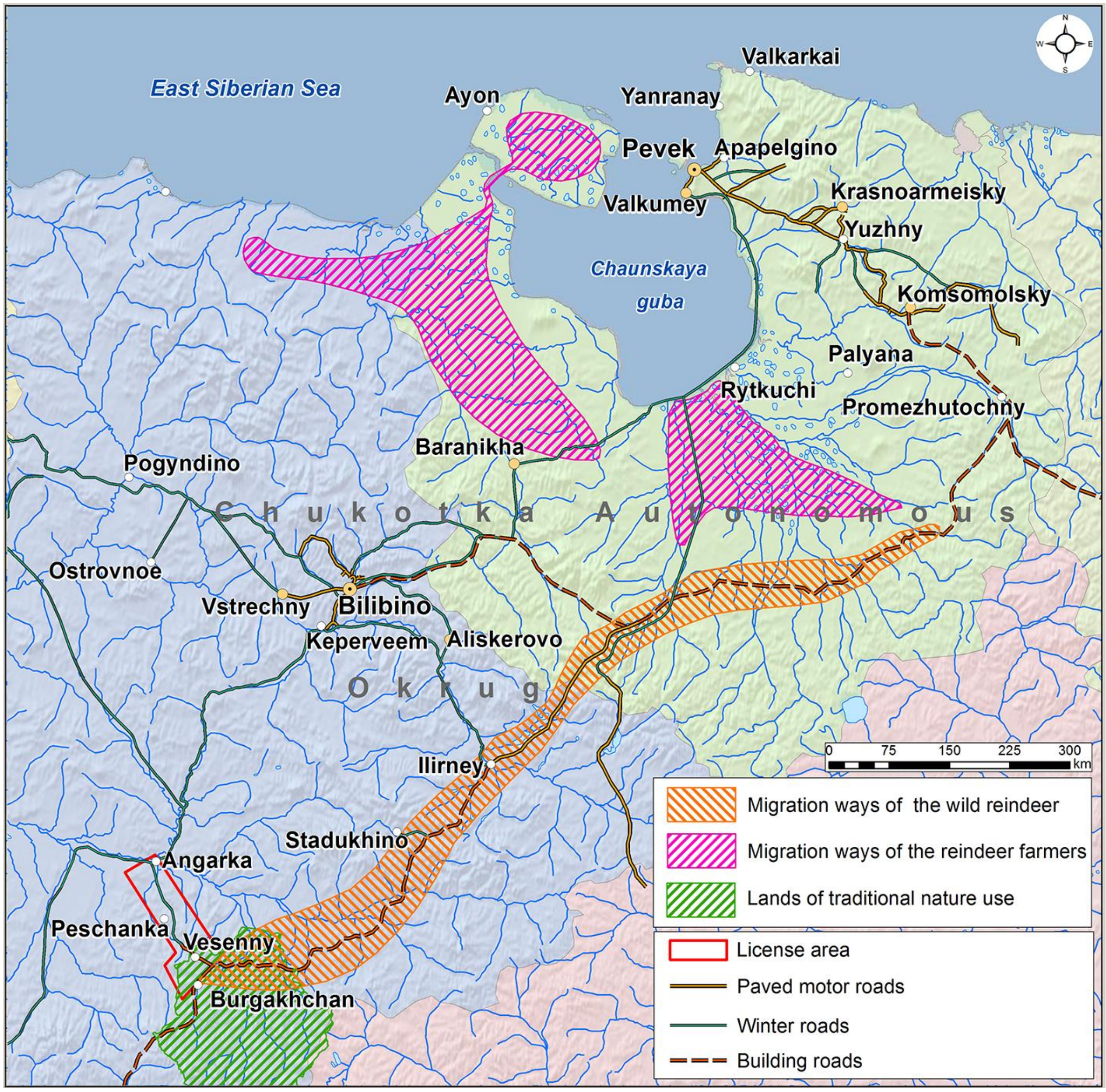

Figure 39. The Reindeer Migration Pathways[79]

10.4. Project Closure Impacts

The closure of a mine and associated infrastructure always entails potentially dramatic social consequences. Mine closure means *inter alia* the cessation of tax revenues and a redundant workforce. The local labour market will shrink and so will the demand for locally produced goods and services (as a result of outbound migration of temporary workforce and because they will be no longer required for the Project). Within the full-scale ESIA it will be necessary to characterise the expected changes that would result from the Project and the mine closure.

[79] Produced by Ecoline EA Centre; the input data for the map were kindly provided by the Pevek Administration and Chaunsky Reindeer Farming Enterprise.

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ANNEX 1. 2019 ENVIRONMENTAL AND SOCIAL STUDIES

Environmental and social studies, carried out in 2015 – 2018 do not fully comply with the scope of EEI required both for preparation of OVOS materials and for development of the ESIA in accordance with the international lender requirements. This is due to the increase in the number of designed facilities and change in their location on the main production site. In 2019, such infrastructure facilities as an aaerodrome, a warehouse complex near Pevek, a water intake and a reservoir on the Left Peschanka River and others were added, and water intake on the Bolshoy Anyui River was excluded from consideration.

Changes in the design solutions required additional environmental and social investigations in the spring-winter and summer field seasons, a short list of which is given below. The additional investigation program developed in March 2019 was subsequently adjusted in accordance with the changes in the design of infrastructure facilities, as well as optimization of location of production facilities on the territory of GOK. Some of the works from the given list have already been completed or are being performed; analytical and in-office works are being carried out. The joint analysis of underground and surface water is also being performed together with CSA Global.

Table 39. List of Investigations Required for Preparation of the ESIA and OVOS (2019)

Facility /survey	Input to ESIA/BFS	Input to OVOS / Russian Project design / Environmental Engineering Investigations
Spring-winter investigations: - snow composition analysis; - study of animal migration; - study of migratory bird migration	Information to ESIA	Information to OVOS and EEI
Aerodrome: full set of EEI[80] according to RF requirements	Information to ESIA (biodiversity chapter)	The chapter to EEI: Environmental Engineering Investigations. Aerodrome
Water intake area, Left Peschanka: full set of EEI according to RF requirements	Information to ESIA	The chapter to EEI: Environmental Engineering Investigations. Water intake
Analytical works for water samples (as requested by CSA Global)	Information to BFS	Additional information to OVOS
Radioecological survey / radon hazard/physical factors		The chapter to EEI of for Peschanka site: Radioecological/physical factors
Full set of EEI according to RF requirements on the marshalling area near Pevek City	Information for ESIA	The EEI for the marshalling area for OVOS and Project design documentation
Social baseline studies in Pevek, according to the international lender requirements.	Baseline information to ESIA	Information to OVOS

[80] EEI – Environmental Engineering Studies

Facility /survey	Input to ESIA/BFS	Input to OVOS / Russian Project design / Environmental Engineering Investigations
Indigenous people (IP) and traditional lifestyle in the Project affected area		
Social baseline studies in Bilibinsky district (update). IP and traditional lifestyle in the Project area (update).	Baseline information to ESIA	Information to OVOS