

Riga Airport
Master plan 2025 – 2050
ENVIRONMENTAL REPORT

Prepared within the framework of a Strategic Environmental Impact Assessment

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Introduction

The Environmental Report assesses the Master plan of **the State stock company “International Airport Riga”** (hereinafter – **RIX Riga Airport**), which envisages the development of the airport in three stages:

- 2025 – 2030,
- 2031 – 2040,
- 2041 – 2050.

The Strategic Environmental Impact Assessment for the airport’s development is governed by both international standards and Cabinet of Ministers Regulation No.157 “Procedure for Conducting a Strategic Environmental Impact Assessment”, dated 23 March 2004 (Protocol No.15, Section 24). Considering that, in accordance with Cabinet of Ministers Order No.297 “On the Designation of National Interest Object Status for the Territory of the State Joint Stock Company ‘International Airport “Riga”’” (Protocol No.36, Section 51) dated 2 July 2013, the airport territory has been granted **national interest object status**, the document is regarded as a national-level territorial development planning instrument. Based on the development of the previous RIX Riga Airport Development Plan for 2012–2036, which included a Strategic Environmental Impact Assessment, it was also decided to conduct such an assessment for **the Riga Airport Master Plan 2025–2050** (hereinafter – the Master Plan).

The aim of the Strategic Environmental Impact Assessment (hereinafter – SEIA) is **to evaluate the potential environmental impacts of implementing the planning document**. The Environmental Report examines the current state of the environment, the planning document’s compliance with established international and national environmental protection policy objectives and criteria, and the applicable regulatory framework, as well as assessing the solutions proposed in the RIX Riga Airport Master Plan.

The Environmental Report has been prepared by the spatial development planning company LTD “Reģionālie projekti” in collaboration with JSC “VentEko”. Project team – Project Manager Līna Dimitrijeva, Environmental expert Santa Pētersone, Spatial Planner Laine Šildere, Spatial Planner Laura Dimitrijeva, Cartographer Anatolijs Boiko. The RIX Riga Airport Master Plan was developed by the Spanish engineering consultancy INECO.

Abbreviations used

AirBaltic	JSC "Air Baltic Corporation"
APU	Auxiliary Power Unit
BTEX	Benzols, toluols, etilbenzols un ksiloli
CAA	State Agency "Civil Aviation Agency"
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
ESB	State Bureau for Environmental Supervision (*since 01/02/2025, the Energy and Environmental Agency) (Vides pārraudzības valsts birojs (kopš 01.02.2025. Enerģētikas un vides aģentūra)*
EU	European Union
FAA	United States Federal Aviation Administration
FBO	Fixed-base operator
FDP	Fuel distribution point
GA	General aviation
GHG	Greenhouse gas
GPU	Ground Power Unit
ICAO	International Civil Aviation Organization
JSC	Joint Stock Company
KSS	Sewage pumping stations *(kanalizācijas sūkņu stacija)*
LANS	SJSC "Latvian Air Navigation Services" *(Latvijas Gaisa satiksme)*
LEGMC	State Limited Liability Company "Latvian Environment, Geology and Meteorology Centre" *(Latvijas Vides ģeoloģijas un meteoroloģijas centrs)*
LTD	Limited liability company
LTO	Landing and Take-off
MRO	Maintenance, Repair, and Overhaul
NATURA2000	European Union network of protected areas established under the Habitats Directive and the Birds Directive
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
RET	Rapid exit taxiway
RIX	Riga Airport
SAF	Sustainable aviation fuel
SDG	Sustainable Development Goal
SEIA	Strategic Environmental Impact Assessment
SES	State Environmental Service *(Valsts vides dienests)*
SJSC	State Joint Stock Company
SNM	Strategic Noise Map
SSPA	Significant Specially Protected Area
TPI	Total Petroleum Hydrocarbons
VOC	Volatile organic compounds
WWTU	Wastewater Treatment Unit

Photographs used in the Environmental Report are sourced from the [RIX Riga Airport website] as well as from other publicly available sources, in that case with the citation provided beneath each image.

1. The main objectives of the RIX Riga Airport master plan and a brief overview of its content, its connection with other planning documents

The main objectives of the Master plan are defined in accordance with the approach based on ICAO (International Civil Aviation Organization) Doc 9184-AN/902, *Airport Planning Manual*, and the guidelines of the FAA (United States Federal Aviation Administration) *Advisory Circular 150/5070-6B*.

The development plan reflects **an understanding of the airport's core development**, encompassing the entire airport area, including both aviation-related and non-aviation-related zones. It also includes recommendations for the use of land adjacent to the airport.

The airport development plan is a comprehensive study of the airport and outlines **short-term, medium-term, and long-term** development plans to meet future aviation demand. The plan has been developed to facilitate the growth of RIX Riga Airport.

The objective of the elaboration

The objective of the Master Plan is to provide a framework necessary to guide the future development of the airport in a cost-effective manner to meet aviation demand while considering potential environmental and socio-economic impacts.

Content of the Master Plan

The Master Plan consists of several **sections**:

- Master Plan development process and methodology
- General overview
- Analysis of aviation market development
- Traffic forecasts for Riga Airport (scenario analysis)
- Assessment of current capacity and infrastructure, and its development in line with traffic forecasts (current situation and future needs)
- Evaluation of airport area development scenarios and their compliance with military mobility requirements
- Investment programme.

Consistency with Other Planning Documents

In the elaboration of the RIX Riga Airport Master Plan, the principle of **mutual coherence**, as outlined in the Spatial Development Planning Law, has been observed. This principle stipulates that the Master Plan must be assessed and harmonised with other spatial development planning documents in Latvia.

The Master Plan has been elaborated with due regard for **continuity** and in alignment with mutually coordinated spatial development planning documents, including those of the Mārupe Municipality and the Riga City Municipality.

National-level development planning documents	**Regional-level development planning documents**	**Municipal-level development planning documents**
Latvia's Sustainable Development Strategy until 2030	Sustainable Development Strategy of the Riga Planning Region 2014–2030	<u>Development planning documents of Mārupe Municipality</u>: 〉 *Mārupe Municipality Sustainable Development Strategy 2022–2034* 〉 *Mārupe Municipality Development Programme 2022–2028* 〉 *Mārupe Municipality Spatial Plan 2014–2026* 〉 *Detailed Plan for the Eastern Part of the Property of the State Joint Stock Company "Riga International Airport" (2013) and its Amendments (2024)* 〉 *First Draft of the Mārupe Municipality Spatial Plan 2024–2036 (2025)*
Latvia's National Development Plan 2021–2027	Development Programme of the Riga Planning Region 2022–2027	
Transport Development Guidelines 2021–2027	Action Plan for the Development of the Riga Metropolitan Area (2020)	<u>Development planning documents of Riga City Municipality</u>: 〉 Riga Sustainable Development Strategy until 2030 〉 Riga Spatial Plan (2021) 〉 Action Plan for Environmental Noise Reduction in the Riga Agglomeration 2024–2028

Table 1: Key planning documents used in the elaboration of the Master Plan

Continuity in the elaboration of the document has also been ensured by considering various planning documents previously developed for RIX Riga Airport, including:

- Riga International Airport Master Plan 2012–2036 and its Strategic Environmental Impact Assessment (2014),
- Environmental Impact Assessment Report for Riga International Airport Infrastructure Development Projects until 2020 (2015),
- Riga Airport Medium-Term Operational Strategy 2021–2027,
- RIX Sustainability Strategy 2022–2030,
- IT Strategy of SJSC "Riga International Airport" 2024–2034,
- Airport Roadmap for Achieving the Net Zero 3035 Target,
- Various development projects for airport growth, including: RIX Airport City, New Passenger Terminal, Integration and Digital Demonstration of Low-emission Aircraft Technologies and Airport Operations (INDIGO), Baltic Sea Region Hydrogen Air Transport – Preparing Baltic Sea Region Airports for Green Hydrogen (BSR HyAirport), Development of Power Supply and Charging Infrastructure in Baltic Airports within the North Sea-Baltic CNC/TEN-T Corridor for Transition to Environmentally Friendly Operations (e-AIR), Reconstruction of Apron 4 at Riga Airport.

2. Preparation procedure of the Environmental Report and involved institutions

The Environmental Report has been prepared within the framework of the environmental impact assessment procedure, in accordance with the Law *On Environmental Impact Assessment* and the Cabinet of Ministers Regulations No. 157 of 23 March 2004 *Procedure for Conducting a Strategic Environmental Assessment*.

Since the decision to prepare the report was **initiated by the airport**, based on previous experience in the elaboration of the Master Plan, the **public was initially informed** about the commencement of the planning document and its strategic environmental impact assessment (a public notice was published on the Environment State Bureau (website on 01.10.2024). Additionally, information regarding the development of the Master Plan and the Environmental Report was published through various other sources, including the airport's official website (*www.riga-airport.com*) and other platforms such as *www.lvportals.lv* and *www.aprinkis.lv*.

Simultaneously, **initial consultations** were conducted with three institutions regarding the level of detail of the Environmental Report, inviting them to submit any proposals concerning key environmental aspects to be considered in the strategic environmental assessment and the preparation of the Environmental Report.

Initial consultations	Summary with recommendations
Veselības inspekcija 03.10.2024. response from the **Health Inspectorate**	Particular attention should be given to areas where environmental noise limits are exceeded and to noise abatement measures.
Valsts vides dienests 16.10.2024. response from **the State Environmental Service**	The key environmental impacts should be assessed, covering noise levels, contaminated sites, construction activities, air quality, accident risks, water management solutions, transport flows, and nature conservation aspects. Additionally, mitigation measures should be identified, and alternative development scenarios should be evaluated.
Dabas aizsardzības pārvalde 24.10.2024. response from **the Nature Conservation Agency**	The impact of the proposed measures on biodiversity should be assessed, along with the results of environmental condition monitoring concerning Beberbeķi Nature Park, the gull population at Lake Babīte, and the migration patterns of geese and cranes in the airport's vicinity.

Table 2: Summary of initial consultations with institutions on the elaboration of the Environmental Report

In order to prepare the Environmental Report, electronically available information sources, databases, studies, inventory records, as well as various published materials and public annual reports were used, together with data available to Riga Airport regarding the environmental status within the airport territory.

The Environmental Report has been prepared in accordance with the principles of integration, precaution, intergenerational equity, assessment of alternatives and transparency.

Within the framework of the SEIA process, various methods were applied, including analysis of information using the available range of materials concerning the airport territory and its environmental conditions, as well as databases on environmental status and biodiversity. A comparative analysis was carried out in order to assess natural resources and environmental conditions in relation to international and national objectives and standards.

In analysing the Riga Airport Master Plan, the potential environmental impacts arising from the implementation of the planning document were assessed. In evaluating the likely impacts of the implementation of the Master Plan, their **significance, type and duration** were analysed.

SIGNIFANCE	**P – Positive impact**	The implementation of the proposed solution may lead to quantitative or qualitative improvements in the quality of the relevant environmental component/aspect compared to the baseline situation, ensure compliance with environmental quality standards established in legislation and guidelines, and secure the achievement of the objectives set out in the planning documents.
	Ne – Negative impact	The implementation of the proposed solution may result in quantitative or qualitative deterioration in the state of the environment or the quality of the relevant environmental component/aspect compared to the baseline situation. As a consequence of the implementation of the solution, environmental quality limit values or other environmental requirements established in legislation may be exceeded, or a significant adverse impact on the environment/component may occur in comparison with the baseline situation. It is highly likely that the objectives set out in the planning documents will not be achieved.
	U – Unknown impact	Impact unknown (including due to insufficient information on the baseline situation).
	0 – No impact / no significant impact	No qualitative or quantitative changes in the state of the environment/component or in the impact on public environmental rights can be predicted.
TYPE	**D – Direct impact**	Impact arising directly from the implementation of the proposed solution.
	I – Indirect impact	Impact that may arise indirectly from the implementation of the proposed solution.
DURATION	**ST – Short-term impact**	Impact manifested over a defined, short period of time (for example, during the construction phase).
	MT/LT –Medium-term and long-term impact	The implementation of the proposed solution gives rise to permanent, recurring or long-term impacts.
	n/a – Not applicable	In cases where there is no impact, or where the impact is unknown and its duration, as well as whether it will be direct or indirect, cannot be determined.

Table 3: Methodological criteria for the assessment of potential environmental impacts

The Environmental Report provides a summary of the assessment of the significant environmental impacts of the planning document.

In assessing the solutions of the Master Plan in accordance with their level of detail, it has been concluded that their significant impacts (positive, negative, direct, indirect, long-term, short-term) are associated with the following main **environmental impact aspects:**

- Population, human health and safety, material assets
- Infrastructure and sustainable mobility
- Water quality (surface water and groundwater)
- Air quality
- Soil contamination
- Climate change and climate change adaptation
- Hydrological regime
- Natural areas and biodiversity
- Landscape diversity
- Cultural, architectural and archaeological heritage

3. Public participation and outcomes

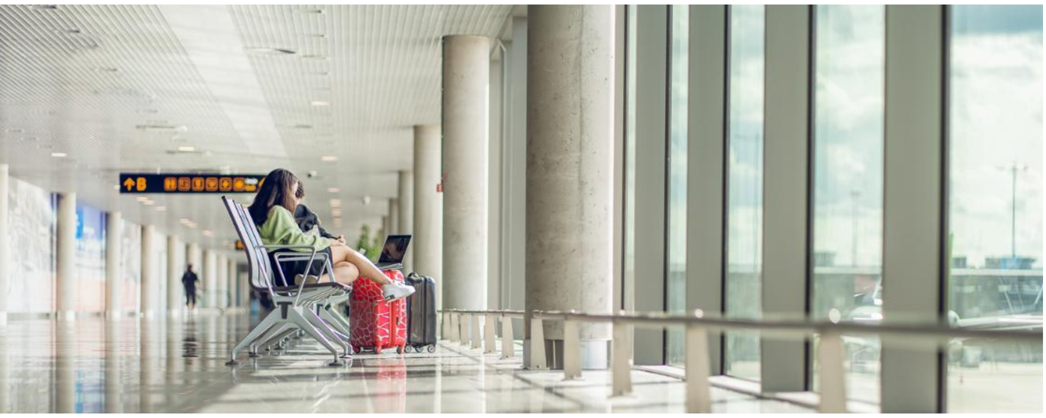
The procedure for the preparation of the Environmental Report and the principles of public participation are determined by Cabinet Regulation No. 157 of 23 March 2004 “Procedures for Carrying out a Strategic Environmental Impact Assessment”. Public participation in the preparation of the Riga Airport Master Plan 2025–2050 and the draft Environmental Report was ensured within the framework of a public consultation held from **3 November 2025 to 3 December 2025.**

Information on the submission of the Master Plan and the draft Environmental Report for public consultation was published in several information sources, including the website of SJSC “Riga International Airport”, the Mārupe Municipality newsletter “Mārupes Vēstis”, the newspaper “Latvijas Avīze”, the website of Mārupe Municipality, the website of the City Development Department of Riga State City Municipality, the website of the Energy and Environment Agency (EVA), as well as the websites of Ltd “Reģionālie projekti” and JSC “VentEko”.

During the public consultation period, the materials of the Master Plan and the draft Environmental Report were made available to the public both electronically and in person. In order to present the solutions of the Master Plan and the draft Environmental Report to the public, **three public consultation meetings** were organised in hybrid format (in person and online) during the consultation period: in **Jaunmārupe, Piņķi and Riga (Imanta neighbourhood).**

During the public consultation, proposals from members of the public were received and are summarised in the section “Summary of Proposals Received during the Public Consultation”. The proposals received were assessed, and comments were provided regarding their possible incorporation and the need for further refinement of the Master Plan and the draft Environmental Report.

At the same time, in addition to public proposals, **opinions** were also received **from the competent authorities** regarding the Riga Airport Master Plan 2025–2050 and the draft Environmental Report. In their opinions, the authorities provided comments and recommendations on the planned solutions, their potential environmental impacts, as well as on the necessary clarifications and conditions for the further refinement and implementation of the documents. The opinions received were systematised, assessed and taken into account in preparing the revised version of the Master Plan and the Environmental Report, while a detailed summary of the authorities’ opinions is included in the public consultation report.



4. Description of the current environmental status and potential development

The description of the current environmental status was prepared at the end of 2024, based on the available data at the time of preparation, primarily up to 2023. The purpose of this description is to provide a comprehensive compilation of information that serves as the foundation for assessing the impact of the RIX Riga Airport Master Plan. Since environmental conditions generally change gradually, with no significant transformations expected over a short period, this description is not continuously updated. The analysis of the Master Plan has been conducted based on both this assessment of the existing situation and the content and context of the Master Plan.

The airport has been issued a **Category B environmental permit** (No. RI15IB0030, issued on 02.04.2015, last permit review date: 12.06.2024) for the following polluting activities within its territory:

- **Airport and aerodrome operations**;
- **Wastewater treatment units** of the vehicle washing hangar *BioDRY-A-30 (A100744)* with a capacity of up to 25 m^3/day, discharging into a drainage ditch (*N100829*);
- **Fuel filling station** with an annual fuel volume of up to 2,000 m^3 – two above-ground diesel storage tanks, each with a capacity of 25 m^3, and one petrol storage tank with a capacity of 5 m^3;
- Operation of the airport's **vehicle maintenance workshop** and vehicle **washing hangar**;
- **Groundwater extraction** from boreholes *P100899 (DB1052)*, *P101487 (DB21446)*, and *P101642 (DB25133)* with a total extraction volume of up to 300,000 m^3/year (*groundwater deposit passport "Airport" valid until 09.06.2036*).

4.1. Physical and geographical characteristics of the territory

The administrative territory of the airport covers **621 hectares**, including 0.47 hectares designated as commercial areas and 4.98 hectares allocated for the passenger terminal[1]. The territory is predominantly located within Mārupe Municipality, with a small northern section extending into Riga City.

The total airfield area, including land required for future development, has been designated as a nationally significant infrastructure site, covering 1,907.2 hectares[2]. The territory of the airport of national interest in the eastern part overlaps with another object of national interest, the European gauge public railway line **Rail Baltica.** Construction of the Rail Baltica station and associated infrastructure at RIX Riga Airport commenced in late June 2021, marking the first high-speed rail and air transport hub in the Baltic region[3].

The territory is situated in the Tīreļi Plain of the Coastal Lowland, an area historically characterised by bog formation due to a high groundwater level. However, land drainage measures have mitigated these processes, and the airport's historical development included extensive land regulation, including water drainage systems. The

[1] SJSC "Riga International Airport" Non-Financial Statement 2023

[2] Cabinet of Ministers Regulations No. 535 of 5 July 2011 "Regulations on the Airfield Status, Airfield Territory Boundaries, and Planned (Permitted) Use of the State Joint Stock Company 'Riga International Airport'" and Cabinet of Ministers Order No. 297 of 2 July 2013 "On the Designation of the Airfield Territory of the State Joint Stock Company 'Riga International Airport' as a Nationally Significant Infrastructure Site"

[3] Ltd. "Eiropas Dzelzceļa līnijas" webpage (accessed on 30.10.2024.)

hydrological network within the airport area is artificially managed — in the northern section, water drains into Lāčupīte, while in other areas, it is channelled into the Neriņa River via drainage ditches [4].

Image 1: Geographical location of RIX Riga Airport in the Baltic region and Latvia

[4] Strategic Environmental Impact Assessment of the Riga International Airport Development Plan 2012–2036

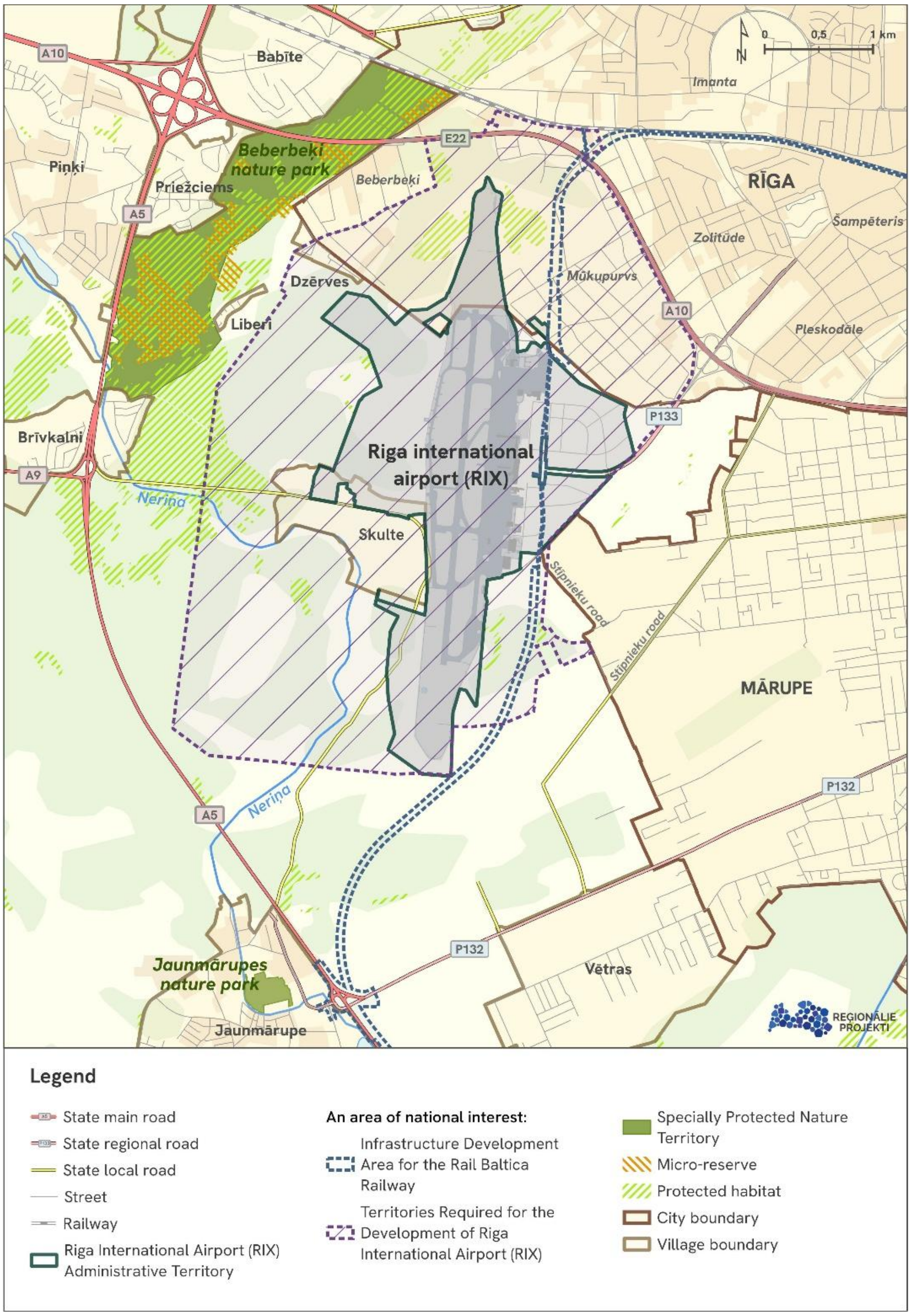


Image 2: RIX Riga Airport territory and its surroundings, development areas of nationally significant infrastructure sites (2025)

The area surrounding the airport consists of forested land, meadows and developed areas. To the west, there is the Skulte village of **Mārupe Municipality** and forested areas, while to the south, slightly farther from the airport, lie two villages of Mārupe Municipality – Jaunmārupe and Vētras. To the east of the airport is the town of Mārupe, whereas to the north, there are two neighbourhoods of **Riga City** – Mūkupurvs, which directly borders the airport territory and is a sparsely developed, marshy area with a small number of residential buildings, and Beberbeķi, characterised by detached housing and the **Beberbeķi Nature Park** (a NATURA 2000 site, located approximately 2 km from the airport's runway). The Zolitūde neighbourhood in Riga is also relatively close to the airport.

Slightly further south of the airport territory, there are two additional NATURA 2000 sites – the Melnā ezera purvs Nature Reserve and the Cenas tīrelis Nature Reserve. To the west of the airport, at a greater distance, lies Lake Babīte. More detailed information on these natural areas is provided in *Chapter 5.*

The airport can only be accessed from the eastern side. From Riga, access is provided via the **national road of regional importance P133**, which serves as the access road to Riga Airport. This road connects the national main road A10 (Kārļa Ulmaņa gatve) and Jūrkalnes Street in Riga with the airport. From the Mārupe side, access is available via **Stīpnieku Road**, which connects to Dzirnieku Street, further linking with P133 and Ziemeļu Street. Currently, the airport can be reached by private vehicles (including rental and car-sharing services, as well as taxis), bus route 22 (operated by Riga Municipality's Ltd. "Rīgas satiksme"), or the LUX Express City Express. Within the airport territory, short-term parking is available at P1, while long-term parking is provided at P3 and P4. Additionally, a P5 parking area is designated exclusively for airport staff. Although Skulte village in Mārupe Municipality is located to the west of the airport, it does not have direct access to the airport territory, as the area is fenced off.

4.2. Geological and geomorphological structure

The relief was formed after the end of the Ice Age, when the Baltic Ice Lake and the Littorina Sea washed away the sediments left by the glacier. The Quaternary sediment layer does not exceed 25–30 metres in thickness, with a basal layer consisting of glacial moraine, which is 1–5 metres thick. Above this, proglacial basin deposits composed of silt, silty clay, and sand form a layer approximately 10 metres thick. The uppermost sediment layer consists of fine-grained sand deposited by the Baltic Ice Lake. In areas where the terrain has subsided, peat bogs have developed, while in other areas, wind-driven sand has formed dunes, reaching heights of 3–5 metres and, in rare cases, up to 10 metres. The airport territory is located within this plain, where dune ridges and isolated dune masses occasionally rise. To the north of the airport lies the Mūku (Zolitūde) Bog. The surface of the plain is gently undulating, predominantly consisting of slightly wind-reworked sections with small dunes, with elevation levels ranging from 7 to 12 metres above sea level. The plain slopes slightly westward towards the Neriņa River, which also serves as the main drainage route for surface water. As the Neriņa River crosses the Nordeķi-Kalnciems dune ridge, it ultimately flows into Lake Babīte.

The upper part of the geological layer in the airport and its adjacent territory consists of Quaternary sediments with a total thickness of up to 25 metres, including:

- Technogenic deposits: embankment soil (sand mixed with gravel and construction debris, topsoil), thickness up to 1.2 metres,
- Eluvial deposits: topsoil, thickness up to 0.5 metres,
- Peat deposits: wood and moss peat, thickness up to 1.5 metres,
- Baltic Ice Lake deposits: fine-grained sand with silty interlayers, thickness up to 20 metres,
- Glacigenic deposits: reddish-brown sandy clay with gravel and pebble inclusions.

At greater depths, there is a layer of moraine sandy clay and clayey sand up to 9.6 metres thick, overlying layers of dolomite, marl, and clay containing gypsum. The area has a moderately complex geological structure with a Quaternary soil complex. The following types of soil are present: artificially deposited sand with gravel, natural sand with organic material, and peat[5].

4.3. Current land use structure and available areas

The airport operator is the **State Joint Stock Company "Riga International Airport"** (a joint stock company owned by the Republic of Latvia, with the Ministry of Transport as the holder of its capital shares), with its registered

[5] Environmental Impact Assessment Report for Riga International Airport Infrastructure Development Projects until 2020 (LTD "Eiroprojekts", 2015)

address at Riga Airport 10/1, Mārupe Municipality, LV-1053, Latvia. The airport's international codes are IATA: RIX and ICAO: EVRA. The airport operates 24 hours a day and has been located on its current premises since 1974.

RIX Riga Airport is the largest **international airport in Latvia** and the leading air transport infrastructure company in the Baltic region, providing international **passenger, cargo, and postal services**, as well as supporting **military and state-importance** flights within Latvia. The airport is part of the European Transport Network (TEN-T), ensuring connectivity and mobility within the EU. The core economic activity of the airport is to provide and maintain the necessary infrastructure for passenger, cargo, and aircraft services, complemented by related services[6].

The runway is 3,200 metres long and 45 metres wide, with an average capacity of 29 flights per hour. The runway direction 36 (RWY36) is used for aircraft operations towards the north, while direction 18 (RWY18) is used for operations towards the south. Aircraft access to the runway is provided by seven taxiways, two of which are designated for arriving aircraft only. The runway meets the requirements of the CAT II Instrument Landing System, enabling aircraft to take off and land in adverse weather conditions and emergency situations. The airport's fire safety category is CAT8, with CAT9 available upon request.

Within the airport territory, the following facilities are located:

- **5 aprons**;
- **88 aircraft parking stands**;
- **7 aircraft maintenance hangars** with a total area of 33,944 m² (each ranging from 2,000 m² to 9,323 m²);
- **5 cargo terminals** with a total area of 7,591 m²;
- **2 business aviation terminals**.

The most significant carriers by passenger volume in 2024 were AirBaltic (57.6% of total passengers), Ryanair (24.0%), Norwegian (4,2%), Lufthansa (2.4%), Turkish Airlines (2.1%), Finnair (2.0%), LOT Polish Airlines (1.6%), Uzbekistan Airways (0,8%), Freebird Airlines (0.8%), Bristish Airways (0,7%) and others 3.7%.[7]

In 2024, the airport handled **7.12 million passengers**, including 22% transit passengers, and **63,186 flights**. Prior to the COVID-19 pandemic, in 2019, the number of passengers served reached 7,798,394, with 87,007 flights. The volume of cargo handled in 2024 was 18,794 tonnes. The number of scheduled airlines operating at the airport is 12. During the summer season of 2024, the number of passenger flight destinations was 108, while in the winter season, it was 88.[8]

Most of the land surrounding the airport is owned by legal entities or municipalities. Some land parcels belong to the state, while privately owned properties are mostly concentrated in nearby villages and neighbourhoods.

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[6] RIX Sustainability Strategy 2022–2030

[7] Riga Airport Non-Financial Statement 2024

[8] RIX Statistical Report 2024

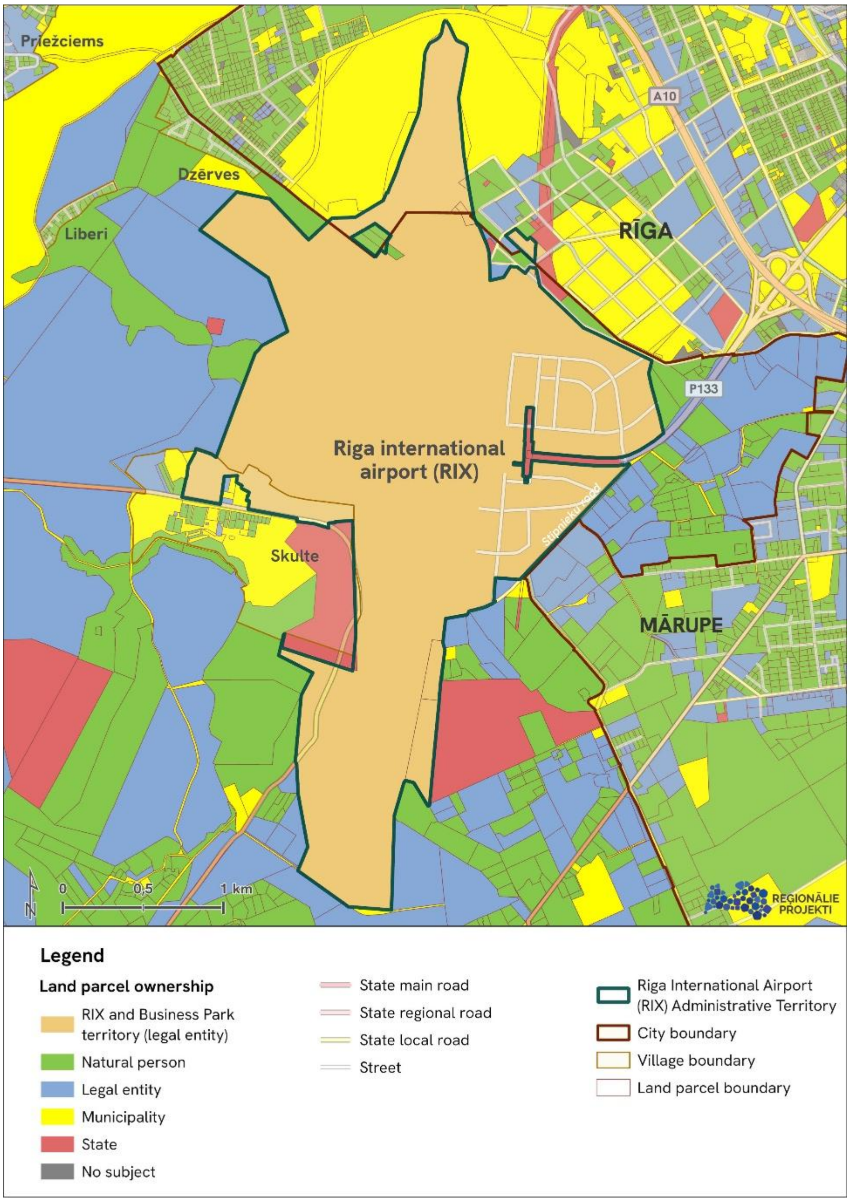
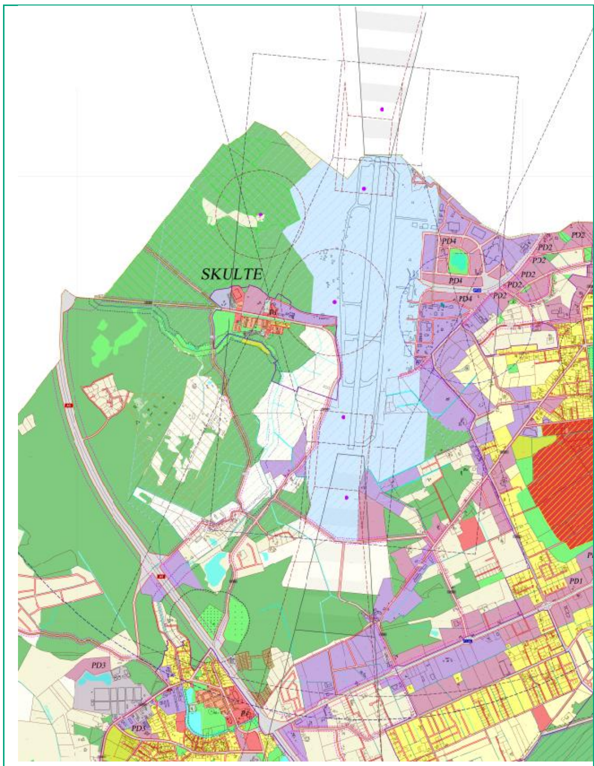


Image 3: Distribution of land units by ownership (Source: State Land Service data from data.gov.lv, 10.01.2025)

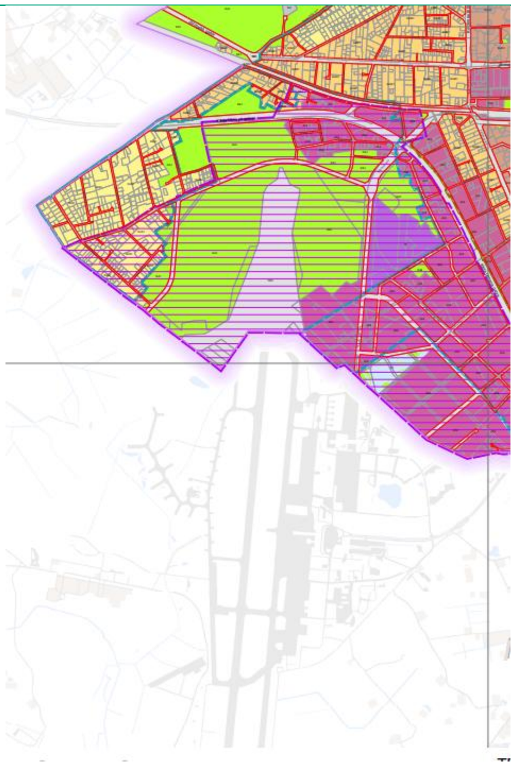
Under the current **Mārupe Municipality Spatial Plan 2014–2026**, the airport territory is designated in the functional zoning as a transport infrastructure facility – airfield territory (LO), where the permitted land use includes the construction of airport and airport infrastructure facilities. Secondary permitted uses include the development of office buildings, logistics company facilities, commercial and service establishments, defence and security institutions, parking areas, and garages.

The detailed plan for the eastern part of the property of SJSC "Riga International Airport," developed in 2013, refines and specifies the planned (permitted) land use and usage restrictions set in the spatial plan. It also defines the future routes of roads, streets, and railway tracks providing access to the existing and planned passenger terminal, parking areas, business parks, technical and maintenance zones within the airport territory, considering the current land use and the planned development of the airport area.

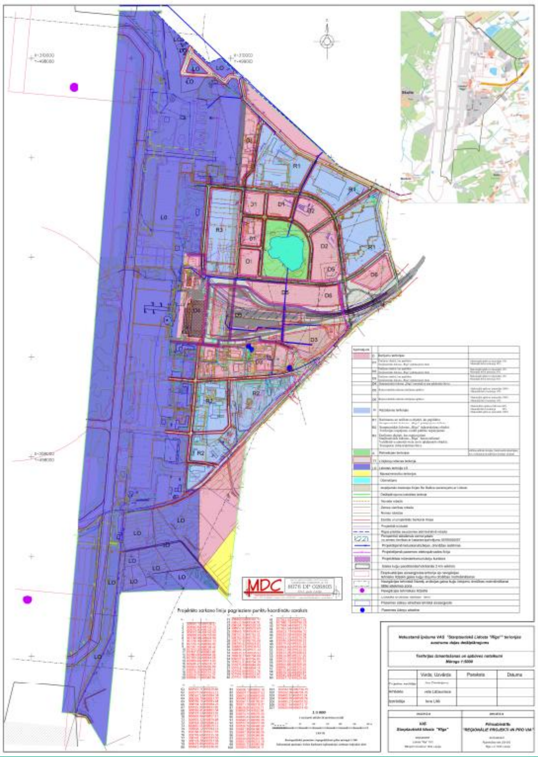
In 2024, amendments to this detailed plan were made, adjusting the boundaries of the transport area zoning in accordance with the road access solutions for the airport and the Rail Baltica railway station construction project. These changes aim to enable the development of the airport-owned free land, transforming it into a commercially built-up area in compliance with the graphic section of the current detailed plan and the land use and construction regulations.



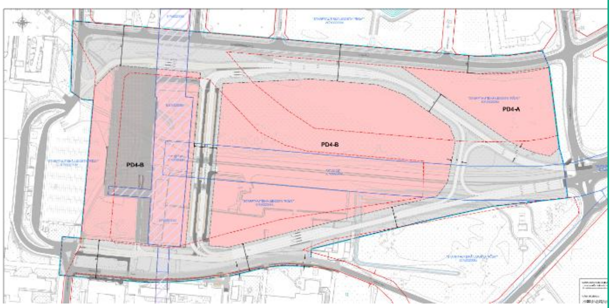
Mārupe Municipality Spatial Plan 2014–2026



Riga Spatial Plan (2023)



Detailed Plan for the Eastern Part of the Property of SJSC "Riga International Airport" (2013)



Amendments to the Detailed Plan for the Eastern Part of the Property of SJSC "Riga International Airport" (2024)

Image 4: Functional zoning from various planning documents covering the airport and its surrounding area – current spatial plans and detailed plans (Source: ĢEOlatvija.lv)

During the elaboration of the RIX Riga Airport Master Plan and its Environmental Report, the development of the new **Mārupe Municipality Spatial Plan 2024–2036** is taking place simultaneously (first draft public consultation from 17.02.2025 to 15.04.2025). Below is a summary of the key proposed solutions and restrictions in this draft that affect RIX Riga Airport and its surrounding area.

The airport territory has been designated as a **new village** within the urban space of Mārupe Municipality, defining the boundaries of the new village for areas on both sides of the airfield, as well as establishing street red lines and categories only in the part of the airport that is publicly accessible and designated for the development of public facilities.

The first draft of the spatial plan does not propose changes to the areas designated for the development of airport infrastructure, as these have already been established by Cabinet of Ministers regulations. However, it introduces new solutions for refining **functional zoning and transport development**.

The zoning associated with the airport is primarily classified as **JC5 – mixed central development area**, allowing for a broad range of mixed-use functions except residential, and **TR3 – airport and port areas**. Several areas subject to special regulations apply to the airport, including:

- TIN16 – Airport aircraft landing/take-off sector (0–2 km)
- TIN17 – Airport aircraft landing/take-off sector (2–5 km)
- TIN18 – 5 km radius around the Riga airfield control point
- TIN19 – 5 km radius around the Riga airfield thresholds
- TIN71 – Rail Baltica construction area
- TIN72 – Area designated for the reconstruction of the A5 national main road and its connection to Riga Airport
- TIN75 – Areas necessary for the development of SJSC "Riga International Airport".

