Kiusumetsa sand mine EIA report summary

SUMMARY

October 2024

Work name:	Environmental impact assessment report on application for environmental permit for Kiusumetsa sand quarry
Work number:	20067
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1 INTRODUCTION

On 12 December 2019, AS YIT Eesti (renamed KMG Inseneriehituse AS) submitted an application to the Ministry of the Environment for an environmental permit to extract mineral resources in Kiusumetsa deposit (register No 749).

On 20 April 2020, the Estonian Environmental Board initiated an environmental impact assessment (hereinafter EIA) by letter No DM-109088-2 for the application for an environmental permit submitted by AS YIT Eesti for Kiusumetsa sand quarry.

The subject of the EIA is the assessment of the effects of the opening, operating, extraction and transport, and decommissioning of Kiusumetsa sand deposit.

The requested mining claim and its service plot are located 10 m from the border of the Republic of Latvia. Cross-border impacts cannot be ruled out given the location of the planned quarry. Potential impact may occur mainly through the spread of noise and dust and changes in the hydrological regime. The size of the impact area and the relevance of the impacts will be determined during the EIA.

The EIA programme was approved by the Estonian Environmental Board by letter No 6-3/21/6683-7 of 4 November 2021.

2 OBJECTIVE AND LOCATION OF PROPOSED ACTIVITY

The purpose of the proposed activity is sand extraction in block 2 of the proved reserve of Kiusumetsa sand deposit (register map No 749).

Kiusumetsa mining claim subject to the application is located on the private land of Kilmezs cadastral unit (cadastral register number 21303:002:0472) in the village of Majaka in the rural municipality of Häädemeeste in Pärnu county (Figure 1). The intended use of the cadastral unit is 100% profit yielding land.

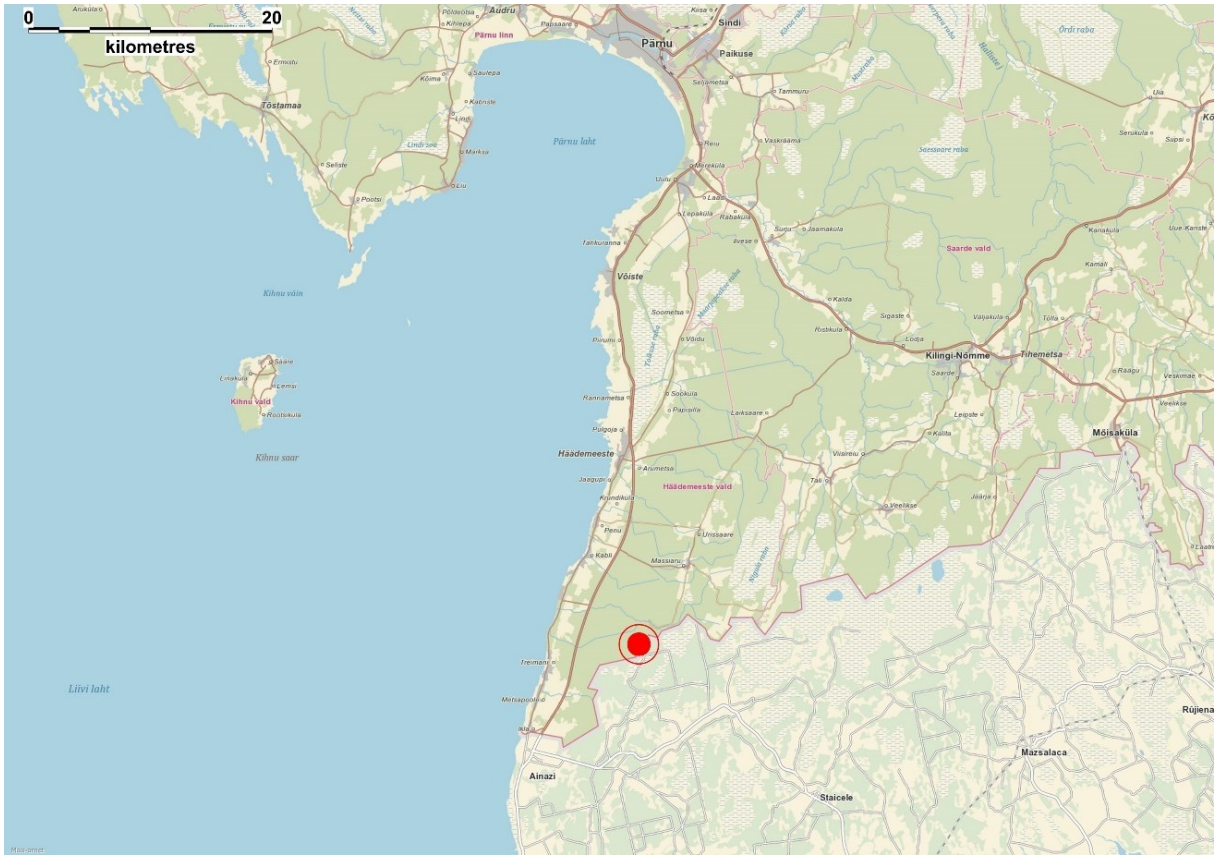

Figure 1. Location of proposed activity. Base map: Land Board, 2022.

2.1 PROPOSED ACTIVITY AND ITS FEASIBLE ALTERNATIVES

2.1.1 Description of proposed activities

According to the application for extraction permit[1], Kiusumetsa mining claim has a proved reserve of 754 thousand m³ of construction sand and an extractable reserve of

[1] Application for extraction permit for mineral resources, Kiusumetsa sand quarry. 2019. Maavarauuringud OÜ, work No: 19-300.

710 thousand m³ as of 1 January 2020. Based on the application for extraction permit, the average annual rate of extraction is 45 thousand m³. Work in the quarry is scheduled for weekdays, between 8:00 and 18:00.

The area of the mining claim to be extracted is 17.84 ha and the area of the service plot is 18.92 ha.

Kiusumetsa sand deposit is registered as a sand deposit of local importance (register map No 749). The sand deposit consists of two blocks of proved reserves of construction sand (block 1 and block 2, Figure 2). The excavated material is intended to be used for the construction of roads in the area.

The applied term of validity of the permit is 15 years.