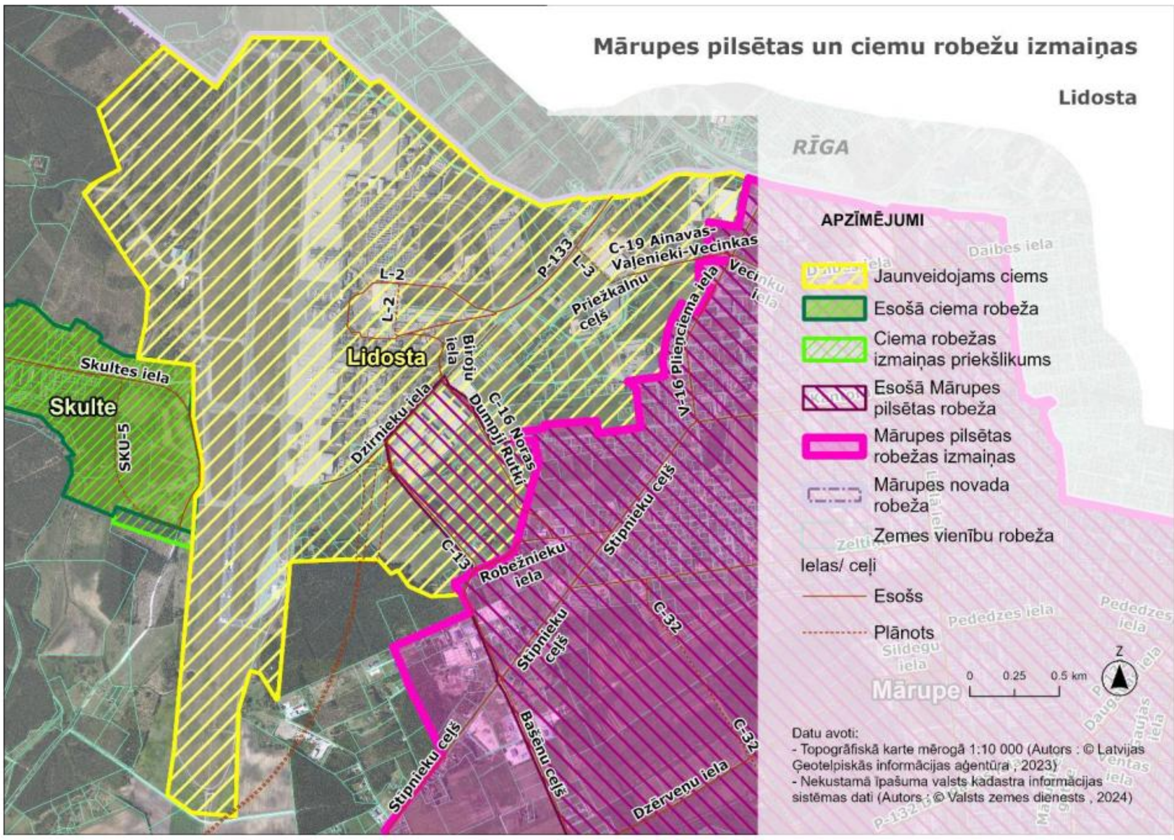


Image 5: Changes in the boundaries of Mārupe town and villages, Explanatory Note of the Mārupe Municipality Spatial Plan 2024–2036 (First Draft) (Source: geolatvija.lv)

The transport development plan includes reconstruction and expansion solutions for national main roads related to the development of the airport. The reconstruction of the national main road A5 involves the construction of a high-speed roadway with two carriageways while maintaining the existing route. Additionally, a new major connection is planned from the airport to the A5 at the Jaunmārupe traffic junction, complementing the development plans of the Rail Baltica railway line and the construction of RIX Airport City within the airport territory. The plan also outlines the construction of a new municipal road from the airport (starting at Dzirnieku Street) to the border of Mārupe Municipality with Olaine Municipality, along with traffic management solutions for logistics and light industrial development areas near the airport.

With the approval of the new spatial plan, the cancellation of the detailed plan is envisaged, retaining only its amended part and integrating the proposed land use solutions into the functional zoning of the plan.

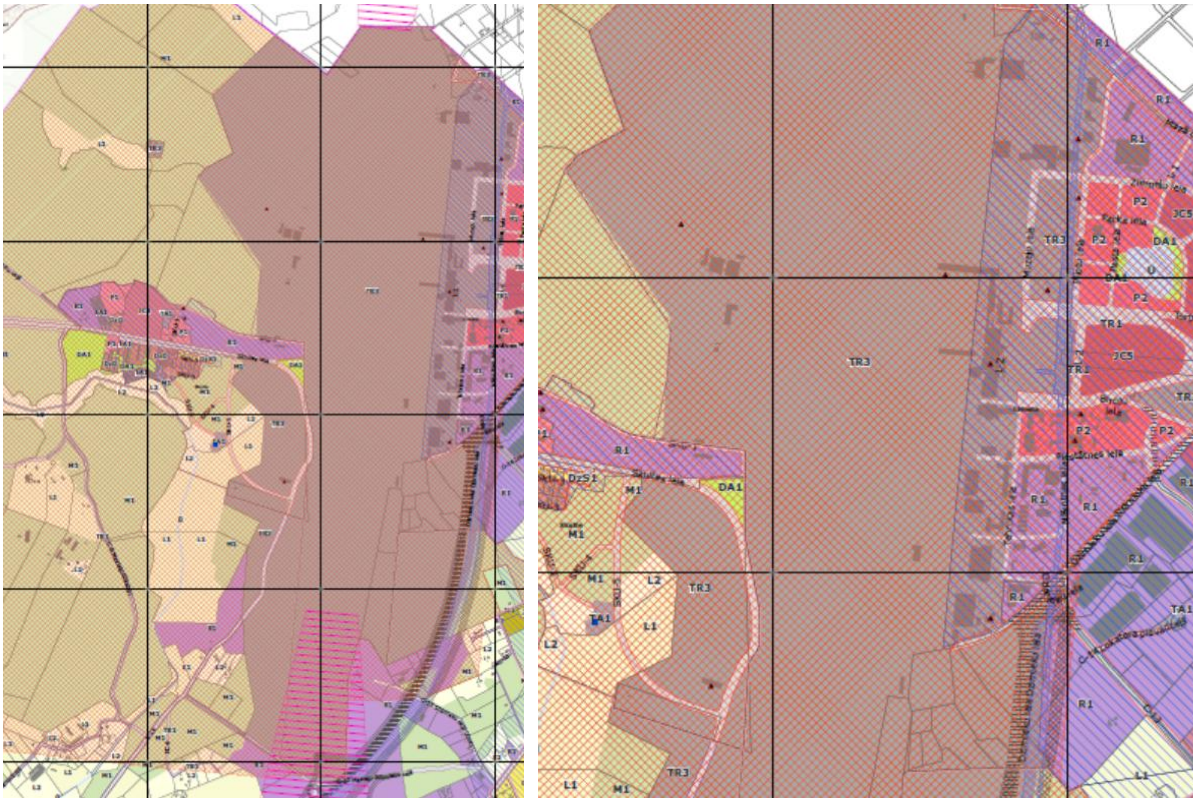


Image 6: Planned functional zoning of the airport and its surroundings from the first draft of the Mārupe Municipality Spatial Plan 2024–2036 (Source: geolatvija.lv)

The spatial plan establishes various **construction restrictions** around navigation technical equipment and take-off/landing safety sectors, as well as requirements for sound insulation in areas affected by increased airport noise.

Several development projects are already being implemented at the airport. The **RIX Airport City** concept envisions the creation of a **multifunctional business centre** near the airport, integrating aviation, logistics, and business infrastructure with a modern, human-friendly urban environment. This initiative aims to enhance connectivity between the Baltic region and Northern Europe, positioning the area as a strategic hub for transport and innovation.

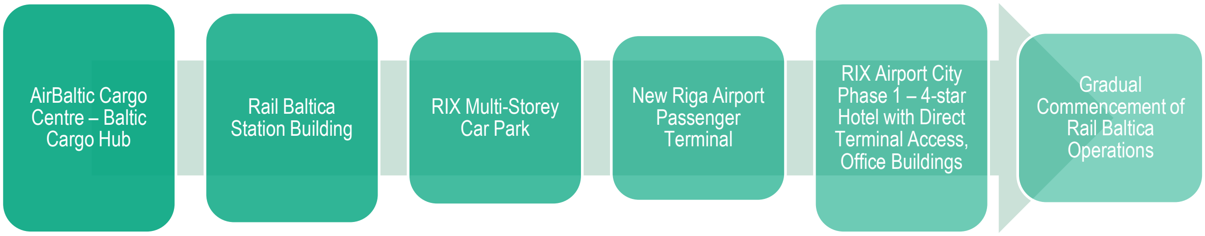


Image 7: Timeline of Riga Airport's Current Development Plans within the RIX Airport City Framework (Source: RIX)

A strong emphasis in this project is placed on adhering to **urban planning principles**, with sustainable planning, architecture, and engineering set as key priorities for the development of the airport city. The design of the new passenger terminal incorporates environmentally friendly and sustainable solutions, such as heated floors, a glass facade, and skylights to maximise natural lighting, as well as a roof covering that reflects solar heat, thereby reducing cooling requirements. Additionally, free drinking water refill stations will be available throughout the terminal. Plans also include extending the Mārupe Municipality cycling path along Biroju Street to the new airport and Rail Baltica station complex, establishing bicycle and motorcycle parking facilities near the airport terminal and station, and installing electric vehicle charging points in car parks. Regarding green outdoor spaces, landscaping between the new airport terminal and the Rail Baltica station building will feature plantings with species that enhance biodiversity, sourced from local flora.

Image 8: Photo Collage – Visualisations of Planned RIX Development Projects (Source: RIX)

4.4. Air Quality

Under the **Category B Polluting Activity Permit** issued by the State Environmental Service Lielrīgas Regional Environmental Authority, **14 air polluting stationary emission sources** are located in the territory of the airport. The total amount of emitted pollutants is 10.46 tonnes per year.

The stationary air pollution emission sources are situated within the Mechanisation Department area, where electric vehicle battery charging and vehicle maintenance take place. During the battery charging process, sulphuric acid vapours are released into the atmosphere through an exhaust vent. For pollutants such as benzene, oil vapours, carbon monoxide, formaldehyde, and nitrogen dioxide, local exhaust ventilation systems are used in the vehicle maintenance workshop. These pollutants are expelled through ventilation pipes embedded in the building walls, with five local exhaust units in operation.

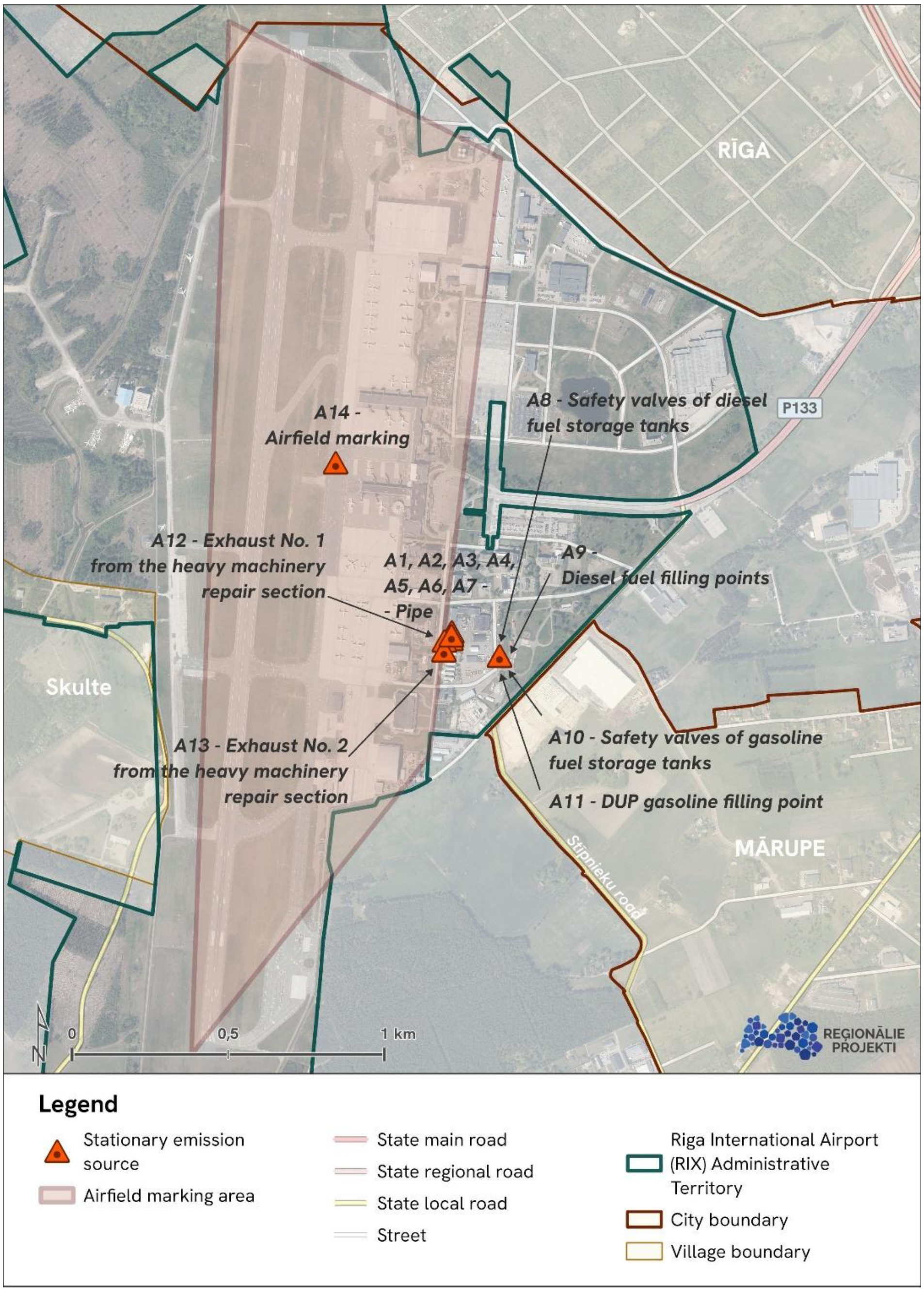


Image 9: Stationary emission sources (Source: B-category polluting activity permit No. RI15IB0030, State Environmental Service)

For the airport service vehicles (including passenger and cargo handling equipment, as well as apron and runway cleaning machinery), a fuel station (DUP) is located within the engineering and technical zone. Diesel fuel is stored in two above-ground tanks (each with a capacity of 25 m³), while petrol is stored in one above-ground tank (capacity 5 m³). The primary pollutant emitted is volatile organic compounds (VOCs).

Within the airport territory, two exhaust sources from heavy machinery repair facilities release the following pollutants: nitrogen oxides, nitrous oxide (NO), methane, carbon monoxide, non-methane volatile organic compounds (NMVOCs), particulate matter (PM2.5), ammonia, and sulphur dioxide (SO_2).

For marking and repainting roads and operational areas within the 272.4 ha airport territory, a Line Lazer V 250 SPS marking machine is used. These activities are carried out irregularly. The main pollutant released in this process is volatile organic compounds (VOCs). Although this is primarily a mobile pollution source, in the context of the B-category polluting activity permit, it is classified as a stationary emission source.

No	Emission Source Name/Code	Description	Pollutant	Emitted Pollutant Amount	
				mg/m³	t/year
1.	Mechanisation Unit (A1)	Charging of Electric Vehicle Lead-Acid Batteries	Sulphuric Acid	0,33	0,0026
2.	Mechanisation Unit (A2)		Sulphuric Acid	1,58	0,0124
3.	Mechanisation Unit (A3)	Vehicle Repair Zone	Hydrocarbons Benzene Oil Vapours C12-C19 Carbon Dioxide (CO_2) Formaldehyde Nitrogen Dioxide (NO_2)	10 2,7 0,125 2 0,361 6,4	0,0054 0,0015 0,00007 0,0011 0,0002 0,0043
4.	Mechanisation Unit (A4)		Hydrocarbons Benzene Oil Vapours C12-C19 Carbon Dioxide (CO_2) Formaldehyde Nitrogen Dioxide (NO_2)	22,2 6 0,139 3,3 0,04 10	0,0127 0,0034 0,00008 0,0018 0,00023 0,0057
5.	Mechanisation Unit (A5)		Hydrocarbons Benzene Oil Vapours C12-C19 Carbon Dioxide (CO_2) Formaldehyde Nitrogen Dioxide (NO_2)	27,8 7,5 0,144 4,4 0,407 10	0,0155 0,0042 0,00008 0,0024 0,0002 0,0056
6.	Mechanisation Unit (A6)		Hydrocarbons Benzene Oil Vapours C12-C19 Carbon Dioxide (CO_2) Formaldehyde Nitrogen Dioxide (NO_2)	22,2 7,5 0,164 4,4 0,447 11,1	0,0123 0,0033 0,00009 0,0024 0,00025 0,0061
7.	Mechanisation Unit (A7)		Hydrocarbons Benzene Oil Vapours C12-C19 Carbon Dioxide (CO_2) Formaldehyde Nitrogen Dioxide (NO_2)	22,2 7,5 0,164 4,4 0,447 11,1	0,0123 0,0033 0,00009 0,0024 0,00025 0,0061

No	Emission Source Name/Code	Description	Pollutant	Emitted Pollutant Amount	
				mg/m^3	t/year
8.	Diesel Storage Tank Safety Valves (A8)	HST Above-Ground	VOCs, including *Benzene* *n-Hexane* *Toluene*	3602 86 169 50	0,0041 *0,00010* *0,00019* *0,00006*
9.	FDP Diesel Fuel Filling Station (A9)		VOCs, including *Benzene* *n-Hexane* *Toluene*	3602 37 22 72	0,0016 *0,00004* *0,00008* *0,00002*
10.	Petrol Storage Tank Safety Valves (A10)		VOCs, including *Benzene* *Toluene* *Ethylbenzene* *1,2,4-Trimethylbenzene* *n-Hexane* *m-Xylene* *Cyclohexane* *Isooctane* *Isopropylbenzene*	-	0,00094 *0,31x10^{-6}* *0,68x10^{-6}* *0,5x10^{-7}* *0,3x10^{-7}* *0,47x10^{-6}* *0,23x10^{-6}* *0,7x10^{-7}* *0,6x10^{-6}* *0,1x10^{-7}*
11.	FDP Petrol Fuel Filling Station (A11)		VOCs, including Benzene Toluene Ethylbenzene 1,2,4-Trimethylbenzene n-Hexane m-Xylene Cyclohexane Isooctane Isopropylbenzene	-	0,00472 *0,15x10^{-5}* *0,341x10^{-5}* *0,26x10^{-6}* *0,14x10^{-6}* *0,236x10^{-5}* *0,116x10^{-5}* *0,36x10^{-6}* *0,3x10^{-5}* *0,5x10^{-7}*
12.	Exhaust No.1 from Heavy Equipment Maintenance Facility (A12)		Nitrogen Oxides Nitric Oxide (NO) Methane Carbon Monoxide (CO) Non-Methane Volatile Organic Compounds (NMVOCs) Particulate Matter PM2.5 Ammonia (NH_3) Sulphur Dioxide (SO_2)	125,2 0,6 0,9 67,1 17,9 3,9 3,7 0,04 0,1	0,03418 0,00017 0,00024 0,01831 0,00488 0,00106 0,00100 9,77 × 10^{-6} 3,14 × 10^{-5}
13.	Exhaust No.2 from Heavy Equipment Maintenance Facility (A13)		Nitrogen Oxides Nitric Oxide (NO) Methane Carbon Monoxide (CO) Non-Methane Volatile Organic Compounds (NMVOCs) Total Suspended Particles (TSP) PM2.5 Ammonia (NH_3) Sulphur Dioxide (SO_2)	125,2 0,6 0,9 67,1 17,9 3,9 3,7 0,04 0,1	0,03418 0,00017 0,00024 0,01831 0,00488 0,00106 0,00100 9,77 × 10^{-6} 3,14 × 10^{-5}

No	Emission Source Name/Code	Description	Pollutant	Emitted Pollutant Amount	
				mg/m^3	t/year
14.	Airfield Marking (A14, G14)	Mobile Marking Machine	VOCs, including	-	10,200
			n-Butyl Acetate		*3,300*
			Ethyl Acetate		*4,050*
			2-Methoxy-1-Methylethyl Acetate		*0,750*
			Butanone		*0,600*
			Acetone		*1,500*

Table 4: Stationary Air Emission Sources (Source: B-category Polluting Activity Permit No. RI15IB0030, State Environmental Service)

Aircraft refuelling takes place on the airfield; however, as the refuelling truck systems are designed to practically eliminate pollutant emissions into the air, they are not considered an air emission source. Aircraft refuelling with aviation fuel is carried out by two companies: **Ltd. "Gulfstream Oil"** and **Ltd. "RIXJET RIGA"**. A B-category permit (No. RI10IB0088) was issued in 2010 (renewed in 2017) for the operations of Ltd. "Gulfstream Oil" at the airport. The requested annual fuel turnover includes: 100,000 tonnes (125,000 m^3) of Jet A-1 aviation fuel, 100 tonnes (137 m^3) of AVGAS 100LL aviation fuel, 60 tonnes (71 m^3) of diesel fuel. Additionally, a B-category permit (No. RI13IB0050) was issued in 2013 for Ltd. "RIXJET RIGA", authorising an annual Jet A-1 aviation fuel turnover of up to 130,000 tonnes.

According to the RIX Net Zero 2035 Roadmap, the plan includes phasing out petrol-engine equipment and introducing electric vehicles. From 2025, fossil diesel fuel will be gradually replaced with synthetic diesel, increasing its share by 10% annually.The plan also includes replacing or operating Ground Power Units (GPU) with synthetic diesel from 2030, as well as replacing passenger buses with electric buses. Additionally, it is planned to either replace the gas boiler or procure biogas, implementing a zero-emission solution.

Mobile pollution sources include aircraft; however, their **impact is localised**. In 2010, a detailed calculation of aircraft emissions and pollutant dispersion was conducted (also used in the Strategic Environmental Impact Assessment for the previous airport development plan), concluding that concentrations of carbon monoxide, sulphur dioxide, PM10 dust, benzene, formaldehyde, and nitrogen dioxide did not exceed the regulatory limit values. The previous Strategic Environmental Impact Assessment (2014) indicated that emissions from aircraft were **insignificant and did not affect air quality outside the airport**. It was also noted that the highest pollution levels were concentrated in aircraft movement zones within the airport territory, which is considered a workplace environment. Air pollution modelling was also carried out in 2015 as part of the Environmental Impact Assessment for RIX infrastructure development projects up to 2020. The Environmental Impact Assessment concluded that a comparison of calculated emissions from engines with detected benzene and toluene concentrations in soil and groundwater samples clearly demonstrated that no increase in dispersed pollution was expected because of airport development. It was also stated that none of the pollutant concentrations were expected to exceed regulatory limits. No more recent specific studies have been conducted regarding aircraft as mobile pollution sources. It should be emphasised that over the past 10 years, **various efficiency improvements have been implemented both in aircraft and at the airport**, contributing to the reduction of greenhouse gas emissions from aircraft and airport servicing equipment. The replacement of Boeing 737-300 and 737-500 aircraft with the Airbus A220-300 has significantly reduced NOx emissions.

To assess the impact of aircraft emissions, the airport's carbon footprint reports are useful, as they include Scope 3 emissions (SCOPE 3) – indirect emissions resulting from the company's operations but not directly controlled by it. Aircraft, by burning aviation fuel, generate CO_2 emissions, which contribute to global warming, making aviation a significant source of greenhouse gases. Methane (CH_4) emissions from aircraft themselves are minimal. To fully evaluate the impact of aircraft on the climate, the CO_2 equivalent (CO_2e) is used. This metric converts emissions of various greenhouse gases into equivalent amounts of CO_2, helping to quantify the overall climate impact of aviation.

Emission Type	Greenhouse Gases	
	t CO_2e	% of Total CO_2e
Aircraft LTO (Landing and Take-off) Emissions	*50 906.2*	68.12%
Aircraft APU (Auxiliary Power Unit – a small engine providing electrical power and air conditioning on the ground when main engines are off)	*1 618.4*	2.17%
Aircraft MRO (Maintenance, Repair, and Overhaul)	*275.5*	0,37%
Total	***52 800.1***	**70%**

Table 5: Aircraft Emissions (Source: RIX Airport Carbon Footprint Report for 2023 (20.01.2024))

Overall, it can be concluded that the emissions generated by the airport and the impact of pollution sources on air quality are currently low and do not exceed the air quality limits set by regulatory standards. It follows that emissions associated with airport operations do not pose a risk of air quality deterioration in the surrounding environment. Furthermore, no reports or complaints have been received to date regarding odours related to the airport territory or its impact on the surrounding area.

4.5. Energy Management

The airport's energy management includes the use of various energy resources to support its operations, including fuel, electricity, and diesel.

Thermal energy for the airport is supplied by Ltd. "Industry Service Partner," which also ensures the operation of ventilation systems. A portion of the purchased thermal energy is resold to tenants[9]. For building heating and hot water preparation, a boiler house is used, operating with **renewable energy resources – wood chips –** as well as gas. Ltd. "Industry Service Partner" has been issued a B category permit for polluting activities (combustion installations) at Ziemeļu Street 18, within the airport territory. To reduce pollutant emissions into the atmosphere, a multicyclone is used before discharging flue gases from the wood chip boiler, effectively filtering out solid particles. The main pollutants emitted into the air include carbon dioxide (CO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), total suspended particles, including PM10 and PM2.5, and sulphur dioxide (SO_2) [10].

Compared to 2019, the airport's **thermal energy** consumption in 2023 decreased by 2,063.86 MWh, or 22.56%. In relation to the heated area, consumption in 2023 was 0.105 MWh/m², which is lower than the 2022 level. The 2023 target of not exceeding 0.120 MWh/m² was achieved due to **energy-saving measures**, such as reducing indoor temperatures and employee education on energy efficiency.

The airport uses **electricity** for airfield and public area lighting, as well as for powering terminals and technical buildings. Various devices and vehicles operate on electricity, with their number increasing as older diesel-powered equipment is replaced with energy-efficient electric alternatives. In 2023, the airport set a target of not exceeding 0.0030 MWh per serviced unit in electricity consumption, which was successfully achieved with a result of 0.0024 MWh/SV, representing a 15.55% decrease compared to 2022. The airport has

[9] SJSC "Riga International Airport" Non-Financial Statement 2023

[10] Decision No. RI16VL0503, On Amendments to the B-Category Polluting Activity Permit No. RI15IB0004 Issued to Ltd. "Industry Service Partner" (State Environmental Service, 2016)

implemented various energy efficiency improvements, including the installation of LED lighting in multiple buildings[11].

Energy Resource	2019	2020	2021	2022	2023
Electricity	13209.45	12308.88	15734.02	15681.83	16157.93
Thermal Energy	9136.81	6866.37	8886.8	7349.29	7072.95
Diesel Fuel	8018.76	2544.86	4605.9	5320.46	5343.35
Fuel	353.56	205.99	198.85	215.37	291.83
Total	**30718.58**	**21926.09**	**29425.57**	**28566.95**	**28866.06**

Table 6: Airport Energy Resource Consumption in MWh (Source: RIX Non-Financial Statement 2023)

According to the EIA report on airport infrastructure projects up to 2020, the **airport lighting system** is designed to have minimal impact on the surrounding area and residents. The lighting system, which ensures safety during flights, is directed towards the sky and does not produce excessive scattered light on the ground. As a result, the lighting does not disturb nearby residents, even at night or in low-visibility conditions. Rotating solar light reflectors used for bird deterrence operate only during daylight hours, reflecting light upwards. They are installed at a low height, making them invisible outside the airfield territory, thereby preventing potential disturbances. Overall, the airport's lighting infrastructure is designed and maintained to ensure maximum operational safety while minimising negative impacts on the surrounding environment and local population[12]. To reduce the impact on climate change, the airport's street lighting and apron lighting around Terminal B have been upgraded by replacing conventional bulbs with LED lights. Additionally, LED lighting has been partially installed for Runway 18 touchdown zone lights, stop bars, and informational signs[13]. The complete replacement of apron and runway lighting with LED is planned to be completed by 2025[14].

Fuel is the primary energy source for airport vehicles, refuelled both on and off the airport premises. The majority (96%) consists of diesel fuel, with 568,442 litres consumed in 2023, representing a 0.43% increase compared to 2022. Petrol consumption reached 31,837 litres, marking a 35.51% increase from 2022.The largest consumers of diesel fuel are passenger and cargo handling equipment, as well as apron and runway cleaning machinery. The rise in fuel consumption during the winter months of 2023 was driven by weather conditions and snow clearance operations. The airport is committed to gradually replacing its vehicle fleet with alternative fuels by 2030 and actively promotes efficient vehicle use among employees[15].

The airport's current energy resource management is considered efficient, as significant energy-saving targets have been achieved over the past five years, reducing thermal energy and electricity consumption per unit. This has been accomplished through the implementation of energy efficiency measures while simultaneously planning a gradual transition to alternative fuel sources.

4.6. Environmental noise

One of the most significant environmental and negative social impacts resulting from airport operations is the noise generated by aircraft.

[11] RIX Environmental Report 2023

[12] Environmental Impact Assessment Report for Riga International Airport Infrastructure Development Projects until 2020 (LTD “Eiroprojekts”, 2015)

[13] RIX Sustainability Strategy 2022–2030

[14] RIX Non-Financial Report 2023

[15] RIX Environmental Report 2023

The most substantial noise emissions extending beyond the airport territory occur during **aircraft take-off and landing**. Aircraft manoeuvring, idling of engines in the apron area, ground handling equipment, and other operational machinery are not expected to produce noise levels high enough to approach the prescribed noise limits outside the airport premises[16].

Since 2008, **aircraft noise monitoring** has been conducted, collecting data from four stationary monitoring stations and analysing aircraft radar data and flight information. Every five years, the airport develops a **Strategic Noise Map (SNM)** and an **Action Plan for Noise Reduction**. The latest SNM was approved in 2023, based on data from 2022[17]. Meanwhile, a new Action Plan for Noise Reduction was developed in 2024, outlining measures to reduce noise in the territories of Mārupe and Olaine municipalities, as well as the city areas of Riga and Jūrmala[18]. The airport's operations themselves do not generate significant noise; it is the aircraft taking off and landing at the airport that cause the noise. As a result, the environmental noise emissions have an indirect impact on the surrounding area from the airport[19].

The largest proportion of flights, both during take-off and landing, occur during the day (07.00 – 19.00). In contrast, there are more aircraft landings than take-offs in the evening.

Gads	Landing						Taking off					
	Day (07.00 – 19.00)		Evening (19.00 – 23.00)		Night (23.00 – 7.00)		Day (07.00 – 19.00)		Evening (19.00 – 23.00)		Night (23.00 – 7.00)	
2024	**17969**	28,4%	**8308**	13,1%	**5317**	8,4%	**22093**	35,0%	**4539**	7,2%	4961	7,9%
2023	**17922**	*29,2%*	**7905**	*12,9%*	**4849**	*7,9%*	**21513**	*35,1%*	**4588**	*7,5%*	**4567**	*7,4%*
2022	**16262**	*29,7%*	**7075**	*12,9%*	**4072**	*7,4%*	**19884**	*36,3%*	**3232**	*5,9%*	**4291**	*7,8%*
2019	**25682**	*29,5%*	**11596**	*13,3%*	**6232**	*7,2%*	**32446**	*37,3%*	**3886**	*4,5%*	**7180**	*8,3%*
2016	**21065**	*30,9%*	**8484**	*12,5%*	**4485**	*6,6%*	**25937**	*38,1%*	**3322**	*4,9%*	**4776**	*7,0%*

Table 7: Number of Aircraft Serviced at the Airport by Time of Day (Number of Flights and Percentage of Total Flights), Source: SJSC "Riga International Airport" Noise Reduction Action Plan (2024)

Under the regulations, permissible traffic-related environmental noise limits differ by time of day:

L_{day}, *dBA*	$L_{evening}$, *dBA*	L_{night}, *dBA*
65	**60**	**55**

The noise limit is the permissible noise indicator value, which, if exceeded, obliges the airport to consider or **implement measures** to reduce the noise indicator value.

In the context of the SNM, the airport surroundings are the area where the night-time noise level in 2022 exceeded 40 dBA (i.e., a total of 87.1 km²). This area is located within Mārupe Municipality and the territory of Riga City, with a small part also covering Olaine Municipality and the city of Jūrmala. In 2022, when the current SNM was developed, most of this area had no specific noise level restrictions assigned to its use. The aircraft noise contours in all parts of the day have a similar configuration and extend along the runway axis. The area where the **24-hour noise indicator exceeds 55 dBA** covers 21.2 km², affecting 1,640 residents and 480 dwellings.

[16] Permit for Category B Polluting Activity No. RI15IB0030 Annex 1 (2024)
[17] SJSC “Riga International Airport” Non-Financial Statement 2023
[18] SJSC “Riga International Airport” Noise Reduction Action Plan 2024
[19] Strategic Environmental Impact Assessment of the SJSC “Riga International Airport” Development Plan 2012–2036

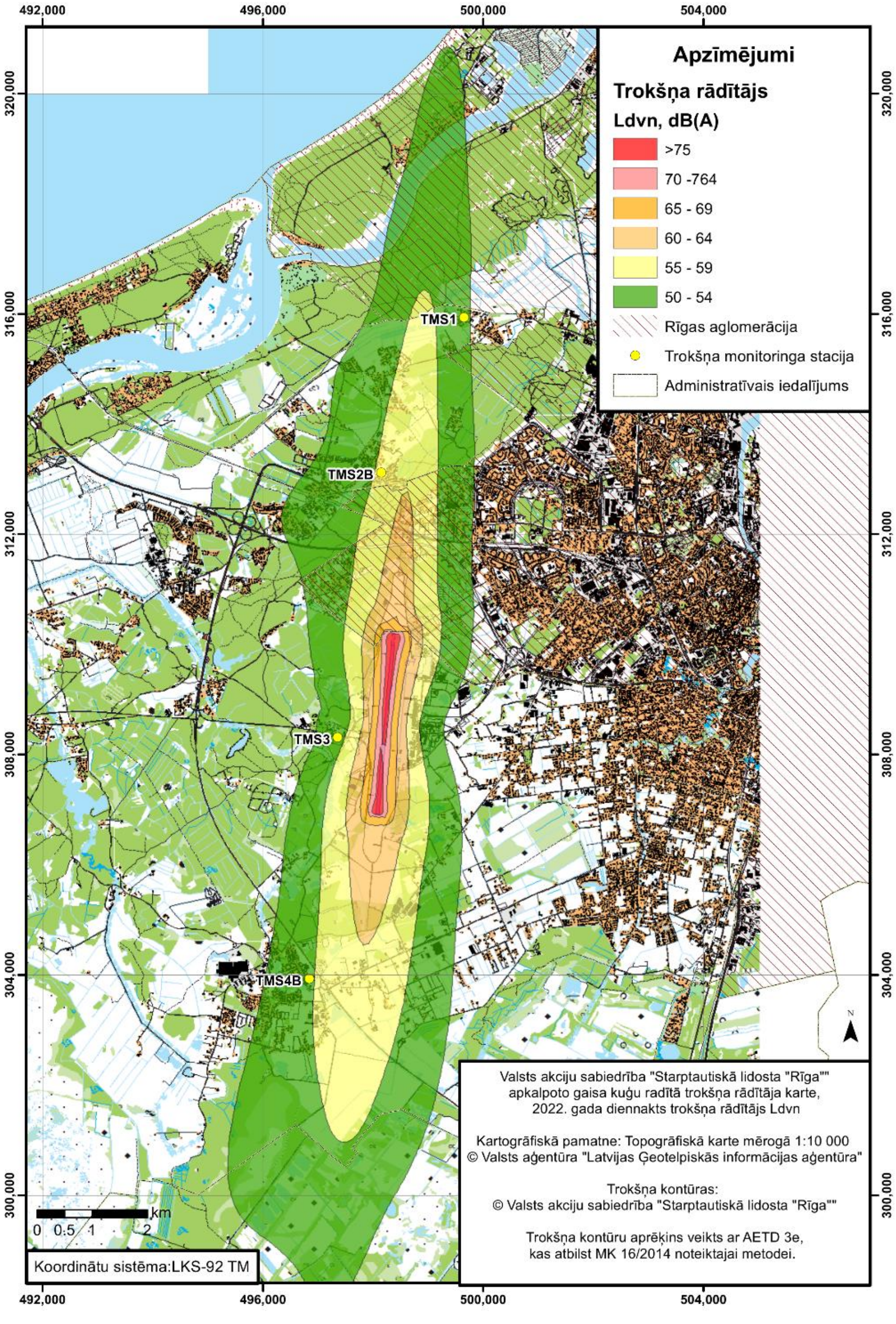


Image 10: 24-Hour Noise Indicator Map (Source: State Joint Stock Company “Riga International Airport” Strategic Noise Map, Part IV. Mapping Results in Map Form, 2023)

The SNM indicates that the noise contours extend further south than north, which can be explained by the higher proportion of departing aircraft in the southern direction. When taking off to the south, most aircraft turn westward, causing the noise contours to shift westward. When departing to the north, aircraft that turned west shortly after take-off crossed the Beberbeķi neighbourhood of Riga City until 16 June 2022, resulting in noise contours extending relatively far to the west. Since 17 June 2022, aircraft have been required to turn later, north of Spilve village[20].

[20] SJSC Riga International Airport Summary of the Noise Action Plan (2024)

		L_{den} >55 dBA	L_{day} >55 dBA	$L_{evening}$ >50 dBA	L_{night} >45 dBA
	Affected Area, km²	21,2	20,8	26,5	32,7
	Affected Residents	1640	400	2560	4350
	Affected Dwellings	480	130	730	1080

Table 8: Area Affected by Specific Noise Indicators, Number of Residents and Dwellings (rounded to the nearest ten), Source: SJSC "Riga International Airport" Noise Reduction Action Plan Summary (2024)

The noise level has significantly decreased throughout the 24-hour period compared to 2016, primarily due to a lower number of flights. Amendments to the permitted land use regulations made by municipalities have altered the applicable noise limits in several areas, which is cumulative with changes in the population distribution.

There has been a significant increase in the number of residents exposed to exceedances of the evening noise limit. This increase is not related to changes in aircraft noise contours but rather to population growth and modifications to the permitted land use.

The population in the immediate vicinity of the airport is relatively low, with the closest settlement being Skulte. In November 2023, according to Mārupe Municipality data, Skulte had 1,094 residents.

On 3 November 2023, following the approval of the SNM, noise limits for traffic noise were revised. Aircraft noise exceeds the noise limits effective from 3 November 2023 only in dwellings located in areas designated for land use that do not permit residential development, specifically in commercial and light industrial zones. The exceedances are presented in relation to the noise limits in force at the time of the SNM approval.

Noise Limit Exceedance, dB(A)	L_day	L_evening	L_night
	Affected area (**km²**)		
-5 – -1	5,7	7,6	7,8
0 –4	0,5	4,8	5,9
5 – 9	0	0,4	1
Total	***0,5***	***5,2***	***6,9***

Table 9: Noise Limit Exceedances – Affected Area (Source: SJSC "Riga International Airport" Noise Reduction Action Plan 2024)

Noise Limit Exceedance, dB(A)	L_day	L_evening	L_night
	Affected Residents		
-5 – -1	2536	5704	6300
0 –4	300	2033	2896
5 – 9	0	299	531
Total	**300**	**2332**	**3427**

Table 10: Noise Limit Exceedances – Affected Residents (Source: SJSC "Riga International Airport" Noise Reduction Action Plan 2024)

Noise Limit Exceedance, dB(A), dB(A)	L_day	L_evening	L_night
	Affected Dwellings		
-5 – -1	734	1726	1970
0 –4	103	591	909
5 – 9	0	101	168
Total	**103**	**692**	**1077**

Table 11: Noise Limit Exceedances – Affected Dwellings (Source: SJSC “Riga International Airport” Noise Reduction Action Plan 2024)

The total area around the airport where **noise limit exceedances** have been identified according to the SNM is 0.5 km² during the day, 5.2 km² in the evening, and 6.9 km² at night. In total, noise limit exceedances affect 300 residents and 103 dwellings during the day, 2,332 residents and 692 dwellings in the evening, and 3,427 residents and 1,077 dwellings at night. Most affected residents live in the villages of Jaunmārupe, Spilve, and Mežāres, as well as in the Beberbeķi neighbourhood of Riga City and the western part of the Imanta neighbourhood.

The only institution located in an area where the noise level exceeds the noise limit is the **pre-school education institution "Zīļuks" in Jaunmārupe**. However, the exceedance occurs in the evening and at night when children are not present at the institution. Jaunmārupe Primary School is situated in an area where Lnight exceeds 45 dBA and Levening exceeds 50 dBA. However, the noise limit set for educational institutions is 55 dBA, meaning that the noise level remains below the prescribed limit[21].

The number of noise complaints received by the airport is low. Typically, most complaints come from residents living outside the SNM area rather than within it and are primarily related to specific, exceptional noise events rather than the continuous airport noise. For example, a higher number of complaints were received in August 2024 due to a significant increase in helicopter flights. Additionally, several comments regarding airport noise were submitted during the public consultation on the draft Noise Reduction Action Plan in 2024.

	2018	2019	2020	2021	2022	2023	2024[22]
Total Number of Complaints	2	3	1	11	1	2	8

Table 12: Number of Received Feedback Classified as Noise Complaints (Source: SJSC “Riga International Airport” Noise Reduction Action Plan 2024)

Objections and proposals regarding airport-generated noise were received during the development of the Riga City Council's Action Plan for Environmental Noise Reduction in the Riga Agglomeration 2024–2028. The association "Rītabuļļi" submitted a proposal related to airport operations, highlighting several aspects, including aircraft landing trajectories, the noise monitoring system, and the number of night flights.

The airport registers and analyses all complaints received regarding noise – both those submitted directly by residents and those forwarded by other institutions (including municipalities). The compilation of complaints is not administratively limited to the territory of a single municipality, and complaints may also relate to adjacent areas within the zone of impact. Complaints are geographically identified, and summary information is regularly reviewed by the Environmental Noise Management Working Group and submitted to the State Environmental Service.

The airport conducts **aircraft noise monitoring** and has established a **Noise Monitoring Station Index**, which normalises the noise level in relation to the scale of airport operations – considering the number of passengers

[21] SJSC “Riga International Airport” Noise Reduction Action Plan 2024
[22] Līdz 12.11.2024. saņemto sūdzību skaits (lidostas sniegtā informācija)

served, cargo volume, and flight numbers. Changes in the noise index at all monitoring stations have been gradual, primarily due to the renewal of airline fleets. The fleet renewal of JSC "Air Baltic Corporation" has been completed, while other airlines are gradually introducing newer aircraft types for flights to the airport[23].

Parameter	Station	2016	2017	2018	2019	2020	2021	2022	2023	2024	2024 vs 2016
Noise index[24]	TMS1	51,8	51,6	51,2	50	50,4	49,7	48,9	49,2	49,2	**-2,6**
	TMS2B	56,7	56,3	56,2	55,4	54,8	54	54,4	54,1	54,2	**-2,5**
	TMS4	57,3	57,3	56,6	55	54,6	54,1	53,2	52,3	52,7	**-4,6**
L_{day}	TMS1	48,1	48,6	48,4	47,8	44,2	43,5	45,4	46,5	46,1	**-2**
$L_{evening}$		47,7	47,9	47,8	47,7	44	43,4	45,2	46,9	46,8	**-0,9**
L_{night}		44,2	44,7	44,9	44,1	38,4	38,4	40,9	42	42,5	**-1,7**
L_{den}		51,8	52,2	52,3	51,7	46,9	46,6	48,8	50	50,2	**-1,6**
L_{day}	TMS2B	53,5	53,5	54,3	53,5	47,9	48,4	51	51,7	51,2	**-2,3**
$L_{evening}$		52,2	52,3	52,8	52,7	48,1	48,4	50,5	51.6	51,4	**-0,8**
L_{night}		48,7	49,1	50,2	49,3	41,7	42,7	46,7	47,1	47,5	**-1,2**
L_{den}		56,5	56,8	57,7	56,9	50,6	51,3	54,4	55	55,1	**-1,4**
L_{day}	TMS3	50,4	49,9	49,6	48,7	45,4	45,2	46,1	47,1	46,6	**-3,8**
$L_{evening}$		49,4	49,4	49,2	49,1	45,9	45,7	46,5	47,3	46,9	**-2,5**
L_{night}		47,1	46,9	47	46	39,5	41,1	43,4	43,6	44,5	**-2,6**
L_{den}		54,4	54,1	54,1	53,3	48,3	49	50,7	51,1	51,6	**-2,8**
L_{day}	TMS4	54,9	55,6	55,5	53	49,7	49,9	49,9	49,9	50,2	**-4,7**
$L_{evening}$		50,4	51,2	53,1	50,9	48,8	49	48,4	48,7	48,7	**-1,7**
L_{night}		49,2	51	50,2	47,8	42,9	44,6	45,3	45	46.5	**-2,7**
L_{den}		56,9	58,3	58	55,6	51,8	52,7	53	52,9	53,8	**-3,1**

Table 13: Noise Monitoring Results and Noise Index Values (Source: SJSC "Riga International Airport")

In 2024, the **aircraft noise index** was 60700, which is higher than in 2022 but significantly lower than in 2019. Although the number of passengers served has increased, the index value in 2024 was 18.54% lower than in 2017. The increase in the index is primarily due to a rise in the number of flights, though it has been slightly offset by a lower proportion of evening and night flights, as well as the use of quieter aircraft. Below is a summary of changes in the aircraft noise index, reflecting the development of the aircraft fleet at the airport.

[23] SJSC "Riga International Airport" Development Plan 2012–2036 Monitoring Report

[24] According to information provided by the airport, the noise index is not calculated for station TMS3 due to methodological challenges.

Year	Aircraft Noise Index, points	Number of flights	Number of passengers, million
2017	74516	74837	6,1
2018	84414	83468	7,1
2019	83821	87007	7,8
2020	26725	35591	2,0
2021	34063	39057	2,4
2022	50687	54818	5,4
2023	55413	61345	6,6
2024	60700	63186	7,1

Table 14: Changes in Aircraft Noise Index, Number of Flights, and Number of Passengers 2017–2024 (Source: SJSC "Riga International Airport")

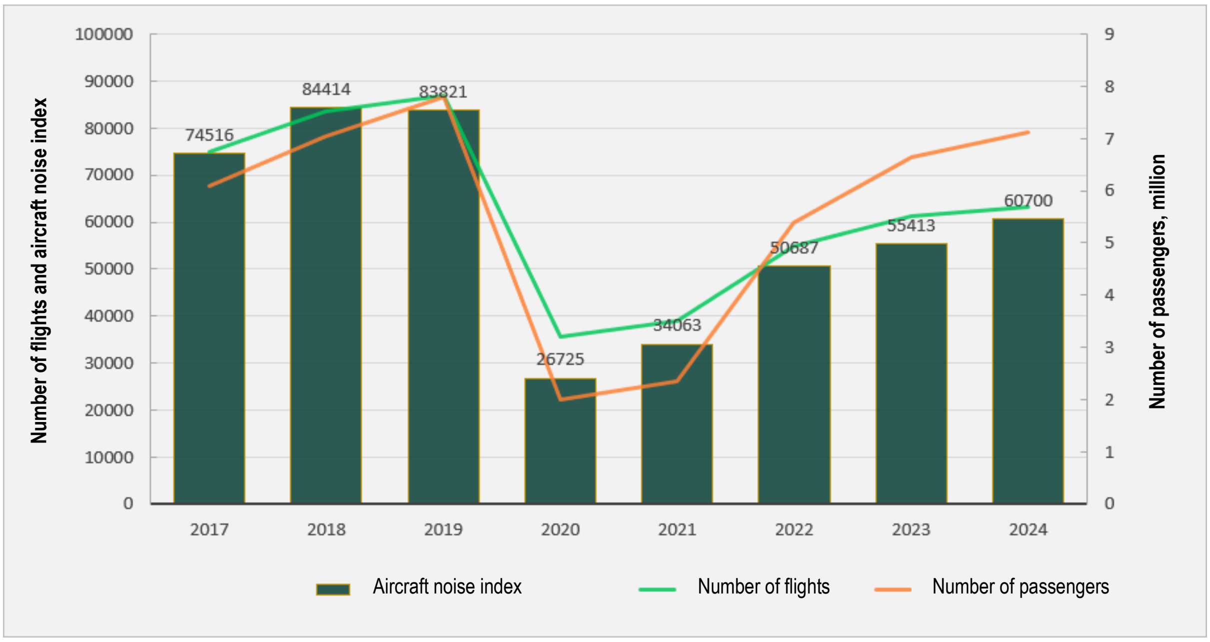


Image 11: Changes in Aircraft Noise Index, Number of Flights, and Number of Passengers 2017–2024 (Source: SJSC "Riga International Airport")

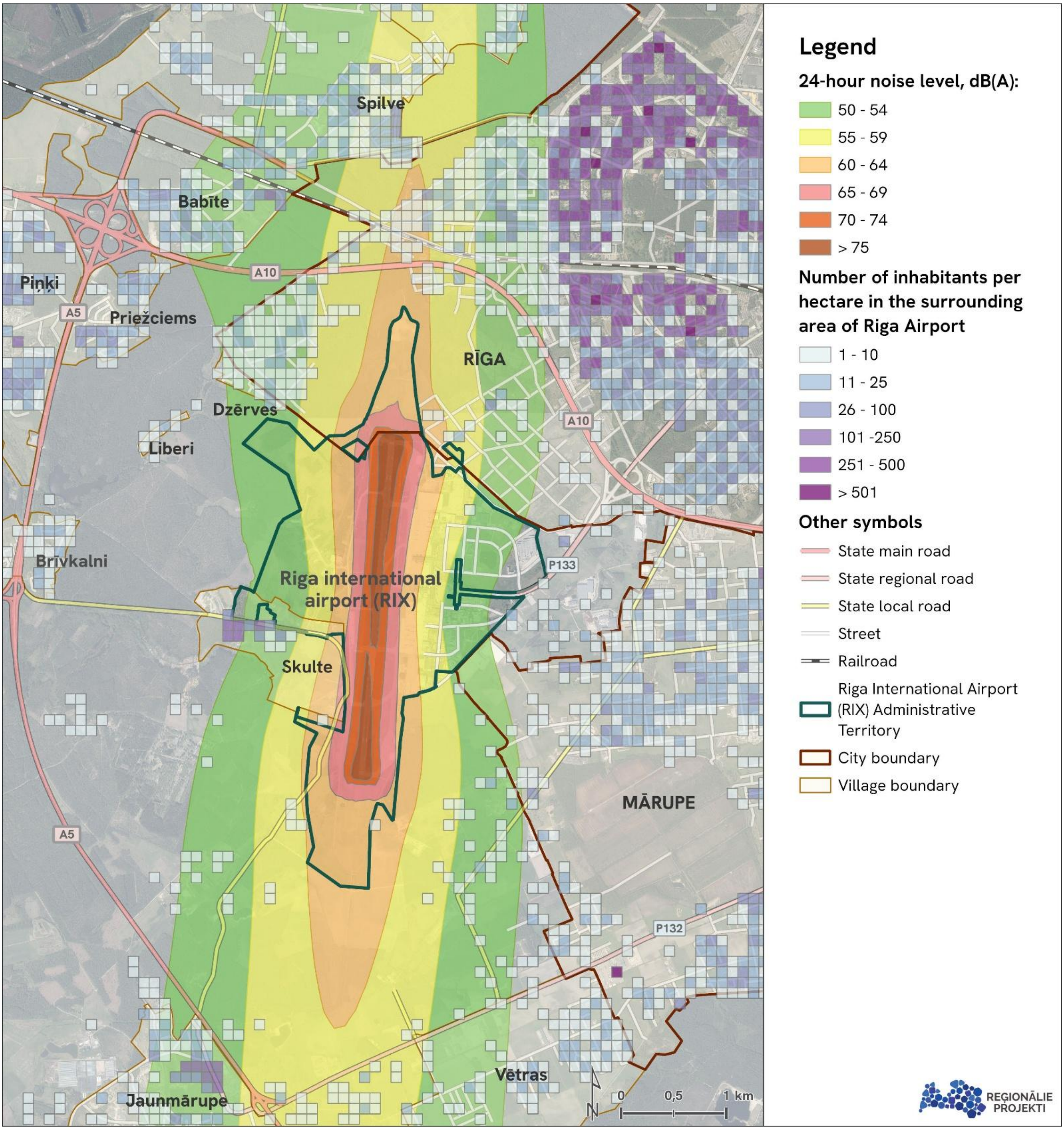


Image 12: Noise Indicator and Population Density in the Vicinity of the Airport (Source: Office of Citizenship and Migration Affairs data as of early 2023 and SJSC "Riga International Airport" Strategic Noise Map (2023), based on 2022 data)

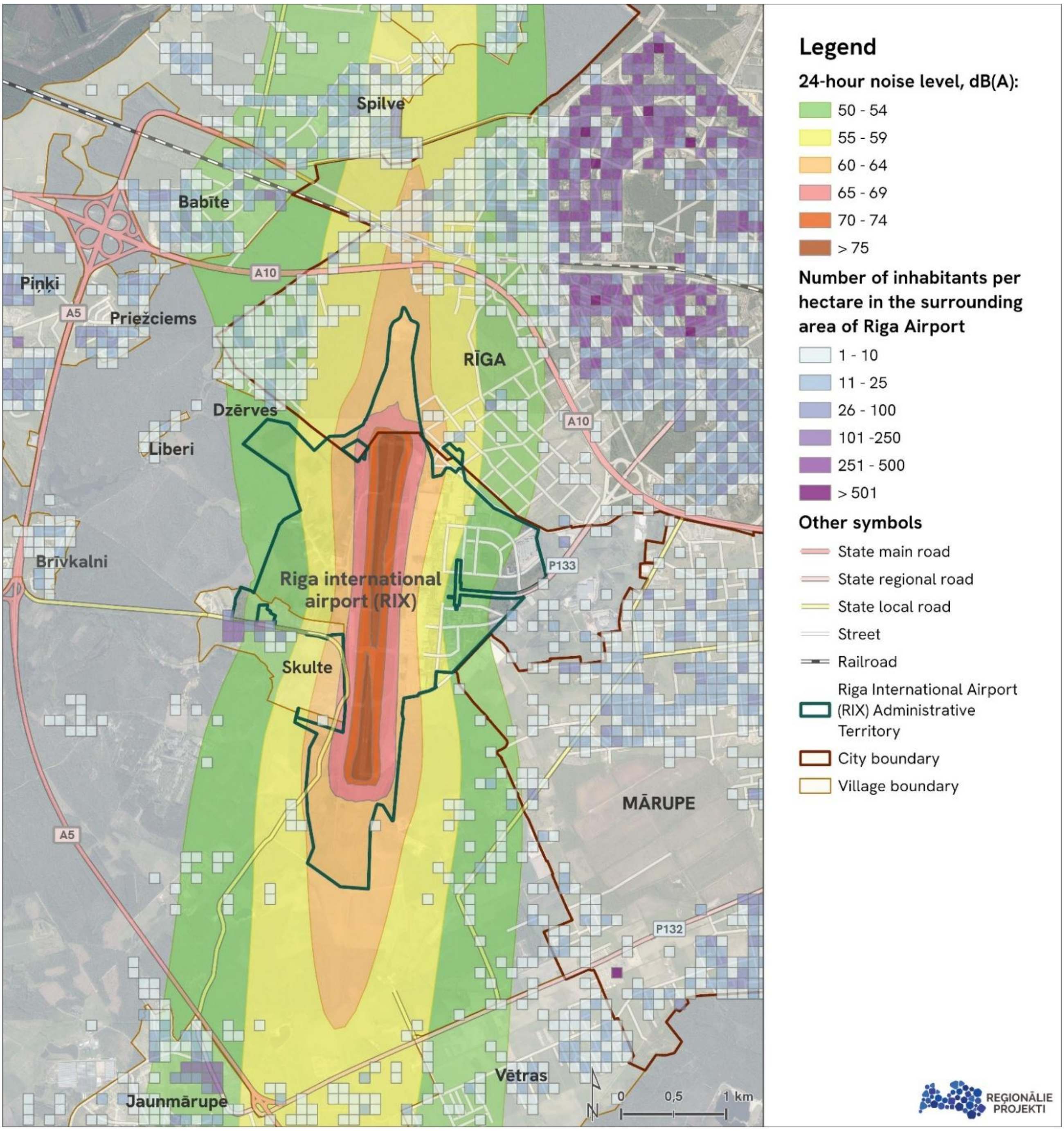


Image 13: Noise Indicator and Settlements (Cities and Villages) in the Vicinity of the Airport (Source: SJSC "Riga International Airport" Strategic Noise Map (2023), based on 2022 data)

To mitigate noise impacts, the airport has implemented **various noise reduction measures** both before the approval of the previous action plan in 2018 and during its implementation. Among the earlier measures introduced were noise certification requirements for aircraft registered in Latvia, environmental noise management at the airport, fleet renewal by AirBaltic and other airlines, enhanced cooperation in land-use planning between the aviation sector and noise-affected municipalities, the establishment of a cooperation framework between the Civil Aviation Agency (CAA) and municipalities, and the formation of a working group with an aviation industry sub-group.

The latest noise reduction measures implemented by the airport include **procedural changes** for using global positioning and navigation systems for flight trajectories, allowing arriving aircraft to approach the airport while avoiding overflights of Riga's Rītabuļļi neighbourhood and the city of Olaine during approach. Following an initial review of procedures in 2022, additional adjustments were made to procedures for flights taking off to the north and making a quick turn westward. A **rapid exit taxiway** was constructed to reduce noise impact on the village of Skulte. AirBaltic has fully transitioned its fleet to quieter Airbus A220-300 aircraft, and cargo aircraft have also become quieter, although cargo operations have not developed as planned due to geopolitical circumstances.

The latest action plan also includes various **planned noise reduction measures**, continuing existing operational initiatives and introducing new ones. The airport will continue assessing and optimising overflights of populated areas (Vētras and Jaunmārupe) and reviewing and refining taxiing and approach procedures to improve flight trajectory efficiency. New operational measures include effective noise prevention communication for Airbus A220-300 aircraft, evaluating helicopter flight procedures, monitoring departure trajectory compliance with noise reduction principles, collaborating with stakeholders to increase the proportion of take-offs and landings from the south, and implementing height control procedures. Additionally, ongoing informational, educational, and research activities will continue, including noise monitoring, publishing aircraft engine test results and noise indices, and introducing new initiatives, including the development of a map showing the number of night-time flights with noise levels exceeding 70 dBA, as well as the provision of training to airlines on aircraft noise management.

In parallel with operational measures, the Airport, in cooperation with Riga State City Municipality, Mārupe Municipality and the Ministry of Transport, will ensure that spatial planning documents and their amendments consistently retain and apply requirements for the mitigation of noise impacts, including provisions relating to land use and development conditions and building sound insulation solutions within areas affected by aircraft noise. The Airport will also continue to participate in the INDIGO research project, promoting the long-term reduction of aircraft noise levels.

The noise pollution generated by aircraft engines is a significant environmental impact factor that can affect the quality of life for residents in surrounding areas, requiring special attention. Considering the measures implemented and planned so far, it can be concluded that the airport is aware of its impact on the surrounding community and consistently undertakes activities to mitigate noise effects. The airport's operations are of great importance, and while noise pollution is an influencing factor, the relatively low number of noise-related complaints suggests that the strategic significance of the airport is, in many cases, balanced with its environmental impact. The measures implemented have helped reduce noise-related inconveniences for residents. It is essential to continue noise reduction efforts and actively collaborate with affected stakeholders to ensure balanced development and safeguard the interests of residents in the surrounding areas.

4.7. Drinking water quality

Water for operational and domestic needs is supplied from **three groundwater extraction wells** owned by the airport (*water management district code – 3812223, territory code – 0807*600). The extracted water originates from the Gauja Suite artesian aquifer (D3Gj). The maximum permitted water extraction volume, as specified in the Category B Polluting Activity Permit, is 822 m^3/day or 300,000 m^3/year. Of this, 1,000 m^3/year is allocated for **production processes**, while 299,000 m^3/year is designated for **domestic needs**.

Artesian Well Identification Number	Year of Installation	Well Depth	Flow Rate (l/s)	Water Volume (m^3/day)	Water Volume (m^3/year)
P100899 (DB1052)	1965	160 m	9.2	122	44 500
P101487 (DB21446)	2006	180 m	22.5	350	127 750
P101642 (DB25133)	2007	181 m	15.0	350	127 750

Table 15: Water Extraction (Sources: Category B Polluting Activity Permit No. RI15IB0030 and its Annex 1)

It is specified that a strict protection zone with a 10-metre radius must be maintained around each well. A bacteriological protection zone is not required, while the chemical protection zone around each well covers approximately 178 hectares.

The extracted water is classified as moderate-quality groundwater (freshwater with an elevated iron content). The drinking water supply system is equipped with a water treatment station **for iron removal and softening.** Powdered potassium permanganate is used for iron removal, while granulated NaCl is used for softening. Before being loaded onto aircraft, the water undergoes additional disinfection using a special drinking water disinfectant. In accordance with the manufacturer's procedure, it is left to stand for 30 minutes and stored in a cistern before delivery to the client. Water usage is monitored through water meters, and measurement data is regularly recorded in the "Instrumental Water Extraction Logbook".

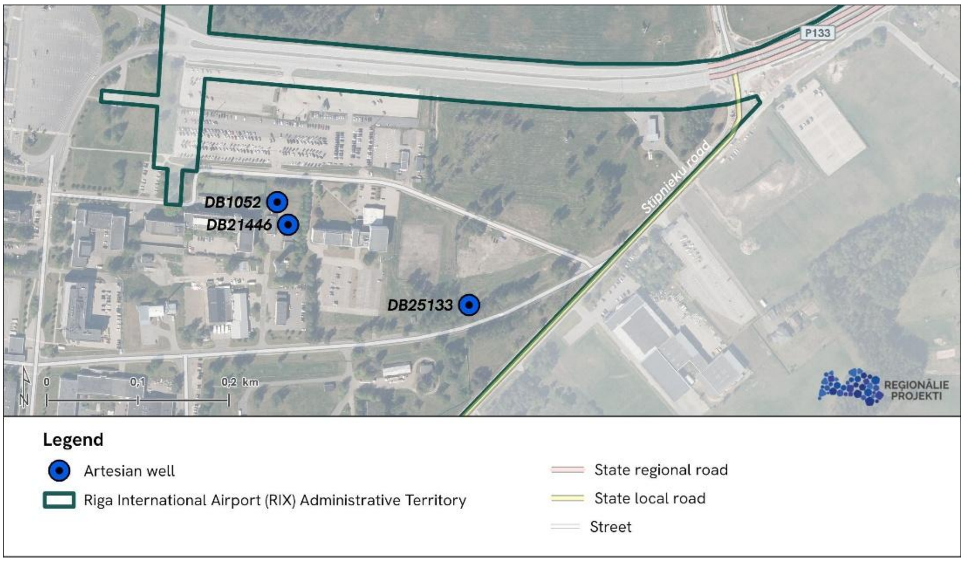


Image 14: Water Extraction Sources (Source: Category B Polluting Activity Permit No. RI15IB0030)

In 2024, the State Environmental Service (SES) concluded that the water extraction limits for each well (m³/day and, consequently, m³/year) were set differently from the approved designed flow rates in the deposit passport for each water extraction well. It was noted that recording the extracted water volume using a single water meter does not comply with the regulatory requirements for water accounting. According to the Category B Polluting Activity Permit, there is only one water meter, which is located after the iron removal station. Therefore, it is currently not possible to determine the actual consumption from each well. The pumps are equipped with an automatic control system, which switches them evenly, also considering the lowering of the water level in the well to ensure uniform water extraction. Domestic wastewater is discharged into the Ltd. “Rīgas ūdens” sewer system. In recent years, water consumption has been significantly lower than the amount permitted in the deposit passport.

Consumer	2019	2020	2021	2022	2023
Airport	67 389	28 040	30 463	54 064	56 698
Tenants and Airfield Service Providers	69 995	52 927	45 361	52 350	56 954
Total	**137 384**	**80 967**	**75 824**	**106 414**	**113 652**

Table 16: Water Consumption at the Airport, m³ (Source: SJSC “Riga International Airport” Non-Financial Statement 2023)

The airport's water resources provide **water supply** for the airport, tenants, and service providers in accordance with contractual agreements. In very small quantities, drinking water in 18.9-litre polycarbonate bottles and 0.5-litre bottles is supplied by an external service provider. Water quality and consumption are monitored in accordance with established regulations, and monitoring results are submitted annually to the relevant authorities. Every quarter, airport specialists conduct well level measurements to assess water inflow and well performance. Although reduced performance has been observed in one of the wells, it does not affect the overall supply system. The highest water consumption occurs in the airport terminal and administration buildings. The airport does not extract water from areas experiencing water shortages. In 2023, the calculated total water consumption per passenger was 0.0086 m^3. The Airport Sustainability Strategy 2022–2030 sets a goal to improve drinking water quality at the airport and promote the rational use of water resources, ensuring that water consumption per passenger does not exceed 0.011 m^3. This target was achieved in 2023[25].

The results of the groundwater monitoring in the airport's groundwater deposit area in 2023 (i.e., testing reports for all three wells) concluded that the only exceeded parameter was the iron content (however, the airport implements iron removal measures). The 2024 testing reports from the artesian wells indicate that iron exceedance remains only in one well (No. 1052 (No.1)). None of the other monitored parameters in 2024 exceeded the set limits. Similarly, the 2024 drinking water test report from the water tower showed no exceedances, except for a slight excess in total iron, which was within the testing uncertainty margin of +/- 0.01. The only parameter slightly exceeded at the drinking water treatment site on the apron (VAD water supply) was sodium (Na), detected in the third quarter. Testing from the water tanker did not indicate any exceedances of monitored parameters.

The Airport Sustainable Development Strategy 2022–2030 envisions **expanding the use of water-saving solutions**, discontinuing the purchase of drinking water in polycarbonate bottles, and implementing various educational initiatives regarding drinking water consumption.

The airport's water consumption does not significantly impact the surrounding environment, and no major issues affecting drinking water quality have been identified. Water is extracted from underground wells, treated in accordance with quality requirements, and consumption remains below the permitted limits.

4.8. Wastewater quality

Given the specific nature of the airport's operations, two separate sewer network systems are in place – **domestic and stormwater drainage** – ensuring wastewater management in accordance with the requirements set out in the issued Category B Polluting Activity Permit.

<u>Domestic wastewater</u> is discharged into **two central sewage pumping stations** (KSS): KSS-2 receives wastewater from the Business Park area, while KSS-1 handles wastewater from the rest of the airport territory.[26]

Both sewage pumping stations (KSS) discharge domestic wastewater into the **centralised sewer network** through a single pressure pipeline, in accordance with a contractual agreement with Ltd. “Rīgas ūdens”. The wastewater outflow connects to the Ltd. “Rīgas ūdens” system at the intersection of Jūrkalnes and Zolitūdes streets in Riga. According to the Category B permit, the total maximum allowable volume of domestic wastewater is 299,000 m^3 per year (or 819.178 m^3 per day)[27]. For domestic wastewater quality control, regular analyses are conducted at both central sewage pumping stations (KSS) and at six domestic wastewater monitoring points located at various tenant sites[28].

[25] SJSC “Riga International Airport” Non-Financial Statement 2023

[26] Strategic Environmental Impact Assessment of the Riga International Airport Development Plan 2012–2036

[27] Permit for Category B Polluting Activity No. RI15IB0030

[28] Domestic Wastewater Self-Monitoring Plan 2024

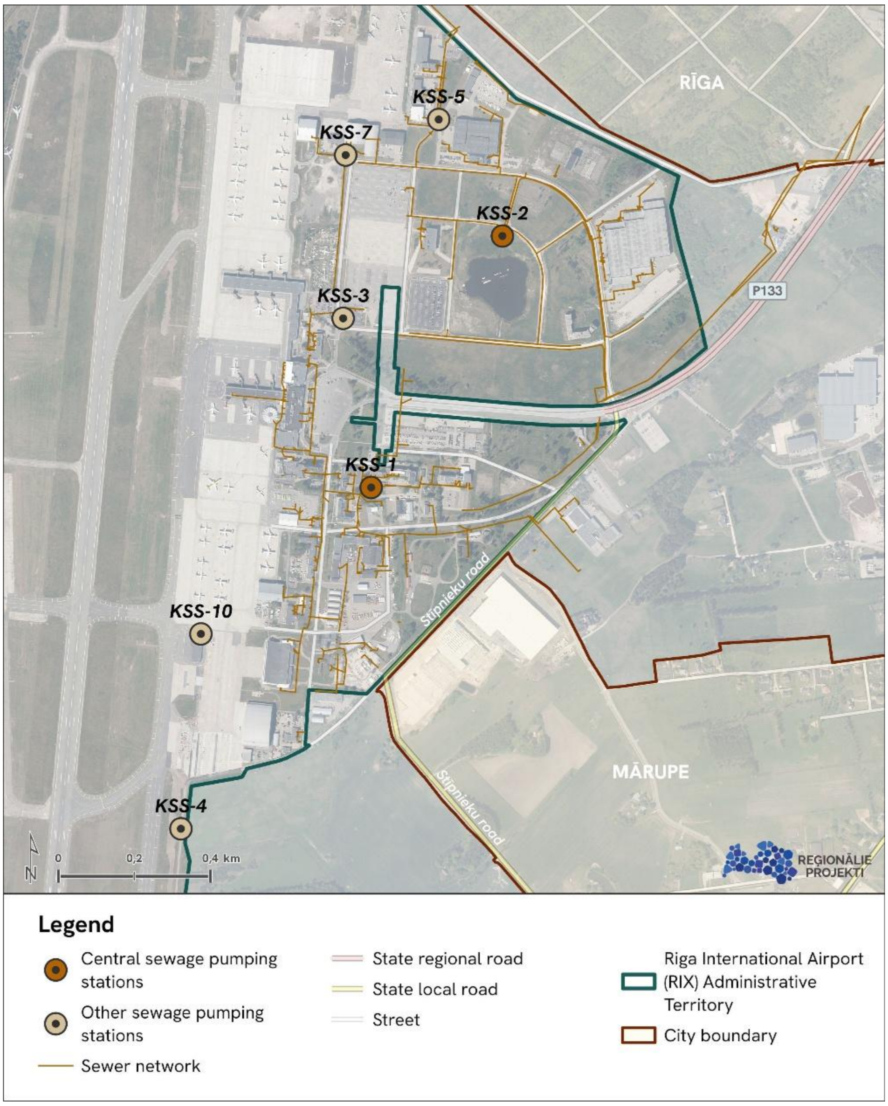


Image 15: Domestic Sewer System (Source: RIX Riga Airport)

The Airport Sustainability Strategy 2022–2030 states that efforts have been made to reduce chemical contaminants in wastewater by setting requirements for service providers to use environmentally friendly cleaning products for airport maintenance and cleaning.

Since 5 May 2021, all **industrial wastewater has** also been transferred to Ltd. "Rīgas ūdens" for treatment. This wastewater is collected in a **decentralised manner**. In 2023, a total of 2,485 m³ of industrial wastewater was transferred to Ltd. "Rīgas ūdens," which is 9.4% more than in 2022.

The increase is primarily attributed to less favourable meteorological conditions during the winter months of 2023[29]. Industrial wastewater is generated from aircraft de-icing and washing, which takes place at two de-icing platforms – the Northern and Southern de-icing areas. All industrial wastewater is recorded as containing isopropylene glycol. This substance is used in aircraft de-icing fluids and, when entering wastewater, can impact water quality, requiring treatment.

During the winter period, **de-icing agents** are used on the runway and aircraft. The Northern and Southern de-icing platforms are equipped with storage tanks that operate year-round to collect wastewater from de-icing operations. In the engineering zone, near the waste storage hangar, a 100 m³

[29] SJSC Riga International Airport Non-financial statement 2023

fibreglass tank is installed for the temporary storage of de-icing fluid in emergency situations. The tank is placed on a solid surface and is regularly inspected visually to ensure its condition. **In emergencies**, if aircraft de-icing cannot be performed at the Northern and Southern platforms, the process is carried out at **apron parking stands**. However, this applies to no more than 10% of the total number of aircraft[30].

According to the Category B Polluting Activity Permit, all aircraft parking stands are connected to the stormwater collection system. At the same time, only one aircraft may undergo de-icing treatment at a time at apron parking stands, ensuring that de-icing fluid is collected using a specialised vehicle, "Jetbroom BJB 8000 EX" (thereby limiting the entry of de-icing fluid into the stormwater drainage system). The forecasted maximum number of aircraft to be de-iced at parking stands on the apron in a calendar year is 350 aircraft. The highest volume of de-icing operations is expected in January, February, and December of the calendar year.

In 2023, all de-icing processes took place at the remote de-icing areas, where de-icing fluid was collected and sent for treatment[31].

At the Northern and Southern de-icing platforms, **aircraft washing** is also carried out, but only when the outside temperature is at least +4°C. The washing process uses the "DASIC" fluid "AEROKLEEN A510" and is performed by airline staff under airport supervision. The wastewater from washing is collected in the platform reservoirs.

During the warm season, when the de-icing areas are not in use, stormwater is directed to nearby oil treatment facilities (by closing the valve) instead of the storage tanks. However, when activities involving aircraft take place on the platforms, including washing, the valve is opened, and industrial wastewater is collected in storage tanks and later transferred to Ltd. "Rīgas ūdens."

For **washing airport vehicles**, a **dedicated hangar** is equipped with treatment facilities. Wastewater flows by gravity into a sand trap, a settling tank, and an oil separator. It is then treated in a biological facility, where mechanical impurities are separated and organic substances are oxidised. The treated water is further directed through quartz and activated carbon filters to remove any remaining contaminants before being discharged into the stormwater drainage system[32].

A total of **16 wastewater treatment facilities** are installed within the airport territory, (including mentioned treatment facilities at the Northern and Southern de-icing areas, which serve as storage tanks). The purpose of these treatment facilities is to purify stormwater that may contain petroleum products.

WWTU Number	Facility	Wastewater Treatment Unit Model	Designed Maximum Capacity	Planned Volume of Wastewater Discharged for Treatment	Discharge Point number
1*	Northern De-Icing Area Treatment Facility	Biological Treatment Facility: BIO-KRB-100 (1 unit)	70 – 100 m3/day	50 – 120 m3/day	No.4
		Oil Separator: Oleopator K (1 unit)	200 l/s	50 – 120 m3/day	
2**	Southern De-Icing Area Treatment Facility	Biological Treatment Facility: BIO-KRB-100 (1 unit)	70 – 100 m3/day	50 – 120 m3/day	No.2
		Oil Separator: Oleopator K (1 unit)	200 l/s	50 – 120 m3/day	
N0.1	Apron 3 Treatment Facility	Oil Separator: Oleopator K (1 unit)	200 l/s	1700 m3/year	No.4
N0.2	Apron 3 Treatment Facility	Oil Separator: Oleopator K (1 unit)	200 l/s	1550 m3/year	No.5

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WWTU Number	Facility	Wastewater Treatment Unit Model	Designed Maximum Capacity	Planned Volume of Wastewater Discharged for Treatment	Discharge Point number
N0.3	Apron 2 Treatment Facility	Oil Separator: Oleopator K (1 unit)	200 l/s	1500 m3/year	No.9
N0.12	Apron 5 Treatment Facility	Oil Separator: Lindberg Lpeter C, No. 16400	75 l/s	~700 m3/year	No.4
N0.14	Apron 5 Treatment Facility	Oil Separator: Lindberg Lpeter C, No. 16400	75 l/s	~300 m3/year	No.4
N0.13	Helicopter Landing Area Treatment Facility	Oil Separator: WWTU-13, Lindberg Lpass C, No. 16511_02 (NS 100)	Q= 100l/s; Qmax=720l/s	~700 m3/year	No.9
N0.8	Filtration Unit near the Fire Station	ACO Calistro OLEOPATOR K	3 l/s	~40 m3/year	No.9
No.4	P3 Public Car Park Treatment Facility	Oil Separator	No data	~700 m3/year	No.4
N0.5	P3 Public Car Park Treatment Facility	Oil Separator	No data	~800 m3/year	No.4
No.11	P4 Public Car Park Treatment Facility	ACO Oleopator-Bypass-C-FST NS 20/200/2000, class I	20 l/s	~300 m3/year	No.4
No.15	P2 Public Car Park Treatment Facility	WWTU -15, ACO Oleopatos – BYPASS - C-FST 20/200/2000	20 l/s	~350 m3/year	No.8
No.6	Filtration Unit near the Fuel Station	Oil Separator: OY LABKO AB (1 unit)	50 l/s	40,15 m3/year	No.7
No.7	Vehicle Wash Hangar Treatment Facility	Bioblock: EcoDRY-KSF-15/20 (1 unit)	20 l/s	12 000 l/ day – 30 000 l/ day	No.9
		Bioblocks: BioDRY-A-30 (3 units)	20 – 25 m3/day	12 000 l/ day – 30 000 l/ day	
		Oil Separator: EcoDRY-KSF-20/2 (1 unit)	20 – 25 m3/day	12 000 l/day – 30 000 l/day	
No.16	TP-23	Oil Separator: Ring Well	20l/s	~350m^3/year	

Table 17: Wastewater sources, treatment facilities, and discharges (Source: Permit for Category B polluting activity No. RI15IB0030 Annex 1 and RIX Riga Airport)

The purpose of the airport's stormwater drainage system is to collect stormwater and ensure its treatment before discharge into the environment. In total, there are **six stormwater discharge points** at the airport. From these discharge points, the water flows further into a drainage ditch, which is connected to the Neriņa River (receiving water body management unit code: *381222 Neriņa from the source to the confluence with Lake Babīte*). To ensure quality control, wastewater analyses are conducted at the stormwater discharge points.

Location and Identification Number	Name of Receiving Water Body	Wastewater Volume m³/d (average)	Wastewater Volume m³/year (Average)	Discharge Duration	Explanation of Discharged Wastewater
Discharge Point No.4 (N100828)	Drainage Ditch Behind the Runway	271.04	135430	24 h/dnn	From the drainage ditch constructed parallel to Mazā Gramzdas Street, the northern part of the runway, and the northern de-icing area after treatment facilities
Discharge Point No.8	Drainage Ditch Behind the Runway	35.2	12881	24 h/dnn	From the P2 public car park

Location and Identification Number	Name of Receiving Water Body	Wastewater Volume m³/d (average)	Wastewater Volume m³/year (Average)	Discharge Duration	Explanation of Discharged Wastewater
Discharge Point No.2 (N100827)	Drainage Ditch at the Southern End of the Runway	24	45260	24	In case of overflow from the fire-fighting pond. The pond accumulates stormwater collected from the southern part of the runway. Additionally, stormwater is discharged after treatment at the southern de-icing area treatment facilities
Discharge Point No.5	Drainage Ditch Behind the Runway	189.5	69167.5	24	From aprons 1, 2, and 3, public car parks, and after treatment, as well as from the central part of the runway
Discharge Point No.7 (N100666)	Drainage Ditch at the Mechanisation Department Behind the Fuelling Station	0.11	40.15	24	From the fuelling station after treatment in the filtration well
Discharge Point No.9 (N100829)	Drainage Ditch	155.75	56848.75	24	From aprons 1 and 2, treated in the apron 2 treatment facilities, from the central and southern parts of the runway, as well as after treatment in the high-power vehicle washing hangar treatment facilities

Table 18: Direct Discharge of Wastewater and Stormwater into Water Bodies (Sources: Permit for Category B Polluting Activity No. RI15IB0030 and its Annex 1)

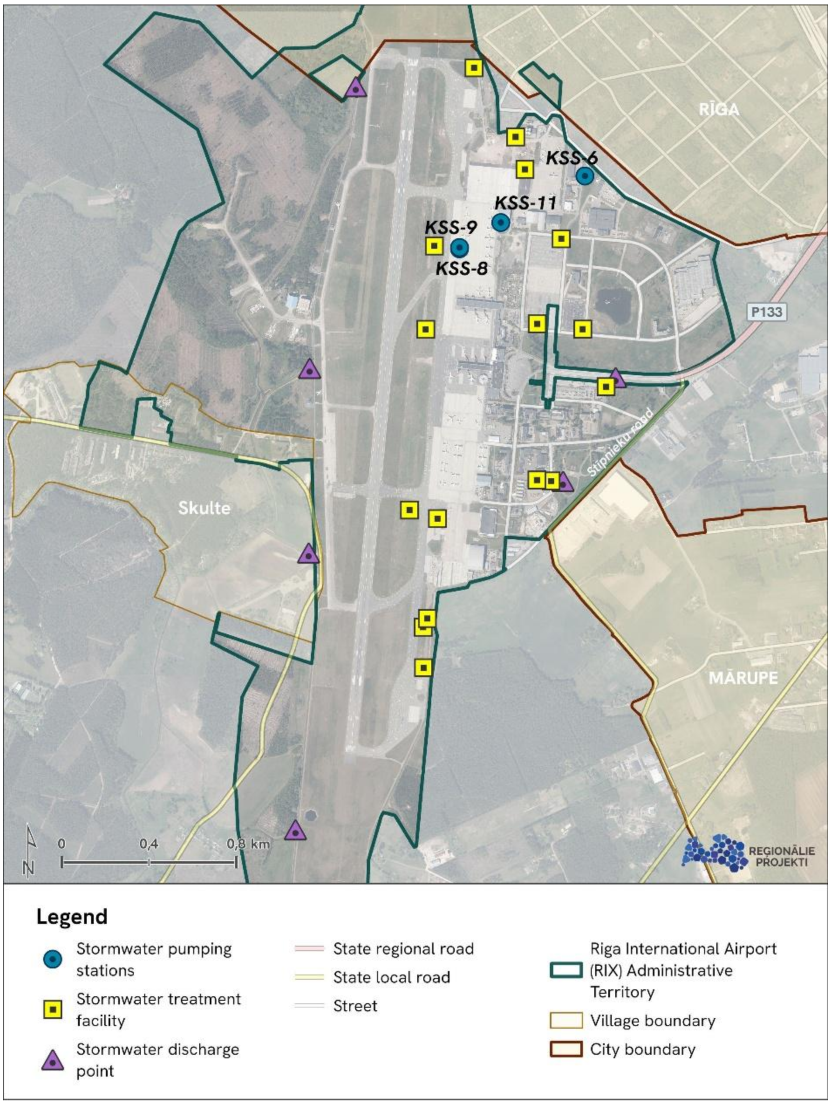

Image 16: Stormwater Drainage System (Source: RIX Riga Airport)

The airport must ensure that pollutant concentration limits are not exceeded at stormwater drainage discharge points: 1) Suspended solids – less than 35 mg/l, 2) Petroleum-derived products – 0.1 mg/l (annual average concentration).

New wastewater treatment units are planned as part of the Rail Baltica project implementation.

The quality of domestic and stormwater is monitored in accordance with an annual monitoring plan in accredited laboratories in Latvia and the Czech Republic. Quality indicators and limit values are defined in various regulatory acts, including Riga City Council binding regulations and Cabinet of Ministers regulations. A report on stormwater quality is submitted annually to the State Environmental Service Permit Management Department.

The 2023 report on stormwater pollution monitoring in the territory of SJSC "Riga International Airport" concluded that the annual measurements were satisfactory and complied with regulatory requirements. The efficiency of the WWTU operation was assessed as good, and the level of wastewater pollution did not pose a risk to human health or the environment, making additional pollution reduction measures unnecessary.

The airport ensures the management and quality control of domestic and stormwater wastewater in accordance with regulatory requirements and the issued Category B Polluting Activity Permit. A particularly important aspect of wastewater management is aircraft de-icing, which involves the use of de-icing agents. These industrial wastewater flows are collected in a decentralised manner. Monitoring *results indicate that wastewater quality complies with regulatory standards, and no significant issues have been identified. Domestic wastewater (including industrial wastewater) is transferred to Ltd. "Rīgas ūdens" for treatment, while stormwater, where necessary, is treated to remove petroleum products before being discharged into the drainage ditch, then into the Neriņa River, and subsequently into Lake Babīte.*

4.9. Soil and Groundwater Quality

For groundwater quality and pollution control, a total of **eight monitoring wells** are installed within the airport territory – three near the airport fuel storage facility (DUP) and five along the runway. Testing is conducted at seven of these wells (No. 2, No. 19, No. 20, No. 21, No. M-01, No. M-07, No. M-10), as one well (No. 1) does not have a sufficient water volume for analysis.

In accordance with regulatory requirements, the airport conducts groundwater monitoring every two years.

The results of the airport's groundwater quality control in 2022 indicate that **no contamination was detected**. Groundwater samples are tested for concentrations of monoaromatic hydrocarbons (benzene, toluene, ethylbenzene, xylene) and total petroleum hydrocarbons. The direction of groundwater flow, based on observation data, remains consistent throughout the year when monitoring is conducted. It is also noted that the groundwater monitoring network is in good technical condition, allowing for high-quality monitoring and the collection of representative groundwater samples.

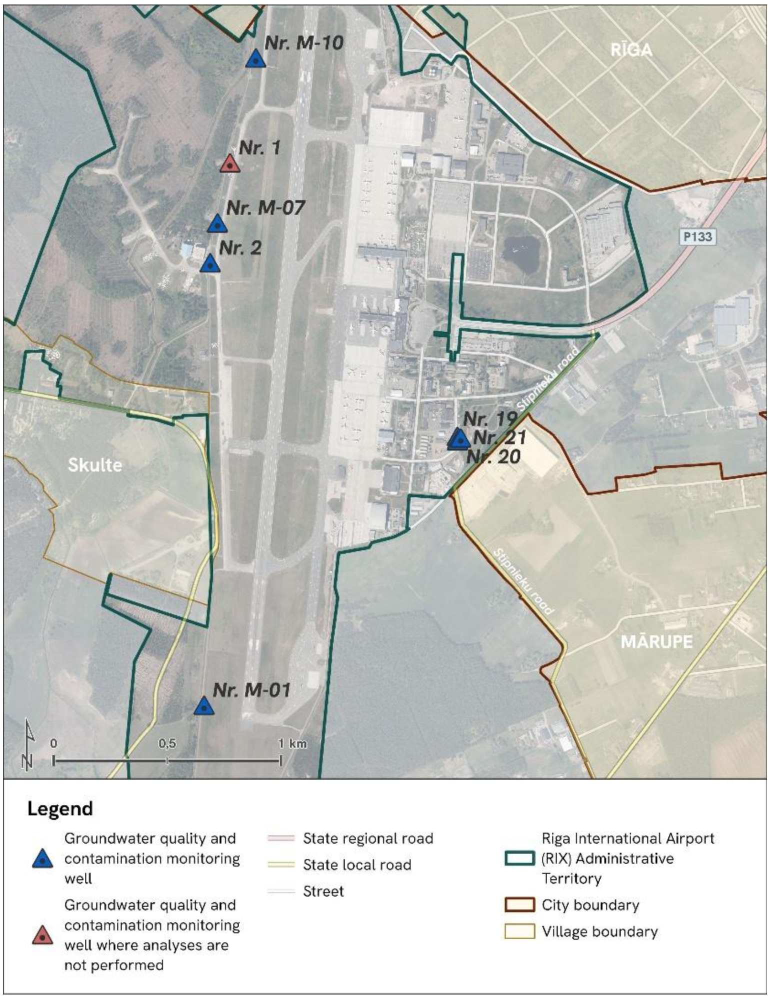

Image 17: Groundwater Quality and Pollution Control Monitoring Wells (Source: RIX Riga Airport)

All **pollutant spills** within the airport territory are recorded, with an incident report being prepared, including the notification of the State Environmental Service in cases of significant spills. In 2023, a total of 387 oil product spills were recorded, representing a 21.7% increase compared to 2022, primarily due to the increase in the number of flights. Most of the spills were minor.