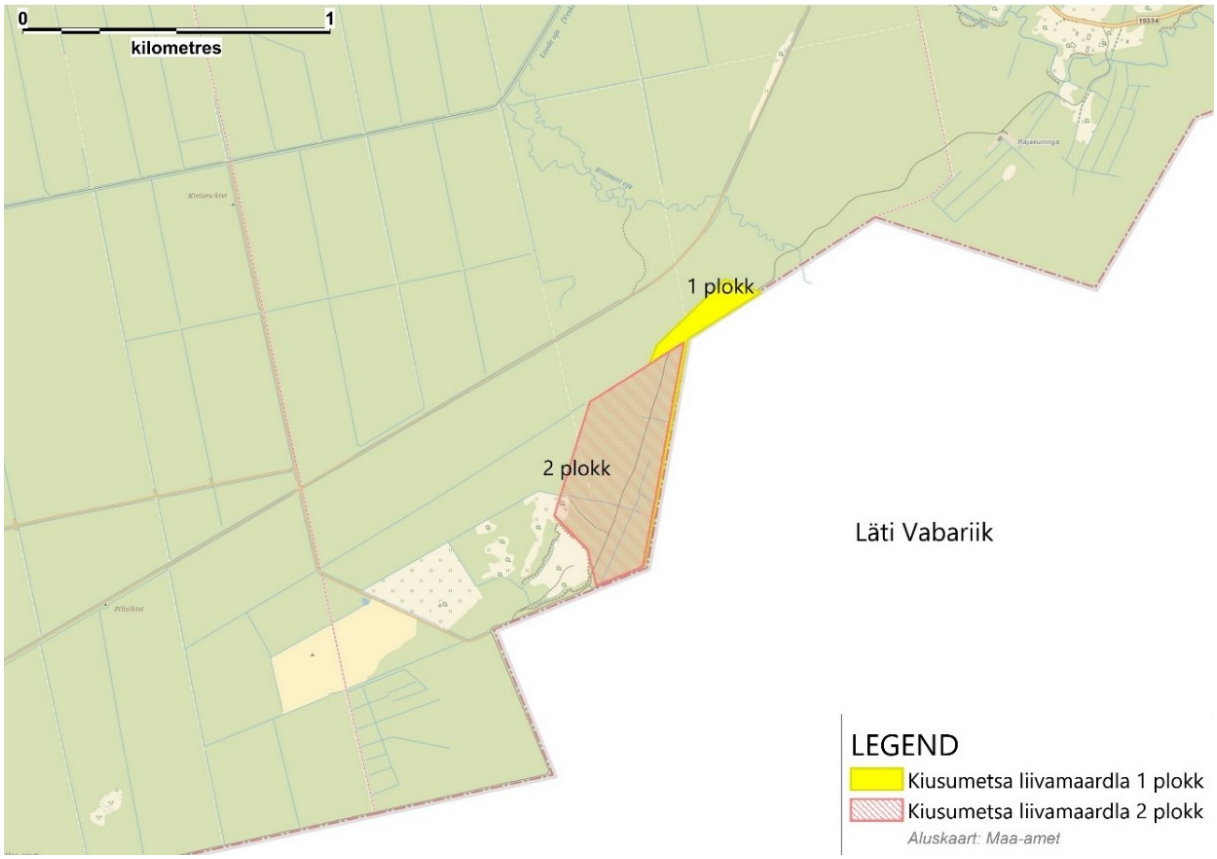

Figure 2. Locations of Kiusumetsa sand deposit blocks. Base map: Land Board, 2022.

The useful layer in Kiusumetsa mining claim is composed of cross-bedded sand with varying grain size, containing gravel and pebbles. The body of sand is thinner in the northern part of the geological exploration area, ranging from 2.3 to 3.3 m, and thicker in the south-western and southern part, ranging from 4.7 to 7.7 m. The average thickness of the body of construction sand is 4.2 m. The thickness of the sand layer above the groundwater level is 3.3 m and below the groundwater level 0.9 m. The useful base consists of sandy loam till and clay loam till, with a layer of sandy loam soil averaging 0.4 m thick acting as the overburden.

Mining conditions are relatively favourable (about 1/4 of the proved reserve is below groundwater level).

Excavation is mainly carried out with a backhoe and, where appropriate, a wheel loader. The plan is to start extraction from the southern corner of the mining claim and then proceed north and west. The first step is to deforest the area and gather the stumps, then peel off the overburden and deposit it into stacks up to 3 m on the mine service plot. The stacks will not be compacted so as to preserve the bioactivity of the soil. The excavator operated by sitting on a terrace, scooping up material and lifting it into the dumper. Underwater reserves will be extracted using an excavator. To this end, the excavator positions itself on a dry terrace, scoops up extracted mineral matter and lifts it to the bank of the body of water to drain. There are no plans for artificial drainage. Excavation will not involve lowering the surface water level. Much like when extracting above-water reserves, the material is loaded onto a dumper or a sorting unit after it has drained. A wheel loader is used to load the material left in heaps. The overburden stored on the service plot will later be used to reclaim the slopes of the exhausted mining claim.

The elevation of the bottom of the drainage ditch, which starts in the south-western part of the mining claim and extends for 100 m in the Kilmezs land unit, discharging into the Loode stream 3.5 km to the west, is 26,16 m at the border of the mining claim. The slope of the ditch is 1:25, i.e. the elevation of the bottom of the ditch is 2 m lower at a distance of 50 m. It is therefore possible to self-regulate the water level downstream as needed by dredging the ditch. In this case, it is possible to create a water body with a water mirror area of about 2 ha, predominantly 2 m deep, in the southern part of the mining claim, where the base of the proved reserve is located at an absolute altitude of 22–24 m, at optimal cost post extraction. If necessary, the north-eastern part of the body of water can be dredged and the bank can be filled with excavated material. The remaining area is to be reclaimed as forest land. This includes using the previously removed overburden. Given that one of the possible uses of the sand reserves is the construction of the Rail Baltica railway line, it is possible to use soil from the track route for backfilling.

In contrast to the application for extraction permit, the developer confirms that there are no plans to use a sorting unit at the quarry or to dredge the ditch and regulate the water level at the Kilmezs land unit.

2.1.2 Feasible alternatives to proposed activity

0-alternative is treated in the EIA report as a comparison with the current situation, i.e. Kiusumetsa quarry will not be established and current land use will continue.

Alternative 1 – extraction in the place and manner specified in the application for extraction permit.

The different alternatives to transport roads from the quarry are considered under the EIA as shown in Figure 3:

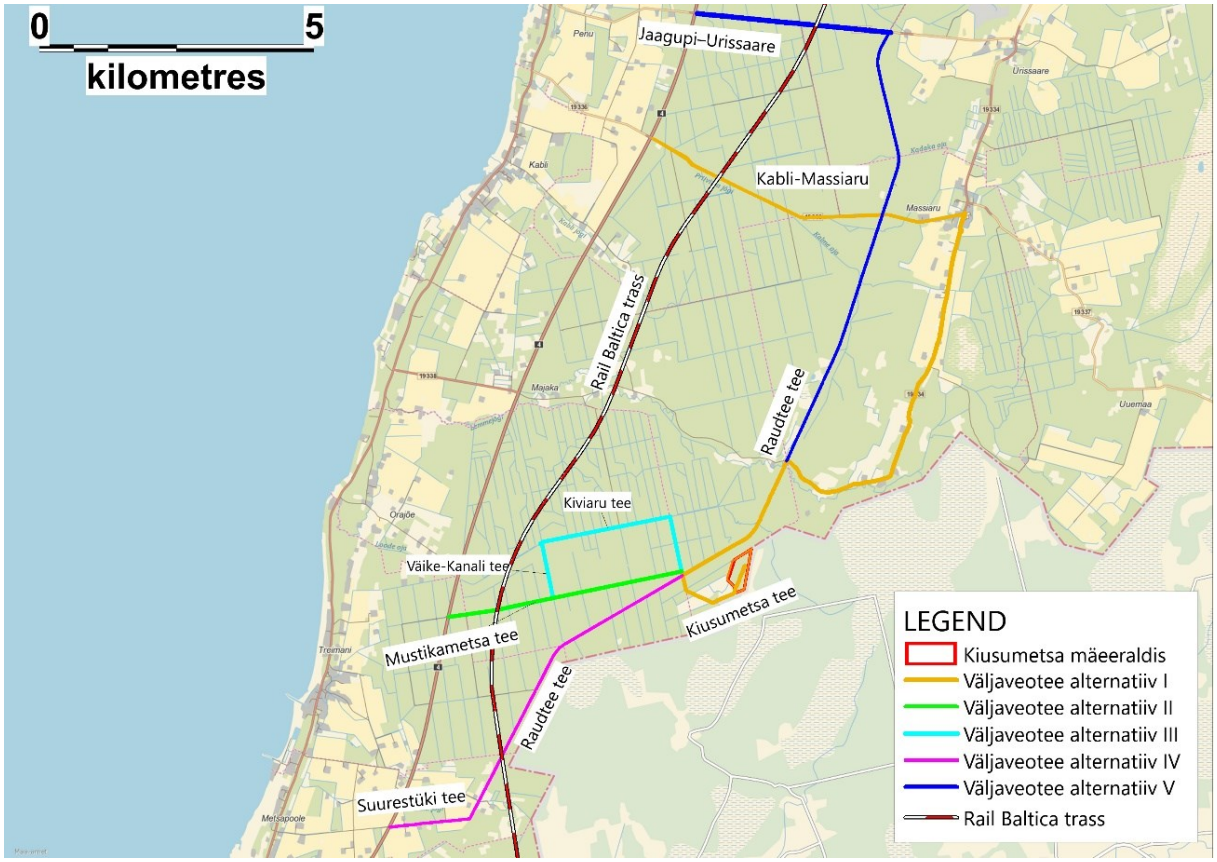

Figure 3. Alternatives to transport roads from the quarry. Base map: Land Board.

3 DESCRIPTION OF ENVIRONMENT EXPECTED TO BE AFFECTED

3.1 Landscape

Kiusumetsa sand deposit is located on the coastal lowland of the Gulf of Riga. The relief is relatively flat, with absolute ground elevations ranging from 27 to 32 metres, gradually rising towards the east[2]. Kiusumetsa sand quarry mining claim is located in the coastal ridges zone of the Baltic Ice Lake. The mine service plot consists of forest land and natural grassland. According to the forest register, the mining claim is mostly covered by coniferous forest (spruces and pines 30–45 years old), with a limited amount of deciduous forest (alders and birches 10–50 years old). The area includes site types for wood sorrel, site types, *Oxalis-Vaccinium* site types and, to a lesser extent, meadowsweet site types. According to the Estonian Nature Information System database, there are no Natura forest habitats or key habitats on or in the immediate vicinity of the mining claim. The Kilmezs registered immovable is also surrounded by forest; the territory to the south, in the Republic of Latvia, is also covered by forest.

The south-western edge of Kiusumetsa sand deposit borders the mining claim of the abandoned Kiusumetsa sand deposit, where no extraction has taken place for at least 20 years[3]. The bottom of the abandoned quarry is level, flooded during seasonal river overflow – the bottom of the quarry, now covered in turf soil, supports moisture-loving plants and the area is not forested. The slopes are gentle, covered in turf soil and support a forest. Birch, pine, alder and willow grow in the western part of the quarry and on the slopes.

3.2 Geology

This chapter is based on the work of Maavarauuringud OÜ produced in 2019.[4] In addition, the material and relief data from the geological base map 1:50 000 of the Land Board have been used.

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[2] Application for extraction permit for mineral resources, Kiusumetsa sand quarry. 2019. Maavarauuringud OÜ, work No: 19-300.

[3] Geological Survey of Estonia. 2014. Revision of quarries of construction minerals damaged by extraction and abandoned in West-Estonia (Hiiu, Lääne, Pärnu, Rapla, Saare, Viljandi counties). Quarries in Pärnu County.

[4] Geological survey of Kiusumetsa geological exploration area of Kiusumetsa sand deposit. 2019. Maavarauuringud OÜ, work No 19-254.

Kiusumetsa geological exploration area of Kiusumetsa sand deposit is located in a south-west to north-east oriented 18 km long and 0.5 to 2.5 km wide coastal ridges zone of the Baltic Ice Lake (Q1jrVr_lg). The landforms along the shoreline of the Baltic Ice Lake consist of sand and gravel of different grain sizes. The bedrock of the mining claim consists of sandstone and aleurolite of the Aruküla geological formation (D2ar) of the Middle Devonian series.

The useful layer is made up of sand with varying grain size, which contains gravel. The average gravel content (particles measuring 2.0–20 mm) is 15.3%. Clay and dust (particle size <0.063 mm) content is on average below 4.6%. The sand does not contain coarse-grained material (>31.5 mm). The layer is thinner in the northern part of the geological exploration area, ranging from 2.3 to 3.3 m, and thicker in the south-western and southern part, ranging from 4.7 to 7.7 m.

The average thickness of the construction sand (block 2) layer is 4.2 m. The thickness of the sand layer above the groundwater level is 3.3 m and below the groundwater level 0.9 m. The thickness of the soil layer in the block 2 area is 0.3-0.5 m, with an average thickness of 0.4 m.

The useful base consists of sandy loam till and clay loam till. The absolute elevation of the sand layer base is lower in the south-western part of the geological exploration area, ranging from 22.1–21.3 m, and higher in the northeastern edge of the geological exploration area, ranging from 26.5–27.0 m.

Based on the geological map, fine sands of the glacial lake predominate in the vicinity of the mining claim, with a grain size of 0.063–0.5 mm and <50% of the sediment volume being potentially finer and/or coarser. These sediments have poorer water conductivity than the sand found on the mining claim.

3.3 Aquatic environment

Kiusumetsa mining claim is located entirely on land improvement construction built in 1972. The total area of the land improvement construction work is 893.4 ha, and its artificial recipient is the drainage ditch KIVIARU TTP-256, which discharges into the Loode stream (VEE1152300) about 3.5 km to the west. The elevation of the bottom of the ditch at the border of the geological exploration area is 26.16 m and the slope is 1:25.

According to the plan of the mining claim of Kiusumetsa sand quarry, the absolute ground elevations in Kiusumetsa mining claim are mostly between 27–31 m. The

absolute ground elevations in the vicinity of Kiusumetsa mining claim (up to 500 m) on the territory of the Republic of Latvia range from 30–32.5 m.

According to the soil map, the western part of the mining claim is, for the most part, temporarily or permanently waterlogged, and in addition to the ditches shown on the current base map, the locations of former agricultural ditches are still clearly visible in the relief. The soil is dry in the eastern part of the mining claim along the Latvian border.

Glacial lake sediments have a variable composition. Due to the peculiarities of sedimentation in glacial lakes, their filtration properties are also uneven. Groundwater, which is present in the sands of the area, does not form a larger aquifer that could carry significant quantities of water from here to surrounding ditches and rivers. The extent of the aquifer in the sands of glacial lake sediments can be considered to be the area around the mining claim associated with the coarser-grained sands of the higher part of the sandy ridge(see Figure 4).

The hydrological regime of the ground (soil layer) in the area largely depends on precipitation and evapotranspiration, and surface water drainage through ditches. The natural relief is not favourable to surface water run-off (see Figure 5).

The most extensive aquifer in the area is the Middle Devonian sandstone aqueous layer, with groundwater elevations at the mining claim close to 25 m. The water level in this aqueous layer is determined by the rivers and major ditches in the area. The aquifer is separated from the groundwater of the glacial lake sediments by a layer of clay loam till with poor hydraulic conductivity, resulting in higher groundwater levels in the sand than in the sandstone. This is therefore a feeding zone of the aquifer bound to sandstone. Groundwater in this aquifer moves from here to the west, towards the sea.