Aircraft	Unknown Sources	Buses and Ground Support Equipment	GPU (Ground Power Unit)
153	125	53	29

Table 19: Sources of Pollutant Spills in 2023 (Source: RIX Riga Airport Environmental Report 2023)

Minor spills (0-9 litres)	**Moderate spills** (10-99 litres)	**Major Spills** (over 100 litres)
359	28	Not Detected

Table 20: Volume of Pollutant Spills in 2023 (Source: RIX Riga Airport Environmental Report 2023)

The largest spill was 80 litres of diesel fuel from a front-end loader, which was quickly contained without causing environmental damage. The airport's fire rescue team recorded four incidents involving hazardous substances, including a broken mercury thermometer, as well as paint, dry ice, and smoking liquid spills in passenger baggage or aircraft cargo compartments. These substances were collected and sent for disposal. In April 2023, a traffic accident occurred in the public area of the airport, resulting in a petroleum product spill (30 litres of diesel fuel entering the airport's stormwater drainage system) when a taxi collided with a fuel tanker. The State Environmental Service was notified, the drainage system was immediately cleaned, and containment booms were laced in the surface water body to collect the pollution[33].

In 2023, a preliminary **geoecological study was conducted to determine the presence of perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) in soil, groundwater**, and surface water within the airport territory. PFOS and PFOA are hazardous to health as they are persistent pollutants that do not degrade under natural conditions, accumulating in the environment and living organisms. Studies indicate that these substances are harmful to mammals and were previously used in firefighting foams, leading to their release into the surrounding environment. For this reason, the **conducted study is considered highly significant**. During fieldwork, three soil samples, three groundwater samples, and two surface water samples were collected. The study concluded that the environmental condition within the airport territory is good. In none of the investigation wells installed in the study area was a "free-phase" layer of petroleum products (i.e., a floating layer of non-absorbed petroleum products in the soil) detected. Based on the available information, the assessment of PFOS and PFOA concentrations in soil, subsoil, groundwater, and surface water concluded that the concentration of these substances in the tested samples within the airport territory is low. The study report also indicated that the chemical oxygen demand in groundwater and surface water samples meets regulatory requirements[34].

During the winter period, the airport uses special liquid de-icing agents and granular de-icing agents for treating the hard surfaces of the runway and aprons, **none of which are classified as hazardous substances**. Certain chemical substances classified as hazardous are also used in airport operations. For example, liquid disinfectant is used for aircraft toilet disinfection, diesel fuel and petrol are used for airport vehicles within the airport premises, and marking paint and solvents are used for airfield marking and its maintenance[35]. The storage of these substances complies with the requirements specified in the Category B Polluting Activity Permit, covering both

33 RIX Riga Airport Environmental Report 2023

34 Report on the Preliminary Geoecological Study for the Detection of Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) in Soil, Groundwater, and Surface Water within the SJSC “Riga International Airport” Territory (VentEko, 2023)

35 Permit for a polluting activity of category B No. RI15IB0030 Annex 1

hazardous and non-hazardous substances in terms of permitted quantities and storage methods, including indoor facilities, hangars, tanks, and other appropriate storage solutions.

4.10. Contaminated and Potentially Contaminated Sites

Regarding **historical pollution** within the airport territory and its immediate vicinity, three contaminated sites and two potentially contaminated sites have been identified, in accordance with the data of the Polluted Sites Management System (PSMS) maintained by the State Environmental Service[36]. Additionally, two other sites located further from the airport territory have been noted. The main pollutant identified in these areas is petroleum products.

The historical contamination within the airport territory is linked to the storage of military-grade chemical substances in tanks designated for the storage and transfer of various petroleum products. When these tanks and related infrastructure were decommissioned in the late 1980s, petroleum products leaked into the ground, contaminating the soil and groundwater[37].

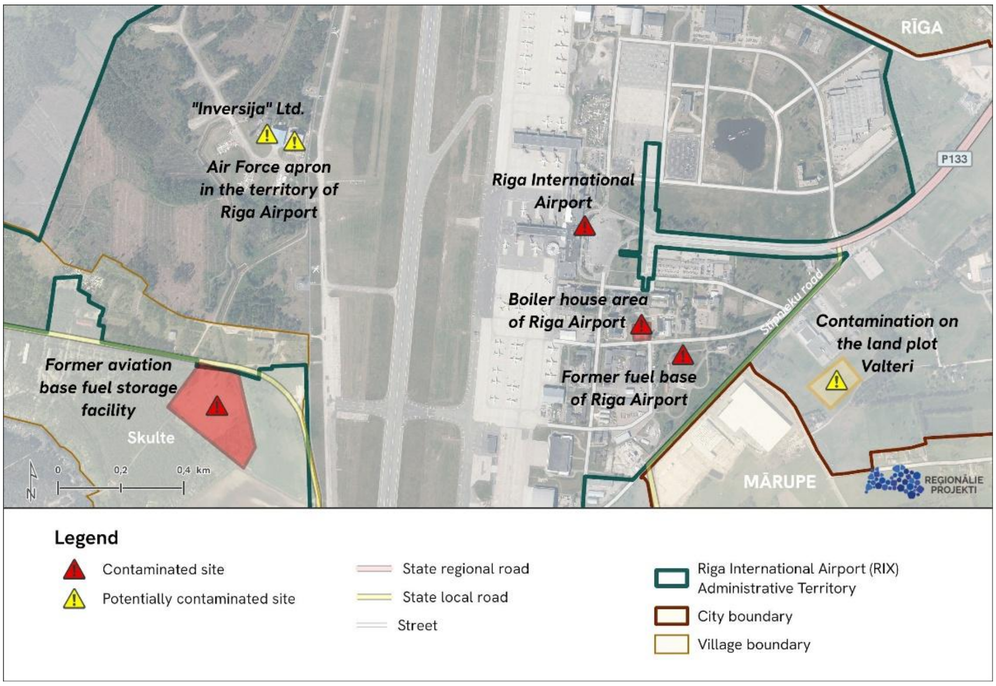

Image 18: Contaminated and Potentially Contaminated Sites (Source: Contaminated and Potentially Contaminated Sites Database, State Environmental Service, 2024)

In 2014/2015, a historical **contamination study of soil, subsoil, and groundwater** was conducted within the airport territory. The study concluded that, within the total airport area of 660 hectares, groundwater and soil contamination were identified in Skulte sector (the site of the former naval aviation fuel and lubricant storage facility) and in the territory of the tenant Ltd. “GulfStreamOil”. The contamination in the Skulte sector consists of floating petroleum products above the groundwater level and residual petroleum fractions sorbed in the soil. The petroleum residues in this sector are more than 20 years old. In the Ltd. “GulfStreamOil” area, the floating petroleum product layer above the groundwater level has formed due to repeated fuel spills since the 1960s, and remediation work in this area is carried out at the tenant’s expense. **Regarding the rest of the airport territory, the study concluded that it is generally not contaminated**. The observed elevated levels of heavy petroleum products

[36] https://pvps.vvd.gov.lv/#/territory/map
[37] RIX Airport Information – Water and Soil (accessed on 13.11.2024)

and organic substances in certain areas of the airport are primarily attributed to natural humus decomposition processes and geological structure, rather than external contamination[38].

Site Name	Registration No. (SES database PSMS)	Registration No. (LEGMC database)	Category	Type of Contaminated Site	Reason for Registration	Date of Information Entry
SJSC Riga International Airport	2954	80768/1475	Contaminated Site	Airfields	Groundwater contamination	30.10.2017
Former Fuel Storage Facility of Riga Airport, Mārupe Parish	2955	80768/1476	Contaminated Site	Fuel Storage Facilities	Groundwater contamination	30.10.2017.
Air Force Apron within the Riga Airport Territory	2956	80768/1718	Potentially Contaminated Site	Military Sites	Petroleum product contamination in groundwater	26.07.2019.
Former Aviation Base Fuel Storage Facility	2963	80768/917	Contaminated Site	Fuel Storage Facilities	Soil and groundwater contamination with petroleum products	24.03.2020
Riga Airport Boiler House Area	3346	003941/0001	Contaminated Site	Boiler Houses, Cogeneration Plants	Out of 30 tested soil samples, contamination B value was exceeded in 6 samples, while contamination C value was exceeded in 2 samples. It was concluded that in borehole P2, the soil layer contaminated with petroleum products extends from 0.5 to 2.0 metres below the ground surface, forming a 1.5-metre thick layer. In borehole P3, the contaminated soil layer extends from 0.5 to 3.0 metres, forming a 2.5-metre thick layer.	06.10.2023.
Ltd. "Inversija"	2959	80768/4697	Potentially Contaminated Site	Boiler Houses, Cogeneration Plants	Mārupe Parish, Riga Airport, Category B enterprise	09.08.2011.

[38] SJSC "Riga International Airport" Historical Soil, Subsoil, and Groundwater Contamination Study – Final Report (Ltd. Eiroprojekts, 2015)

Site Name	Registration No. (SES database PSMS)	Registration No. (LEGMC database)	Category	Type of Contaminated Site	Reason for Registration	Date of Information Entry
Contamination on the Valteri Land Plot	3633	0039410/0002	Potentially Contaminated Site	Industrial Facilities	A single composite soil sample was collected from four boreholes. Soil samples were taken from four investigation points, with two soil samples collected from each point, and each site was equipped with a temporary monitoring well for groundwater sampling. According to the analysis results, no exceedances of limit values were detected in any of the tested soil and subsoil samples. Regarding groundwater quality, the results indicate elevated lead (Pb) concentrations, along with exceedances in arithmetic mean values for lead (Pb), chromium (Cr), mercury (Hg), and chemical oxygen demand (COD) concentrations.	05.12.2023

Table 21: List of Contaminated and Potentially Contaminated Sites (Source: LEGMC/SES)

In 2022, a preliminary investigation of historical contamination was carried **out near the airport's boiler house**, approximately 360 metres southeast of the airport terminal. The historical contamination was detected at a depth of approximately 2 metres during the installation of groundwater monitoring wells for the Rail Baltica project (construction site cadastral No. 80760020007195). In 2023, a geoecological study of this historical contamination was conducted. The initial investigation identified the source of contamination and determined that the total concentration of petroleum products in the soil exceeded the precautionary contamination threshold. The 2023 investigation report concluded that the site's visual environmental condition was good and well-maintained. During fieldwork, 30 soil samples were collected, of which 6 exceeded the precautionary contamination threshold, and 2 exceeded the critical threshold. Petroleum product contamination was found in boreholes P2 (0.5–2.0 m depth) and P3 (0.5–3.0 m depth), with a total volume of contaminated soil estimated at 68.5 m³ and 19.5 m³, respectively. The contamination is considered historical, as mazut is no longer used as fuel in the boiler house. It was concluded that in the Rail Baltica track construction planning, the risk of contamination spreading to surrounding areas is insignificant, and remediation work can be carried out before construction begins[39]. In 2025, remediation works were carried out; however, the contaminated soil was only partially removed, as the extent of the contamination area proved to be larger than initially identified. The clean-up of this area will continue in the future.

In 2024, the owner of the fuel station (DUS) located within the airport territory, Ltd. "BALTIC GROUND SERVICES LV", conducted a **geoecological study** to assess soil, subsoil, and groundwater contamination before the **closure of the aviation fuel station** (DUS operations were discontinued on 31 December 2023 due to its expropriation for the Rail Baltica project). As part of the investigation, four subsoil exploration boreholes were drilled, and eight soil samples and four groundwater samples from monitoring wells installed at different times were collected and

[39] Report on the Detailed Geoecological Investigation of Historical Contamination near the SJSC "Riga International Airport" Boiler House (Cadastral No. 80760020007195), (VentEko, 2023)

analysed. No soil contamination was detected. In monitoring well No. 1, a low level of groundwater contamination with toluene and xylenes was detected, exceeding the target value but remaining below the arithmetic mean of the target and threshold values. The investigation results and control study testing showed variations in benzene concentration, leading to the conclusion that fluctuations in parameter concentrations could be related to differences in weather conditions during sampling, which influence the subsoil. As a recommendation, remediation work was advised for monitoring well No. 1, along with long-term groundwater quality monitoring[40]. In 2025, remediation of the contaminated site was carried out.

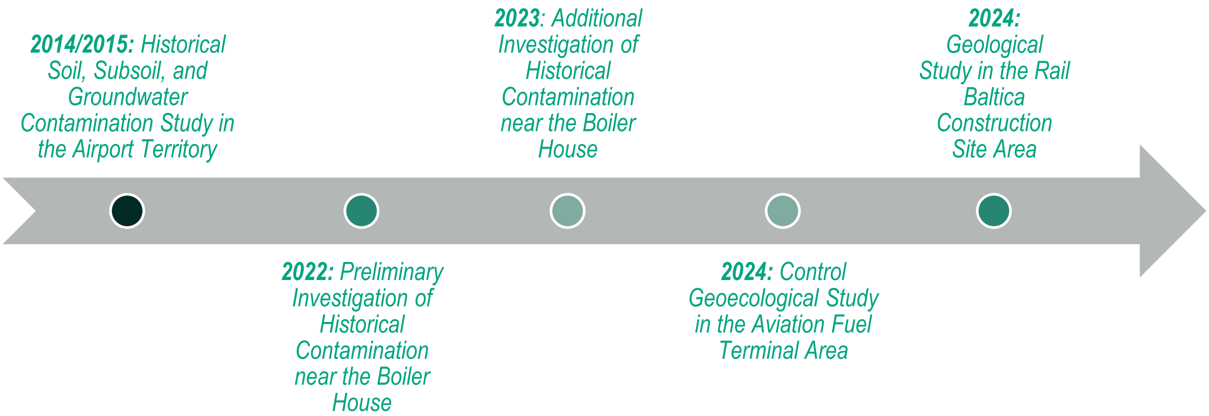

Image 19: Conducted Geological Investigations of Historical Contamination in the Airport Territory

In 2024, **geoecological investigations were also carried out in the Rail Baltica construction site** area within the airport, specifically in the trench excavation zone. This was necessary because soil and groundwater contamination with petroleum products was discovered during Rail Baltica construction works, along with the presence of two underground tanks containing petroleum-contaminated water. During the investigation, 39 soil sampling boreholes were drilled, 9 groundwater wells were installed, and 91 soil samples and 9 groundwater samples were tested for TPH (Total Petroleum Hydrocarbons) and BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) concentrations. The investigation results confirmed soil contamination in five boreholes and groundwater contamination in three boreholes within the Rail Baltica construction site area at the airport. Soil contamination was detected down to a depth of 5 metres, covering an area of approximately 504 m² with a total volume of 495 m³. The groundwater contamination is linked to soil contamination; therefore, comprehensive remediation measures have been recommended**.** In 2025, remediation was carried out.

Regarding soil and groundwater quality, it can be concluded that there is no active contamination within the airport territory, and the monitoring network is in good technical condition. However, the investigation of historical contamination has identified specific locations with contamination, including residual petroleum products in soil and groundwater, with localized exceedances of benzene and other hydrocarbon concentrations. Given the ongoing Rail Baltica construction, contamination has been detected within the construction site, necessitating remediation efforts. The 2023 investigation within the airport territory confirmed that PFOS and PFOA concentrations in soil, groundwater, and surface water are low, and the environmental condition meets regulatory requirements.

4.11. Waste management

[40] Report on the Control Geoecological Investigation in the Aviation Fuel Station Territory of Ltd. "Baltic Ground Services LV" (Ltd. Intergeo Baltic, 2024)

The airport has implemented a waste management system covering key waste generation areas, such as the passenger terminal, administrative premises, aircraft, and external areas. All waste generated at the airport is handed over to a licensed waste management operator, and tenants have the option to join the common waste management system, ensuring compliance with environmental protection requirements[41]. Household, hazardous, and environmentally harmful waste is **temporarily stored** in Riga Airport's **waste hangar** and a specially designated facility within the terminal, except for certain types that are transferred directly to the waste management operator from their point of origin. The airport does not have permanent long-term waste storage facilities, and all waste is recorded in accordance with regulatory requirements[42].

Waste	2019	2020	2021	2022	2023
Total volume of **non-hazardous municipal** waste (t)	**4871.17**	**2223.59**	**2059.06**	**1941**	**1709.53**
Unsorted non-hazardous municipal waste (t)	3522.08	1545.97	1547.81	1573.04	1513.81
% of total volume	72.3 %	69.53 %	75.17 %	81.04 %	88.55 %
Unsorted non-hazardous municipal waste per passenger (t)	0.45	0.77	0.63	0.29	0.23
Total volume of **hazardous municipal** waste (t)	**1672.47**	**1666.34**	**250.23**	**139.53**	**24.85**

Table 22: Key Waste Management Indicators (Source: RIX Environmental Report 2023)

The waste hangar is equipped with self-compacting containers for municipal and paper/cardboard waste (each with a capacity of 20 m³), as well as a 22 m³ container for bulky waste. The hangar also contains a designated area for the temporary storage of hazardous waste, where waste is kept in appropriate containers on a concrete floor. In the event of a spill, liquid is directed into a concrete pit, which can be pumped out if necessary[43].

The total volume of **municipal waste** at the airport in 2023 decreased by 12% compared to 2022, largely due to the introduction of the **deposit system**. Several terminal tenants have signed agreements for the collection of deposit packaging, significantly reducing the overall waste stream. Despite efforts to decrease the proportion of unsorted waste, it still accounted for 88.55% of the total municipal waste volume in 2023.[44].

In addition to municipal waste, **hazardous waste** is also generated at the airport, primarily from maintenance activities and wastewater treatment facilities. In 2023, the volume of hazardous waste decreased significantly by 82%, as no apron oil barrier cleaning was carried out[45]. The intended use of hazardous waste is recorded in registration waybills, and its storage and processing take place at the facilities of waste recipients. Riga Airport does not collect information on the further use of hazardous waste[46]. Hazardous and industrial waste may be stored within the airport's premises in a specially designated area for no longer than three months from the time of generation.[47].

[41] RIX Environmental Report 2023

[42] RIX Non-Financial Statement 2023

[43] Permit for Category B Polluting Activity No. RI15IB0030 and its Annex 1 (State Environmental Service)

[44] RIX Environmental Report 2023

[45] RIX Environmental Report 2023

[46] RIX Non-Financial Statement 2023

[47] Permit for Category B Polluting Activity No. RI15IB0030 and its Annex 1

Code and Name	Hazard Classification	Temporary Storage (t/year)	Main Source	Generated (t/year)	Received from Other Companies	Total Flow
200133 **Batteries and accumulators** classified under 16 06 01, 16 06 02, or 16 06 03, and unsorted batteries and accumulators containing these batteries	Yes	0.5	Confiscated batteries and equipment	2	-	0
200136 Other obsolete **electrical and electronic equipment** not classified under 200121, 200123, and 200135	No	3.5	Computer equipment, office work	4	1	5
130507 **Oily water from oil-water separation equipment**	Yes	100	Oil product separators	400	-	400
160708 **Waste containing petroleum products**	Yes	1	Historical pollution	1	-	1
170601 **Asbestos-containing insulation materials**	Yes	2	Territory maintenance	2	-	2
170605 **Asbestos-containing construction materials**	Yes	10	Territory maintenance	10	-	10
200111 **Textiles**	No	3	Work clothing	3	-	3
160304 **Other inorganic waste** not classified under 160303	No	1	Fire extinguishing powder	1	-	1
080117 **Paint or varnish removal waste** containing organic solvents or other hazardous substances	Yes	1	Airfield apron and taxiway marking	8	2	10
130208 Other **engine oils, gear oils, and lubricating oils**	Yes	3.3	Ground vehicle maintenance and repair	10	6	16
130502 **Sludge from oil-water separation equipment**	Yes	10	Stormwater drainage, oil product separators	30	-	30
150110 **Packaging containing residues of hazardous substances** or contaminated by them	Yes	0.75	Ground vehicle maintenance and repair	1.5	1,5	3
150202 **Absorbents, filter materials** (including oil filters not otherwise specified), wiping materials, and protective clothing contaminated with hazardous substances	Yes	2.5	Oil product collection in case of spills	4	2	6
160107 **Oil filters**	Yes	1	Ground vehicle maintenance and repair	1	1	2
160114 **Antifreeze fluid** containing hazardous substances	Yes	0.5	Equipment maintenance	3	2	5
160601 **Lead batteries**	Yes	1.75	Ground vehicle maintenance and repair	5.5	0,5	6
200121 **Fluorescent tubes and other mercury-containing** waste	Yes	1	Building and premises lighting	1	1	2
150101 **Paper and cardboard packaging**	No	400	Cargo packaging, goods packaging	900	-	900
150106 **Mixed packaging**	No	8	Household	100	-	100
150107 **Glass packaging**	No	5	Bars, restaurants	75	-	75
160103 **Used tyres**	No	5	Ground vehicle maintenance and repair	6	4	10
190802 **Waste from sand traps**	No	10	Stormwater drainage, oil product separators	30	-	30
200101 **Paper and cardboard**	No	5	Office work	15	-	15

Code and Name	Hazard Classification	Temporary Storage (t/year)	Main Source	Generated (t/year)	Received from Other Companies	Total Flow
200134 **Batteries and accumulators** not classified under 200133	No	0.1	Office equipment	0.1	-	0.1
200140 **Metals**	No	60	Obsolete equipment	120	-	120
200301 **Unsorted municipal waste**	No	1000	Household	4500	-	4500
200307 **Bulky waste**	No	200	Economic activities	450	-	450
200201 **Biodegradable waste**	No	50	Territory cleaning	100	-	100
191307 **Water-containing hazardous waste** from groundwater treatment	Yes	1	Territory maintenance	1	0	1
160605 **Other batteries and accumulators**	No	5	Territory maintenance	5	-	5
130703 **Other fuels** (including mixtures)	Yes	1	Seized items	1	-	1
160506 **Laboratory chemicals** consisting of or containing hazardous substances, including mixtures of laboratory chemicals	Yes	0.05	X-ray equipment calibration	0.05	-	0.05
150102 **Plastic packaging**	No	1	Household	50	-	50

Table 23: Waste Generation and Management – Incoming Waste Flow (Source: Permit for Category B Polluting Activity No. RI15IB0030 and its Annex 1)

In 2023, the airport implemented several **circular economy principles** by introducing deposit packaging collection points, additional confidential paper waste containers, and waste bags made from recycled materials. Waste sorting continued, along with the reuse of milled asphalt pavement, and an informational campaign was organised for employees on circular economy principles[48].

It can be concluded that the airport has established an effective waste management system that covers all waste generation areas and ensures short-term storage in compliance with regulations. The main hazardous waste at the airport includes petroleum products, oily water, asbestos, and contaminated packaging, which are temporarily stored in secure areas and handed over to licensed operators for recycling or disposal. No significant issues have been identified in waste management

4.12. Electromagnetic Field (EMF)

The main communication infrastructure objects emitting electromagnetic fields (EMF) near the airport are two: the **THALES radar complex**, managed by SJSC "Latvian Air Navigation Services" (LANS), and the METEOR 500 C **meteorological Doppler radar**, operated by the Latvian Environment, Geology, and Meteorology Centre (LEGMC). The airport also operated the MERLIN™ bird detection radar until 2024; however, as of early 2025, its use was discontinued due to obsolescence.

The THALES radar complex is located near the airport's runway (approximately 1.2 km from the runway centreline), while the meteorological radar is situated about 1 km from the airport. The THALES radar complex consists of the STAR 2000 primary radar and the RSM-970S secondary radar. It is used to monitor aircraft positions and coordinate take-offs and landings at the airport. Meanwhile, the LEGMC-operated radar is a C-Band radar that scans the atmosphere using short radio waves (5.4 cm) at a frequency of 5.6 GHz, with a range of 250 km[49]. According to information provided by LEGMC in November 2024, this radar is scheduled for an upgrade in 2025,

[48] RIX Non-Financial Statement 2023
[49] Strategic Environmental Impact Assessment of the Development Plan 2012–2036 of SJSC "Riga International Airport"

replacing it with a dual-polarisation radar. The technical specifications are currently being developed, with an expected change in pulse power from 2x2 kW to a potential increase to 2x4 kW over time.

The limits and target values for electromagnetic radiation, as well as requirements for mitigating EMF-related risks, are regulated by the Cabinet of Ministers Regulations No. 637 of 16 October 2018, *Regulations on the Assessment and Limitation of Electromagnetic Field Exposure to the Population.* These regulations establish the EMF radiation limits and target values for devices used in electricity generation and transmission, as well as for radiofrequency devices. The normative values for radiation are based on the recommendations adopted by the EU (Council Recommendation 1999/519/EC of 12 July 1999 on limiting exposure of the public to electromagnetic fields from 0 Hz to 300 GHz). The regulations also define methods for assessing EMF radiation, requirements for preventing or reducing EMF-related risks, and designate the competent authority for EMF radiation monitoring, which is the Health Inspectorate.

According to the latest information provided by LANS in November 2024 regarding the operation of the THALES radar, during its commissioning and certification process by the *Civil Aviation Agency*, EMF measurements were conducted, and the Health Inspectorate confirmed its **compliance with applicable standards and regulations**. The radar system is not subject to separate ongoing EMF monitoring since no new equipment has been installed that could alter its emissions.

In addition to the radar, LANS operates other smaller navigation systems near the airport to ensure safe aircraft orientation and precise landing guidance within the airport's territory. These include: DVOR/DME radio beacon RIA (provides directional and distance information), LOC18 and LOC36 localisers (help aircraft maintain a horizontal course during landing and are part of the instrument landing system), GP18 and GP36 glide path signals (indicate the correct vertical descent angle, operating in conjunction with the localisers), DME18 and DME36 distance measuring equipment (provide precise distance information between the aircraft and specific runways, working alongside the Instrumental landing systems (ILS) system components). All these systems emit EMF at moderate levels, which are strictly regulated and safe for both humans and the environment[50].

As part of its workplace monitoring, LANS has conducted EMF measurements in the air traffic control tower – the highest point of the building with direct visibility to the THALES radar. The results confirmed that the EMF levels **did not exceed permissible limits**. These measurements assessed not only the THALES radar but also the cumulative impact of all emitting equipment. Meanwhile, according to information from LEGMC, the METEOR 500 C Doppler radar is monitored by SJSC *Electronic Communications* (identifying interference sources on the radar frequency), with prior scanning conducted by LEGMC.

It should be emphasised that radars and other equipment are designed in accordance with safety standards to ensure that EMF levels in the surrounding environment do not exceed permissible limits. Therefore, it is considered that, with proper radar operation, their impact on the **electromagnetic field levels in the surrounding environment is minimal**.

It can be concluded that the operation of EMF sources near the airport, including the THALES radar and the meteorological radar, complies with regulatory safety standards, and their electromagnetic impact on the surrounding environment is insignificant.

4.13. Environmental Monitoring and Management

Mandatory environmental monitoring measures are carried out in accordance with the Category B Polluting Activity Permit and applicable environmental regulations.

50 SJSC "Latvian Air Navigation Services" Aeronautical Information Management Division (eAIP)

Each year, several **monitoring plans** are developed to assess and analyse various environmental aspects, including:

- Groundwater Monitoring Plan,
- Stormwater Monitoring Plan,
- Municipal Wastewater Self-Monitoring Plan,
- Drinking and Artesian Water Monitoring Plan (Airport Technical Maintenance Division)
- Drinking Water Monitoring Plan (Airport Ground Handling Department),
- Aircraft Noise Monitoring Plan.

The first two plans are prepared in accordance with the requirements of the Category B Polluting Activity Permit. The Airport Technical Maintenance Division plan is developed based on the annual requirements set out in the Health Inspectorate's Drinking Water Routine Monitoring Programme and the groundwater deposit passport requirements, while the Airport Ground Handling Department plan is prepared in accordance with the annual requirements of the same monitoring programme.

The preparation and implementation of monitoring plans in line with airport processes fall under the responsibility of the Environmental Protection Specialist from the Sustainability and Environmental Management Division of the Quality and Sustainability Department (KID IVPN). Testing is carried out by an accredited organisation in accordance with the contract.

Below is a summary of the main **environmental monitoring activities** and their frequency:

1	By 1 April each year, submit **an annual report** to the State Environmental Service **on compliance with permit conditions**, environmental monitoring, and its evaluation for the previous year.
2	**Register received complaints** regarding environmental pollution, including odours or noise, investigate their causes, implement corrective measures, and inform the SES accordingly.
3	Ensure the submission of a**nnual official environmental protection and polluting activity statistical reports f**or the previous calendar year, including: *Form No. 2–Air: Report on Air Protection, Form No. 2–Water: Report on Water Resource Use, Form No. 3–Waste: Report on Waste*
4	Quarterly calculate the **emissions of air pollutants** from pollution sources and record the results in emission tracking documents.
5	Conduct **water resource** monitoring, including: 〉 Quarterly measurements of static and dynamic water levels in boreholes. 〉 Annually conduct chemical analysis of groundwater boreholes. 〉 Quarterly conduct chemical analysis of the water tower. 〉 Quarterly conduct basic chemical analysis of drinking water for aircraft from water supply No.1 (Airport Ground Handling Department), and annually conduct an extended chemical analysis. 〉 Quarterly analyse drinking water for aircraft from Airport Ground Handling Department tankers and reserve tanks. 〉 Conduct control measurements in the event of complaints and/or quality non-conformities. Annually, submit monitoring results and evaluations to the Latvian Environment, Geology, and Meteorology Centre (LEGMC).

6	Track the volume of untreated **industrial wastewater**, which is transported to Ltd. “Rīgas ūdens”, and perform **wastewater testing** in an accredited laboratory, including: 〉 Quarterly testing of WWTU (A100744) inflow and outflow (before discharge into the drainage ditch), monitoring: suspended solids, COD, BOD5, total nitrogen, and total phosphorus. 〉 Twice per year testing at outlet No. 9, monitoring: suspended solids, COD, and petroleum products. 〉 Twice per year testing at outlets No. 2, 4, 5, 7, and 8, monitoring: suspended solids and petroleum products. **Groundwater analysis** – every two years, testing for benzene, toluene, ethylbenzene, m-xylene, p-xylene, o-xylene, and total petroleum hydrocarbons. Submit **wastewater testing reports** to SES together with the annual report. Conduct **stormwater self-monitoring** (at discharge control points No. 2, 4, 5, and 8, determining COD) in accordance with the annual monitoring plan. **Wastewater self-monitoring** (for both KSS – suspended solids, COD, extractable substances, petroleum products – and wastewater control points – suspended solids, COD, extractable substances), once per year.
7	The Airport’s Quality Department Environmental Noise Laboratory *(Accreditation No. LATAK-T-494-06-2014)* conducts **environmental noise monitoring** at fixed monitoring stations. Noise monitoring data are published on the airport's website.
8	Maintain **waste tracking** records, registering data in waste accounting documentation.
9	Monitor **electricity, thermal energy, and fuel consumption**.
10	Perform electronic tracking of **raw material circulation**. Each year by 1 March, submit reports to LEGMC on **chemical substances or mixtures** imported into or produced in Latvia, and by 31 March, submit a report on fluorinated greenhouse gases used in the previous year.

Table 24: Summary of Key Environmental Monitoring Activities (Source: 2024 Monitoring Plans and Category B Polluting Activity Permit)

In 2023, the airport submitted a **monitoring report** on the Development Plan 2012–2036 of SJSC "Riga International Airport" to the State Environmental Monitoring Bureau (ESB). The report included information on aircraft noise monitoring (including a comparison of Strategic Noise Maps (SNM) from 2016 and 2022) and the airport's greenhouse gas emissions from 2014 to 2022. The monitoring report indicated that the airport had achieved a significant reduction in emissions: from 5114 t CO_2 equivalent in 2012 to 3304 t CO_2 in 2024, representing a 35.4% reduction.

According to the 2015 ESB opinion on the Environmental Impact Assessment (EIA) report for the Riga International Airport infrastructure development project until 2020, the airport was a**ssigned specific conditions** related to its indirect impact on the surrounding environment and biodiversity:

Environmental monitoring must be initiated to assess and evaluate the impact of aircraft emissions on the **Beberbeķi Nature Park** and **the forests near** the airport.	Monitoring of **the gull colonies at Lake Babīte** must be carried out to assess and track the impact of pesticide use.	A methodology for **monitoring geese and cranes** during spring and autumn migration periods in the surrounding fields must be developed and implemented.

In accordance with the conditions set by ESB, the **airport has successfully implemented all three measures**.

In 2018, Ltd. "Estonian, Latvian & Lithuanian Environment" developed a **methodology** for monitoring the impact of aircraft emissions on forests near the airport and in Beberbeķi Nature Park. The monitoring aimed to provide information on changes in the overall health of the forest and vegetation in the study area as the number of aircraft operations at the airport increased. The monitoring included an assessment of tree health (vitality) and changes in ground vegetation. The analysis covered 200 vegetation survey plots (10 sample plots, 4 vegetation observation plots, 5 inspections), identifying 27 species: 5 mosses, 7 herbaceous plants, 6 small shrubs, and 9 shrub and tree species. Annual monitoring was conducted from 2019 to 2022, with reports prepared on the findings and recommendations for future monitoring. The final report (2023) concluded **that air pollution modelling** results **did not indicate air pollution problems** associated with the projected increase in flight operations, and none of the pollutants were expected to exceed regulatory limits. Therefore, the increase in pollutant levels in the air concerning biodiversity was **considered insignificant.** Overall, the monitoring did not identify any impact of aviation on vegetation. The final monitoring report recommended continuing the monitoring of forests around the airport and in Beberbeķi Nature Park **every five years** using the existing methodology, noting that annual data collection was not necessary. Additionally, it was suggested that the Nature Conservation Agency should be encouraged to develop a new nature conservation plan for Beberbeķi Nature Park, as the previous plan had expired.

In 2018, a Nature Conservation Agency certified expert initiated **the monitoring of black-headed gull *(Chroicocephalus ridibundus)*** colonies nesting in Lake Babīte. The aim was to determine whether the gulls nesting in Lake Babīte visited and fed in the airport area, thereby being exposed to the insecticide Proteus OD, which was used for airfield spraying and could potentially harm the gull population. The monitoring data were used to develop recommendations for deterring birds from the airport area and assessing the actual risk of harm. Two surveys were conducted in 2018 by boat. The first survey did not identify nesting sites, although approximately 2700 black-headed gulls were observed. The second survey identified a colony with approximately 180–200 nesting pairs in the western part of Lake Babīte, where 33 birds were ringed. In 2019, both surveys were conducted from the shore. Several gull nesting sites were identified in the western part of Lake Babīte, including a colony at Bēnūži Point with 180–200 nesting pairs. During two visits, a total of 70 juvenile gulls were ringed to track their movements. The total number of ringed birds in both years reached 103. During the monitoring period (2018–2020), **none of the marked birds were observed within the airport area**. Therefore, it was concluded that the previous assumption (R. Lebus' opinion RL/26, Riga, 27.10.2014) was incorrect, and there was **no basis to suggest that the use of Proteus OD in the airport area had any impact on the black-headed gull population in Lake Babīte**. At the same time, it was noted that there was no reason to discontinue the use of Proteus OD for the eradication of garden chafer beetles in the airport area, as the airport's activities were not found to have a negative impact on the black-headed gull population in Lake Babīte[51]. It should also be noted that neither during the monitoring period (2018–2020) nor in the following years has airfield spraying been conducted again.

In 2018, a Nature Conservation Agency-certified expert initiated **monitoring of geese (Anserini)** and **cranes (Grus grus)** during spring and autumn migration in the fields surrounding the airport, as well as **swifts (Apodidae) and swallows (Hirundinidae)** during the breeding/summer season (May–July) within the airport territory. The objective of the monitoring was to provide the airport with recommendations for future actions – deterring or repelling birds from runways and the immediate vicinity of the airport. The monitoring was conducted from 2018 to 2020. The main conclusions regarding migrating birds in spring and autumn were as follows: the phenology of both spring and autumn migration varies each year, primarily depending on meteorological

[51] Monitoring reports of black-headed gull (Chroicocephalus ridibundus) colonies at Lake Babīte, 2018, 2019, 2020, Mg. biol. Kārlis Millers

conditions. Since the monitored species overwinter in Central Europe, migration is particularly influenced by the retreat of frost and snow, meaning that no two seasons are alike, and the results reflected the specific conditions of each year. Regarding swifts and swallows, it was noted that due to their small size, extremely high mobility, and the vastness of the study area, it was not possible to obtain representative data within the scope of the monitoring. The recommendations for deterring and repelling birds from the airport territory emphasised that the most effective solution is human presence combined with the use of bird detection radars to enable timely responses to approaching birds. This approach was found to be more effective than mechanical methods, to which birds quickly adapt. Additionally, it was noted that flying birds and their flocks are often beyond human control, making constant **monitoring necessary to manage the risk**. Furthermore, it was recommended to modify habitats by using crops in surrounding fields that are unattractive to geese, cranes, and swans, as well as reducing vegetation in the airport area and eliminating insects wherever possible. Additional solutions include the use of specially trained falcons or dogs, and, in extreme cases, relocating birds. The recommendations advised continuing the existing **bird control and deterrence measures** while complementing them with these additional strategies[52].

To assess the **impact of airport operations on birds within the airfield territory**, the airport prepares an annual report on observed bird species, captured and relocated protected birds, and birds that have perished in collisions with aircraft. In addition, the airport submits a report to the Nature Conservation Agency on birds that have died in aircraft collisions, which is evaluated in the context of biodiversity. If an injured animal is captured, it is transferred to the Latvian wild bird rescue association *Drauga Spārns* for veterinary care. Since 2019, grass cut in the airfield area has been collected to reduce the number of insects, thereby making the grasslands less attractive to birds[53] The airport operates a specialised **Bird and Wildlife Control Team** (PUDZK), which continuously **monitors and deters wildlife and birds to reduce hazards** within the airfield territory and up to 13 km around it. Using various active methods, such as a specially equipped vehicle, gas cannons, handheld lasers, and pyrotechnics, as well as passive methods, effective airfield safety is ensured. The assessment is carried out across three zones:

- Active Control Zone (Airfield) requires particular attention to **grassland maintenance, open water resource control** (as water sources and wetland areas around the airfield attract wildlife and birds, they must be regularly monitored and made less attractive, for example, by fencing or installing drainage systems), **inspection of airport buildings and hangars** (to address bird nesting), treatment of aeronautical signs and lighting masts with bird repellent and installation of bird spikes, as well as **waste container management** within the airfield.
- Preventive Control Zone (300–500 m radius) – bird and wildlife presence is monitored, and measures are implemented to reduce the attractiveness of these areas to animals. Regular inspection and maintenance of forests, marshes, agricultural land, bodies of water, and other environmental elements are carried out, along with methods such as the removal of beaver dams, grassland maintenance, bird nest removal, and waste management. This zone is inspected at least twice a year, and data is recorded to mitigate risks to airfield operations.
- Environmental Monitoring Zone (up to 13 km around the airfield) is surveyed to identify and assess objects that could attract wildlife and birds, posing a risk to aircraft safety.

[52] Monitoring reports on migrating geese, cranes, and breeding-season swifts and swallows, 2018, 2019, 2020, Mg. biol. Kārlis Millers
[53] RIX Sustainability Strategy 2022–2030

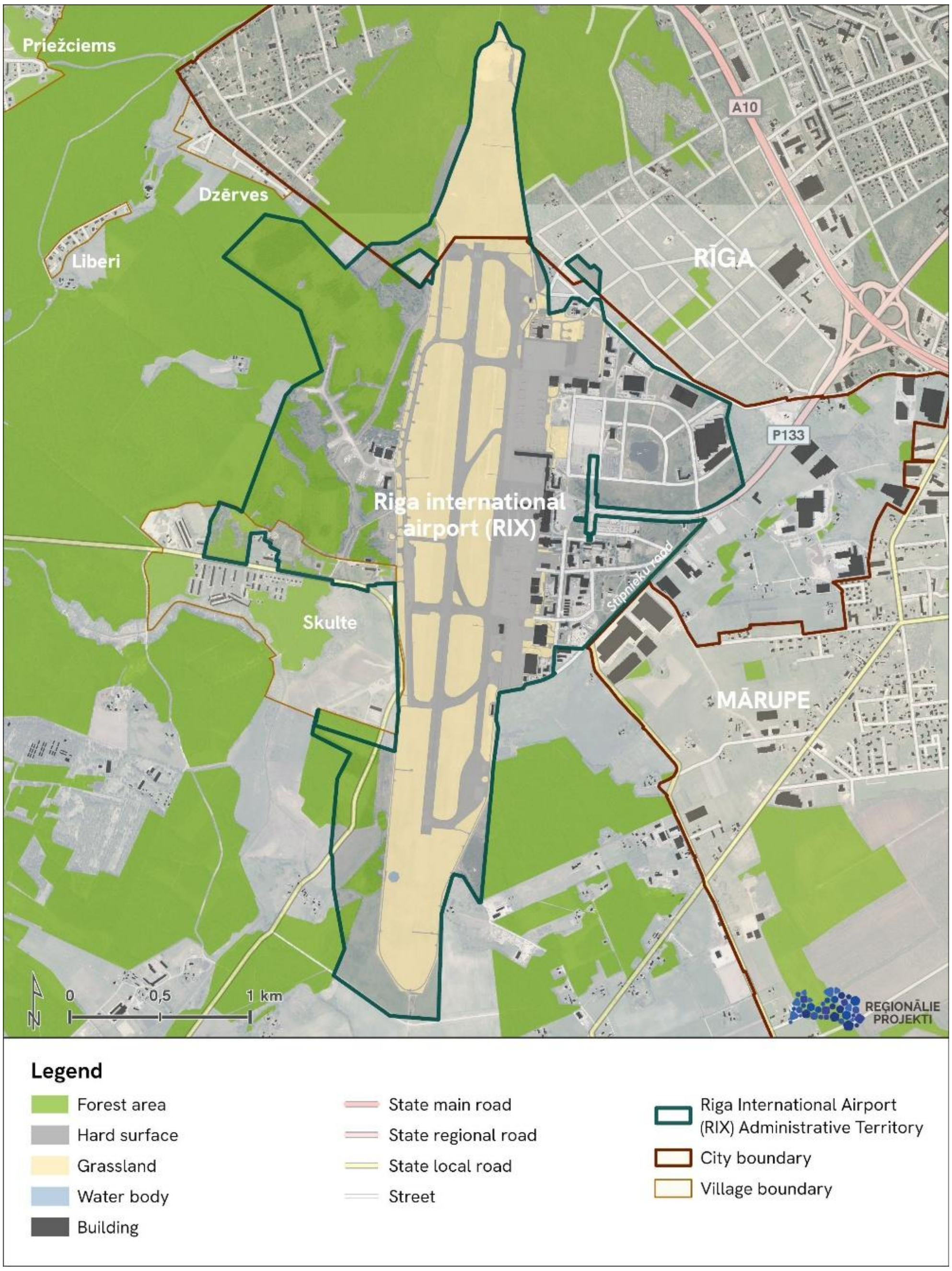

Image 20: Forest areas and grasslands within and around the airport territory

The airfield territory is regularly inspected using a specially equipped vehicle with acoustic and GPS devices, where observations and data on implemented deterrence methods are recorded.

	2019	2020	2021	2022	2023
Recorded bird and wildlife observations	80 762	43 494	72 052	32 914	41 701
Repelled birds and wildlife	82 756	91 386	73 002	103 969	106 881

Table 25: Recorded observations and repelled birds/wildlife, Scarecrow B.I.R.D Tab device data (Source: Riga International Airport Bird and Wildlife Control Annual Reports (2021–2023))

In 2023, the most frequently recorded bird species were the black-headed gull, common starling, grey crow, swallow, rock pigeon, less frequently – wagtail, skylark, common buzzard, swift, Eurasian kestrel. The highest black-headed gull activity was observed in June when they arrived at the airfield to feed on garden chafer beetles. The recorded wildlife species included hares, and less frequently, foxes, cats, and snakes.

2019. gads	2020. gads	2021. gads	2022. gads	2023. gads
61	25	29	56	56

Table 26: Confirmed bird and wildlife collision incidents (Source: Riga International Airport Bird and Wildlife Control Annual Report, 2023)

Recent statistics indicate that most **aircraft and bird collisions** occur near airports, particularly on or in the immediate vicinity of the runway. In 2023, the airport recorded 54 confirmed and 32 unconfirmed collisions, primarily involving small birds, with no significant damage to aircraft. The collision trend shows an increase compared to previous years, attributed to **higher flight intensity,** and **improved reporting practices**. However, the collision rate reflects the effectiveness of enhanced preventive measures. The primary mitigation strategy remains maintaining the airfield environment to reduce its attractiveness to birds, thereby minimising risks to flight safety[54].

In 2021, the airport approved and, in 2024, reviewed the **Environmental and Energy Management Policy**, which outlines key principles. These include **environmental and energy resource monitoring**, reduction of energy consumption, efficient use of resources, promotion of environmental awareness among employees, collaboration with partners, and increased use of renewable energy sources. Additionally, the overall integrated management system is maintained.The Environmental Management System and Energy Management System have been implemented and are maintained in compliance with the requirements of **ISO 14001:2015 and ISO 50001:2018** standards.


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ISO 50001:2018

standarta prasībām

Sertificētā darbības sfēra

Image 21: Environmental management certificates (initial certification date – 18.09.2015, certificate issuance date – 13.09.2024)

[54] Riga International Airport Bird and Wildlife Control Annual Report, 2023

The **key identified environmental aspects** at the airport include energy and water resource consumption, noise and pollution emissions, hazardous and municipal waste generation, chemical spill management, and fire risks. The Environmental Management System ensures the monitoring of these and other aspects, such as CO_2 emissions, and compliance with regulatory requirements.

The airport's strategic development objectives reflect its commitment to actively promoting **climate neutrality** in Europe and supporting global climate goals. In July 2021, Riga Airport joined the ACI Europe NET ZERO 2050 initiative, committing to achieving net-zero CO_2 emissions by 2050. Following a review in 2024, a more ambitious target was set to reach net-zero by 2035. To facilitate this goal, the Net Zero 2035 Roadmap has been developed.

In 2023, emissions decreased by 2.59%, primarily due to reduced use of de-icing agents. In 2024, a solar panel park with a 701-kW capacity was installed, generating green energy since February 2024. The airport has begun transitioning to electric transport, signing agreements to replace buses with electric buses and planning additional charging stations. Furthermore, the airport is actively involved in hydrogen technology research projects to support future aviation decarbonisation.

The **airport's environmental objectives** are outlined in both its Sustainability Strategy 2022–2030 and Medium-Term Operational Strategy. By 2030, the airport aims to: Reduce CO_2 emissions by 65%, Increase the proportion of sorted waste to 40%, Optimise water resource use and improve drinking water quality, Ensure environmentally responsible land management with minimal impact on biodiversity. Additionally, the airport seeks to foster a sustainable and responsible business environment in Latvia, ensuring fair wages, safe working conditions, and maintaining a high-quality living environment for local communities through active cooperation with municipalities and the public. The strategy also includes improving connectivity between the airport, Riga, and surrounding areas, promoting sustainable transport options, and reducing CO_2 emissions.

The airport annually prepares an energy report for the previous year and sets energy consumption targets for all buildings and operational units. It also conducts **regular environmental inspections** in **tenant and service provider areas** to ensure compliance with environmental regulations. In 2023, eight inspections were carried out, identifying violations such as improper hazardous waste management and incorrect chemical labelling. Recommendations for improvements were provided, along with updates on regulatory changes[55].

Analysis of the airport's environmental management practices, including monitoring, indicates that it implements diverse, well-managed, and regular measures to comply with regulatory requirements, monitoring air, water, and waste quality, as well as noise levels and emissions. The ISO 14001 and ISO 50001-certified environmental management systems have contributed to significant reductions in greenhouse gas emissions. Recent CO_2 reductions have been achieved through energy efficiency improvements, such as LED lighting installation. In 2024, the airport installed a solar panel park and advanced its transition to electric transport. Regular inspections ensure compliance in both tenant and service provider areas.

Bird monitoring (2018–2020) confirmed that airport activities, including past insecticide use, have no impact on local bird populations, with recommendations to adjust surrounding habitats to reduce the airport's attractiveness to birds. The Beberbeķi Forest monitoring (2018–2020) showed that air pollution levels near the airport do not impact biodiversity.

[55] RIX Environmental Report 2023

To ensure airport safety, continuous monitoring of the airfield and its surroundings is carried out, with wildlife and bird control measures in place. The airport remains committed to climate neutrality, continuously implementing sustainability and energy efficiency initiatives. Various airport development planning documents set clear environmental objectives, with specific targets actively pursued in daily operations.

Overall, it can be concluded that the airport's environmental efforts are highly strategic and goal-oriented.

5. Environmental issues related to the RIX Riga Airport Master Plan

Several environmentally significant areas are in the vicinity of the airport, which must be considered in the context of the development plan, including the assessment of potential environmental issues.

Image 22: Specially protected nature territories in the vicinity of RIX Riga Airport (2024)

Nature Park "Beberbeķi"

Approximately 2 km from the airport runway is Nature Park "Beberbeķi", a nationally significant specially protected natural area (SSPA) and a Natura 2000 site. It is in Babīte Parish, Mārupe Municipality, covering a total area of 268 ha.

The park was established to protect biologically valuable pine forests, including old-growth stands. It is also an important recreational and educational site for the residents of the capital[56].

The central part of the park features dunes covered with pine forests and heather, while the eastern section contains an artificial reservoir. In the south of the park lies the 10.3 ha Beberbeķi Mill Lake, formed by the construction of a mill on the Beberbeķi Stream, creating a pond. The lake has an average depth of 1.7 m and a maximum depth of 3.5 m. Its shores are picturesque, with some steep sections and sandy beaches in certain areas. Most of the park consists of pine forests and heather meadows. Near the lake's beach, Ltd."Rīgas meži", which owns the territory, has set up a recreational area.[57].

Image 23: Nature Park "Beberbeķi" (Source: Mārupe Municipality and Ltd. "Rīgas meži")

The individual protection and usage regulations for Nature Park "Beberbeķi" (Cabinet of Ministers Regulations No. 714, 16.12.2003) stipulate that it is divided into three functional zones: the nature reserve zone, the nature park zone, and the neutral zone, each with specific protection and usage regulations. The primary objective is to protect and preserve designated habitats, dunes, and pine forest landscapes while providing visitors with opportunities for education and peaceful recreation. The following activities are prohibited in the park: land transformation, hunting of waterfowl, off-road motor vehicle movement, berry and mushroom picking with mechanical tools, lighting fires outside designated areas, and any actions that endanger the soil and natural values. The nature reserve zone is specifically dedicated to forest habitat and dune protection, where all types of logging are prohibited, except for specific interventions aimed at habitat conservation. The nature park zone ensures nature protection and landscape preservation while promoting the development of biologically valuable forest stands. The neutral zone includes the Riga–Ventspils (A10) national highway. These regulations ensure the conservation and sustainable use of natural values. The general regulations on nature parks (Cabinet of Ministers Regulations No. 83, 09.03.1999, prot.No.16, 1.§) also apply to Nature Park "Beberbeķi".

Nature reserve "Melnā ezera purvs" ("Black Lake bog")

Approximately 6 km south of the airport runway lies the Nature Reserve "Melnā ezera purvs". It is a nationally significant specially protected area (SSPA) and a Natura 2000 site, covering a total area of 342 ha. The reserve is in Olaines Parish, Olaine Municipality, and is municipally owned.

Today, Black Lake bog is a small but ecologically important wetland that, due to its geographical location, enhances the biological value of the nearby Nature Reserve "Cenas tīrelis". The primary ecological significance of the area

[56] Nature Conservation Agency (28.11.2024.)
[57] Ltd. Rīgas meži (28.11.2024.)

lies in its peatland habitats and bird diversity. The reserve is notable for Black Lake and other bog lakes, with a high diversity of nesting and migratory birds[58].

84% of the nature reserve consists of specially protected habitats, with 17 specially protected bird species recorded[59].

Image 24: Nature Reserve "Melnā ezera purvs" (Source: Olaine Municipality)

There are no specific individual protection and usage regulations for this territory; however, two key regulatory acts apply: 21.11.2023. Cabinet of Ministers Regulations No. 674 "Regulations on Nature Reserves" (prot. No. 58, § 63), 16.03.2010. Cabinet of Ministers Regulations No. 264 "General Regulations on Specially Protected Natural Areas" (prot. No. 14, § 36).

Nature Reserve "Cenas tīrelis"

Approximately 6 km southwest of the airport runway lies the Nature Reserve "Cenas tīrelis", which spans across Mārupe Municipality and Olaine Municipality, covering a total area of 2296 ha. It is designated as a Natura 2000 site. Although part of the bog is used for peat extraction, the area plays a crucial role in the conservation of raised bogs, transition mires, and dystrophic lakes. It is one of the few Latvian peatlands that exhibits characteristics of both eastern-type (*Betula nana, Chamaedaphne calyculata*) and western-type (*Trichophorum caespitosum*) peatlands. The reserve is also significant for bird conservation, with 10 bird species protected in Latvia and Europe recorded in the area[60].

Image 25: Nature Reserve "Cenas tīrelis" (Source: Mārupe Municipality))

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[58] Olaine Municipality Development Programme until 2028, Environmental Report, Developed within the Framework of the Strategic Environmental Impact Assessment, 2023

[59] Olaine Municipality (28.11.2024.)

[60] Nature Conservation Agency (28.11.2024.)

There are no specific individual protection and usage regulations for this territory; however, two key regulatory acts apply: 21.11.2023. Cabinet of Ministers Regulations No. 674 “Regulations on Nature Reserves” (prot. No. 58, § 63), 16.03.2010. Cabinet of Ministers Regulations No. 264 “General Regulations on Specially Protected Natural Areas” (prot. No. 14, § 36).

The Nature Reserve “Cenas tīrelis” has an active nature conservation plan for 2005–2020, which has been extended until 21 December 2025. The plan outlines the long-term objectives for the territory, including: ensuring the undisturbed development of biologically and scenically valuable natural habitats, preserving the wetland complex as an internationally significant bird area, stabilising the hydrological regime to prevent bog habitat degradation caused by drainage ditches, and balancing nature conservation and socio-economic interests with the future development of the area. Of the 25 habitat types found in Cenas tīrelis, 5 are of European significance, collectively covering 95% of the bog's area. The nature reserve is primarily designated for the protection of birds and their essential habitats.

Nature Reserve “Babītes ezers” (“Babīte Lake”)

Approximately 7 km from the airport lies another nature reserve “Babīte Lake”. It is a nationally significant specially protected area (SSPA) and a Natura 2000 site. The lake is one of Latvia’s few lagoon lakes, classified as a eutrophic lake with extensive common reed, bulrush, and cattail vegetation, as well as submerged and floating aquatic plants. A valuable habitat within the reserve is its wet meadows, which in Zemgale have survived only in small fragmented areas, primarily along the Lielupe River. A total of seven specially protected bird species has been recorded here, including the Montagu’s harrier, hen harrier, ruff, corncrake, and wood sandpiper. The reserve covers a total area of 2988 ha, spanning Babīte and Sala Parishes in Mārupe Municipality, as well as Valgunde Parish in Jelgava Municipality.

The individual protection and usage regulations for Nature Reserve “Babītes ezers” (Cabinet of Ministers Regulations No. 409, 24.04.2011) state that the reserve was established to protect key waterbird feeding, breeding, and moulting areas, as well as important migratory stopovers. The area also safeguards European priority habitats, including natural eutrophic lakes with submerged and floating vegetation and floodplain meadows, along with protected bird species such as the smew, white-tailed eagle, and little tern. The reserve’s protection regime consists of: Strict protection zone, ensuring waterbird nesting and migration, Nature reserve zone, preserving floodplain meadows and meadow bird habitats, Nature Park zone, promoting meadow bird nesting and protected habitat conservation. The reserve prohibits the degradation of floodplain meadows, cranberry plantation establishment, economic activities within designated seasonal protection periods, and the use of water sports equipment or internal combustion engines on the lake. Additionally, public activities and habitat management require Nature Conservation Agency approval to maintain the area’s natural values. The following regulations apply to the territory: Cabinet of Ministers Regulations No. 674, 21.11.2023 – Regulations on Nature Reserves (prot. No. 58, § 63), Nature Conservation Plan (2009–2019), which remains in force until 31.12.2024. A new conservation plan is scheduled for development in 2025.

Image 26: Babītes ezers Nature Reserve (Source: Mārupe Municipality)

Nature Park “Jaunmārupe”

Nature Park “Jaunmārupe” is a locally designated protected natural area, established in 2000 in Jaunmārupe, near the Pavasari Reservoir. The park is located approximately 2.5 km from the southern part of the airport. A lit promenade with benches has been built between the park and the adjacent reservoir, and a beach area has been developed along the shoreline. A natural network of trails has formed within the park, with a central open space for visitors. The park also features a historic alley, which once led to the nearby Švarcekmuiža estate[61].

Image 27: Locally Significant Protected Natural Area - Nature Park “Jaunmārupe” (Source: Mārupe Municipality)

In implementing the Riga Airport Master Plan 2025–2050, no significant adverse impact on specially protected nature areas located in the vicinity of the airport (SSPA and Natura 2000 sites) and their natural values is anticipated. The development projects are predominantly planned within the airport territory, which has already been significantly affected by anthropogenic activities; therefore, their impacts are localised and manageable. Potential risks – including increases in noise, emissions and surface runoff – will be controlled through the expansion of noise management, stormwater treatment and monitoring systems, thereby ensuring the long-term preservation of the protected areas and their ecological functions.

[61] Mārupe municipality (24.11.2024.)

6. International and national environmental protection goals

International environmental protection goals are established in multilateral conventions, EU directives and regulations, and international documents specifically related to aviation:

- Bern Convention (1979): *Convention on the Conservation of European Wildlife and Natural Habitats.* Protects wild flora, fauna, and natural habitats, particularly endangered and disappearing species. In force in Latvia since 1996.
- Bonn Convention (1979): *Convention on the Conservation of Migratory Species of Wild Animals.* Promotes international cooperation in the protection of migratory species and their habitats. In force in Latvia since 1999.
- Rio de Janeiro Convention (1992): *Convention on Biological Diversity (CBD).* Aims to promote the conservation and sustainable use of biological diversity.
- Aarhus Convention (1998): *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.* Strengthens public participation in environmental governance. In force in Latvia since 2002.
- Kyoto Protocol (1997): A supplement to the *United Nations Framework Convention on Climate Change (UNFCCC)*, requiring signatories to reduce greenhouse gas emissions.
- Paris Agreement (2015): Aims to reduce CO_2 emissions to limit global warming (targeting an increase well below 2°C, with efforts to limit it to 1.5°C).
- Council Directive 92/43/EEC (Habitats Directive): *On the conservation of natural habitats and of wild fauna and flora.* Forms the basis of the Natura 2000 network.
- Directive 2000/60/EC (Water Framework Directive): *Establishing a framework for Community action in the field of water policy.* Promotes the sustainable management of water resources.
- Directive 2002/49/EC (Environmental Noise Directive): *On the assessment and management of environmental noise.* Regulates the evaluation and management of environmental noise in cities, along roads, railways, and airports.
- Directive 2004/35/EC (Environmental Liability Directive): *On environmental liability with regard to the prevention and remedying of environmental damage.* Establishes company liability for environmental damage.
- Directive 2008/50/EC (Air Quality Directive): *On ambient air quality and cleaner air for Europe.* Sets air quality standards and targets to improve air quality and reduce pollution across Europe.
- Directive 2009/147/EC (Birds Directive): *On the conservation of wild birds.* Protects bird populations and their habitats.
- Directive 2011/92/EU (Environmental Impact Assessment Directive – EIA Directive): *On the assessment of the effects of certain public and private projects on the environment.* Defines the environmental impact assessment (EIA) procedure for a wide range of projects, including industrial sites and infrastructure.
- Regulation (EU) No. 139/2014: Establishes requirements for airport rescue and firefighting services, including administrative procedures, equipment, personnel training, and professional competence standards.

- Regulation (EU) 2018/1139: Defines environmental protection requirements in civil aviation.
- Regulation (EU) 2020/784: Introduces restrictions on the use of perfluorooctanoic acid (PFOA), its salts, and related compounds in firefighting foams to reduce environmental and human health impacts.
- Regulation (EU) 2023/1804: Mandates the deployment of alternative fuel infrastructure at TEN-T network airports, ensuring power supply for stationary aircraft.
- Regulation (EU) 2023/2405: Establishes fair competition conditions for sustainable air transport, setting a gradual increase in the use of Sustainable Aviation Fuel (SAF) up to 2050.
- Annex 16 to the ICAO Chicago Convention: Sets standards for aircraft noise and emissions reduction.
- ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA): Implements carbon offset and reduction mechanisms for international aviation.

Alongside multilateral conventions and EU directives, **the United Nations Sustainable Development Goals (SDGs)**, adopted in 2015, play a key role in airport sustainability efforts. The 17 SDGs set global priorities for environmental, economic, and social sustainability up to 2030.

Image 28: Riga Airport's Priority SDGs (Source: RIX Sustainability Strategy 2022–2030)

Riga Airport in its Sustainability Strategy 2022–2030 has defined six of the 17 SDGs as priority objectives. The remaining SDGs have been assigned medium or low priority in relation to the airport's operations and development.

National environmental protection goals are defined in the **Environmental Policy Guidelines for 2021–2027**, which also include the Environmental Monitoring Programme for 2021–2026. These guidelines are derived from the Latvia 2030 Sustainable Development Strategy and the **National Development Plan for 2021–2027 (NAP2027).**

The guidelines set objectives related to climate neutrality, biodiversity conservation, pollution reduction, and resource efficiency, which are particularly relevant to the transport sector, including airport development. They establish governance tasks, monitoring requirements, and sustainable development principles, which play a crucial role in greening airport infrastructure and reducing greenhouse gas emissions.

Other key national-level documents in the environmental context include:

- *Latvia's National Energy and Climate Plan 2021–2030* (updated in 2024) – Serves as Latvia's energy policy roadmap, aimed at achieving energy independence, energy supply security, and economic decarbonisation by leveraging local renewable resources and innovation, while addressing social and economic challenges associated with the energy transition.
- *Air Pollution Reduction Action Plan 2020–2030* – Defines measures and strategies to reduce emissions of air pollutants, improve air quality, and mitigate their negative impact on human health and the environment, in line with the EU's 2030 targets.
- *Latvia's Climate Change Adaptation Plan until 2030* – Establishes strategic goals and action directions to mitigate the negative effects of climate change on people, the economy, and nature, promote climate adaptation, and leverage the opportunities created by climate change.

- *Latvia's Climate Neutrality Strategy until 2050* – Sets the goal of achieving climate neutrality by 2050 through reducing greenhouse gas emissions and enhancing CO_2 sequestration, while improving economic sustainability, living conditions, and environmental resilience.
- *Regional Policy Guidelines for 2021–2027* – Define Latvia's regional socio-economic development strategy, aiming to reduce regional disparities and enhance competitiveness until 2027. These guidelines incorporate environmental sustainability objectives, including the preservation of natural and cultural heritage, improvements in energy efficiency, and the promotion of smart, environmentally friendly solutions.
- *Riga and Pieriga Mobility Plan (2010)* – A strategic document designed to develop an integrated and sustainable transport system in the Riga metropolitan area, improving accessibility, public transport quality, traffic safety, and reducing the environmental impact of transport.

To ensure the implementation of environmental and nature protection measures at the national level in Latvia, the airport must comply with the **following laws:**

- *Protection Zone Law* (1997) – Establishes protection zones around the airport's artesian wells.
- *Chemical Substances Law* (1998) – Requires the storage of safety data sheets for chemical substances and maintenance of records.
- *Law on Environmental Impact Assessment* (1998) – Requires the airport to conduct environmental impact assessments for development projects.
- *Forest Law* (2000) – Regulates Forest management and tree felling procedures within the airport's territory.
- *Species and Habitat Protection Law* (2000) – Governs the management of risks related to wild birds and animals at the airport.
- *Packaging Law* (2001) – Imposes obligations to provide deposit packaging collection points.
- *Pollution Law* (2001) – Requires the airport to carry out pollution monitoring and comply with emission limits.
- Water Management Law (2002) – Obligates the airport to monitor water resources and comply with protection zone regulations.

- *Fire Safety and Firefighting Law* (2002) – Defines fire safety and emergency response requirements, ensuring appropriate measures for fire incidents and coordination with the State Fire and Rescue Service (VUGD).
- *Natural Resources Tax Law* (2005) – Requires the airport to calculate taxes on polluting activities and environmentally harmful goods.
- *Environmental Protection Law* (2006) – Mandates the implementation of an environmental management system and monitoring of water, noise, and waste.
- *Waste Management Law* (2010) – Requires the collection and disposal of hazardous and municipal waste by a licensed operator.
- *Building Energy Efficiency Law* (2012) – Requires the airport to conduct energy certification and monitoring in accordance with regulations.
- *Energy Efficiency Law* (2016) – Obliges the airport to maintain a certified energy management system (ISO 50001).

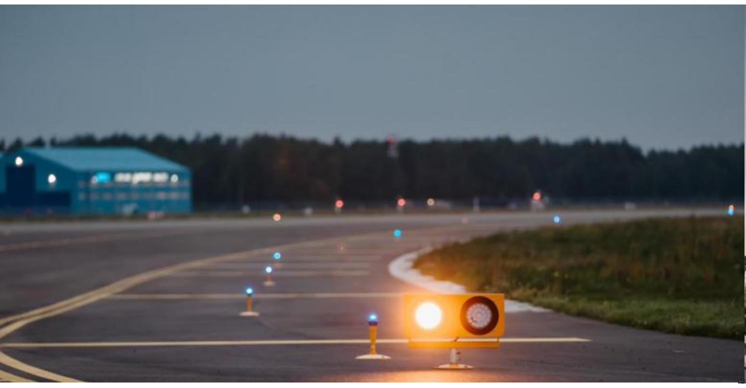
In addition to the above-mentioned laws, in 2024, RIX Riga Airport **was subject to 47 Cabinet of Ministers regulations** covering a wide range of environmental aspects[62].

No.	Environmental objective / document	Essence of the objective	How it is addressed in the Development Plan	Specific solutions (with references to Environmental Report sections)
1.	Paris Agreement (2015), EU climate policy	Reduction of GHG emissions, climate neutrality	Integrated climate management and emissions reduction approach	Net Zero 2035 roadmap; GHG inventory (Scope 1–2); Net Zero 2050; ACA programme (see Sections 4.4, 4.5, 4.13, 7.3, 7.4; 8; 11)
2.	EU Biodiversity Strategy 2030	Protection of habitats and species	Assessment of impacts on biodiversity and aviation safety aspects	Bird strike monitoring; habitat management; restoration of compensated habitats (see Sections 4.13, 5, 7.7, 8, 11)
3.	Natura 2000 and specially protected nature areas (EU / LV)	Protection of Natura 2000 sites and protected areas	Assessment of impacts on nearby Natura 2000 sites and protected areas (incl. Beberbeķi Nature Park)	Impact assessment on Natura 2000 sites and protected areas; monitoring and cooperation with the Nature Conservation Agency (see Sections 4.13, 5, 7.7, 11)
4.	Air quality policy (EU / LV)	Reduction of air pollution	Assessment of air quality and emissions under development scenarios	GHG inventory; emission reduction measures; SAF deployment pathways (see Sections 4.4, 4.5, 7.3, 7.4, 8, 11)
5.	EU Water Framework Directive	Protection of water quality	Assessment of airport impacts on surface water and groundwater	Collection of de-icing fluids; stormwater runoff control; water quality monitoring (see

[62] eRIX Document: List of Regulatory Acts and Other Documents Governing Environmental Protection and Energy Management" (27.11.2024)

No.	Environmental objective / document	Essence of the objective	How it is addressed in the Development Plan	Specific solutions (with references to Environmental Report sections)
				Sections 4.7, 4.8, 4.9, 4.13, 7.5; 8, 11)
6.	EU Environmental Noise Directive, World Health Organization (WHO) guidelines	Reduction of noise impacts on health	Noise impacts modelled and analysed within the SEA	Strategic Noise Maps; Noise Action Plan; assessment of limit values; ICAO Balanced Approach; monitoring (see Sections 4.13, 4.6; 7.9, 8, 11)
7.	EU waste policy	Reduction of waste generation and promotion of recycling	Assessment of the waste management system included	Waste volume and recycling indicators; waste sorting system (see Sections 4.11, 8, 11)
8.	Soil and pollution policy (EU / LV)	Prevention of pollution risks	Identification of contaminated and potentially contaminated sites	Spill recording; management of contaminated soil; PSMS database (see Sections 4.9, 4.10, 7.6, 8, 11)
9.	Sustainable development principles (EU / LV)	Integrated approach to environmental protection	SEA based on integration, precaution and alternatives assessment principles	Alternatives assessment; impact analysis; mitigation measures; monitoring (see Sections 2, 7.10, 8; 11)

Table 27: Integration of international and national environmental protection objectives



7. Assessment of the significant environmental impact of the RIX Riga Airport Master Plan and its possible alternatives

7.1. Infrastructure development projects under the Riga Airport Master Plan and their assessment

The Riga Airport Master Plan sets out infrastructure development projects for the next 25 years, outlining the airport's prospective strategic and spatial development in the long term **up to 2050**, and providing guidance for infrastructure development up to 2065.

The baseline for the Master Plan is the Riga Airport infrastructure as at 2025, together with all ongoing and planned projects at Riga Airport, including new access roads, parking facilities, the sixth phase of the Riga Airport terminal expansion, hangars, and the construction of the Rail Baltica railway link and railway station.

The planned development is based on a flexible scenario enabling the phased development of Riga Airport infrastructure: in the **medium term up to 2030 (Phase 1), up to 2040 (Phase 2), and in the long term up to 2050 (Phase 3).** This approach avoids unjustified infrastructure expansion and ensures economically sound investment. Infrastructure development is planned on a gradual basis, with projects implemented in line with air traffic demand and the growth in passenger and cargo volumes. Investments are to be made upon reaching specific air traffic thresholds, thereby ensuring that development corresponds to actual demand.

An annex to the Master Plan includes "Initial Recommendations for Development beyond 2050", which provide guidance for Riga Airport development up to 2065. These include the potential development of a second runway and associated taxiways, commercial passenger aircraft aprons and terminal buildings, cargo aprons and terminals, as well as a proposal for the creation of a new northern access to the airport territory, connecting the A10 motorway to the airport. The principal objective is to define a proposal for a revised boundary of the national interest territory (currently[63] 1,906 ha; proposed 1,803 ha, including 280 ha excluded from the currently reserved area and 177 ha newly included), in order to enable the timely reservation of land required for future airport expansion and to establish appropriate land use restrictions at an early stage.

The Strategic Environmental Impact Assessment evaluates the projects planned under the Riga Airport Master Plan up to 2050, based on forecast changes in passenger numbers. The recommendations for development up to 2065 are not assessed, as specific decisions will be taken in the next Master Plan, taking into account the projects implemented up to 2050, future demand, required capacity and technologies available at that time.

The Riga Airport Master Plan and the Environmental Report were prepared concurrently; therefore, alternative infrastructure development options were assessed already during the drafting stage, incorporating criteria relating to environmental impacts, surrounding areas and residents. The Master Plan takes into account the recommendations of the Environmental Report in order to minimise, as far as possible, the potential environmental impacts arising from the implementation of the airport's planned long-term development projects up to 2050.

[63] Approved by Cabinet of Ministers Order No. 297 of 2 July 2013 "On the Designation of National Interest Object Status to the Airfield Territory of the State Joint-Stock Company "Riga International Airport"".

Correlation between passenger growth and infrastructure development

The development of Riga Airport is directly linked to the growth in passenger flows and the increasing intensity of aircraft movements. In 2022, the airport handled 5.4 million passengers, while in 2024 the number reached 7.1 million passengers. Forecasts indicate further growth in the medium term to 10.5 million passengers by 2030, to 13.5 million passengers by 2040, and in the long term to 17.5 million passengers by 2050. Aircraft movements are projected to increase from 88,000 movements in the medium term (2030) to 134,000 movements in the long term (2050). These indicators demonstrate the need to increase capacity in the airport terminal, aircraft stands and aprons, as well as in landside access infrastructure.

The planned development projects are intended to be implemented upon reaching defined air traffic thresholds, thereby ensuring a coordinated and sustainable alignment between demand and the development of airport infrastructure. The Master Plan is aimed at maximising the use of existing infrastructure while incorporating significant improvements to increase the overall airport capacity.

Development phases and projects

Phase 1 (medium term) – up to 2030 *(10.5 million passengers, 88,000 aircraft movements)*

Projects – *Implementation outcome*:

- Construction of Phase 6 of the Riga Airport terminal expansion and apron reconstruction – expansion and modernisation – *Increased passenger handling capacity and improved comfort.*
- Integration of the Rail Baltica railway link and station – *Provision of an international connection to the European rail network.*
- Improvement of the access node – reconstruction of the junction of the P133 motorway and Dzirnieku Street into a roundabout, and optimisation of traffic flows for public transport, private vehicles and taxis – *More efficient traffic management at intersecting roads and reduced congestion during peak hours.*
- Initial development of the Airport City Business Park (one hotel and conference centre, one office building and supporting commercial premises, one industrial area, and a full-service fuel station) – *Enhanced commercial attractiveness of the airport and promotion of economic growth.*
- Maintenance and renewal of the existing runway, taxiways and apron pavements – *Ensuring safe and efficient aircraft operations.*
- Modernisation of technical areas, including service yards and equipment zones, and investment in new service vehicles – *Improved operational capacity of the airport.*

In Phase 1 of the development, the primary focus is on improving the existing airport infrastructure and extending its operational lifespan, as well as increasing the capacity of the main access route (the junction of the P133 motorway and Dzirnieku Street), thereby establishing a foundation for further development. The proposed activities do not require additional land (no land acquisition is necessary).

Phase 2 (medium term) – up to 2040 *(13.5 million passengers, 134,000 aircraft movements)*

Projects – *Implementation outcome*:

- Construction of new taxiways and rapid exit taxiways (hereinafter also – RET (Rapid Exit Taxiway)): a Code E full-length taxiway (parallel to the existing Taxiway F), a partially parallel taxiway (on the western side of the existing runway, providing access to the development of the western technical area), and two new RETs – *Reduced runway occupancy time, segregated traffic flows and increased overall airport capacity.*

- Significant apron upgrades – southern expansion of Apron 2 and reconfiguration of stands for commercial passenger operations; reconfiguration of Apron 1 and construction of a new pier with nine Code C contact stands; relocation of the isolated aircraft stand to the north-west (which may also be used for engine ground runs); modernisation of electrical infrastructure – *Increased overall aircraft handling capacity.*

- Development of a new Maintenance, Repair and Overhaul (MRO) area, a Fixed-Based Operator (FBO) area for private and business aviation operators, and a General Aviation (GA) zone to the west of the existing runway, including the construction of a new apron – *Spatial relocation and segregation of MRO and GA activities to the western development zone of the airport (partial relocation of MRO from its current location is planned by 2040).*

- Reconfiguration of two aircraft de-icing pads at each end of the runway to enable their dual use as holding areas for aircraft awaiting runway access – *Improved operational efficiency and safety, as well as increased overall runway capacity.*

- Relocation of the DVOR/DME RIA radio navigation beacon (location to be agreed with LANS) – *Ensuring compatibility with future airport development.*

- Designation of obstacle limitation surface in the areas beyond the ends of the existing runway – *Increased available take-off distance without extending the runway length.*

- Expansion of cargo logistics infrastructure, including warehouses, cargo terminals and technical areas. Further development of the Airport City Business Park, including two industrial/commercial zones with a total developable area of 40,860 m² (to be implemented subject to market demand) – *Enhanced commercial attractiveness of the airport, economic growth and increased cargo logistics capacity.*

- Development of car parking facilities and intermodal access – *Ensuring integration of airport access with public transport, including the Rail Baltica railway link and station.*

- In addition to the new projects, renewal and reconstruction works – resurfacing of Taxiways F, Y and B, and renewal of the runway section between Taxiways A and B – *Ensuring safe aircraft operations (landing and take-off) and enhanced safety.*

As it is forecast that Riga Airport will be able to efficiently accommodate demand with a single runway until 2050, Phase 2 of the development primarily provides for substantial improvements to the taxiway and apron system, thereby increasing the capacity of the existing runway and the overall airfield. For the implementation of the proposed activities related to the development and expansion of airfield infrastructure (including the southern expansion of Apron 2), additional land amounting to 45.6 ha will be required by 2040.

Phase 3 (long term) – up to 2050 *(17.5 million passengers, 134,000 aircraft movements)*

Projects – *Implementation outcome*:

- Extension of the western parallel taxiway – *Ensuring smoother and more efficient connections to the MRO, FBO and GA zones.*
- Southern apron expansion, including the provision of two aircraft stand taxilanes – *Significant increase in overall airfield capacity and improved efficiency of aircraft parking and manoeuvring.*
- Terminal building – *No changes planned.*
- Expansion of the MRO and GA aprons. Relocation of all MRO (Maintenance, Repair and Overhaul) and GA activities to the western apron – *Segregated and optimised spatial use of the airfield area and streamlined MRO and GA operations. The central airfield area released exclusively for passenger traffic flows.*
- Further development of aircraft stands and comprehensive electrical installation works, including the airfield lighting system, GA power supply and external ground power units – *Energy-efficient and modernised technical infrastructure of Riga Airport.*
- Proposed study of a new northern connection between Riga Airport and the A10 motorway, in accordance with spatial plans – *Further investigation and planning of new northern access routes to Riga Airport, with segregation and optimisation of traffic flows.*
- Long-term development of the Airport City Business Park – *Establishment of a multifunctional area comprising offices, hotels, a conference centre, retail and industrial buildings (at this stage, a second hotel with a developable area of 9,000 m² and a second office building with a developable area of 12,000 m² are planned).*

In the long term up to 2050, the primary focus is on infrastructure relocation measures and improving connectivity with the western airfield development area (MRO, FBO, GA and military flight zones). The total additional land area required for the development of Riga Airport amounts to 0.7 ha.

Image 29: Riga Airport development phases and planned activities

7.2. Methodological framework for the assessment of environmental impacts

The assessment of the potential environmental impacts of the Riga Airport Master Plan has been prepared on the basis of the **principles** set out in **Chapter 2,** further adapted to the specific nature of Riga Airport operations and the characteristics of the planned development phases, and correlated with the forecast number of passengers and flights. The purpose of the assessment is to provide transparent, comparable, fact-based and forward-looking information on the **significance, type, duration** and **character** of the potential impacts.

The assessment has been carried out using the following criteria:

- **Significance** – the importance of the impact (insignificant, moderately significant, significant, unknown), assessed in relation to compliance with legislation and with environmental quality and human health protection objectives.
- **Type** – direct impact (arising directly from the implementation of a specific project) or indirect impact (arising indirectly through interactions between the environment and direct impacts, for example from traffic flows to and from the airport).
- **Duration** – short-term impact (for example during the construction phase), resulting in relatively temporary environmental disturbance, with most such effects ceasing once the activity ends. Medium-term or long-term impacts arise during the operational phase of the development and are associated with land transformation and changes in land use designation.
- **Character** – positive or negative impact on environmental quality.
- **Cumulative impact** – the combined effect resulting from the overlap of multiple direct and indirect impacts (for example, projects under the Master Plan, the high-speed Rail Baltica project, the spatial plans of Riga State City and Mārupe Municipality, and other development and infrastructure projects). Both direct and indirect cumulative adverse environmental impacts will be mitigated through compliance with environmental quality standards and pollution limit values established in legislation, Riga Airport's participation in the Airport Carbon Accreditation (ACA) programme, the "Net Zero 2050" initiative and other environmental sustainability projects.

Noise is assessed in the Environmental Report as a separate impact. Although it is not traditionally classified as an independent environmental component, in the context of Riga Airport development noise has been identified as the most significant factor affecting residents' health and quality of life. Accordingly, the assessment of noise is presented in a separate subsection, 7.9 "Impact on Noise Levels". In determining significance, the Strategic Noise Map (SNM), forecast changes in the number of flights and flight trajectories, the spatial plans of Riga State City and Mārupe Municipality, as well as the statutory noise indicators established in legislation have been taken into account.

Recommendations aimed at preventing or mitigating the potential environmental impacts of the implementation of the Riga Airport Master Plan, including impacts on the quality of life and health of residents in settlements located in the vicinity of the airport, were developed at the drafting stage of the planning document and have therefore already been incorporated into the Master Plan.

7.3. Impact on air quality

Existing situation

According to Chapter 4.4, air quality in the vicinity of Riga Airport is primarily affected by aircraft engine operations (take-off, landing, taxiing and apron idling), as well as by ground transport movements and airfield maintenance activities. Within the airport territory, 14 stationary emission sources are registered, with a total annual emission volume of 10.46 tonnes per year.

Modelling results indicate that concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}, $PM_{2,5}$) do not exceed the limit values established in legislation outside the airport territory, although short-term increases may occur during certain periods. The greatest impact on air quality remains within the airfield territory itself, which is regarded as a working environment.

Assessment of impacts from the implementation of the Master Plan

Section 5.2 "Air Quality Assessment" of the Master Plan provides a detailed review of the air pollution limit values established in Cabinet of Ministers Regulation No. 1290 of 3 November 2009 "Regulations on Air Quality", as well as an analysis of the potential impact of the projects proposed in the Master Plan on air quality. The analysis is based on modelling of Riga Airport operations and associated emissions for the following time periods: 2024 (current situation), 2030 (medium term) and 2050 (long term), in line with the forecast growth in passenger numbers and aircraft movements.

Concluded:

- The principal air pollutants emitted into the atmosphere – carbon monoxide (CO), benzene (C_6H_6), nitrogen oxides (NO_x), sulphur oxides (SO_x), particulate matter (PM_{10}, $PM_{2,5}$) and carbon dioxide (CO_2) – arise primarily from the aircraft landing and take-off cycle (hereinafter also referred to as the LTO cycle), aircraft auxiliary power units (APUs), ground support equipment, vehicles operating in airport parking and access areas, heating boilers, and to a lesser extent from stationary generators and fire service training exercises.
- Modelling of Riga Airport operations indicates pollutant emissions (t/year) for the following time periods:

Time period	CO	Benzene	No_x	SO_x	PM_{10}	$PM_{2,5}$	CO_2[64]
2024	125,37	0,15	244,59	19,38	1,44	1,42	48496,45
2030	140,14	0,14	347,15	25,61	1,70	1,67	62263,29
2050	188,63	0,24	**549,92**	26,88	1,15	1,10	**33029,11**

- It is anticipated that pollutant emissions generated by the aircraft LTO cycle will increase in line with growth in passenger numbers and aircraft operations (passenger traffic is forecast to increase by 48% by 2030 and by 144% by 2050; the number of flights is projected to increase by 39% by 2030 and by 155% by 2050, compared with 2024). However, taking into account the objectives of the ReFuelEU Aviation Regulation to achieve a 70% share of sustainable aviation fuel (SAF) by 2050 (of which 35% must consist of synthetic fuels), the increase in LTO cycle emissions will not be proportional to the growth in passenger numbers and aircraft movements. Instead, the increase will be significantly lower than would otherwise be expected, as it will be offset by the high level of SAF use. As a result, despite substantial growth in passenger numbers and flight movements, LTO cycle emissions are projected to increase only in the medium term (from 45,635.11 t/year in 2024 to 59,663.59 t/year), and to decrease significantly in the long term, amounting to 30,310.40 t/year, which is lower than the current level.
- Emissions modelling indicates that, among all pollutants, only nitrogen oxides (NO_x) are projected to increase – by 42% in 2030 (347.15 t/year) and by 125% in 2050 (549.92 t/year), compared with 2024 (244.59 t/year), as they are least affected by the use of SAF. Emissions of other pollutants are expected

[64] See also section 7.4. of the Environmental Report "Impact on climate change"

to increase more moderately or even decrease. It is forecast that by 2050 emissions of particulate matter (PM_{10}, $PM_{2,5}$) and carbon dioxide (CO_2) will decrease by approximately 20% to 32% compared with 2024.