The unpressurised groundwater from glacial lake sediments present on the site is drained by the sandstone aqueous layer and by the Biitman stream, which discharges into the Loode stream 420 m north of the geological exploration area, whereas the Biitman stream drains the groundwater of the sandy ridge to the north of the mining claim.

According to ground elevations, groundwater moves in the direction of the territory of the Republic of Estonia (north and north-west), following the slope of the land relief. The unpressurised aqueous layer from glacial lake sediments present on the site is drained by ditches of the land improvement system, and by the Biitman stream, which discharges into the Loode stream 420 m north of the geological exploration area, whereas the Biitman stream drains the groundwater of the sandy ridge to the north.

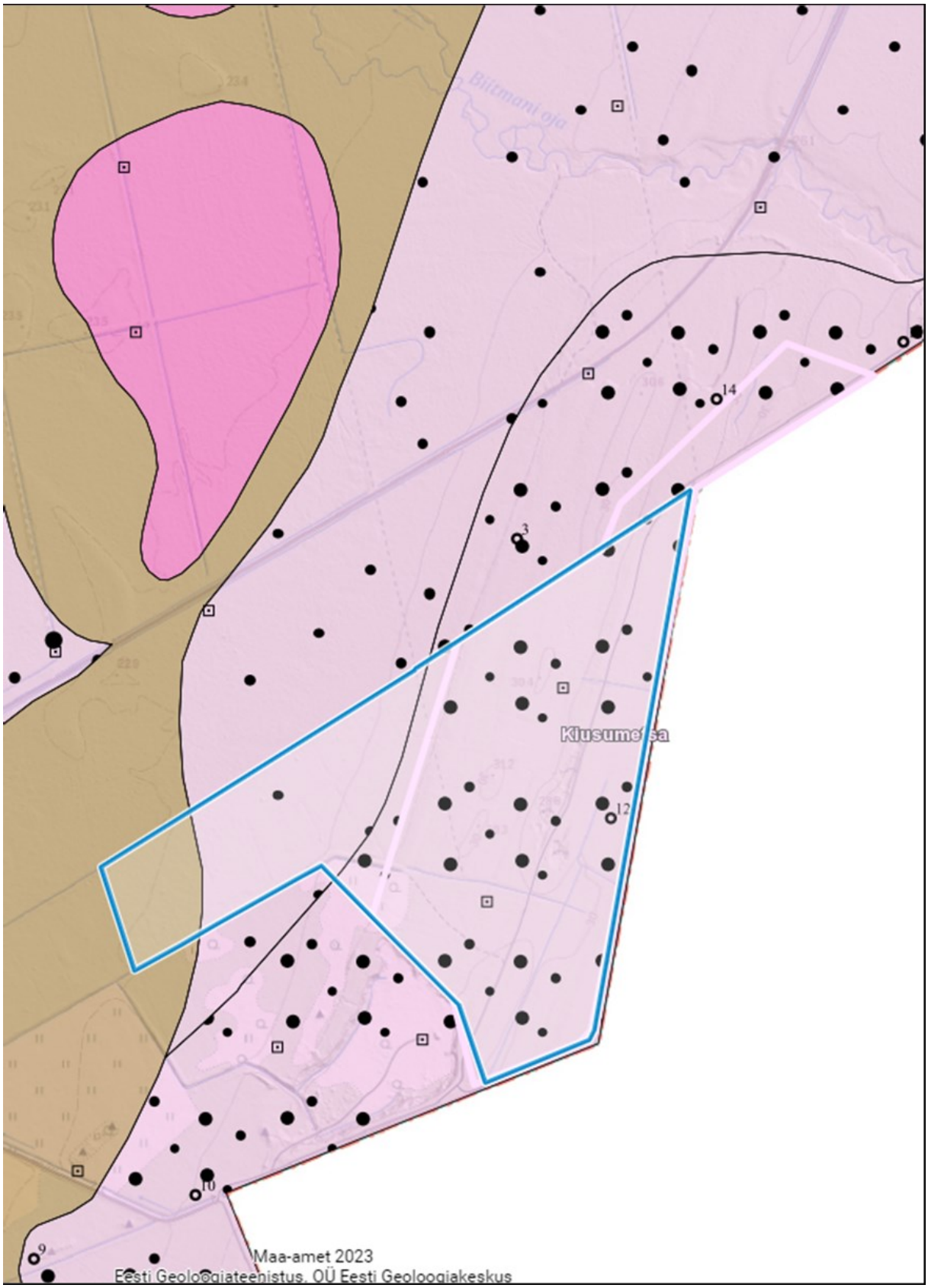

Figure 4. Extract from the surface cover map of the geological base map. The aquifer bound to the sands of the glacial lake is linked to the distribution of coarser sands in Kiusumetsa mining claim and in its immediate vicinity.

The total thickness of glacial lake sediments in the geological exploration area is 2.3–7.7 m. The thickness of the useful layer on the north-western border of the North Livonia special protection area is 2.6–3.7 m.

The water level in the boreholes drilled in April 2019 as part of the mineral resource survey was 0.7–3.0 m below the ground (absolute elevation 26.7–29.5 m). The water level is higher on the western border of the mining claim. The slope of the groundwater level is 0.01 and declines perpendicular to the sandy ridge from west to north-west. The thickness of the sand-bound aquifer was 1.8–4.7 m. The groundwater level at the north-western border with the North Livonia special protection area was 26.7 (PA-11)–28.8 (PA-1 and PA-10) m. The aqueous layer here was 1.8–3.1 m thick.

At the same time, the absolute water surface elevation at the bottom of the abandoned Kiusumetsa quarry in Kilingi-Nõmme demonstrative forest holding, immediately to the south-west of the geological exploration area, was 26.9 m, with puddles 0.2–0.3 m deep. Absolute altitude at the bottom of the abandoned quarry is 26 m in most parts. The bottom of the quarry is dry in summer, flooded during seasonal river overflow – moisture-loving plants grow in the turf soil covering the bottom of the quarry. Given the circumstances of the adjacent quarry, a water level of 26.0 m has been used to calculate the underwater reserve of the geological exploration area.

The sand filtration module determined during geological exploration ranges from 0.4 m/day (in the extreme south-western part of the geological exploration area PA-13) to 2.6 m/day (in the central part of the geological exploration area PA-8 and PA-9). Hence, the water conductivity of the sand-bound aquifer of the mining claim is modest at 2–7 m^3/per day, probably within the lower end of this range at the boundary of the North Livonia special protection area. The soil types of the shallower sandy areas also indicate that the aquifer in these areas has modest water conductivity.