- Notwithstanding the anticipated increase in the operational intensity of aircraft ground support equipment, related emissions are expected to decrease, as the share of electric ground handling equipment will increase in the future.
- Emissions associated with aircraft auxiliary power units (APUs) are expected to increase in line with higher operational volumes; however, projections for 2030 indicate a reduction compared with levels that would otherwise be expected. Similarly to the LTO cycle, this reduction is attributable to the uptake of SAF and the introduction of regulatory requirements stipulating that, from 2030, all aircraft stands – both contact and remote stands – must be equipped with fixed or mobile ground power supply units. By 2050, emissions are projected to increase moderately; however, due to these same measures, they will remain below the level that would otherwise be anticipated.
- Although passenger numbers are forecast to increase by 48% in 2030 and by 144% in 2050, total emissions from landside transport – generated by public transport and private vehicles travelling to and from the airport via access roads, as well as vehicles parked in airport car parks – are not expected to increase at the same rate. In fact, a reduction in air emissions is projected by 2050, as the share of electric vehicles will increase (from 1% in 2024 to 5% by 2030 and to 44% by 2050 of all passenger vehicles), a proportion of passengers will access the airport by rail (following implementation of the high-speed Rail Baltica project and integration of the railway link and station into the airport infrastructure), and emission factors associated with road vehicles are expected to decline in the long term.
- Emissions generated by heating boilers, stationary generators and simulated emergency situations (fire service training exercises) will remain unchanged across all three time periods; however, given the planned gradual transition to cleaner fuels and more energy-efficient systems, an actual reduction in emissions is likely.
- Modelling of airport operations for the time periods 2024, 2030 and 2050 shows that the calculated concentration curves for atmospheric air pollutants (NO_2, CO, SO_2, PM_{10}, $PM_{2,5}$, C_6H_6) do not exceed the annual, daily and/or hourly limit values[65] established in legislation for the protection of human health under any of the assessed scenarios in the inhabited areas of Mārupe Municipality or the neighbourhoods of Riga State City surrounding Riga Airport (Beberbeķi, Brīvkalni, Imanta West, Jaunmārupe, Libri, Mārupe, Mārupe West, Mūkupurvs, Mazāva, Skulte, Spilve, Vētras, Zolitūde), nor within the airport service area (the highest NO_2 concentration >20 µg/m³, ³), which does not exceed the applicable limit value, has been observed in the vicinity of the threshold of Runway 18). Maximum CO concentrations (0,01-0,13 mg/m³) at all assessed locations are significantly below the limit values established in legislation[66]. No exceedances of limit values for SO_2[67], PM_{10}[68], $PM_{2,5}$[69] or benzene[70] have been identified, nor are significant changes in these pollutants projected in the medium or long term.

All modelling results are significantly below the statutory limit values for the relevant air pollutants. Overall, it may be concluded that emissions generated by aircraft operations are insignificant, do not

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[65] NO_2 annual limit value 40 µg/m³, hourly limit value 200 µg/m³ (not to be exceeded more than 18 times per calendar year)
[66] CO maximum daily eight-hour mean limit value 10 mg/m³
[67] SO_2 daily limit value 125 µg/m³ (not to be exceeded more than three times per calendar year), hourly limit value 350 µg/m³ (not to be exceeded more than 24 times per calendar year)
[68] PM_{10} annual limit value 40 µg/m³, 24-hour limit value 50 µg/m³ (not to be exceeded more than 35 times per calendar year)
[69] $PM_{2,5}$ annual limit value 25 µg/m³
[70] Benzene (C_6H_6) annual limit value 5 µg/m³

affect air quality outside the airport territory, and are not expected to result in adverse impacts on ambient air quality or human health.

Assessment of impacts by project implementation phase

The projects envisaged in the Master Plan up to 2050 will affect air quality and pollutant emissions. The nature of the impacts depends on the type of project and the stage of implementation:

- **direct impacts** will primarily arise from aircraft engine emissions during the LTO cycle and ground taxiing cycle, landside transport within the Riga Airport territory, traffic to and from Riga Airport, vehicle movements in car parks, as well as infrastructure construction and renewal works;
- **indirect impacts** will result from increased traffic flows towards Riga and Mārupe and from development in surrounding areas;
- **positive impacts** are expected from the integration of the high-speed Rail Baltica railway link and station into the airport infrastructure, the gradual transition to more energy-efficient solutions in airfield infrastructure, the increasing share of sustainable aviation fuel (SAF), changes in fleet composition (newer and more environmentally friendly aircraft models), and the planned development of a solar power plant (land reserved), as well as the future establishment of hydrogen storage and refuelling infrastructure.

Each of the planned activities, taken individually, is neutral or potentially positive in nature, as they are related to the maintenance, modernisation or provision of services within existing infrastructure. Additional environmental impacts arise primarily from the long-term increase in operational volumes, resulting from the development of airport activities and the growth in passenger, cargo and transport flows.

A detailed assessment of direct and indirect impacts by development phase and the principal projects planned within each phase is provided below.

Phase 1: up to 2030

This phase provides for the expansion of the Riga Airport terminal (Phase 6), integration of the Rail Baltica railway link and station into the airport infrastructure, improvement of the capacity of access roads and traffic nodes, modernisation of car parks, renewal of runway and apron pavements, and the initial development of the Airport City Business Park.

- **Terminal expansion (Phase 6):** During construction, emissions of dust and volatile organic compounds (VOCs), as well as transport-related pollution, will increase; however, this impact will be temporary and is not considered significant. During operation, increased passenger and transport flows will result in a long-term rise in traffic-related emissions (NO_x, PM, CO_2, etc.) in access areas.

- **Integration of the Rail Baltica railway link and station (connection to Riga Airport):** During construction, pollutant emissions will arise from construction machinery and material deliveries. In the long term, this project will significantly reduce the use of private cars, thereby lowering transport-related emissions per passenger.

- **Access node and car parks:** Increased traffic flows will result in a long-term rise in NO_x, PM, CO_2 and other emissions in terminal access areas. If airport access capacity (roads, public transport, Rail Baltica railway connection) is insufficient, congestion on the P133 motorway and Dzirnieku Street may lead to localised deterioration in air quality. The negative impact may be significant; however, it will be partially mitigated by increasing the capacity of the main landside access node – reconstruction of the P133/Dzirnieku Street junction into a roundabout – thereby reducing congestion and associated emissions, as well as by the modal shift enabled by the Rail Baltica railway connection. Without improvements to access infrastructure, emissions may be significant in the long term; with modernisation of the traffic node and implementation of the Rail Baltica connection, the impact is expected to decrease to moderately significant.

- **Renewal of runway and apron pavements:** Construction works will generate temporary emissions (primarily dust and volatile organic compounds), but long-term impacts on air quality will be minimal, as the works involve infrastructure renewal rather than capacity expansion.
- **Initial development of the Airport City Business Park:** Construction will generate temporary impacts; however, the operation of new commercial premises and offices will increase traffic intensity and generate additional long-term emissions, particularly from access roads.

Phase 2: 2031 – 2040

This phase provides for an increase in the capacity of the airfield's technical infrastructure, including the construction of new taxiways and Rapid Exit Taxiways (RETs), reconfiguration of Aprons 1 and 2 and the southern expansion, development of western aprons, relocation of the isolated engine test stand, reconfiguration of aircraft de-icing pads, and expansion of cargo logistics infrastructure.

- **Construction of new taxiways and Rapid Exit Taxiways (RETs).** The optimisation of airfield infrastructure will reduce runway occupancy time and increase operational throughput. The aircraft ground taxiing cycle generates the highest volume of pollutant emissions. By constructing additional taxiways and rapid exit taxiways, the duration of the ground taxiing cycle will be shortened. From an air quality perspective, the project is expected to have a neutral to positive impact, as it will reduce the time during which aircraft engines operate at high thrust during landing and runway vacating, resulting in lower emissions per operation (NO_x, PM, CO_2, etc.). Improved traffic flow and reduced runway delays are directly correlated with lower local emission concentrations both within the central airfield area and in nearby residential areas. The project will enable more efficient use of the existing single-runway system, thereby avoiding, in the long term, the need for construction of a second runway, which would have significantly greater environmental impacts. Increased operational efficiency will contribute positively to emission reduction compared with a scenario in which the project is not implemented. Overall, during the operational phase, the impact is forecast to be insignificant.
- **Reconfiguration of Apron 1 with construction of a new pier:** The project provides for a direct connection between the new pier and the terminal, delivering 9 additional Code C contact stands. The additional stands will enable the handling of more flights and passengers; consequently, total NO_x, PM and CO_2 emissions will increase during the operational phase. However, the direct terminal connection will reduce the need for passenger bus transfers between aircraft and the terminal, thereby lowering associated transport emissions. A reduction in aircraft engine idling time is also anticipated, as the new configuration will shorten taxiing times. Emissions are expected to increase primarily in the southern and central parts of Apron 1; however, overall air pollution levels in surrounding residential areas (Skulte, Jaunmārupe) will not be affected. Overall, implementation of the project is expected to result in a moderately significant impact on air quality. Although total emissions will increase due to higher airfield capacity, the more efficient pier and stand configuration will reduce emissions per passenger handled, and the emissions will remain localised within the airfield working environment.
- **Southern expansion of Apron 2 and reconfiguration of aircraft stands:** This project is expected to result in a moderately significant impact on air quality, as the increase in the number of stands and flights will lead to a higher overall volume of emissions. At the same time, more efficient aircraft positioning, shorter taxiing times and appropriate engineering solutions – including the provision of ground power supply at aircraft stands and passenger boarding via piers, thereby reducing the need for bus transfers – will decrease emission intensity per flight. The localised impact will be concentrated in the southern part

of the airfield and will not affect residential areas; therefore, overall, the impact is considered manageable and accompanied by positive management trends.

- **Relocation of the isolated aircraft engine test stand:** This will improve safety and operational organisation. During engine testing, short-term peaks of NO_2, CO_2 and PM emissions will occur at high power settings; however, the impact is expected to be moderately significant and localised within the airfield territory. By relocating the stand to the west of the runway, emissions will be directed away from residential areas, thereby significantly reducing population exposure to air pollution and providing a positive contribution to the protection of public health.
- **Construction of western aprons for the development of the MRO and GA zones:** This is expected to result in a moderately significant, localised impact on air quality, as emissions from maintenance activities, engine testing and general aviation (GA) flights will increase. At the same time, the spatial relocation of these activities to the western part of the airfield will redirect emissions away from more densely populated areas, thereby reducing residents' exposure to air pollution. Air pollution impacts will be concentrated primarily within the airfield working environment, where they are controllable. Improvements in traffic organisation and manoeuvring efficiency (reduced taxiing, increased use of ground power supply) will support more efficient operations and lower emissions per movement, contributing positively to environmental quality management.
- **Reconfiguration of two aircraft de-icing pads:** Relocation to each end of the runway will result in a moderately significant, localised impact on air quality within the airfield territory during periods of engine operation. However, overall, the measure will improve traffic flow, reduce aircraft taxiing and hold times, and thereby decrease emissions per movement. The redistribution of emissions towards the runway ends means that the impact on surrounding areas will be insignificant, while a positive contribution is expected as a result of improved traffic efficiency and reduced delays.
- **Expansion of cargo logistics infrastructure:** This will increase heavy vehicle traffic flows and, consequently, emissions from cargo aircraft, road transport and specialised equipment, particularly along access routes to and from the airport (P133 motorway, and in the directions of Riga and Jaunmārupe). The absolute volume of emissions will increase; however, the new infrastructure will enable more efficient organisation of cargo flows, reduced idling times and broader use of electrically powered equipment, thereby reducing emission intensity per unit of cargo and mitigating localised pollution in apron and warehouse areas.

Overall, the Phase 2 projects will enhance airfield operational efficiency and significantly reduce localised emissions, particularly within apron areas, even in the context of an overall increase in airport activity.

Phase 3: 2041 – 2050

Also, in the long term up to 2050, the principal projects are aimed at further increasing airfield capacity – including the provision of two aircraft stand taxilanes within the southern apron expansion and the extension of the western parallel taxiway to the new western apron serving MRO, FBO and GA operations. At the same time, the long-term development of the Airport City Business Park will continue, providing additional commercial premises, offices and hotel facilities within the airport territory.

- **Extension of the western parallel taxiway:** The project is intended to improve aircraft movement organisation by providing more direct access to the western technical zones (the new MRO area and the GA/FBO western apron). Although an overall increase in emissions may be expected due to higher capacity, the new taxiway will reduce taxiing time and overlapping manoeuvres, thereby ensuring more efficient fuel use and lower emissions per movement.

- **Southern apron expansion, including the provision of two aircraft stand taxilanes:** The project will significantly increase airfield capacity, resulting in an absolute rise in emissions due to a higher number of flights and aircraft parking positions. However, more efficient aircraft positioning and movement will reduce taxiing times, thereby lowering emissions per movement. The impact on air quality is assessed as moderately significant and localised within the airfield territory.
- **MRO and GA western apron:** By relocating all maintenance, repair, overhaul and GA activities to the western zone, emissions from engine testing and GA flights will be concentrated within the airfield territory and will not affect residential areas. The total volume of emissions will increase in line with higher operational intensity; however, relative emissions per movement will decrease due to more efficient traffic organisation. The impact on air quality is assessed as moderately significant but localised.
- **Further development of aircraft stands and comprehensive electrical installation works:** This will improve energy efficiency by providing external ground power supply units and modern lighting systems. It will reduce the use of aircraft auxiliary power units and localised apron emissions, while also decreasing pollution generated by vehicles and ground support equipment. The impact on air quality is assessed as positive and long-term.
- **Long-term development of the Airport City Business Park:** The construction of new offices, hotels and commercial premises will generate a significant increase in traffic flows, resulting in higher NO_x, PM and CO_2 emissions along access roads and in nearby residential areas. At the same time, modernised infrastructure, the availability of public transport and the use of electrically powered equipment will reduce relative emission intensity. The impact on air quality is assessed as moderately significant and localised.

Below is an assessment of the impact of the planned projects on air quality, classified according to the type, duration, character and significance of the impact:

Project	Type of impact [71]	Duration [72]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Neutral	Moderately significant
Integration of the Rail Baltica railway link and station	Direct / Indirect	Long-term	Positive	Significant
Access node and car parks	Direct / Indirect	Long-term	Neutral	Moderately significant
Renewal of runway, taxiway and apron pavements	Indirect	Short-term	Neutral	Insignificant
New taxiways and Rapid Exit Taxiways (RETs)	Direct	Long-term	Positive	Moderately significant
Reconfiguration of Apron 1 and construction of a new pier	Direct	Long-term	Neutral	Significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Neutral	Significant
Western aprons (MRO, FBO, GA)	Direct	Long-term	Neutral	Significant
Relocation of the isolated aircraft stand	Direct	Long-term	Neutral	Moderately significant
Cargo logistics infrastructure	Direct / Indirect	Long-term	Negative	Significant
Reconfiguration of two aircraft de-icing pads	Direct	Long-term	Neutral	Moderately significant
New technical zone (MRO, FBO, GA western aprons)	Direct	Long-term	Neutral	Moderately significant

[71] Additional direct impacts during the implementation of all projects will arise from construction works.
[72] Additional short-term impacts during the implementation of all projects will arise from construction works.

Project	Type of impact [71]	Duration [72]	Character	Significance
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Neutral	Significant
Extension of the western taxiway	Direct	Long-term	Neutral	Moderately significant
Airport City Business Park development	Direct / Indirect	Long-term	Neutral	Moderately significant

Cumulative impacts

Overall, in Phase 1 the most significant impacts are short-term emissions generated during construction and the increase in traffic intensity, which will be partially offset by the modal shift opportunities provided by Rail Baltica. In Phase 2, long-term impacts predominate, associated with apron expansion and the development of cargo logistics infrastructure, resulting in a more substantial increase in NOx, CO_2 and PM emissions within the airfield territory and across the regional transport network. In Phase 3, the most significant impacts are the indirect emissions arising from the development of the Airport City Business Park and the western technical zone, which in the long term will also affect surrounding residential areas.

Impacts on air quality are primarily linked to increasing demand; however, these effects are balanced by the integration of the Rail Baltica railway connection and the installation of apron ground power supply systems, which will reduce the use of aircraft auxiliary power units and thereby decrease both emissions and noise levels within the airport territory.

Overall, these impacts are predominantly localised within the working environment, proportionate in scale and manageable.

7.4. Impact on climate change

Existing situation

Riga Airport operations constitute a significant source of **greenhouse gas (GHG)** emissions, including CO_2 and other climate-relevant gases. The principal source of emissions is aircraft engines during landing and take-off cycles, while landside transport and airfield maintenance equipment generate additional emission loads.

In order to reduce GHG emissions and achieve the Net Zero objective, Riga Airport has:

- obtained certification under the Airport Carbon Accreditation (ACA) programme at Level 3 (with certification at Level 3+ planned for 2025), thereby addressing not only the reduction of GHG emissions from its own operations but also engaging third parties (airlines, service providers, road transport operators, etc.) in carbon footprint management (a Stakeholder Engagement Plan has been developed outlining various cooperation measures);
- joined the “Net Zero 2050” initiative, confirming its commitment to achieving full CO_2 emission reduction from emission sources under the direct control of Riga Airport by 2050. In 2023, the first Net Zero Roadmap for Riga Airport was developed, setting 2050 as the target year for achieving the objective. In 2024, Riga Airport updated its Net Zero Roadmap, establishing a target of reaching net zero emissions by 2035. In 2035, Riga Airport plans to obtain the highest level of ACA certification, confirming that the airport generates no Scope 1 and Scope 2 emissions and is actively addressing Scope 3 emissions.

Assessment of impacts from the implementation of the Master Plan

Airport development is planned on a phased basis and aligned with actual demand. This means that any increase in GHG emissions will be proportional to passenger and cargo volumes rather than occurring prematurely.

During construction, emissions will be temporary and will arise mainly from construction machinery and the transport of materials. In the long term, greenhouse gas impacts will be linked to increased airfield capacity and more intensive use of infrastructure. However, the Master Plan includes measures designed to reduce emission intensity per passenger and per unit of cargo, such as integration of the Rail Baltica railway connection, expansion of apron ground power supply systems, electrification of ground support equipment, increased use of sustainable aviation fuel (SAF), fleet modernisation, deployment of solar energy generation, and the future introduction of hydrogen infrastructure. Collectively, these measures will help contain overall GHG emission growth and ensure compliance with international climate targets.

Detailed forecasts of atmospheric pollution, including GHG emissions (CO_2), under the 2030 and 2050 scenarios, as well as an assessment of the impacts of the planned projects, are provided in Section 7.3 “Impact on Air Quality” of the Environmental Report.

Phase 1: up to 2030

- **Direct impacts:** During construction, an increase in CO_2 emissions is expected from construction machinery, asphalt paving works and material deliveries. This impact will be temporary and limited in scope, and will decrease significantly upon completion of the works.
- **Indirect impacts:** During operation, the increase in emissions will primarily be associated with greater passenger and employee mobility, resulting in higher traffic flows in the access areas to Riga Airport and, consequently, increased GHG emissions (CO_2, CH_4, N_2O) from road transport. This impact will be long-term and moderately significant, particularly in the vicinity of the P133 motorway and Dzirnieku Street junction.
- **Positive aspects:** The integration of the Rail Baltica railway link and station, together with improvements to public transport, will provide an alternative to private car use and, in the long term, reduce CO_2 emissions per passenger. Ensuring the full functionality of the rail connection to the airport will strengthen the competitiveness of public transport and reduce the share of private vehicles, thereby significantly lowering transport-related emissions over time.

Phase 2: 2031 – 2040

- **Direct impacts:** The expansion of aprons and construction of new aircraft stands will increase the number of aircraft cycles and overall fuel consumption, resulting in a long-term rise in CO_2 emissions.
- **Indirect impacts:** The expansion of cargo logistics infrastructure and increased cargo flows will significantly raise heavy vehicle emissions along access roads (CO_2, NO_x). This impact will be long-term and moderately significant, particularly with regard to GHG emissions within the regional transport network.
- **Positive aspects:** The introduction of apron ground power supply systems will significantly reduce the use of aircraft auxiliary power units, which are currently a notable source of local emissions. In the long term, this will lower GHG emission intensity per flight and improve air quality in apron areas. The relocation of the isolated stand to the west of the runway (THR36) will not alter the overall volume of GHG emissions.

Phase 3: 2041 – 2050

- **Direct impacts:** The full development of the Airport City Business Park and the establishment of the new technical zone will result in a long-term increase in GHG emissions from transport, building energy consumption and the operation of specialised equipment. The southern apron expansion with two aircraft stand taxilanes and the extension of the western taxiway will facilitate higher flight intensity and consequently increase CO_2 emissions from flights and aircraft taxiing operations.

- **Indirect impacts:** An increase in the number of passengers and employees will raise emissions from daily mobility (CO_2, CH_4, N_2O), particularly if a high share of private car use persists. This impact will be long-term and moderately significant.
- **Positive aspects:** The planned introduction of sustainable aviation fuel (SAF) and the electrification of ground support equipment will significantly reduce emission intensity per movement. In combination with a more modern fleet and the provision of apron ground power supply systems, these measures will help offset overall GHG emission growth, even in the context of increased capacity.

Project	Type of impact [73]	Duration [74]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Neutral	Moderately significant
Integration of the Rail Baltica railway link and station	Direct / Indirect	Long-term	Positive	Significant
Access node and car parks	Direct / Indirect	Long-term	Neutral	Moderately significant
Renewal of runway, taxiway and apron pavements	Indirect	Short-term	Neutral	Insignificant
New taxiways and Rapid Exit Taxiways (RETs)	Direct	Long-term	Neutral	Moderately significant
Reconfiguration of Apron 1 and construction of a new pier	Direct	Long-term	Neutral	Significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Negative	Significant
Construction of western aprons	Direct	Long-term	Negative	Significant
Relocation of the isolated engine test stand	Direct	Short-term / repeating	Negative	Significant
Expansion of cargo logistics infrastructure	Direct / Indirect	Long-term	Negative	Significant
Apron ground power supply systems	Indirect	Long-term	Positive	Significant
Full development of the Airport City Business Park	Indirect	Long-term	Neutral	Significant
Full operation of the new technical zone	Direct	Long-term	Neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Neutral	Significant
Extension of the western taxiway	Direct	Long-term	Neutral	Moderately significant
Sustainable aviation fuel (SAF)	Indirect	Long-term	Positive	Significant
Electrification of ground support equipment	Indirect	Long-term	Positive	Moderately significant

Cumulative impacts

In Phase 1 of Riga Airport's development, the increase in GHG emissions is primarily driven by transport intensity and building operation; however, this is mitigated by the integration of the Rail Baltica railway connection and improvements to access infrastructure. In Phase 2, emissions rise in line with increased airport capacity, but are offset by apron ground power supply systems and more efficient traffic organisation, resulting in proportionate impacts.In the long term up to 2050, the increase is more substantial (due to the full development of the Airport City Business Park, technical zones, intensified flight activity and cargo transport); nevertheless, the use of sustainable aviation fuel (SAF), infrastructure electrification and modernisation, including the future development of hydrogen infrastructure, will reduce both total emissions and emissions per passenger or per unit of cargo, ensuring alignment with climate objectives. Modelling results indicate that CO_2 emissions from the LTO cycle will decrease significantly from 45,283 tonnes in 2024 to 30,311 tonnes in 2050.

[73] Additional direct impacts during the implementation of all projects will arise from construction works.
[74] Additional short-term impacts during the implementation of all projects will arise from construction works.

7.5. Impact on water resources

Existing situation

According to Sections 4.6–4.7, the most significant water resources within the Riga Airport territory are groundwater and surface waters (Neriņa, drainage ditches, etc.). These water bodies are sensitive to runoff from airfield pavements, parking areas and technical zones, as such runoff may contain petroleum products, heavy metals, chemicals and de-icing and anti-icing fluids.

The existing drainage and wastewater treatment infrastructure ensures the collection and treatment of pollutants; however, with increasing operational intensity, greater hydraulic and pollution pressure on the system is expected. At present, the most significant risk is associated with runoff generated during aircraft de-icing operations, which contains glycol; during its decomposition, glycol consumes oxygen and may adversely affect the ecological quality of water.

Assessment of impacts from the implementation of the Master Plan

Phase 1: up to 2030

- **Terminal expansion (Phase 6):** During construction, the main risks are associated with localised contamination of groundwater and surface waters resulting from the operation of construction machinery and temporary storage of materials (petroleum products, lubricants, construction materials). These risks are short-term and controllable through the implementation of standard environmental management measures (designated fuel storage areas, availability of absorbent materials, runoff control). During operation, the principal impact factor is the increased volume of wastewater generated from sanitary facilities.
- **Integration of the Rail Baltica railway connection and station:** During construction, temporary pollution risks will be associated with extensive earthworks and potential sediment runoff in stormwater. During operation, the volume of wastewater and stormwater will increase; however, the Rail Baltica project includes the construction of new wastewater treatment facilities, and their integration into the overall airport wastewater treatment system will ensure that the impact remains manageable.
- **Access node and car parks:** These will increase the volume of stormwater runoff and create an additional risk of contamination by petroleum products and heavy metals. The project plans the installation of oil separators and filtration systems, which will significantly reduce impacts on groundwater and surface waters.
- **Renewal of runway and apron pavements:** During construction, temporary pollution risks are associated with construction waste, dust and the possibility of minor fuel spills. These risks are short-term and manageable through construction process control measures. In the long term, the impact on water resources is not significant, as the works are of a maintenance nature.
- **Initial development of the Airport City Business Park:** The development will increase the proportion of built-up and paved areas, thereby increasing the volume of stormwater runoff and domestic wastewater. The project plans additional drainage capacity and local infiltration/filtration systems, which will mitigate potential impacts on groundwater and surface water bodies.

The impact of all Phase 1 projects on water resources is assessed as localised, manageable and temporary during the construction phase. During operation, the main risks are associated with increased stormwater runoff and wastewater volumes; however, these are balanced by the proposed technical solutions, including drainage systems, treatment facilities and oil separation systems, expansion of wastewater treatment capacity, green infrastructure measures and water monitoring systems. No significant negative impact on water quality is anticipated.

Phase 2: 2031 – 2040

At this stage, the most significant changes are related to the expansion of platforms and the development of cargo logistics infrastructure.

- **New taxiways and Rapid Exit Taxiways (RETs):** This will cause temporary construction related risks (leakage, pollution from construction equipment), however, in the long term, the impact will be manageable through the expansion of the stormwater drainage and treatment system and the integration of oil separators.but in the long term the impact can be managed by expanding the stormwater drainage and treatment system and integrating oil separators (oil separators).
- **Apron development (Reconfiguration of Apron 1, southern expansion of Apron 2, reconfiguration of aircraft stands):** This will increase the extent of impermeable surfaces, resulting in higher volumes of stormwater runoff and an elevated risk of contamination (petroleum products, heavy metals, etc.). This impact is manageable through the implementation of modernised stormwater collection and treatment systems. Particular attention must be given to ensuring effective wastewater collection and treatment in the southern expansion area of Apron 2, where construction works affect forested land and partially forested coastal dune habitats, in order to prevent any deterioration in groundwater quality.
- **Relocation of the isolated engine test stand:** This will increase the extent of impermeable surfaces and stormwater runoff in the western part of the airfield. The potential impact on water resources is localised and manageable through the implementation of infiltration and filtration solutions (e.g. local treatment facilities) to ensure pollution control before runoff is discharged into the environment.
- **Construction of western aprons for the development of the MRO, FBO and GA zones:** The development will partially affect forest and agricultural land. Stormwater runoff volumes will increase; however, the impact on water resources is controllable through expanded stormwater collection and treatment solutions.
- **Reconfiguration of two aircraft de-icing pads at each end of the runway:** This project is of particular importance for the management of water resource quality, as de-icing and anti-icing fluids (primarily glycol) represent one of the main pollution risks associated with Riga Airport operations. The reconfiguration involves direct collection of glycol-contaminated runoff at the source areas and its conveyance to dedicated collection and treatment systems. This will significantly reduce the risk of pollutants entering the general drainage system and affecting surface water or groundwater.
- **Expansion of cargo logistics infrastructure:** This will increase the extent of impermeable surfaces and the volume of runoff generated by intensified transport activity (primarily containing petroleum products and heavy metals). The impact will be long-term; however, it is manageable through the use of oil separators for the collection of petroleum products, filtration units for additional pollutant removal and infiltration, as well as upgraded stormwater treatment infrastructure and an expanded monitoring system.

In Phase 2 of airport development, the most significant impacts on water resources are associated with the increase in impermeable surfaces (due to apron and cargo logistics infrastructure expansion) and the rise in runoff from aircraft de-icing fluids. These impacts are manageable; however, they require a substantial increase in the capacity of stormwater collection, treatment and infiltration systems, as well as further enhancement of glycol runoff collection and monitoring solutions. Direct adverse impacts on surface waters (drainage ditches, the Neriņa River) and groundwater are expected only in the event of inadequate management or accidental incidents.

Phase 3: 2041 – 2050

This phase includes the full development of the Airport City Business Park and the construction of a new technical zone in west.

- **Extension of western taxiway:** This will result in a minor increase in impermeable surfaces and, consequently, stormwater runoff, which can be absorbed and discharged within the existing stormwater collection and treatment system. The impact on surface water and groundwater is assessed as insignificant and manageable.

- **Southern apron expansion (provision of two aircraft stand taxilanes):** This will increase the volume of surface runoff and the potential risk of contamination (petroleum products, lubricants, heavy metals). The expansion of collection and treatment infrastructure is planned (oil separators, filtration solutions, monitoring systems), which will mitigate impacts on groundwater and nearby surface waters.
- **New technical zone**: The relocation of MRO, FBO and GA activities to the western apron is associated with an increased risk arising from the storage of fuel, lubricants and chemicals, as well as from maintenance and repair processes. The negative impact can be controlled through specialised pollution collection systems, sealed storage facilities and enhanced monitoring.
- **Full development of the Airport City Business Park:** In terms of scale, this is the most significant project, substantially increasing the proportion of impermeable surfaces and stormwater runoff. Treatment capacity is planned to be expanded proportionally to the anticipated growth, integrating oil separators, filtration units and additional retention basins. The impact is assessed as manageable, provided that these measures are fully implemented.

In phase 3, the main risks to water resources are associated with the increase in impermeable surfaces and the use of chemicals in the technical zone. These impacts are manageable, provided that the capacity of collection, treatment and monitoring systems is expanded in parallel with project development, thereby preventing negative effects on surface waters (drainage ditches, the Neriņa) and groundwater.

Cumulative impacts and control measures

Implementation of the Riga Airport Master Plan will inevitably increase the volume of stormwater and wastewater; however, no significant negative impact on water resource quality is expected, provided that appropriate management measures are ensured. The main conditions for impact management are as follows:

- gradual expansion and modernisation of drainage and wastewater treatment systems;
- enhancement of oil separation systems in car parks, aprons, cargo logistics and technical zones;
- increased capacity for glycol collection and treatment;
- during construction – strict pollution risk control procedures;
- during operation – regular water quality monitoring and ongoing system modernisation measures.

Such an integrated approach will ensure that water resource quality is maintained at an environmentally safe level, in line with sustainable airport operation standards. The impact on the water environment is manageable and proportionate to the development benefits; however, its long-term character will depend directly on the effectiveness of the implemented modernisation measures, with the potential to maintain a neutral or even positive impact.

Project	Type of impact [75]	Duration [76]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Neutral	Moderately significant
Integration of the Rail Baltica railway link and station	Direct / Indirect	Long-term	Neutral	Insignificant
Access node and car parks	Direct / Indirect	Long-term	Neutral	Moderately significant
Renewal of runway, taxiway and apron pavements	Direct	Short-term	Neutral	Insignificant
Initial phase of the Airport City Business Park	Direct / Indirect	Long-term	Neutral	Moderately significant
Reconfiguration of Apron 1 and construction of a new pier	Direct	Long-term	Neutral	Significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Neutral	Significant
Construction of western aprons	Direct	Long-term	Neutral	Significant
Relocation of the isolated engine test stand	Direct	Short-term / repeating	Neutral	Moderately significant
Reconfiguration of two aircraft de-icing pads	Direct	Long-term	Negative	Significant
Expansion of cargo logistics infrastructure	Direct / Indirect	Long-term	Neutral	Significant
Full development of the Airport City Business Park	Direct / Indirect	Long-term	Neutral	Significant
Full operation of the new western technical zone	Direct	Long-term	Neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Neutral	Significant
Extension of the western taxiway	Direct	Long-term	Neutral	Moderately significant
De-icing and anti-icing operations (system modernisation)	Direct	Long-term	Neutral / positive	Significant

7.6. Impact on soil and land use

Existing situation

According to Section 4.8, the territory of Riga Airport is located within a long-established and urbanised environment. The majority of the area is already covered by artificial surfaces, including the runway, aprons, car parks and access roads. The proportion of agricultural land in the immediate vicinity of the airfield is limited, and its quality is influenced by anthropogenic pressures. Soil adjacent to airfield pavements is exposed to potential contamination from transport activities, the use of technical fluids and aircraft de-icing processes; however, regular monitoring data do not indicate significant exceedances of established limit values.

Under existing conditions, the principal risk is associated with localised pollution incidents (fuel or technical fluid spills), which may affect soil quality and groundwater. Nevertheless, these risks are managed through safety procedures and the environmental monitoring programme.

Assessment of impacts from the implementation of the Master Plan

Phase 1: up to 2030

- **Terminal expansion (Phase 6):** During the construction phase, excavation and site levelling works will temporarily affect soil structure (compaction, changes in ground surface levels, etc.). These impacts are localised and can be effectively managed through appropriate construction planning and site management measures.

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[75] Additional direct impacts during the implementation of all projects will arise from construction works.

[76] Additional short-term impacts during the implementation of all projects will arise from construction works.

- **Initial development phase of the Airport City Business Park:** This involves the transformation of vacant and partially natural land into commercial development, in accordance with the planned functional zoning. The impact on soil is irreversible but territorially limited and proportionate to the objectives of airport urban development.
- **Access node and car parks:** The projects are implemented within areas already designated for transport infrastructure. The construction of new paved surfaces will result in soil sealing and reduced water infiltration; however, engineering solutions (stormwater collection and filtration systems, etc.) will mitigate the risks of erosion and potential soil contamination.
- **Resurfacing of runway and apron pavement:** These are maintenance works with temporary and localised impacts during the construction phase. In the long term, the nature and function of land use will remain unchanged.

The projects of Phase 1 of the Master Plan will mainly cause local and temporary impacts during construction works – removal of topsoil and structural modification, construction of new covered surfaces. In the long term, land use is gradually transformed from free or semi-natural areas to buildings and engineering structures, but this is in accordance with the functional zoning and development objectives of the airport area.

Phase 2: 2031 – 2040

This phase includes significant development of the aprons and cargo area.

- **Construction of new taxiways and rapid exit taxiways (RET):** This will involve soil transformation and sealing through the installation of paved surfaces, increasing the proportion of continuously covered areas. In the long term, the impact represents a functionally justified change in land use for aviation purposes.
- **Apron development (reconfiguration of Apron 1, southern expansion of Apron 2, rearrangement of stands):** Significant modification of the topsoil layer is planned through the installation of paved surfaces, reducing the extent of exposed soil. However, these changes remain within the boundaries of the airfield, where land use is already designated for aviation functions. The southern expansion also affects part of a forested area, resulting in a long-term land use transformation from natural land cover to transport infrastructure (airfield territory). Its implementation requires the reservation of additional land for airfield development purposes.
- **Izolētās dzinēju testu stāvvietas pārvietošana:** Local soil transformation and covering, which will increase the proportion of covered areas. In the long term – irreversible, but functionally justified land use change for airfield development.
- **Construction of western aprons for the development of MRO, FBO and GA areas**: Soil covering and partial transformation of forest lands for aviation infrastructure needs will be carried out. The impact is irreversible, but is intended for an area designated in the spatial plan as a transport infrastructure object – the airfield territory.
- **Redesign of two aircraft de-icing areas at each end of the runway:** Short-term excavation works with local soil modification. Long-term – specialization of land use for aviation technical functions without adding significant new occupied area.
- **Expansion of cargo logistics infrastructure:** Change of land use from semi-free or agricultural territory to logistics and industrial functions. The proportion of covered areas increases, reducing the natural functional role of the soil, but in accordance with the functional zoning and development strategy of the Mārupe municipality territory.

In phase 2, the most significant impact is associated with the increase in covered areas (development of aprons, taxiways and logistics areas), as well as partial transformation of forest lands in the west and south directions. The impact is irreversible in terms of land use change, but it occurs in accordance with the zoning determined in the spatial plan, therefore it can be assessed as functionally justified and manageable. The risk of technical fluid leaks on aprons and parking lots can be managed with isolation and collection systems.

Phase 3: 2041 – 2050

- **Western taxiway extension:** Soil modification is expected in a specific part of the technical zone, but the impact is assessed as minor, as the works are taking place in an already anthropogenically modified area with low natural soil quality.
- **Southern apron expansion (creation of two aircraft stand rows):** Soil sealing will reduce natural infiltration capacity; however, the negative impact can be mitigated through the planned stormwater collection and management solutions.
- **New technical zone:** The relocation of MRO, FBO and GA operations to the western apron involves soil transformation and development of the area, but pollution control solutions are planned.
- **Full development of the Airport City Business Park:** creates a significant land use change from partially open or lightly used areas to commercial development. The impact on the natural soil is irreversible; however, it is consistent with the spatial plan and strengthens the functionality of the airport by integrating it into the urban fabric.

Also, in the Phase 3 the most significant changes are associated with land use change and increase in covered soil areas. The impact is irreversible, but it occurs in already anthropogenically transformed territories, is functionally justified and manageable.

Cumulative impacts and control measures

The implementation of the Riga Airport Master Plan implies a gradual change in land use – open and partially vacant areas will be transformed into aprons, technical areas and commercial development of the Airport City Business Park. This will reduce the extent of natural soil areas, but will comply with the functional zoning of the territory and promote orderly, purposeful use of the territory.

The main risks associated with soil contamination during construction and operation. These will be controlled by:

- construction supervision and environmental risk management procedures,
- pollution collection and localization solutions in technical areas,
- expansion of stormwater collection and treatment systems.

The changes in soil and land use are irreversible, yet functionally justified, manageable and integrated into the long-term development structure of Riga Airport. Negative impacts are prevented by technical solutions, therefore no significant negative impact on soil and land use is expected.

Project	Type of impact [77]	Duration [78]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Neutral	Moderately significant
Access node and car parks	Direct	Long-term	Neutral	Moderately significant
Renewal of runway, taxiway and apron pavements	Indirect	Short-term	Neutral	Insignificant
Initial phase of the Airport City Business Park	Direct	Long-term	Neutral	Moderately significant

[77] Additional direct impacts during the implementation of all projects will arise from construction works.
[78] Additional short-term impacts during the implementation of all projects will arise from construction works.

Project	Type of impact [77]	Duration [78]	Character	Significance
Expansion of Apron 1 with a new pier	Direct	Long-term	Neutral	Significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Neutral	Significant
Construction of western aprons	Direct	Long-term	Neutral	Significant
Isolated engine test stand (THR36)	Direct	Long-term	Neutral	Moderately significant
Expansion of cargo logistics infrastructure	Direct	Long-term	Neutral	Significant
Full development of the Airport City Business Park	Direct	Long-term	Positive	Significant
Full operation of the new western technical zone	Direct	Long-term	Neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Neutral	Significant
Extension of the western taxiway	Direct	Long-term	Neutral	Moderately significant

7.7. Impact on biodiversity

Existing situation

According to Chapter 4.9, the territory of Riga Airport and its immediate surroundings have been intensively anthropogenically modified. Most of the territory has been used for aviation purposes for a long time, and artificial surfaces dominate it – runways, aprons, parking lots and access roads. In such an environment, the biodiversity value is low, since the remaining areas of natural habitats are small and fragmented.

Several protected nature areas are located in the vicinity of the airport, including sites within the NATURA 2000 network designated for the protection of habitats and species. Although these areas do not directly overlap with the airport territory, they are sensitive to indirect impacts that may arise from development activities, such as increased traffic flows, changes in noise levels, or variations in air quality.

Particular significance is attached to bird migration routes that cross the wider Riga region, including the airspace above the airfield. This creates a potential risk of bird strikes with aircraft, which is already managed through regular monitoring, maintenance of the airfield territory (grass cutting, control of standing water), and measures to reduce the presence of wildlife.

Assessment of impacts from the implementation of the Master Plan

Phase 1 (up to 2030)

- **Terminal expansion (Phase 6):** During construction, temporary noise and visual disturbances to birds and other fauna may occur. Habitat fragmentation will not take place, as the works are carried out within an already built-up area.
- **Integration of the Rail Baltica railway connection and station:** During construction, localised impacts may occur; however, the works are planned within an already anthropogenically modified environment. In the long term, the impacts will be managed through the compensation and integration measures included in the project.
- **Access node and car parks**: Construction will increase the proportion of paved surfaces and reduce green areas; however, there will be no impact on natural habitats, as the affected areas are already anthropogenically modified transport infrastructure sites.
- **Initial development of the Airport City Business Park:** Construction will reduce the extent of secondary habitats (grasslands and shrublands); however, these areas are not considered significant biodiversity sites.

The overall impact of the Phase 1 airport development projects on biodiversity is insignificant. Temporary construction-related impacts may occur; however, in the long term, there will be no significant reduction in natural habitats.