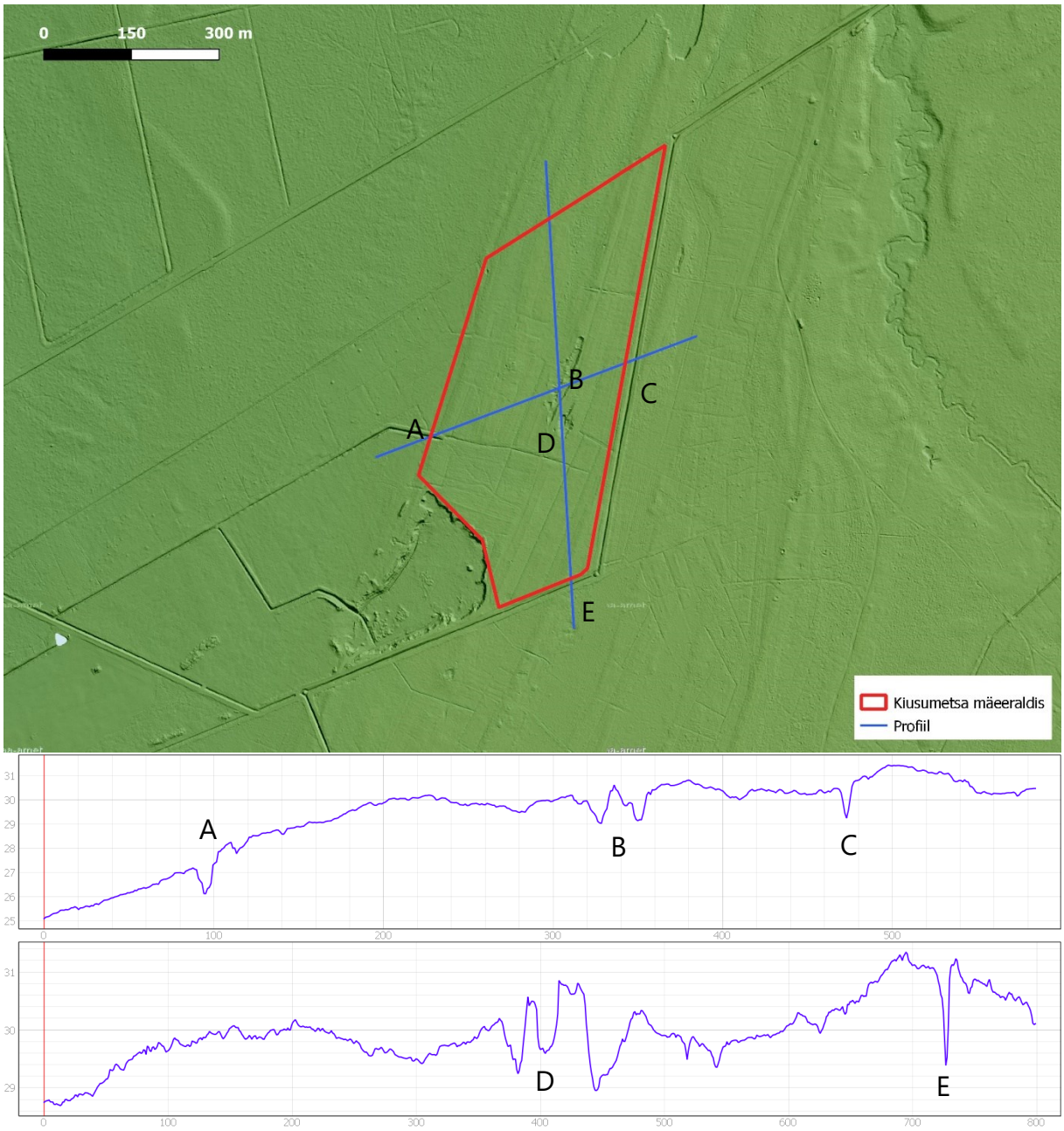

Figure 5. Cross-sections of the ground surface in Kiusumetsa mining claim. Land Board base map and elevation model.

3.4 Settlement, land use and infrastructure

The closest household on the territory of the Republic of Latvia is located 890 m to the south-east (Silbērzi). Other households are more than 5 km away.

The mine service plot consists of forest land and natural grassland. The Kilmezs registered immovable is surrounded by forest; the territory to the south, in the Republic of Latvia, is also covered by forest.

Satisfactory access to the quarry site is located in the south-western corner of the mining claim. The quarry road leads to a local forest track that runs along the national border and from there to an old railway embankment (used as a forest track).

3.5 Protected natural objects

The closest Natura sites in the Republic of Latvia are the Kalna purvs special area of conservation (LV0533700), 2.5 km to the east, and the Mernieku dumbraji special area of conservation (LV0522000), 4 km to the southwest.

3.5.1 Protected areas

Kiusumetsa deposit borders the North Vidzeme Biosphere Reserve in Latvia to the south.

The **North Vidzeme Biosphere Reserve** (LV0000100) was established in 1997. The protected area of 457,708 hectares (representing 6% of the total area of the Republic of Latvia) covers an area 53 km long along the Gulf of Riga and borders the Republic of Estonia to the north. The reserve was created to protect the characteristic land and coastal ecosystems along the Baltic Sea. More than half of the protected area is covered by forests and swamps. At national and international level, the biosphere reserve seeks to strike a balance between protecting biodiversity, promoting economic development and preserving cultural values[5]. In order to ensure the conservation of the landscape, ecosystems, species and the genetic diversity present on the territory, and to promote sustainable economic development, the territory of the biosphere reserve is divided into functional zones (landscape protection zones and neutral zones). There is a landscape protection zone – an area of cultural landscapes characteristic of the North Vidzeme region – in the vicinity of Kiusumetsa mining claim on the territory of the Republic of Latvia.

3.5.2 Protected bird species in areas adjacent to mining claim

To determine bird species important for conservation purposes and other protected bird species, avifauna surveys were carried out within the expected impact radius (500 m) of Kiusumetsa mining claim on the territories of the Republic of Estonia and the

[5] Saeinma of the Republic of Latvia, 11 December 1997. Par Ziemeļvidzemes biosfēras rezervātu. https://likumi.lv/ta/id/52952-par-ziemelvidzemes-biosferas-rezervatu

Republic of Latvia in 2021. The methodology of the European Breeding Bird Atlas was used to determine the breeding security of birds[6].

During surveys carried out on the **territory of the Republic of Latvia**, a total of 8 protected bird species were recorded in the Republic of Latvia, 7 of whom are covered by the Birds Directive. In terms of landscape, 10–15% of the territory of Latvia in Kiusumetsa mining claim is anthropogenic in nature and, due to the absence of human activity, is in the process of reverting to its natural state. The rest is forest land, but heavily impacted by clear cutting.

The survey estimated that there are two territories of the Eurasian pygmy owl within the expected impact radius, although a total of four songbirds were heard. Some of the contacts were likely from the same birds, because the size of the territory and the presence of habitats indicates that only breeding pairs could fit in the area.

Two observations were made of Eurasian cranes and it is likely to be a single breeding pair. The area is a good nesting ground for Eurasian cranes.

Two observations were also made of the common merganser, including the discovery of a nest in the hollow of an ash tree. The number of breeding pairs was estimated at 1–3.

A total of four red-breasted flycatchers were recorded. Based on habitats, the estimated number was 3–4 breeding pairs.

A total of four observations were made of the black woodpecker, but given the rather large territory of the species, the number of breeding pairs was estimated at one.

There were two observations of the woodlark, but there is probably only one breeding pair.

In total, six occasions of the Ural owl singing were recorded, but luring makes the species restless and it can move around in quite a large area. There are likely two breeding pairs in the area.

There are two known observations of the European nightjar in the area. There is likely one breeding pair of the European nightjar in the vicinity.