Phase 2 (2031 – 2040)

- **Construction of new taxiways and Rapid Exit Taxiways (RETs):** The works and development are planned within the existing airfield territory, and no significant impact on natural habitats is expected. Temporary noise and visual disturbances to birds may occur during construction.
- **Reconfiguration of Apron 1 with construction of a new pier:** No significant direct impact on habitats is expected, as the works take place within the existing airfield infrastructure. Temporary disturbances to birds may occur during the construction phase.
- Southern expansion of Apron 2 and reconfiguration of aircraft stands: The project will increase the extent of paved surfaces and reduce areas of natural land cover. Its implementation requires the expansion of the airport territory southwards into currently forested land, where two protected habitats have been identified – 2180 "*Wooded coastal dunes*" (covering areas of 1.36 ha and 1.82 ha). Therefore, the impact on biodiversity is assessed as significant, but it can be balanced through compensation and mitigation measures.
- **Relocation of the isolated aircraft engine test stand:** The stand is planned to be relocated to the western part of the airfield, where a relatively small area will be occupied. This will increase the extent of paved surfaces and reduce natural land cover (birch grove and shrublands); however, no habitats of high ecological value have been identified in this area. Therefore, the impact on biodiversity is assessed as moderately significant. During operation, short-term noise disturbances to birds may occur; however, these will be localised within the airfield territory and can be managed through appropriate mitigation measures (for example, monitoring at the noise monitoring station located in Skulte village).
- **Construction of western aprons for the development of the MRO, FBO and GA zones:** The project envisages the construction of aprons in the western part of the airport territory, partly on forest land (within the MRO zone) and partly on agricultural land (within the GA zone). As a result of the development, the extent of paved surfaces will increase and the area of natural land cover will decrease; however, the impact on biodiversity is assessed as insignificant. The area is already located within a technical zone of low ecological value, and no protected species or habitats have been identified there. The adverse impact will be localised and manageable.
- **Reconfiguration of two aircraft de-icing pads at each end of the runway:** The works will be carried out within the existing airfield territory, and no significant impact on habitats or species is anticipated.
- **Expansion of cargo logistics infrastructure:** This will create additional anthropogenic pressure and reduce the extent of secondary habitats (grasslands, shrublands, agricultural land); however, these habitats are not of high ecological value. The impact is assessed as locally significant but manageable through the implementation of compensation or landscape integration measures.

Most Phase 2 projects are implemented within already anthropogenically modified technical areas of the airfield, where biodiversity value is low. No direct impact on protected species or habitats is expected, with the exception of the southern expansion of Apron 2, which requires the transformation of forest land and the partial loss of two protected habitats (*2180 "Wooded coastal dunes"*, totalling approximately 3.2 ha). This impact is significant; however, it can be balanced through compensation measures (for example, habitat restoration or the conservation of an equivalent compensatory area).

Phase 3 (2041 – 2050)

- **Extension of the western taxiway:** The impact will occur mainly during construction, potentially causing temporary disturbances to birds and reducing small areas of natural land cover. In the long term, the condition of biodiversity will remain unchanged.
- **Southern apron expansion (two aircraft stand rows):** Direct impacts are limited, as the works take place within an already modified area; the territory was previously transformed for airfield purposes during Phase 2, and therefore no direct impacts on natural habitats are expected. The impact is assessed as insignificant.
- **New technical zone:** Relocation of MRO, FBO and GA activities to the western apron. The development is planned within the airfield technical zone, where the natural land cover has low ecological value and no protected habitats have been identified. The impact on biodiversity is assessed as insignificant.
- **Full development of the Airport City Business Park:** As a result of construction, secondary habitats (e.g. open areas and grasslands), which may currently serve as feeding grounds for birds, will be reduced. However, the development takes place within an anthropogenic area of low ecological value. The negative impacts are localised and can be mitigated through compensation measures (integration of green spaces and landscaping).

Overall Conclusion

Impacts on biodiversity across all phases of airport development are primarily localised and associated with construction activities (temporary) and the loss of secondary habitats (long-term). Overall, no significant adverse impacts on NATURA 2000 sites or protected species are expected, with the exception of the most notable impact identified in Phase 2, where the southern expansion of Apron 2 partially affects the protected habitat *2180 "Wooded coastal dunes".* The territory of Riga Airport is already intensively anthropogenically modified, and the majority of development projects are planned within existing operational zones. A positive aspect is the reduction of bird attraction sites in the vicinity of the airfield, which will decrease the risk of bird strikes with aircraft. The projects will be implemented only in response to actual demand, ensuring that impacts are not created prematurely. At the same time, landscaping and planting measures are envisaged during the detailed design stage, particularly outside the airfield zone where they do not pose additional risks to aviation safety. These plantings may include species that provide food resources for insects and other invertebrates, thereby supporting additional biodiversity. Such an approach will help balance infrastructure development with the conservation of biodiversity, while complying with aviation safety and environmental protection requirements.

Project	Type of impact [79]	Duration [80]	Character	Significance
Terminal expansion (Phase 6)	Direct	Short-term	Neutral	Insignificant
Rail Baltica railway link and station	Direct	Long-term	Neutral	Insignificant
Access node and car parks	Direct	Long-term	Neutral	Insignificant
Initial phase of the Airport City Business Park	Direct	Long-term	Neutral	Insignificant
Expansion of Apron 1 with a new pier	Direct	Long-term	Neutral	Insignificant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Negative–neutral	Significant
Western aprons and taxiways	Direct	Long-term	Neutral	Moderately significant
The isolated engine test stand	Direct	Short-term	Neutral	Insignificant
Full development of the Airport City Business Park	Direct / Indirect	Long-term	Neutral	Moderately significant

[79] Additional direct impacts during the implementation of all projects will arise from construction works.
[80] Additional short-term impacts during the implementation of all projects will arise from construction works.

Project	Type of impact [79]	Duration [80]	Character	Significance
The new western technical zone	Direct	Long-term	Neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Neutral	Moderately significant
Extension of the western taxiway	Direct	Short-term / Long-term	Neutral	Insignificant

7.8. Impact on landscape, cultural, architectural and archaeological heritage

Existing situation

The territory of Riga Airport is intensively built up and anthropogenically modified. The landscape is dominated by airfield infrastructure – runways, aprons, the terminal, technical zones and access roads – which define the visual character of the area. Natural landscape elements within the territory are minimal, and the perception of the landscape is closely linked to the functional character of the airport.

There are no cultural or architectural monuments within the airport territory, and no significant historical buildings are present. No archaeological heritage sites have been registered within the area. However, the wider surroundings contain cultural and historical values whose preservation must be considered when assessing indirect impacts, such as potential changes to the visual landscape or increased pressure from transport flows.

Assessment of impacts from the implementation of the Master Plan

Phase 1: up to 2030

- **Terminal expansion (Phase 6):** The visual impact is localised and integrates with the existing airport development structure, without creating contrasts with the surrounding environment. No impact on cultural heritage is expected.
- **Rail Baltica railway connection and station:** This will create a significant new architectural landmark, altering the visual character of the airport access area. The impact is assessed as neutral to positive, as it introduces modern, high-quality infrastructure that contributes positively to the development of regional mobility and architectural quality.
- **Access node and car parks:** These visually complement the transport infrastructure (roundabout). No significant impacts on the urban landscape or cultural heritage are anticipated.
- **Initial development of the Airport City Business Park:** This will introduce a new built and architectural structure in the airport forecourt area. The visual impact is assessed as moderately significant, as it changes the scale of the surrounding landscape and gives it a more commercially urban character. No adverse impact on landscape or cultural heritage is expected, provided that architectural quality is ensured and the new development is harmonised with the surrounding airport environment.

Phase 1 projects will primarily generate localised visual impacts within the airport territory and its immediate surroundings. The terminal expansion and the construction of the Rail Baltica railway connection and station will alter the visual character of the access area by introducing modern architecture and an updated urban environment, which is assessed as having a neutral to positive impact. The reconstruction of the access node into a roundabout and the development of car parks will complement the existing infrastructure without significantly altering the surrounding landscape. The initial development of the Airport City Business Park will create visible changes in the visual character of the area; however, these will occur within an already urbanised environment within the airport territory. No direct adverse impacts on landscape, cultural, architectural or archaeological heritage are anticipated.

Phase 2: 2031 – 2040

- **Construction of new taxiways and rapid exit taxiways (RET):** Located within the technical zone; visual impact on the surrounding landscape is not significant.
- **Apron development (reconfiguration of Apron 1 with construction of a new pier, southern expansion of Apron 2 and reconfiguration of aircraft stands):** Visual impact is limited to the airfield technical zone, maintaining the overall industrial–transport character of the landscape. Cultural heritage sites are not affected.
- **Relocation of the isolated engine testing stand:** Creates local visual changes within the technical zone; no impact on landscape or cultural values is expected.
- **Construction of western aprons for the development of MRO, FBO and GA areas:** Visually extends the airfield technical zone westwards, but the changes remain functional within an already industrial landscape. Cultural heritage objects are not affected.
- **Reconfiguration of two aircraft de-icing areas:** Minor visual changes near the runway ends; no impact on the surrounding landscape or cultural heritage is expected.
- **Expansion of cargo logistics infrastructure:** Introduces visible changes to the industrial landscape of the access roads and the airport territory; however, this occurs within an already significantly anthropogenically modified environment. No impact on cultural heritage is anticipated.

In Phase 2, the planned development projects are spatially concentrated mainly within the airfield technical zone; therefore, visual changes occur within an already existing industrial–transport environment and do not significantly alter the overall character of the surrounding landscape. Cultural, architectural and archaeological heritage objects are not affected, and the impact is assessed as localised and manageable within the technical area. Overall, the visual changes can be characterised as gradual and functionally logical, reinforcing the dominance of technical airfield infrastructure in the landscape without causing significant negative impacts on the cultural and historical environment.

Phase 3: 2041 – 2050

- **Extension of the western parallel taxiway and southern apron expansion (two aircraft stand rows):** visually complement the existing airfield technical zone while maintaining the industrial–transport character of the area. No impact on cultural heritage is expected.
- **New technical zone:** relocation of MRO, FBO and GA operations to the western apron represents a localised impact that reinforces the dominance of technical airfield infrastructure. The additional visual load remains within the functional airport perimeter and does not create significant new impacts on the surrounding landscape or cultural values.
- **Full development of the Airport City Business Park:** the most significant visual transformation, converting parts of the airport surroundings from partially open areas into an urban-type built environment. The project will substantially alter the visual perception of the area, making it more urbanised; however, it is consistent with the functional zoning established in the spatial planning documents. Cultural and architectural heritage monuments are not directly affected.
- **Other infrastructure improvements:** access road solutions (roundabout, overpass) introduce visual changes in the access area, but in the long term improve traffic organisation and highlight the role of Riga Airport as a multimodal transport hub. The impact on cultural heritage is not significant.

In Phase 3, the main visual changes are associated with the full development of the Airport City Business Park, which transforms the airport surroundings from partially open areas into an urban-type built environment, significantly altering the visual landscape and character of the area. The remaining projects take place within existing technical zones; therefore, their impact on the landscape is minimal. Overall, the impacts are localised and manageable, and primarily reinforce the industrial–transport landscape character consistent with the long-term functional development of the airport.

Cumulative impacts

The impacts of Riga Airport development projects on landscape and cultural heritage are localised, gradual and capable of being integrated into the existing built structure. No direct negative impacts on landscape or cultural heritage are expected. The most notable visual changes are associated with the construction of the Rail Baltica railway station and the development of the Airport City Business Park, which will transform the airport surroundings from a predominantly technical–industrial area into a modern urban complex, strengthening the visual identity of the airport as a regional transport and business centre. Other projects mainly consolidate and reinforce the industrial landscape character within the airport territory, reducing potential conflicts with surrounding cultural and natural values. These changes are assessed as neutral to positive, as they improve the functional and architectural quality of the area, correspond to mobility and economic development trends, and are implemented gradually in line with actual demand.

Project	Type of impact [81]	Duration [82]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Neutral – positive	Insignificant
Rail Baltica railway link and station	Direct	Long-term	Positive	Moderately significant
Access node and car parks	Direct	Long-term	Neutral	Insignificant
Apron development (Apron 1 and 2, southern expansion)	Direct	Long-term	Neutral	Insignificant
Western aprons and taxiways	Direct	Long-term	Neutral	Insignificant
The isolated engine test stand	Direct	Long-term	Neutral	Insignificant
Full development of the Airport City Business Park	Direct	Long-term	Neutral – positive	Moderately significant
The new western technical zone	Direct	Long-term	Neutral	Insignificant
Southern apron expansion and extension of the western taxiway	Direct	Long-term	Neutral	Insignificant

7.9. Impact on noise levels

Existing situation

In the vicinity of Riga Airport, the main source of environmental noise is aircraft take-off and landing, as well as related aircraft taxiing, the use of aircraft auxiliary power units and engine testing activities. Additional noise is generated by airfield service equipment and vehicles, traffic on access roads to the airport, and specific noise from bird-scaring gas cannons.

Existing noise measurements (from four permanent monitoring stations) and the SNM (Strategic Noise Map), based on 2022 data, indicate that the greatest impact is concentrated along flight corridors, particularly along the landing and take-off (runway) axis towards Riga and Jaunmārupe. The total area around the airport where noise limit values identified in the SNM are exceeded is 0.5 km² during the day, 5.2 km² in the evening and 6.9 km² at night. According to the noise limits applicable at the time of SNM approval, exceedances affect a total of 300 residents and 103 dwellings during the day, 2,332 residents and 692 dwellings in the evening, and 3,427 residents and 1,077 dwellings at night. The areas affected by noise include the settlements of Jaunmārupe, Spilve and

[81] Additional direct impacts during the implementation of all projects will arise from construction works.
[82] Additional short-term impacts during the implementation of all projects will arise from construction works.

Mežāri, as well as parts of the Beberbeķi neighbourhood and the western part of Imanta in the city of Riga, where some residents are exposed to noise levels exceeding the established limits.

The airport already implements environmental noise management measures, including the preparation of the SNM and a Noise Action Plan, regular aircraft noise monitoring, the establishment of a noise monitoring station index, cooperation with aircraft operators to promote the use of quieter aircraft fleets, and maintenance of the airfield territory to reduce the cumulative impact of noise and other environmental risks.

Assessment of impacts from the implementation of the Master Plan

In Chapter 5 of the Master Plan, “Impact on Surrounding Areas”, noise is identified as one of the most significant environmental issues and has been analysed in detail, including forecast noise contours for the airport development scenarios for 2030 and 2050. The assessment used the aviation environmental design tool AETD 3g version, which models noise levels for each period of the day (L_{day}, $L_{evening}$, L_{night}) the day-evening-night (24-hour) indicator (L_{den}), based on the airfield configuration, fleet composition, flight trajectories and operational data. The results quantitatively describe both the area affected by noise and the number of affected residents, using the SNM (Strategic Noise Map) based on 2022 data as the baseline.

The modelling results indicate that the increase in noise impact is associated with the growth in air traffic intensity; however, the changes are not linear in relation to the number of flights, as aircraft fleet modernisation and improvements in operational efficiency have a significant influence. In future scenarios, a key role is expected for next-generation aircraft (such as *Airbus A220, A320neo and B737MAX*), which will become dominant and will support a gradual transition to a quieter fleet.

It is positively assessed that the Master Plan does not include the extension of the existing runway or the construction of a new runway. Instead, the focus is placed on improving existing infrastructure and defining obstacle limitation surfaces, ensuring safety without altering the fundamental principles of flight procedures. Consequently, the geographical pattern of noise exposure will continue to depend mainly on take-off and landing operations. The planned functional and spatial changes – apron reconfiguration and expansion, the development of MRO, FBO and GA areas in the western zone, and others – primarily improve operational efficiency and reduce aircraft waiting times on the airfield, without creating new significant noise sources.

It is important to note that **growth in the number of flights and passengers does not directly translate into a proportional increase in noise exposure.** Since the pandemic, aircraft load factors have increased – in 2025 passenger traffic reached the 2019 level, while the number of flights remained approximately 25% lower. This means that the noise and emission burden per passenger served has decreased, and this disparity between passenger and flight dynamics will continue to act as an important mitigating factor in the future.

The noise assessment in the Master Plan is based on a transparent methodology and realistic assumptions regarding aircraft fleet modernisation and traffic demand. The results demonstrate that, even with an increase in aviation operations, the noise impact on surrounding areas does not increase proportionally, as it is mitigated by the growing share of quieter aircraft, higher passenger capacity and more efficient airfield operations. The planned airfield infrastructure development projects do not significantly alter the geographical pattern of environmental noise – the impact will continue to be determined mainly by aircraft take-off and landing operations, as neither the extension of the existing runway nor the construction of a new runway is planned.

Phase 1: up to 2030

At this stage, the most significant development projects are related to the expansion of the airport terminal, the integration of the Rail Baltica railway connection into the overall airport infrastructure, and the improvement of the main access road and traffic node (the reconstruction of the intersection of road P133 and Dzirnieku Street into a roundabout). These projects will primarily generate indirect long-term impacts – an increase in traffic around the terminal and on access roads to the airport, which may locally increase transport-related noise.

Phase 2: 2031 – 2040

Projects planned until 2040 (new taxiways, apron expansion and reconfiguration, relocation of the isolated stand, development of MRO, FBO and GA areas, etc.) will increase the overall capacity of the airfield and the number of operations, thereby generating a moderately significant increase in noise within the airport territory and its immediate surroundings. However, improvements to airfield infrastructure and traffic organisation will reduce waiting times and unnecessary noise peaks. The relocation of the isolated stand and the development of MRO and GA areas in the western zone will shift noise sources away from residential areas, concentrating them within the airfield territory. Phase 2 projects will affect environmental noise mainly indirectly – through increased operations and traffic flows – but will not create significant new noise contours. The main changes will be localised, with positive trends resulting from more efficient operations and a quieter aircraft fleet.

Phase 3: 2041 – 2050

Projects planned until 2050 (additional aircraft stands in the southern apron extension, a new technical zone, the extension of the western taxiway and the full development of the Airport City Business Park) will support the expansion of airport capacity and the growth of commercial infrastructure. This implies higher operational intensity and additional transport flows, which will generate a moderately significant level of noise within the airfield territory and on access roads. However, the infrastructure will concentrate noise within the airfield area and reduce impacts on residential areas, keeping the spread of noise controllable.

Across all phases, the noise impacts of the planned projects are largely localised and manageable, as the runway configuration remains unchanged. In Phase 1, the impacts are minor and mainly indirect (traffic and access-related). In Phase 2, the most significant elements are apron expansions and the development of MRO, FBO and GA areas, although the impacts remain largely within the airfield territory. In Phase 3, noise levels increase in line with capacity growth; however, the changes are not linear in relation to the number of flights, as mitigating factors are present – a quieter aircraft fleet, apron power supply systems and more efficient operational procedures.

Project	Type of impact [83]	Duration [84]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Negative	Moderately significant
Integration of the Rail Baltica railway link and station	Direct	Long-term	Neutral - positive	Insignificant
Access node and car parks	Direct / Indirect	Long-term	Positive	Moderately significant
Renewal of runway, taxiway and apron pavements	Direct	Short-term	Neutral	Insignificant
New taxiways, rapid exit taxiways	Direct	Long-term	Positive *(localised within the airport working environment)*	Insignificant
Reconfiguration of Apron 1 and construction of a new pier	Direct	Long-term	Negative *(localised within the airport working environment)*	Moderately significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Negative with minimising aspects *(localised within the airport working environment)*	Moderately significant

[83] Additional direct impacts during the implementation of all projects will arise from construction works.
[84] Additional short-term impacts during the implementation of all projects will arise from construction works.

Project	Type of impact [83]	Duration [84]	Character	Significance
Relocation of the isolated aircraft stand (and engine test stand)	Direct	Long-term	Neutral *(localised within the airport working environment)*	Insignificant
Cargo logistics infrastructure	Direct / Indirect	Long-term	Negative	Moderately significant
Reconfiguration of two aircraft de-icing pads	Direct	Short-term	Neutral	Insignificant
New technical zone (MRO, FBO and GA western aprons)	Direct	Long-term	Positive – neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Negative *(localised within the airport working environment)*	Moderately significant
Extension of the western taxiway	Direct	Long-term	Positive *(localised within the airport working environment)*	Insignificant
Development of the Airport City Business Park	Direct / Indirect	Long-term	Negative	Moderately significant

Assessment of areas and population affected by noise exceedances

The assessment for 2030 is based on a forecast of 88,123 flights, while the assessment for 2050 is based on a forecast of 142,100 flights. If the actual number of flights is lower, the actual impact will also be lower.

Image 1, Image 2, Image 3, Image 4 shows the modelled noise indicator contours for the airport development scenarios for 2030 and 2050 during the day (7.00–19.00), evening (19.00–23.00) and night (23.00–7.00) periods, indicating the boundary of areas where the regulatory noise limit values are exceeded: L_{day} >65 dBA, $L_{evening}$ >60 dBA and L_{night} >55 dBA, as well as the 24-hour (L_{den}) noise contours.

In the calculation of the 24-hour noise indicator, the daytime period (07.00–19.00) is used as the baseline. An additional correction of +5 dBA is applied to the evening period (19.00–23.00), as people are more sensitive to noise during this time, while a +10 dBA correction is applied to the night period (23.00–07.00), as disturbances during sleep are considered more significant. Consequently, the 24-hour noise indicator (L_{den}) reflects the overall acoustic load over the full 24-hour period, emphasising evening and night-time hours rather than only the average sound level.

In addition to the limit values established in regulatory frameworks, the assessment of noise impacts in international practice also applies target values recommended by the World Health Organization (WHO), which serve as a framework for interpreting long-term public health risks. The WHO Environmental Noise Guidelines for the European Region (2018) represent an important international reference for assessing long-term public health risks; however, by their nature they constitute public health policy recommendations rather than legally binding limit values for defining the spatial extent of impact zones of specific infrastructure in strategic planning documents. The guideline-recommended aviation noise target values (including L_{den} 45 dBA and L_{night} 40 dBA) are primarily intended for interpreting overall environmental noise exposure and associated health risks, taking into account prolonged exposure of residents to noise and the simultaneous presence of multiple noise sources.

Within the SEIA framework, the significance of noise impacts is assessed on the basis of the noise contours modelled in the Master Plan and the areas where regulatory limit values are exceeded, ensuring comparability and consistency with the level of detail of the document. The depiction of the lower WHO isophones (L_{den} 45 dBA and L_{night} 40 dBA) on maps, when applied only to aviation noise, is not methodologically necessary for achieving the objectives of the SEIA and may create a risk of misinterpretation, as at these noise levels the cumulative influence of multiple sources (road traffic, railways, background noise, etc.) becomes significant.

The WHO 2018 guidelines are used in the Environmental Report as a framework for interpreting target values and health risks, with particular emphasis on the significance of night-time noise. In the graphical section, an approach appropriate for strategic assessment has been maintained, presenting the noise contours modelled in the Master

Plan and the areas where regulatory limit values are exceeded, rather than the isophones corresponding to the WHO recommended target values.

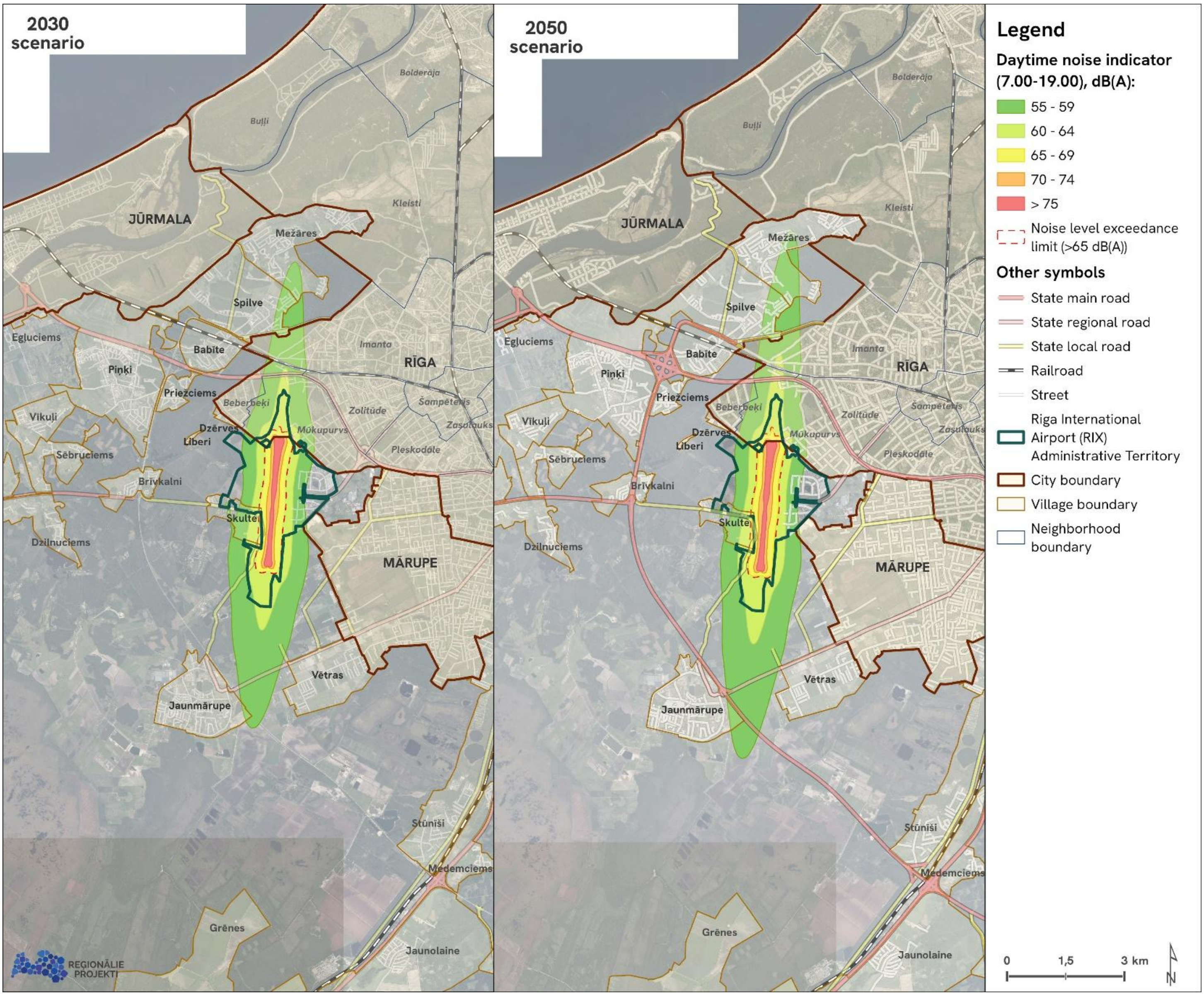

Image 1: Noise contours L_{day} for the 2030 and 2050 scenarios

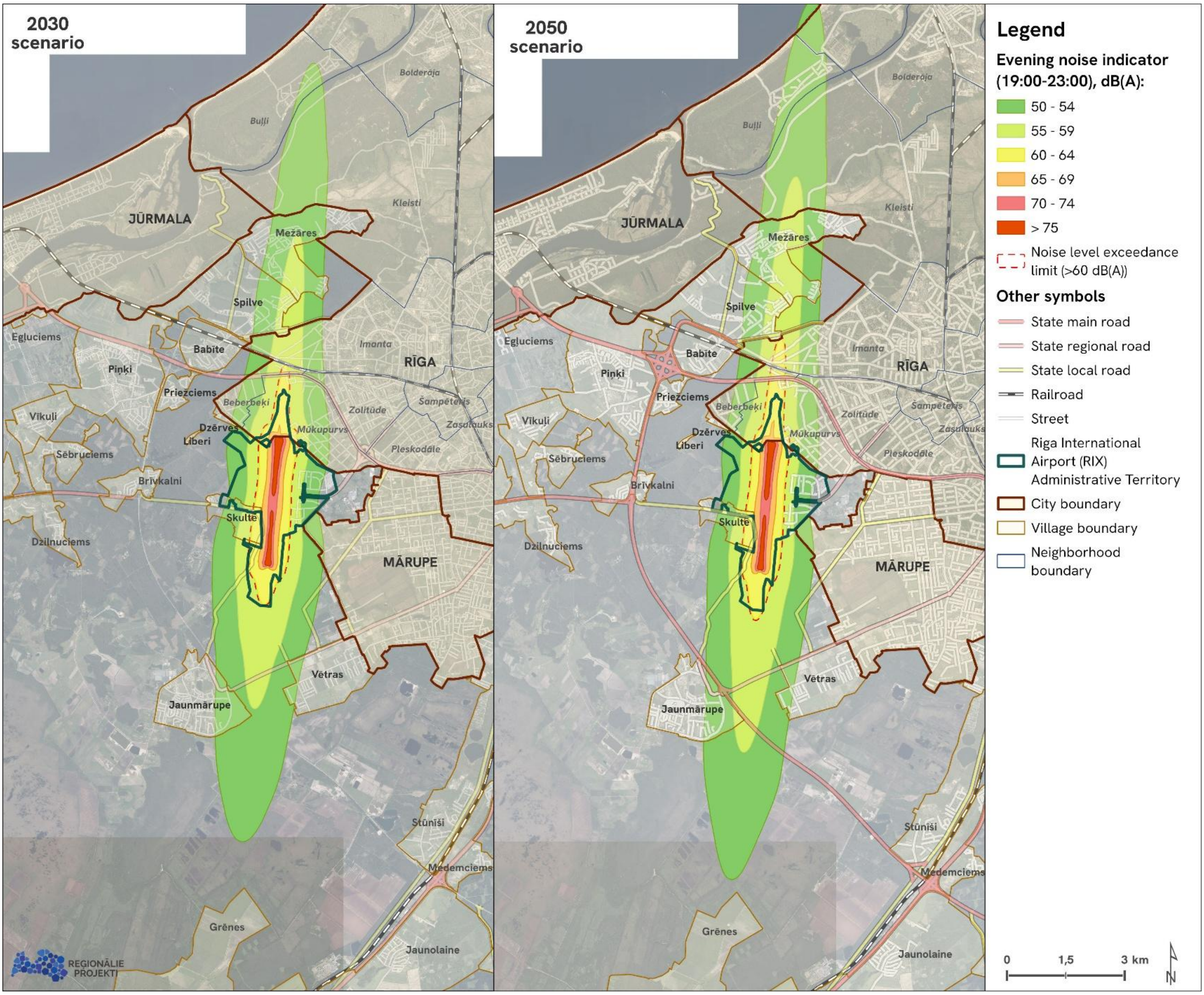

Image 2: Noise contours $L_{evening}$ for 2030 and 2050 scenarios

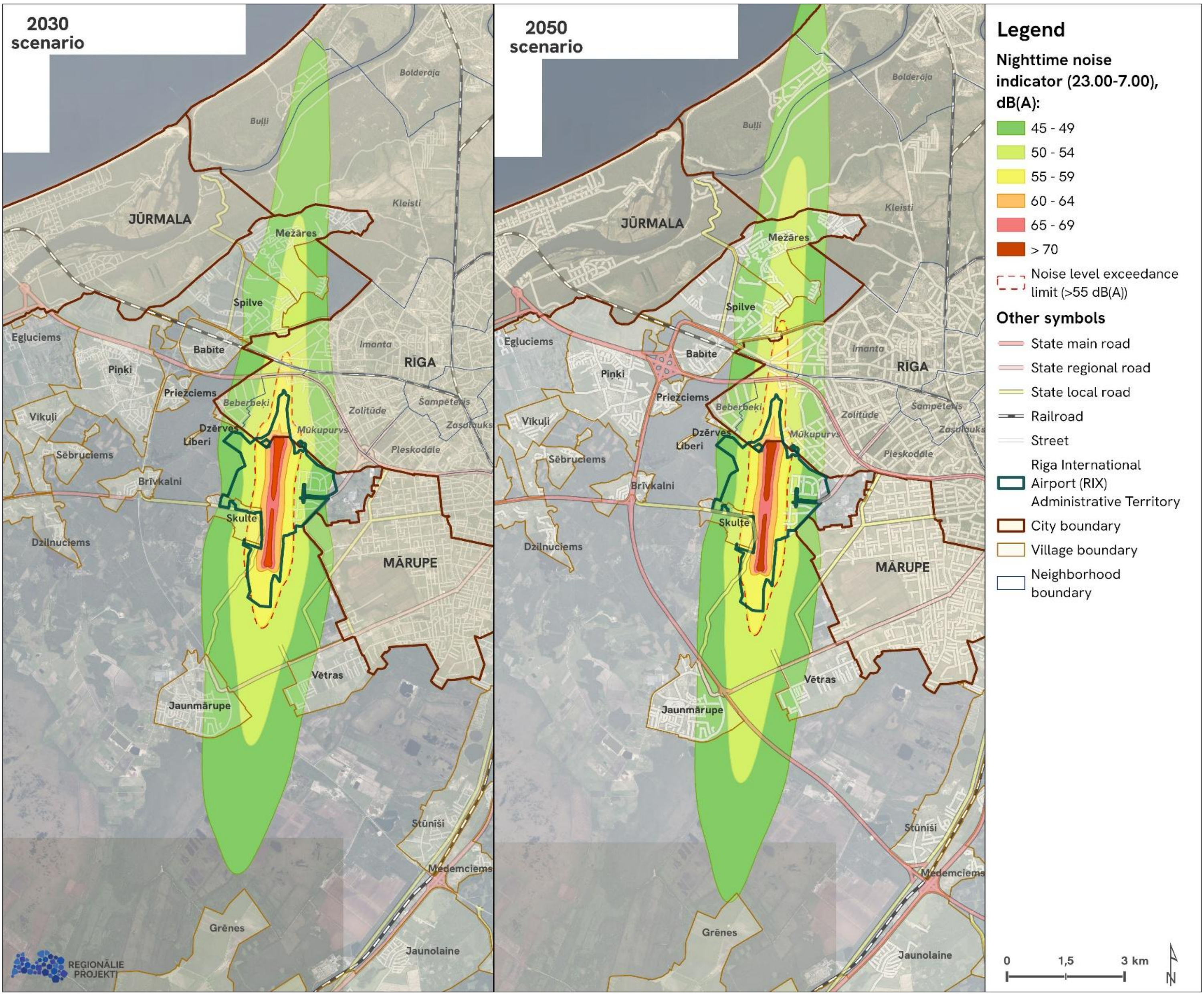

Image 3: Noise contours L_{night} for 2030 and 2050 scenarios

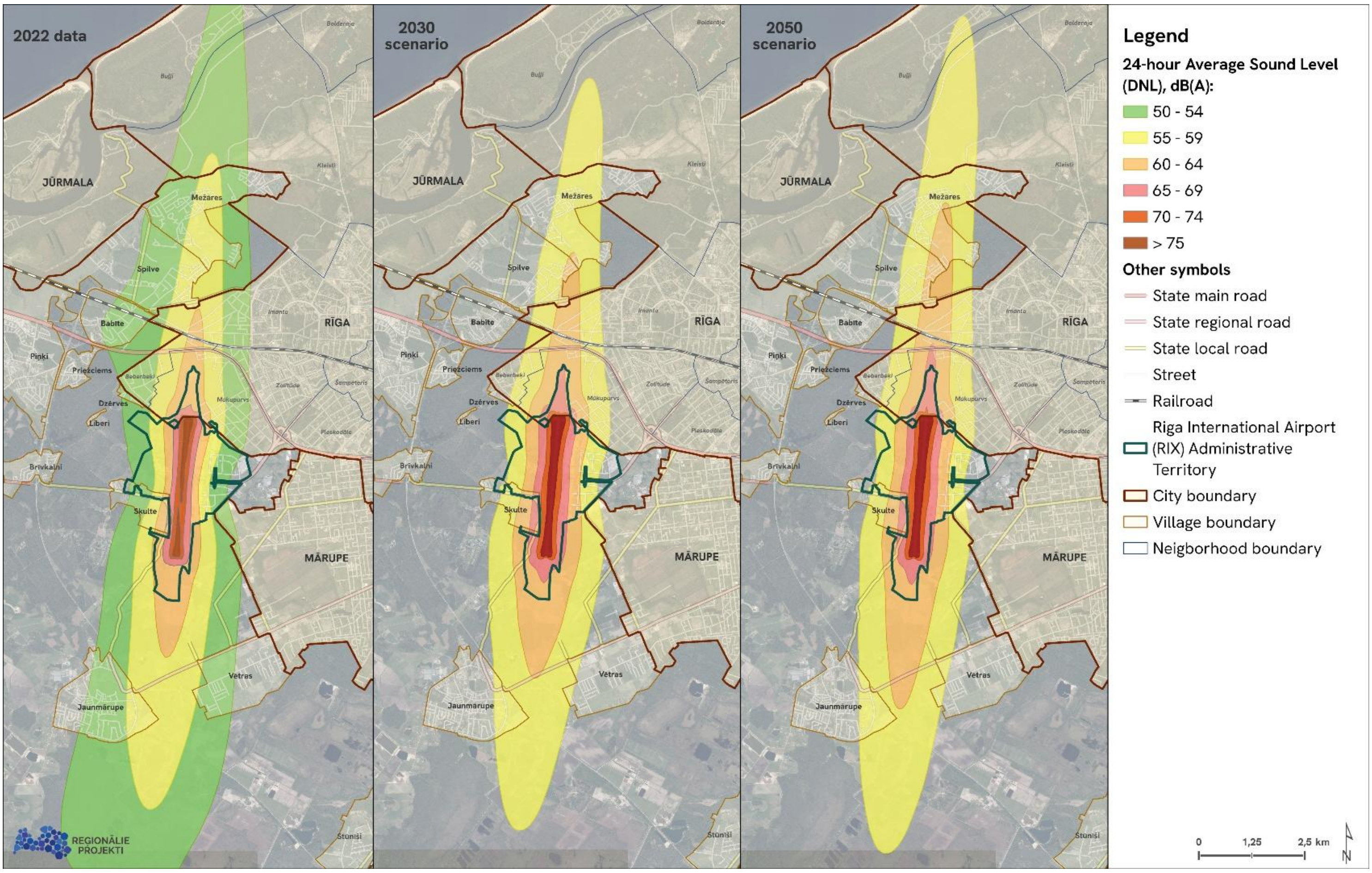

Image 4: Noise contours Lden in 2022 and for 2030, 2050 scenarios

Noise limit exceedance, dB(A)	L_{day} >65 dBA (7.00-23.00)	$L_{evening}$ >60 dBA (19.00-23.00)	L_{night} >55 dBA (23.00-7.00)	L_{den} >55 dBA (24 h)
	Affected area **(km²)**			
SNM (Data of 2022)	1,3	2,4	3,2	21,2
Scenario for 2030	2,1	4,2	5,6	30,5
Scenario for 2050	2,2	4,7	5,7	33,67

Table 28: Noise limit exceedances – affected area (Source: Riga Airport Master Plan (2025))

As shown in Image 1, Image 2, Image 3, Image 4 and the Table 28 projected increase in the number of flights (by 39% by 2030 and by 155% by 2050) **does not lead to a proportional expansion of areas where noise limit values are exceeded.** In the airport development scenarios, the area affected by noise increases gradually across all periods of the day, but more notably during the evening and night hours. Compared with 2022, during the daytime period (>65 dBA) the area where noise limits are exceeded increases by 0.8 km² (2030) and by 0.9 km² (2050), indicating that the spread of exceedances during the day remains relatively limited. During the more sensitive periods – the evening – the area affected by noise levels exceeding >60 dBA increases by 1.8 km² (2030) and by 2.3 km² (2050), while during the night period (>55 dBA) it increases by 2.4 km² (2030) and by 2.5 km²

(2050), compared with 2022 data. The total area affected by the 24-hour noise indicator (>55 dBA) increases from 21.2 km² in 2022 to 30.5 km² in 2030 and 33.7 km² in 2050.

Analysis of the data shows that a more significant increase in areas affected by noise limit exceedances occurs only in the medium term up to 2030, while in the long-term trend the increase is relatively small. This means that even with a substantial growth in the number of flights by 2050, the expansion of noise-affected areas is not particularly significant, and in the long term the impact remains controllable.

Spatially, the increase is moderately significant and is mainly concentrated in the evening and night periods, while during the daytime and in the overall 24-hour indicator the increase remains relatively small, particularly in the long term up to 2050. This indicates that noise management measures and technological developments will effectively offset part of the impact caused by increased traffic intensity.

When analysing the increase in noise-affected areas, it is important to assess not only the extent of the affected territory but also the functional zoning defined in the spatial planning documents of the local municipalities (Riga City Municipality and Mārupe Municipality). The significance of the impact increases substantially if areas where noise limit values are exceeded include existing or planned residential development. In contrast, where zoning is designated for commercial activities, logistics or transport infrastructure, as well as agricultural, forest, or nature and green areas, the actual impact on residents is negligible. Therefore, particular attention in noise management should be given to areas where noise contours overlap with existing or planned residential development.

A more detailed analysis of the functional zoning defined in the spatial planning documents of Riga City Municipality and Mārupe Municipality (at the time of preparation of the Environmental Report, the spatial plan of Mārupe Municipality is under preparation), correlated with the noise propagation scenarios for 2030 and 2050, is presented in Image 5. The analysis applies the following criteria: exceedances of daytime noise (>65 dBA), evening noise (>60 dBA) and night-time noise (>55 dBA) limit values.

Within the areas affected by noise limit exceedances in the vicinity of the airport, the spatial plans of the municipalities define the following functional zoning categories: Detached housing territory (DzS), Low-rise residential territory (DzM), Mixed central development territory (JC), Industrial development territory (R), Technical development territory (T), Transport infrastructure territory (TR), Agricultural territory (L), Nature and greenery territory (DA), and Forest territory (M). The analysis concludes that:

- detached housing and low-rise residential areas (primarily consisting of existing historical residential development) occupy 0.164 km², representing only 2.88% of the total area affected by noise exceedances in the maximum 2050 scenario (5.7 km²). Mixed central development areas, where residential development is also permitted, account for 0.128 km² or 2.25% of the total affected area. The overwhelming majority – 94.7% – consists of functional zones designated for other land uses (transport and technical infrastructure, industrial development, nature and green areas, etc.), which are not sensitive to noise impacts.
- in 2030, the area where daytime noise (>65 dBA) exceeds the limit values remains mainly within the airfield territory and the surrounding industrial and technical development areas, without significantly affecting residential areas. In 2050, the expansion is small and still largely concentrated within the airfield territory. Residential development is practically unaffected, and the impact remains localised within functionally less sensitive zones.
- evening noise (>60 dBA) and night-time noise (>55 dBA) exceedances in the 2030 and 2050 development scenarios affect parts of residential areas in the Imanta and Beberbeķi neighbourhoods of Riga and the Spilve settlement in Mārupe Municipality. In 2030, the contour of evening (>60 dBA) and night-time (>55 dBA) noise exceedance extends further towards Imanta, Beberbeķi and Mūkupurvs neighbourhoods and the Spilve settlement, affecting parts of existing low-rise and detached housing areas in western Imanta, the northern part of Beberbeķi along the railway line, and detached housing areas in the south-eastern

part of Spilve. In 2050, this contour expands further in the same direction. In the Beberbeķi neighbourhood it mostly does not directly affect residential development but rather includes nature and green areas. In the Mūkupurvs neighbourhood it also does not affect existing or planned noise-sensitive zones. A more significant impact on residents' quality of life and health due to noise exceedances is identified in the residential areas of western Imanta.