The report of the survey carried out on the territory of the Republic of Latvia is attached in Annex 3.

[6] https://ebba2.info/about/methodology/

4 ESTIMATES OF MAGNITUDE OF IMPACT

4.1 Aquatic environment

In contrast to the solution proposed in the application for environmental permit, which is to drain the quarry by dredging the ditch starting from the south-western part of the mining claim, the developer confirms that no drainage is planned.

Extraction of mineral resources is planned in the quarry at an absolute water surface elevation of 26 m. During the proposed extraction, the underwater reserves (deeper than 26 m) will be extracted using an excavator. To this end, the excavator positions itself on a dry terrace, scoops up extracted mineral matter and lifts it to the bank of the body of water to drain. Surface water is not diverted from the quarry during extraction.

The excavation of a sandy outcrop with a groundwater level that follows the ground relief will reduce the groundwater level in the sand at the edges of the quarry from the current 26.7–29.5 m to 26 m, or to the base of the useful layer. The base of the useful layer is higher than 26 m (up to 27 m) in the north-eastern part of the mining claim. This means that the groundwater level at the north-western border of the quarry will decrease by 0.7–2.8 m compared to the time the geological exploration was carried out. The north-eastern part of the quarry, where the bottom of the useful layer is higher than 26 m, remains dry.

The effects of lowering the water level on groundwater do not extend beyond 100–200 m in sand-bound groundwater. This is the result of the limited reach of the aquifer (see Figure 8) and the uneven lithological composition of the sands. To the west, the spread of the water surface depression is limited to a decline in relief of less than 25 m. In the south, groundwater levels have already been lowered to 26 metres as a result of prior extraction. At higher elevations, on ridges of sand with varying grain size, the effects of depression can extend up to 200 m from the quarry (Figure 6).

The moisture regime of soil in the vicinity of the mining claim is not directly dependent on the groundwater level, which was also deeper than the soil layer during the spring surveys conducted in April 2019. The soil moisture regime in the surrounding ground depends mainly on precipitation and evapotranspiration, and on the possibilities for surface water run-off, which is not facilitated by the micro-relief of the area (Figure 4).

The receiving body of water used to divert the drainage water is located in the south-western part of the mining claim, discharging into the Loode stream 3.5 km to the west.

The application for the environmental permit describes the option of dredging the drainage ditch in the south-western part of the mining claim in order to regulate the water level downstream as needed. Dredging the drainage ditch may affect the soil moisture regime, particularly in the area bordering the north-western part of the mining claim, where the current moisture regime is established. Elsewhere, additional impacts outside the aquifer reach are insignificant. The developer also confirms that no drainage is planned.

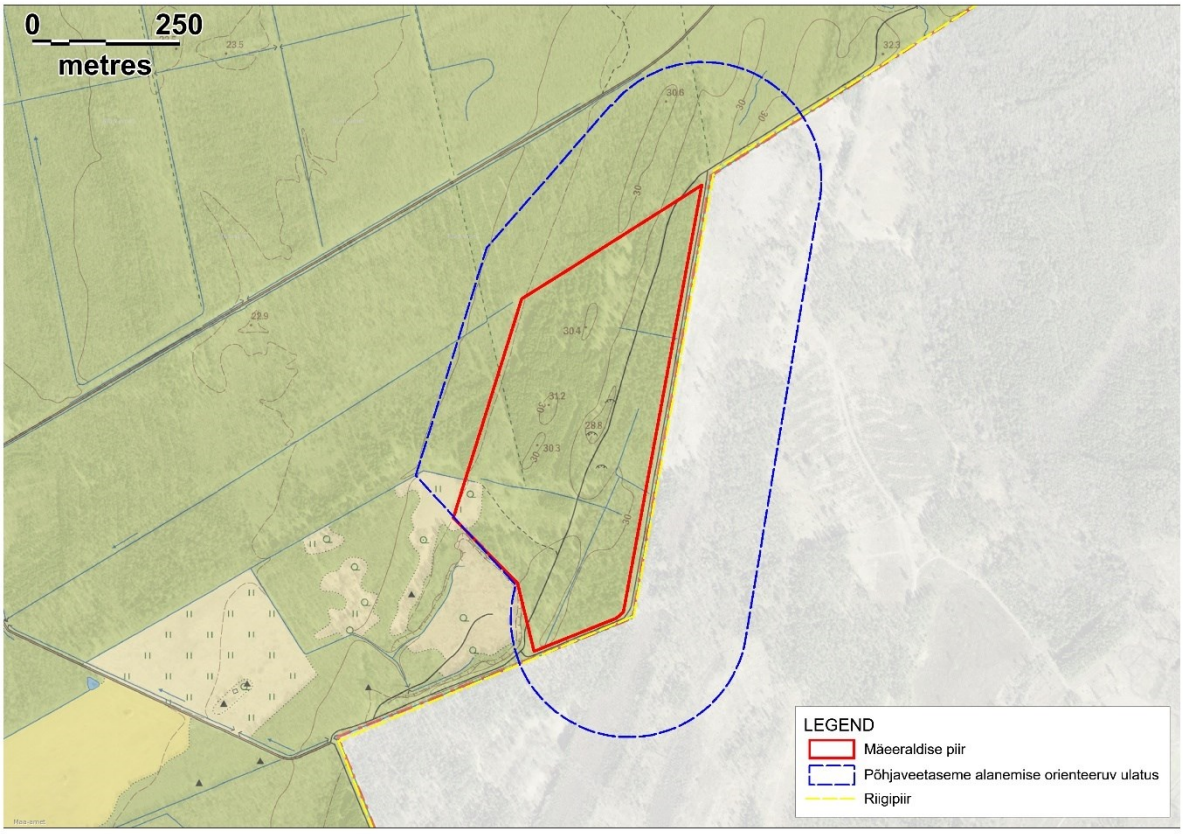

Figure 6. Estimated radius of influence of groundwater level decline. Base map: Land Board, 2023.

The impact of extraction on groundwater and surface water quality can become apparent in case of an emergency situation with mining machinery, such as fuel or lubricant leaks. To minimise the risk, machinery must be refuelled (this applies to fuel storage) and serviced regularly in a designated area. Extraction must be done using technically sound equipment. There is no reason to assume that the proposed activity will have a significant impact on the quality of groundwater and surface water.

The aquifer in question is not used for groundwater supply in the area.

The nearest households are more than 1 km away, and the extraction of sand in Kiusumetsa mining claim will not affect the drinking water supply of such households.

Currently, groundwater levels in the sandy layer present in the area are regulated by forest drainage ditches.

A decrease in the groundwater level in the area bordering the quarry (Figure 6) might have a slight drying effect on soil moisture conditions.

Summary:

- In the case of undrained extraction, the effects of lowering the water level do not extend beyond 200 m in the relevant Quaternary aqueous layer.
- Extraction without drainage will not result in significant negative impacts on groundwater and surface water.
- The extraction of sand in Kiusumetsa mining claim will have no impact on water supply.

4.2 Noise

Extraction in Kiusumetsa mining claim generates environmental noise from the extraction, loading and transport of materials and the movement of excavators and loaders. Operational noise is only present during working hours.

Sand is mainly extracted using a backhoe excavator and, where appropriate, a wheel loader, with trucks used to transport sand off site. There are no plans for blasting in the quarry.

The planned overburden, heaps of extracted mineral matter, as well as the pit created during extraction, will reduce the noise levels associated with extraction. The extraction area is surrounded by forest land. The closest household on the territory of the Republic of Latvia is located 890 m to the south-east (Silbērzi). Other households are more than 5 km away.

Noise in a quarry

In terms of industrial noise, a surface noise source from light industry has been accounted for throughout the entire quarry, plus spot noise sources from loading operations in the areas to the north-east and south-east, closest to residential buildings (Figure 7).

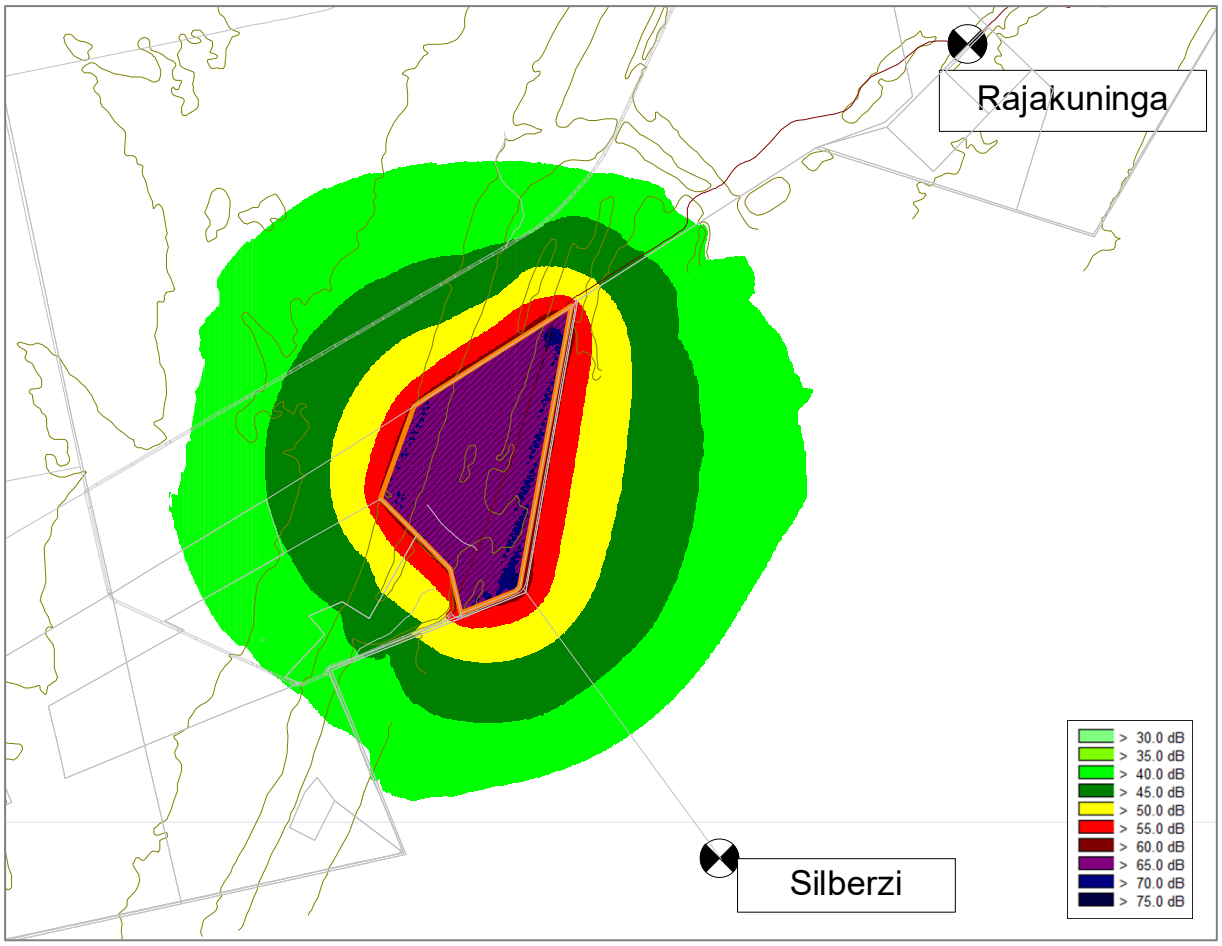

Figure 7. Occupational noise levels during the day (7–23).

Noise levels of <30 dB reach the nearest residential buildings (Rajakuninga, Silbērzi) during the day. This resembles natural noise levels (e.g. forest resonating in the wind). In other words, the extraction in Kiusumetsa sand quarry does not cause noise levels specified in Regulation[7] No 16 of the Cabinet of Ministers of 7 January 2014 on "Noise Assessment and Control Procedures" at the nearest residential buildings.

Road traffic noise

In terms of road traffic noise, the current situation and the envisaged situation were mapped, with the latter taking into account the different alternatives to transport roads adding dumper traffic when transporting material from the sand quarry. The noise level of the transport roads for extraction at the nearest residential buildings complies with the category II road traffic noise limit values (65 dB) set out in Annex 1 of the Regulation of the Minister of the Environment of 16 December 2016.

[7] Noise assessment and control procedures. Regulation No 16 of the Cabinet of Ministers of 7 January 2014.

Summary:

- The industrial noise levels generated by the proposed activity are below the noise levels set out in Regulation No 16 of the Cabinet of Ministers "Noise assessment and control procedures";

4.3 Air quality

The proposed activity will have an impact on air quality both when extracting and transporting mineral resources. Atmospheric particulate matter ($PM_{2,5}$, PM_{10}, PM_{sum}) is essentially the only significant contributor to ambient air quality (pollution) resulting from sand extraction and transport. The formation of atmospheric particulate matter is minimised during extraction and loading due to the natural moisture content of the mineral resource, and the particles that are produced quickly settle in the vicinity of the machinery working zone. Atmospheric particulate matter is generated during loading and intra-quarry transport only during dry periods.

Findings show that operational processes in the mining claim result in minimal dust emissions. The highest momentary concentrations of atmospheric particulate matter on the mining claim occurs in the immediate vicinity of the excavator (at a distance of about 10 m), with quantitative values of 32 µg/m^3 and 47 µg/m^3 for different scenarios.

Most of the particulate matter is generated when transporting the material, especially when the material is transported on gravel roads. According to the dispersion diagram of one of the modelled scenarios, there are almost no concentrations above standard content in the immediate vicinity of the transport road, because the concentration generated is evenly distributed over time at the applied transport intensity (five machines per hour). The concentrations decrease severalfold as the distance from the road increases.

Summary:

- **Extraction in Kiusumetsa mining claim will not have a significant impact on regional air quality.**

5 SIGNIFICANT ENVIRONMENTAL IMPACT EXPECTED TO RESULT FROM PROPOSED ACTION

5.1 Impact on protected natural objects

5.1.1 Impact on protected bird species

This chapter covers protected bird species in Latvian territory. There are no nearby Natura sites on the territory of the Republic of Latvia, the impact on bird species there is described in this chapter.

Species on the territory of the Republic of Latvia

The impact assessment regarding protected bird species on the territory of the Republic of Latvia is based on the survey report prepared by a Latvian ornithologist, the noise assessment carried out in the framework of the EIA and the impact assessment on the aquatic environment.

A Latvian ornithologist mapped the following bird species protected in Latvia within the estimated impact radius (500 m) of the mining claim: the Eurasian crane, the woodlark, the Ural owl, the Eurasian pygmy owl and the red-breasted flycatcher.

Black woodpecker

Extraction will increase the fragmentation of the forest landscape in the area, but given the normal size of the territory of a black woodpecker (200–300 ha) and the size of Kiusumetsa mining claim, this alone will not result in a potential loss of habitat. The black woodpecker is known to be quite sensitive to disturbance, so the noise levels associated with extraction that reach into habitats cannot be considered significant.

Ural owl

The Ural owl mainly relies on its auditory senses when hunting, so the impact of noise can be important for the species. Noise levels of 45–50 dB may be produced in the habitats of Eurasian owls in Latvia as the result of extraction. It is not clear exactly at what level noise could be considered significant. As a preventive measure, any noisy activities in the quarry should be suspended during the nesting season of the Ural owl (1 February–31 August). Stacks of soil can be placed on the eastern and western sides of Kiusumetsa mining claim to prevent noise transmission (stacks of soil or noise barrier walls at least 4 m high).

The Ural owl may be exposed to negative noise from quarry preparations (deforestation, road construction, etc.), which is why these works must also be carried out outside the nesting season of the Ural owl (1 February–31 August).

Eurasian pygmy owl

The main negative factors that affect the Eurasian pygmy owl are related to disturbance and habitat fragmentation caused by forest management. The species may be disturbed by the noise caused by extraction in the quarry. Compared to other owls, the Eurasian pygmy owl relies more on sight than hearing when hunting. For this reason, noise may be a less critical factor for them than for other species. As a preventive measure however, noisy activities should be avoided during the nesting period (1 March–30 July) or noise reduction measures should be used (e.g. stacking soil at least 4 m high along the eastern and southern edges of Kiusumetsa mining claim or using noise barrier walls). The changes to the hydrological regime on the mining claim are not significant enough to affect the habitat of the species.

Noise impacts associated with preparatory work (deforestation, road construction, etc.) can be avoided by undertaking this work outside the nesting season.

Eurasian crane

The Eurasian crane has become a very common species in Latvia. According to the most recent population estimates, there are 2,800–10,000 pairs of Eurasian cranes nesting in Latvia. Their numbers have been increasing in both the short and long term. The Eurasian crane is not exposed to any significant hazards in the area. The current landscape seems to suit the species. The establishment of a sand quarry is not expected to have a negative impact, as Eurasian cranes are known to breed in areas of relatively high disturbance, both in nature and in urban areas. Changes in the hydrological regime could theoretically have an impact. Judging from the assessment of the impact on the hydrological regime of the quarry, no changes in the habitat of the Eurasian crane are expected that would significantly disturb the habitat of the species on the territory of the Republic of Latvia.

Woodlark

Woodlarks often nest in areas affected by human activity and also in high-disturbance areas (including in the immediate vicinity of quarries). Extraction in Kiusumetsa mining claim will not have any negative impact on the woodlark habitat.

European nightjar

The European nightjar is tolerant of disturbances caused by forest management and uses clearcuts as a feeding area. There are no specific studies regarding the impact on

night birds, but it is known that birds (in occupied breeding territory) also sing in areas with high noise levels. Therefore, the establishment of a quarry is not expected to have any negative impacts.

Red-breasted flycatcher

The red-breasted flycatcher lesser spotted flycatcher is mainly negatively impacted by forest management and the resulting decline in habitat quality. Noise is not known to be a significant factor, as potential nesting areas for the species are also reported to be in noisy areas. The same measures apply for avoiding disturbances as for the Ural owl and the Eurasian pygmy owl.

Summary:

- Any noisy work for preparing the quarry (deforestation, road construction, etc.) cannot be carried out during the nesting season of the Ural owl and the Eurasian pygmy owl (1 February–31 August).
- Due to potential disturbances to the Ural owl and the Eurasian pygmy owl which are protected species in Latvia, noisy operations in the quarry must be suspended during the nesting season of the Ural owl and the Eurasian pygmy owl (1 February–31 August) or stacks of soil at least 4 m high must be installed along the eastern and southern edges of Kiusumetsa mining claim (a total of about 900 m) or noise barrier walls must be used to prevent the impact of noise. By adhering to the necessary measures, it will also help to prevent potential impacts on other identified protected species in the vicinity.

5.2 Cross-border impact

The proposed activity directly borders the Republic of Latvia. The extraction operations in Kiusumetsa mining claim could theoretically have cross-border impacts through changes in the hydrological regime or noise affecting protected avifauna.

Summary:

- In the case of undrained extraction, the effects of lowering the water level do not extend beyond 100–200 m in the Quaternary aqueous layer. A decrease in the groundwater level in the area bordering the quarry might have a slight drying effect on soil moisture conditions, but will not affect the habitat quality of protected species on the territory of the Republic of Latvia;
- Sand extraction will have no impact on water supply.
- Any noisy work for preparing the quarry (deforestation, road construction, etc.) cannot be carried out during the nesting season of the Ural owl and the Eurasian pygmy owl (1 February–31 August).

- Due to potential disturbances to the Ural owl and the Eurasian pygmy owl which are protected species in Latvia, noisy operations in the quarry must be suspended during the nesting season of the Ural owl and the Eurasian pygmy owl (1 February–31 August) or stacks of soil at least 4 m high must be installed along the eastern and southern edges of Kiusumetsa mining claim (a total of about 900 m) or noise barrier walls must be used to prevent the impact of noise. By adhering to the necessary measures, it will also help to prevent potential impacts on other identified protected species in the vicinity.

6 MITIGATING MEASURES

Wildlife

- It must be ensured that deforestation on the mining claim takes place outside the bird nesting season (1 February to 31 August). This takes into account the nesting seasons of different species.
- To prevent noise from potentially disturbing Ural owls and Eurasian pygmy owls nesting on the territory of the Republic of Latvia, work in the quarry must be stopped during the nesting season (1 February–31 August) or stacks of soil at least 4 m high must be laid along the eastern and southern edges of the quarry or noise barrier walls must be used.
- Based on the principle of precaution, it is recommended not to transport material from the quarry in large masses during the bird nesting season (1 February to 31 August), but to use a maximum of four trips per hour. This measure will help to reduce potential disturbances from transport noise.

Noise and vibration

- To reduce noise disturbance, stacks of soil at least 4 m high must be installed along the northern, western and north-western edges of the site or special noise barrier walls must be used.

SUMMARY

The objective of the proposed activity is the extraction of construction sand in block 2 of Kiusumetsa deposit in Kiusumetsa mining claim. The extractable reserve is 710 thousand m^3. The area of the mining claim to be extracted is 17.84 ha and the area of the service plot is 18.92 ha. The application for a mining claim arises from the desire to supply surrounding construction and road-building sites with suitable material. The period of validity of the applied permit is 15 years.

The EIA assessed the impacts associated with the proposed activity and came to the following conclusions:

- The proposed activity will not have a significant impact on surface water.
- In the case of undrained extraction, the effects of lowering the water level do not extend beyond 200 m in the relevant Quaternary aqueous layer. A decrease in the groundwater level in the area bordering the quarry might have a slight drying effect on soil moisture conditions.
- Extraction in Kiusumetsa mining claim will not have a significant impact on regional air quality.