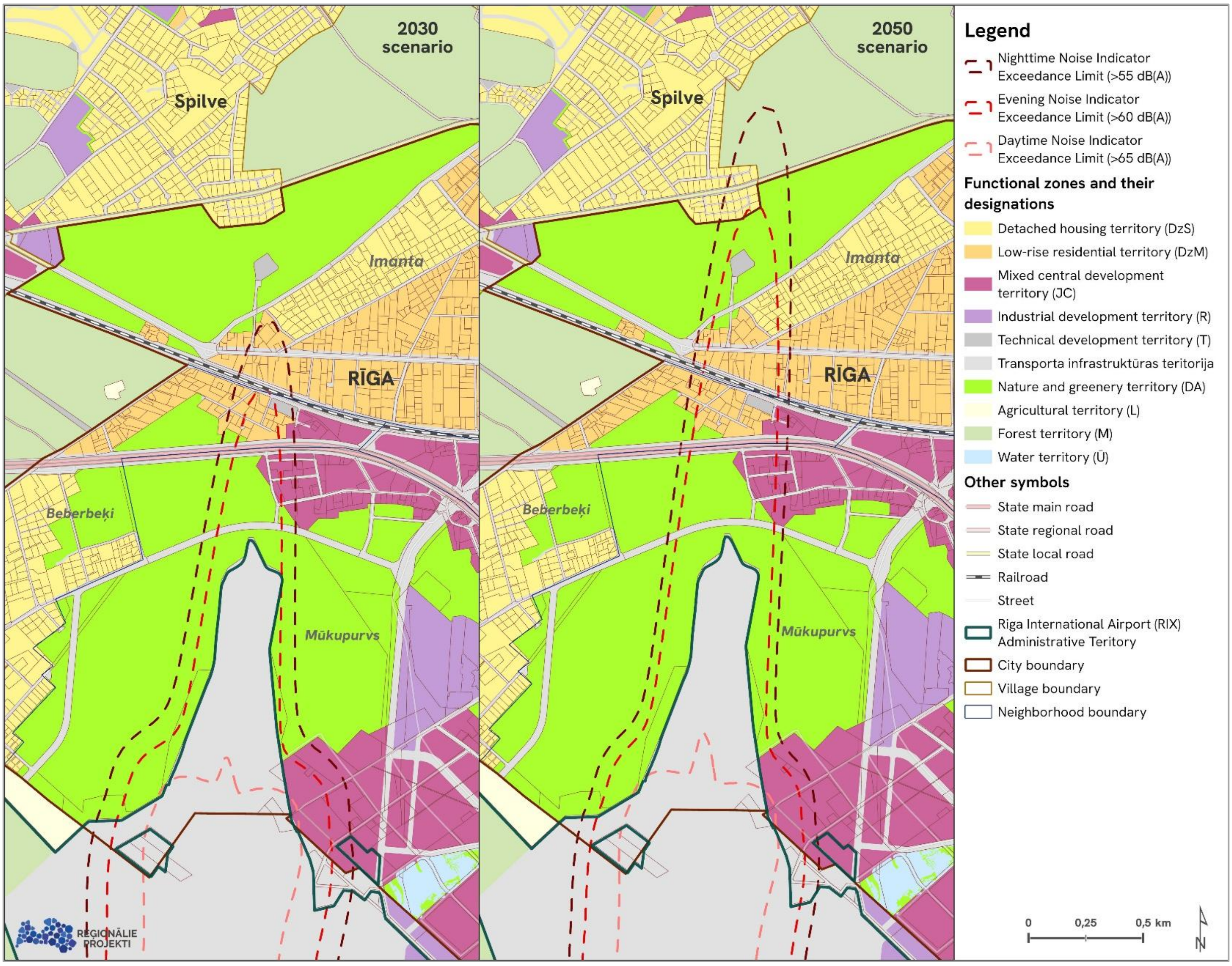

Image 5: Functional zoning within the areas where day, evening and night noise limits are exceeded (2030 and 2050 scenarios)

The total number of residents exposed to day, evening and night noise levels exceeding the traffic-related environmental noise limit values[85] established in legislation, as well as the number of residents affected by the day--night noise indicator >55 dBA under the 2022 situation and in the modelled airport development scenarios up to 2030 and up to 2050, is presented in Table 29.

[85] Cabinet of Ministers Regulation No.16 of January 7, 2014 "Procedures for Noise Assessment and Management" Paragraph 2 of Annex 2

The greatest impact of noise on residents' quality of life and health occurs during night-time hours, when noise can disturb sleep and rest, as well as in the evening, when residents are already at home and increased noise levels affect comfort and opportunities for relaxation.

The day-evening-night (24-hour) noise indicator (L_{den}) does not represent a subjective perception of loudness but serves as a statistical indicator of noise exposure used to assess potential long-term health risks (such as the likelihood of cardiovascular diseases, sleep disturbances, etc.).

Noise limit exceedance, dB(A)	L_{day} >65 dBA (7.00-19.00)	$L_{evening}$ >60 dBA (19.00-23.00)	L_{night} >55 dBA (23.00-7.00)	L_{den} >55 dBA (24 h)
	Number of **affected residents**			
SNM (Data of 2022)	-	-	<10	1642
Scenario for 2030	-	17	51	3195
Scenario for 2050	-	99	199	3597

Table 29: Noise limit exceedances – number of affected residents (Source: Riga Airport Master Plan (2025))

Although the airport development scenarios up to 2030 and 2050 foresee a significant increase in the number of flights, the number of residents affected by noise in nearby settlements is expected to increase relatively moderately.

As shown in **Kļūda! Nav atrasts atsauces avots.**, exceedances of the daytime noise limit (>65 dBA) in the projected scenarios for 2030 and 2050 will not affect residents. Meanwhile, exceedances of the evening noise limit (>60 dBA) will affect only a small number of residents (in 2030 – fewer than 20 residents; in 2050 – approximately 50 residents), and therefore cannot be considered significant.

The most affected and sensitive factor is the projected exceedance of the night-time noise limit (>55 dBA), which is expected to affect around 100 residents by 2030 and approximately 200 residents in the long term by 2050. The sensitivity of the night period means that even a small increase in the share of night flights significantly affects the statistics, although the absolute number of residents in these zones remains low.

From a spatial perspective, the impact on residents is concentrated in specific residential areas rather than being dispersed across the entire airport surroundings. It does not directly correlate with the overall increase in the number of flights, but rather with the distribution of flight routes and the density of residential areas. The number of residents affected by night-time noise limit exceedances is expected to increase most in the western part of the Imanta neighbourhood and the northern part of the Beberbeķi neighbourhood in Riga, as well as in the southern part of the Spilve settlement in Mārupe Municipality. In the settlements of Jaunmārupe and Skulte in Mārupe Municipality, the impact in the modelled scenarios remains relatively smaller and more localised (depending on flight trajectories; compared with the 2022 situation, no significant increase in the number of affected residents is projected).

The impact of night-time noise exceedances is assessed as moderately significant; however, it is localised in specific residential areas and remains manageable. Therefore, the main challenge in noise management is associated with the night period, during which the impact on residents' health and quality of life will be most pronounced.

The assessment of the 24-hour indicator (L_{den}) shows that the number of residents exposed to noise levels above 55 dB increases significantly with the intensity of flight operations. While in 2022 approximately 1,650 residents were affected, this number is projected to rise to 3,200 residents by 2030 and to nearly 3,600 residents by 2050 (see **Kļūda! Nav atrasts atsauces avots.**).

Image 6 shows that in the 2030 and 2050 scenarios the noise contours (>55 dBA), compared with 2022, expand and cover a larger area, thereby increasing the number of affected residents.

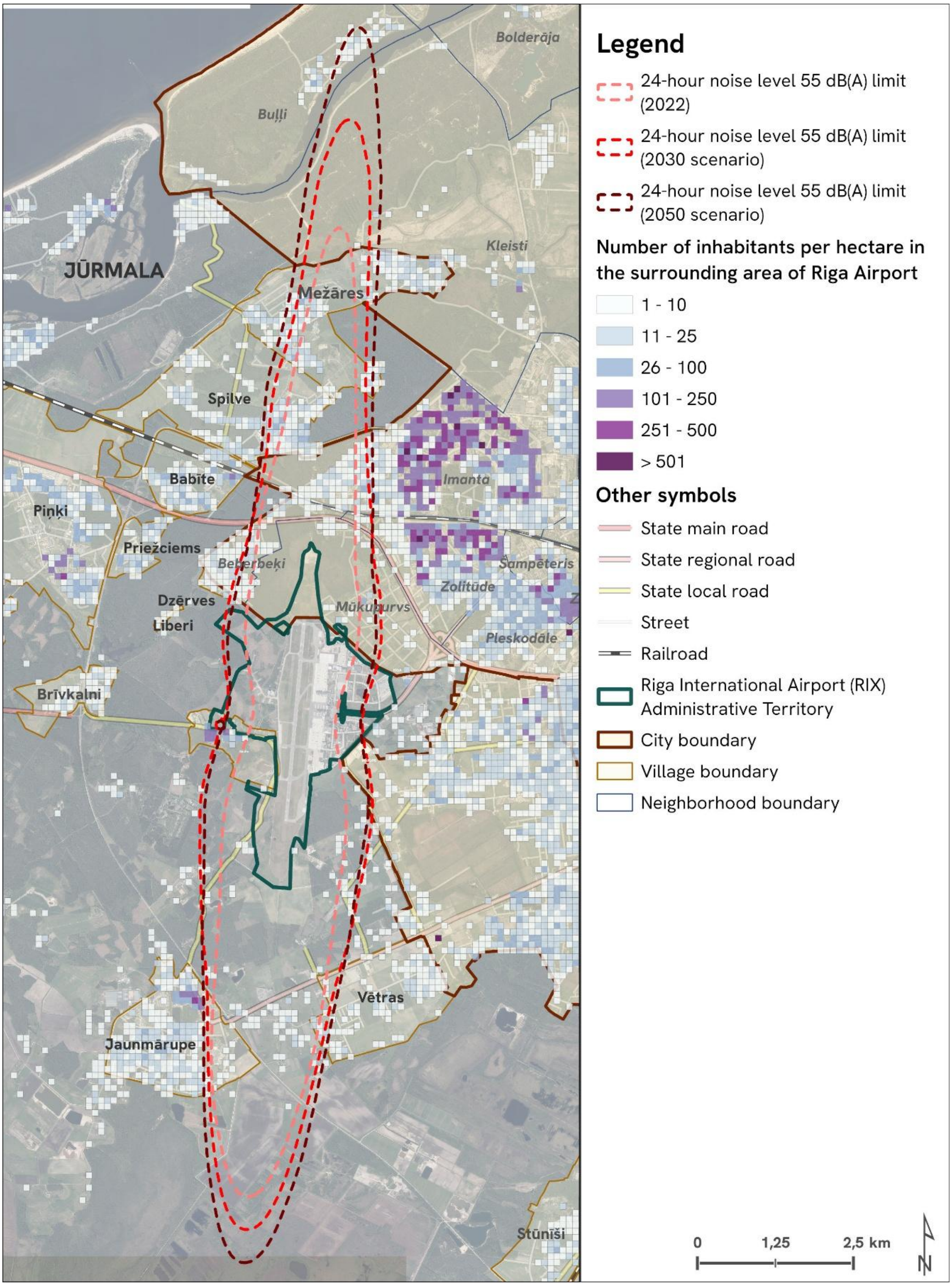

Image 6: 24-hour noise indicator (>55 dBA) contour in the 2022 situation and in the 2030 and 2050 scenarios

The most significant expansion of the noise contour (>55 dBA) occurs in the southern and western directions, determined by the traffic structure – a higher proportion of departing aircraft heading south and the turning of flight trajectories towards the west after take-off. As a result, by 2030 the areas where noise levels exceed 55 dBA expand more notably in parts of the Spilve and Mežāres settlements in Mārupe Municipality, as well as in parts of the Imanta and Beberbeķi neighbourhoods of Riga. By 2050, the noise impact extends further, also reaching the residential development area of Buļļi. In these territories, the impact on residents is assessed as locally significant, particularly during the night period, when noise directly affects sleep and rest quality. In contrast, the expansion towards the northern and eastern directions is much more limited – in the settlements of Jaunmārupe, Vētras and Mārupe in Mārupe Municipality the impact remains minor, affecting only individual residential land parcels. In the settlement of Skulte, changes in the >55 dBA noise contours are more pronounced than in other northern areas; therefore, residents' exposure here is notable, although on a smaller scale compared with the residential areas located to the south and west.

This increase in the long term is not linearly proportional to the growth in the number of flights, as aircraft fleet modernisation and noise management procedures will mitigate the expansion of noise contours. However, the increase in the number of affected residents can be explained by changes in settlement patterns and by the fact that the L_{den} methodology assigns greater weight to the evening (+5 dB) and night periods (+10 dB). Consequently, the main challenge in noise management is not only technological development but also spatial planning solutions implemented by Riga City Municipality and Mārupe Municipality, ensuring that new residential development areas are not established in zones with elevated L_{den} levels.

The number of residents affected by day-evening-night (24 hour) noise levels above 55 dBA (L_{den} >55 dBA) is explained by several factors. The cumulative effect means that L_{den} does not assess only the loudness of individual flights but aggregates all flights occurring over a 24-hour period and applies additional corrections. As a result, even relatively quieter flights taking place in the evening or night can significantly increase the indicator. Strategic Noise Maps (SNM) are delineated over large areas, and the impact is calculated up to a defined L_{den} threshold (for example, >55 dB). This means that all residents living within these areas are included in the affected population, not only those who experience direct discomfort. The regulatory calculation methodology (the EU CNOSSOS-EU method) is designed to apply a conservative approach in order to avoid underestimating public health risks. Therefore, the number of affected residents presented in tables often appears higher than the level of noise that may be directly perceived in reality.

The most significant noise issues related to airport development are associated with the night period, particularly in the Imanta and Beberbeķi neighbourhoods of Riga and in Spilve, where noise management measures are required. Daytime and evening exceedances are limited, while the impact of 24-hour noise (L_{den} >55 dBA) is concentrated mainly along the take-off and landing corridors towards the south and west. Overall, the increase in noise is not proportional to the growth in the number of flights, and it is mitigated by the use of quieter aircraft fleets, more efficient operational procedures and restrictions established in municipal spatial planning documents, ensuring that environmental noise impacts remain manageable in the long term.

7.10. Assessment of alternatives

Methodological framework

The assessment of alternatives has been carried out in accordance with the criteria defined in **Chapter 2** of the Environmental Report (significance, type of impact, duration, character, cumulative impact) and the unified structure of Chapter 7. The "**0 alternative**" ("status quo", i.e. the existing situation without development) has been used as a **baseline scenario**, allowing comparison of the solution selected in the Development Plan with a situation in which development projects are not implemented.

The Master Plan emphasises that airport development projects are linked to demand. Implementation takes place gradually, **when there is an objective need** (thresholds defined in the Master Plan), ensuring that environmental impacts **increase in line with demand** (rather than prematurely) and in compliance with international safety and environmental requirements. In the evaluation of alternatives, particular attention is given to balancing capacity, safety and the environmental impacts of airport operations in order to ensure proportionate development and maintain control over potential impacts on surrounding areas.

The “0 alternative” or “status quo” scenario assumes that the development of Riga Airport would not be implemented, maintaining the existing infrastructure and capacity limitations. This would require the use of existing infrastructure under conditions of growing demand, which would inevitably lead to operational overload and congestion both on taxiways and in the airspace. This would result in a significant increase in noise, air pollution and greenhouse gas emissions, as well as the possible shift of flights to night-time hours, thereby increasing impacts on the quality of life of nearby residents. Furthermore, the integration of the Rail Baltica railway access lines and station and the development of sustainable mobility would not be ensured, which in the long term would reduce the competitiveness of Riga Airport in the region. Although the “0 alternative” avoids new construction works and the associated direct impacts, in the long term it would lead to a significant and uncontrolled increase in negative impacts, increasing environmental pressure in proportion to each operation.

Assessment of development alternatives

In Chapter 3 of the Riga Airport Master Plan, “Development alternatives for the period until 2050”, the main development alternatives are analysed in relation to the runway and taxiway system, the development of the terminal and apron, and the improvement of land access infrastructure to Riga Airport, with particular attention given to the potential environmental impacts of development:

- **Runway and taxiway system** – the possibility of increasing the capacity of the existing runway by constructing a parallel taxiway and rapid exit taxiways has been assessed, while the option of constructing a new runway has been rejected.
- **Terminal and apron development** – several (five) long-term alternatives for terminal and apron development have been analysed, including the construction of new piers and the gradual increase of terminal and apron capacity in line with demand.
- **Access roads and access infrastructure** – alternatives for improving land accessibility to Riga Airport have been assessed, including the integration of public transport (Rail Baltica railway station and public transport buses) and the development of access roads and car parks.

The evaluation of alternatives is based on a set of criteria (cost of alternatives, operational feasibility, environmental impact, impact and integration with existing infrastructure and operations, ease of phased implementation, impact on airport operations/constraints during construction, and the influence of administrative procedures), which allow development scenarios to be compared, the scale of environmental impacts to be determined, and solutions to be identified that ensure a balance between increasing the capacity of Riga Airport and preserving the quality of the surrounding environment. *(For more details see Chapter 3 of the Master Plan.)*

Runway and taxiway system alternatives

During the preparation process, two alternatives for the development of the runway and taxiway system were analysed:

- **alternative 1 – maximum development of Runway 18/36.** This alternative envisages maintaining the existing runway while significantly improving and modernising the taxiway system, thereby increasing the operational efficiency and safety of the airfield. This approach provides sufficient capacity until 2050 without expanding the geographical extent of noise impacts. A positive aspect is that the development takes place within the existing airfield territory, without creating additional direct impacts on surrounding residential areas.

- **alternative 2 – a new Runway 18/36.** This option was assessed as a strategic possibility for a very distant future period; however, it was considered disproportionate to the projected traffic growth up to 2050. Such a solution would entail significant negative environmental impacts – the occupation of new land areas, a considerable expansion of noise contours, the need for land acquisition and the implementation of a full Environmental Impact Assessment (EIA) procedure.

The optimal alternative selected was the maximum development of Runway 18/36 (Alternative 1), *as it ensures a gradual increase in airfield capacity until 2050 while maintaining environmental impacts and impacts on surrounding areas at a proportionate and manageable level compared with the construction of a new (second) runway*

Alternative	Type of impact	Duration	Short description	Character	Significance	Cumulative impact
“0 alternative” – Maintaining existing situation	Indirect	Long-term	Retention of the existing runway and taxiway configuration without significant improvements. Capacity remains limited, and traffic efficiency and safety are not improved.	Predominantly negative	Moderately significant to significant	If operational demand exceeds capacity, noise, air pollution and greenhouse gas emissions would increase significantly. As a result, each operation would generate a higher intensity of pollution, increasing negative environmental impacts.
Alternative 1 – Maximum development of Runway 18/36 *(selected)*	Direct and indirect	Long-term	Retention of the existing runway combined with significant improvements to the taxiway system would increase capacity, safety and operational efficiency without occupying additional land.	Predominantly positive	Moderately significant	This approach reduces the expansion of noise contours, improves operational organisation and, in combination with other projects, creates positive synergy in the management of pollution, greenhouse gas emissions and noise.
Alternative 2 – New 18/36 runway	Direct	Long-term	Construction of a new runway, which would significantly alter the geography of noise and occupy new land areas. By 2050, it would not correspond to the projected demand.	Negative	Significant	Cumulatively, it would generate very significant environmental impacts, including the expansion of noise contours and the occupation of new territories, requiring land acquisition and a full Environmental Impact Assessment (EIA) process.

Project	Type of impact [86]	Duration [87]	Character	Significance
Terminal expansion (Phase 6)	Direct	Long-term	Negative	Moderately significant
Integration of the Rail Baltica railway link and station	Direct	Long-term	Neutral - positive	Insignificant
Access node and car parks	Direct / Indirect	Long-term	Positive	Moderately significant
Renewal of runway, taxiway and apron pavements	Direct	Short-term	Neutral	Insignificant
New taxiways, rapid exit taxiways	Direct	Long-term	Positive *(localised within the airport working environment)*	Insignificant
Reconfiguration of Apron 1 and construction of a new pier	Direct	Long-term	Negative *(localised within the airport working environment)*	Moderately significant
Southern expansion of Apron 2 and reconfiguration of stands	Direct	Long-term	Negative with minimising aspects *(localised within the airport working environment)*	Moderately significant
Relocation of the isolated aircraft stand (and engine test stand)	Direct	Long-term	Neutral *(localised within the airport working environment)*	Insignificant
Cargo logistics infrastructure	Direct / Indirect	Long-term	Negative	Moderately significant
Reconfiguration of two aircraft de-icing pads	Direct	Short-term	Neutral	Insignificant
New technical zone (MRO, FBO and GA western aprons)	Direct	Long-term	Positive – neutral	Moderately significant
Southern apron expansion (two aircraft stand taxilanes)	Direct	Long-term	Negative *(localised within the airport working environment)*	Moderately significant
Extension of the western taxiway	Direct	Long-term	Positive *(localised within the airport working environment)*	Insignificant
Development of the Airport City Business Park	Direct / Indirect	Long-term	Negative	Moderately significant

Terminal and apron development alternatives

Terminal and apron development alternatives were assessed as an integrated solution that combines the location of the new terminal building with the possibilities for apron expansion, ensuring their functional interconnection.

Three potential apron development zones were analysed – expansion towards the west (Zone A), expansion towards the north-east (Zone B), and expansion towards the south-east (Zone C).

It was concluded that Zone A is not suitable for the development of a commercial passenger terminal and apron, as its large distance from existing infrastructure would reduce operational efficiency, increase passenger transit time and require significant changes to the land access road network. In addition, the use of this zone would be linked to a premature decision on the location of a second runway, which would complicate long-term planning. Zone A should therefore be reserved for other purposes (MRO and general aviation). In contrast, Zones B and C, which are located closer to the existing Riga Airport terminal building and taxiway system, provide faster access, better integration with existing infrastructure and shorter aircraft taxiing times.

Taking into account the requirements for the terminal and apron, as well as the spatial constraints of Riga Airport, five alternatives were developed in which both commercial passenger and cargo expansion in Zones B and C, as well as general aviation activities in Zone A, were assessed. In all alternatives it is envisaged that, in the long term, MRO and general aviation facilities will be relocated to the western zone (A), on the opposite side of the existing runway, leaving the current central area exclusively for airline passenger and cargo handling. The analysis shows

[86] Additional direct impacts during the implementation of all projects will arise from construction works.
[87] Additional short-term impacts during the implementation of all projects will arise from construction works.

that Zone A is not suitable for the development of a commercial terminal and apron due to its large distance from the existing terminal building, complicated access and incompatibility with the planned Rail Baltica railway access lines and station solutions.

- **Alternative 1 – Northern single-sided perpendicular pier.** Expansion towards the north-east (Zone B) through the construction of a single-sided perpendicular pier with up to seven new aircraft stands. This option enables the use of existing infrastructure but results in long passenger walking distances, affects the existing cargo apron and limits future expansion possibilities. The environmental impact is small (as it reduces the need to expand the southern apron), but the functional efficiency is low.
- **Alternative 2 – Southern double-sided parallel pier.** Expansion towards the south-east (Zone C) with a parallel double-sided pier providing up to nine aircraft stands, including two multi-aircraft ramp system (MARS) stands. This alternative offers short walking distances, high flexibility and efficient passenger flow management between Schengen and non-Schengen zones. Functionally it is the most efficient option, with environmental impacts that are localised and manageable (requiring the expansion of the southern apron but without affecting other existing facilities).
- **Alternative 3 – Southern circular pier.** Expansion towards the south-east (Zone C) with a circular pier (nine aircraft stands). Spatially, this option provides a compact layout and uniform distances to boarding gates; however, it complicates the separation of passenger flows between Schengen and non-Schengen zones. The environmental impact is significant (requiring expansion both on the southern apron and to the east and west of Apron 1, as well as the demolition of the VIP terminal). Functional efficiency is also low.
- **Alternative 4 – Southern single-sided perpendicular pier**. Expansion towards the south-east (Zone C) with a single-sided perpendicular pier (eight aircraft stands). This option offers a balanced solution with the possibility for future expansion, but requires the relocation of the VIP terminal and maintenance hangars. Functionally it is moderately efficient, with a moderate environmental impact (requiring additional apron space for aircraft stands and affecting existing facilities).
- **Alternative 5 – Southern double-sided perpendicular pier.** Expansion towards the south-east (Zone C) with a double-sided perpendicular pier (ten aircraft stands). This option combines high capacity with efficient passenger flow organisation, but requires a significant increase in apron width away from the runway and modifications to existing infrastructure, which also increase short-term construction impacts. The environmental impact is significant (requiring expansion both on the southern apron and to the east and west of Apron 1, as well as the demolition of the VIP terminal).

*For the development of the terminal and apron, **Alternative 2 – the Southern double-sided parallel pier (in Zone C)** – was selected as the most balanced solution in terms of functionality, economic efficiency and environmental impact. It builds on the use of the existing terminal infrastructure, does not require significant additional land take, and allows capacity to be increased gradually in line with demand. Expansion towards the south-east ensures optimal integration with the Rail Baltica railway station and the public transport system, while reducing transport-related pressure. The solution enables effective management of potential increases in noise and emissions and supports the long-term sustainability of the airport.*

Alternative	Type of impact	Duration	Short description	Character	Significance	Cumulative impact
“0 alternative” – maintaining existing situation	Indirect	Long-term	Existing capacity constraints remain, while noise and emission levels increase proportionally with demand in	Neutral to negative	Moderately significant	Increases cumulative environmental impacts, as the pressures

Alternative	Type of impact	Duration	Short description	Character	Significance	Cumulative impact
			the absence of infrastructure optimisation. Noise and emissions per passenger increase, and air quality near access roads deteriorates.			generated by demand are not addressed.
Alternative 1 – Northern single-sided perpendicular pier	Direct	Long-term	Efficiently utilises the existing apron but results in long walking distances and limits future expansion. Environmental impact is minor, as development takes place in an anthropogenically modified area.	Positive/ neutral	Moderately significant	Reduces the need to expand the southern apron, thereby minimising environmental impacts and waste generation.
Alternative 2 – Southern double-sided parallel pier *(selected)*	Direct	Long-term	Highest operational efficiency – short distances and effective separation of passenger flows. Environmental impact is local (southern apron expansion) but manageable.	Positive/ neutral	Moderately significant	The compact development and strong integration with other projects support long-term sustainability. Environmental impact is minimal and manageable and does not affect other existing facilities.
Alternative 3 – Southern circular pier	Direct	Long-term	Ensures even distances, but complicates the separation of Schengen/non-Schengen flows. Requires expansion in several directions, demolition of existing facilities.	Negative	Significant	Cumulatively, this could create functional constraints affecting operational efficiency and lead to significant negative environmental impacts, including increased waste generation.
Alternative 4 – Southern single-sided perpendicular pier	Direct	Long-term	Provides a balance between expansion and the use of existing infrastructure but requires the relocation of existing facilities. Environmental impact is local but manageable.	Neutral to negative	Moderately significant	Moderate cumulative impact. The demolition of the VIP terminal and hangars, as well as the construction of an additional apron, would increase the overall environmental burden.
Alternative 5 – Southern double-sided perpendicular pier	Direct	Long-term	Combines the advantages of Alternatives 2 and 4 – high capacity and effective separation of passenger flows. The drawback is the need for expansion in several directions, a significant increase in apron width away from the runway, and interventions in the existing infrastructure.	Negative	Significant	The planned pier configuration increases the overall apron area and environmental impact. The demolition of the VIP terminal and the volume of construction waste further add to this burden, creating a substantial cumulative impact.

Alternatives for access infrastructure to Riga Airport

The main access to Riga Airport is via the intersection of road P133 and Dzirnieku Street, which is already operating under overload conditions and will not have sufficient capacity in the future. This creates congestion, increases traffic load, pollution and GHG emissions, and negatively affects airport accessibility. The Master Plan provides for the integration of the Rail Baltica railway connection with the airport, while also improving road access in order to ensure balanced, safe and sustainable mobility. In this context, several traffic management alternatives at the intersection of road P133 and Dzirnieku Street were analysed, assessing their functional, environmental and social aspects to identify the optimal solution for improving traffic flows and reducing emissions.

- **Alternative 1 – construction of an overpass to directly connect the P133 motorway and Dzirnieku Street.** It is planned to build an overpass above the intersection[88] of the P133 motorway and Dzirnieku Street, ensuring a southern connection to the airport and priority, uninterrupted access to the airport from the Riga city centre and Jurmala direction. The solution significantly improves the south-east direction traffic flow, eliminating congestion and ensuring direct and faster access to the airport, especially during peak hours. However, the overpass creates a significant visual and spatial impact on the surrounding area, including a possible negative impact on adjacent buildings.
- **Alternative 2 – traffic-regulated roundabout.** This alternative envisages the reconstruction of the existing intersection of road P133 and Dzirnieku Street into a single-level roundabout. The solution improves traffic safety and distributes traffic flows more evenly, reducing the risk of congestion. The construction of a roundabout is less visually intrusive than a flyover but provides lower capacity under peak traffic conditions; therefore, its effectiveness under future traffic intensity may be limited.
- **Alternative 3 – overpass and roundabout (combined solution).** This scenario envisages the simultaneous implementation of the overpass and the roundabouts underneath it. The overpass provides priority access to the main airport flows, while the roundabout effectively distributes local traffic accessing the airport from the city of Mārupe. The solution provides the highest capacity, reduces congestion and ensures the best long-term efficiency.

The selected option is Alternative 3 – overpass and roundabout (combined solution)*, which best balances mobility requirements with environmental aspects, by reducing CO_2 emissions per passenger and traffic noise, while ensuring high capacity and safety. It enables the effective separation of traffic flows and their integration with the Rail Baltica railway hub, thus reducing transport-related emissions and environmental impacts in the long term. Although short-term negative impacts (noise, vibrations, visual disturbances) are expected during construction, in the long term the solution is functionally and environmentally optimal, ensuring sustainable and efficient access to Riga Airport.*

Alternative	Type of impact	Duration	Short description	Character	Significance	Cumulative impact
"0 alternative" – maintaining existing situation	Indirect	Long-term	The increase in traffic intensity causes congestion, increased emissions and noise on access roads (Dzirnieku Street, P133, Ziemeļu Street, etc.). Negative impact on mobility and air quality.	Negative	Significant	Increases the overall negative impact on airport accessibility and surrounding areas (noise, pollution, GHG emissions).
Alternative 1 – construction of an overpass to directly connect the P133 motorway and Dzirnieku Street	Direct (construction), indirect (operation)	Short-term (construction), long-term (operation)	Increases traffic capacity, reduces congestion and emissions. In construction – noise, vibrations, visual impact.	Negative (short-term), positive (long-term)	Moderately significant	Together with Rail Baltica, it creates a significant reduction in emissions per passenger, but increases the visual

[88] As a part of A5 motorway improvement project

Alternative	Type of impact	Duration	Short description	Character	Significance	Cumulative impact
						impact of the infrastructure.
Alternative 2 – traffic-regulated roundabout	Direct (construction), indirect (operation)	Short-term (construction), long-term (operation)	Improves safety and traffic flow but limited capacity.	Predominantly positive, with limitations in the long term	Moderately significant	As flows increase, there is a risk of creating congestion and a concentration of pollution and GHG emissions.
Alternative 3 – overpass and roundabout (combined solution) ***(selected)***	Direct (construction), indirect (operation)	Short-term (construction), long-term (operation)	Provides maximum capacity, separates traffic flows, reduces emissions in the long term. More significant visual impact.	Negative (short-term), positive (long-term)	Significant	Provides the best cumulative effect when integrated with the Rail Baltica railway and public transport system – the largest reduction in emissions and noise in the long term, but a more significant visual impact.

*The **solutions (alternatives) selected** in the Riga Airport Master Plan – maintaining the existing runway and taxiway system with optimisation, the gradual expansion of the terminal and apron towards the south-east (with a southern double-sided parallel pier), and integrated access through the Rail Baltica railway connection together with improvements to road access infrastructure – ensure a balance between capacity growth, safety, the promotion of sustainable mobility and the management of environmental impacts. This approach is based on maximising the use of existing infrastructure, limiting additional land take, reducing transport and noise pressure on residents and contributing to the reduction of pollutant emissions. As a result, the development is proportionate, controllable and aligned with international environmental and climate objectives*

8. Recommendations to prevent or mitigate the significant environmental impact of the RIX Riga Airport Master Plan and its possible alternatives

General principles

The impact assessment of the Master Plan (see Chapter 7) shows that most potential impacts are **predictable, manageable and can be mitigated** through the planned technical solutions and measures. The main strategic instrument for impact mitigation is the airport's approach whereby projects are implemented only in response to actual demand; therefore, development is gradual and aligned with the needs of society and the market.

The recommendations have been developed in accordance with several environmental management and planning principles:

- **Integration and precautionary principle**. Airport development measures are assessed taking into account their interaction with other planning documents and sectors, as well as potential risks that may arise in the future. This means that solutions are selected in a way that prevents or reduces possible environmental harm at an early stage, even where a full prediction of impacts is not possible.

- **Ensuring sustainability for the future.** The Master Plan envisages that decisions taken today will not create an irreversible burden in the future but will ensure a safe and high-quality living environment in the airport surroundings for both present and future generations. This approach envisages that infrastructure development is based on sustainable solutions – emission reduction, noise control measures and the preservation of biodiversity.
- **Results of the alternatives assessment.** Both development scenarios and specific technical solutions assessed in Chapter 7 have been taken into account. Their objective is to ensure that the selected solutions cause the least environmental harm while remaining consistent with aviation development requirements and the needs of economic growth.
- **Latvian and European Union legislation.** The development measures are aligned with national requirements in the fields of environmental protection, water resources, air quality and noise management, as well as with EU regulations and directives related to aviation and climate policy.
- **ICAO and EU aviation environmental standards.** The solutions of the Plan comply with internationally recognised civil aviation impact mitigation standards, including the ICAO Balanced Approach to noise management and the ICAO CORSIA system in the field of climate policy, as well as European Commission regulations on the use of sustainable aviation fuel and the development of the TEN-T transport network.

Recommendations by environmental aspects

Air quality and climate

- Ensure that the installation and modernisation of apron power supply systems is implemented at each development stage, reducing the use of aircraft auxiliary power units.
- Promote the availability and use of sustainable aviation fuel (SAF), particularly after 2040, when a significant increase in operations is projected.
- Expand the electrification of ground transport.
- Use the integration of the Rail Baltica railway connection and station as a key measure to reduce emissions from private transport per passenger.
- Regularly assess the volume and trends of GHG emissions generated by the airport, linking them to the implementation of the airport's Net Zero strategy and international certification requirements (e.g. ACI Airport Carbon Accreditation).
- Continue educating and engaging the airport's third parties (airlines, service providers – air traffic management, ground handling, catering, fuel supply and other companies operating within the airport territory, transport service providers – road carriers, railway operators) to share best practices in reducing CO_2 emissions and mitigating climate change, as well as promoting environmentally friendly access to the airport.
- Continue implementing specific emission reduction measures and obtain the highest level of ACI certification by 2035.

Noise

- Systematically implement noise management plans at each development stage in accordance with the ICAO Balanced Approach (fleet modernisation, optimisation of flight procedures, land-use planning and protection measures).

- Regularly carry out noise monitoring and prepare the Strategic Noise Map (SNM) and Noise Action Plan every five years, ensuring that the results are communicated to the public.
- Comply with the requirements already established in the Riga Airport Noise Action Plan and in municipal spatial planning documents regarding land-use planning and the provision of protection measures.
- Ensure cooperation and continued alignment of the spatial plans of Riga City Municipality and Mārupe Municipality with airport development, particularly in noise-sensitive areas where the projected scenarios indicate that the day–evening–night (24-hour) noise indicator (L_{den}) exceeds 55 dBA. In these areas, functional zoning should prioritise commercial, logistics, transport, technical and industrial uses, avoiding the planning of new residential development. In addition, the preservation and development of green belts and buffer zones around the noise contours should be promoted to reduce visual and acoustic pressure on existing residential environments and to improve landscape quality.
- Identify noise-sensitive residential areas in municipal spatial plans where 24-hour noise indicator (L_{den}) exceeds 55 dBA. These areas should be designated as zones with specific requirements, introducing additional protection measures to reduce indoor noise exposure. Appropriate measures include the integration of quiet facade solutions, replacement of windows or additional sound insulation improvements, and planning restrictions on new noise-sensitive development in these zones.

Water resources

- Ensure that the construction of new aprons, parking areas and access zones is implemented only in parallel with the expansion of stormwater, drainage and wastewater treatment systems, thereby providing capacity reserves for future development.
- Ensure that aircraft de-icing and anti-icing operations are carried out using modern runoff collection and treatment methods, preventing chemicals from entering the Neriņa River and other surface waters.
- Introduce local separators, infiltration and filtration units in risk areas (aprons, technical zones, logistics areas) to reduce the release of oil products and heavy metals into the environment.
- Regularly monitor the quality of surface water and groundwater (particularly concentrations of suspended solids, glycol and oil products), ensuring timely response to exceedances and adjusting treatment capacity to increasing demand.
- Preserve and develop green areas around the airfield perimeter as natural filtration and buffer elements that reduce the impact of runoff on the surrounding environment.

Soil and land use

- During construction, ensure the protection of soil quality and the disposal of construction waste in accordance with regulatory requirements.
- Prevent pollution risks by introducing secure storage areas for fuel and chemical substances.
- Ensure that land-use change (from open land to built-up areas) occurs only in functionally necessary areas.

Biodiversity

- Continue monitoring birds and wildlife within the airfield territory and its surroundings; regularly review risk mitigation measures (grass mowing, control of water accumulation areas, introduction of new bird deterrence technologies, including radar, acoustic or light systems, and visual deterrents).
- In cooperation with the Nature Conservation Agency, ensure that development activities do not affect Natura 2000 sites.
- Before starting construction works for the southern expansion of Apron 2, carry out detailed habitat mapping to determine the boundaries of impacts and prevent unnecessary fragmentation of natural areas.

Where habitat loss cannot be avoided, compensatory areas must be provided that match or exceed the affected areas in both quality and extent (for example, by rehabilitating degraded areas or restoring similar habitats outside the construction zone). Compensation conditions should be agreed with the Nature Conservation Agency. As part of the compensation mechanism, improvements to affected habitats may also be implemented elsewhere within or outside the airport territory – for example, by controlling invasive species, restoring native species and carrying out habitat restoration measures.

- When implementing development projects, integrate green areas, groups of trees and ecological corridors wherever possible to preserve biodiversity elements and visually reduce the impact of industrial development.

Cultural heritage and landscape

- Ensure that new buildings are architecturally and visually consistent with the existing airport complex.
- Provide landscape planning solutions in the Airport City Business Park area in order to reduce visual impact.

Public health and quality of life

- Ensure that information on noise monitoring results is accessible to the public.
- Involve residents in regular consultations regarding key stages of airport development.
- Promote employment opportunities and the use of public transport by improving mobility.

Waste management

- In parallel with the development of the terminal and the Airport City Business Park, gradually increase sorting and recycling capacity.
- Ensure the safe storage of hazardous waste (chemicals, fuel residues, maintenance waste) and its transfer to licensed waste management operators.
- Link waste management with GHG emission reduction measures (circular economy solutions and reduction of landfill use).

Integration of the alternatives assessment

In accordance with the assessment provided in Chapter 7.10 of the Environmental Report, the selected combination of development alternatives – maximum development of Runway 18/36 while maintaining it within its existing location without extension or configuration changes, expansion of the terminal and aprons towards the south-east, and the provision of land access through a hybrid solution combining the P133/Dzirnieku Street roundabout and flyover together with the integration of the Rail Baltica railway connection and station – is considered the most appropriate solution for both the environment and the interests of society.

This approach ensures sustainable airport development while maintaining a balance between increasing capacity and functionality and preserving environmental quality. It allows efficient use of existing infrastructure, avoiding significant additional land take and reducing potential impacts on the surrounding environment and residential areas. In the long term, this solution ensures a balance between mobility, environmental, social and economic considerations, enabling gradual adaptation to actual demand and operational volumes, preventing premature and economically unjustified investments, while maintaining the airport's international competitiveness and safeguarding public and environmental interests.

Recommendations for the implementation of the selected alternatives:

- Maintain a flexible approach to development planning by implementing projects only when there is actual demand and avoiding premature expansion, thereby reducing potential negative impacts.

- Implement apron development in combination with power supply systems that reduce aircraft ground handling emissions, improve air quality and reduce noise levels.
- Provide opportunities to integrate modern technologies and additional alternative fuel solutions in the future (e.g. solar energy generation, hydrogen refuelling infrastructure, support for electromobility), which in the long term will reduce environmental impacts while increasing operational efficiency and competitiveness.
- Ensure the prioritisation of public transport and full integration of the Rail Baltica railway connection, promoting passenger access by environmentally friendly modes of transport and reducing the pressure created by private vehicles.
- Continue developing monitoring and control systems (noise, air quality, water resources, biodiversity) to ensure timely identification of impacts and the adaptation of management measures.
- Ensure cooperation with municipalities and the public, particularly with Riga City Municipality and Mārupe Municipality, which are affected by noise emissions, by establishing reliable communication and integrating public interests into the planning process.
- Follow the precautionary and intergenerational equity principles to ensure that airport development does not lead to irreversible deterioration of environmental quality in the long term and maintains balanced development for future generations.

Main impact mitigation mechanism – correlation with demand

The key conclusion from the alternatives assessment and the analysis of the Development Plan is that projects are not implemented prematurely – they are carried out only when passenger and cargo flows objectively require additional capacity. This means:

- if demand does not increase, projects may be postponed or not implemented,
- consequently, environmental impacts are directly proportional to actual demand,
- this approach itself functions as an impact mitigation mechanism.

The system of recommendations combines technical solutions (GPU, SAF, electrification, de-icing schemes), elements of public policy (monitoring, public engagement) and a strategic approach (gradual development linked to demand). This ensures that airport development up to 2050 remains sustainable and socially acceptable, while maintaining Riga Airport as a national and Baltic-level transport hub.

9. Possible compensation measures

In accordance with the Law "On Specially Protected Nature Territories", compensation measures are implemented to ensure the conservation, protection and balancing of negative impacts affecting nature areas and objects included in the network of European protected areas (Natura 2000) that arise as a result of activities provided for in a planning document. The purpose of such measures is to ensure that the negative impacts of the implementation of the planning document are balanced and that the integrity and functional quality of the territories are preserved. Paragraph six of Section 43 of the Law provides: "If the proposed activity or the implementation of a planning document negatively affects a European protected nature territory (Natura 2000), the activity may be permitted or the document implemented only if it is the sole solution and is necessary to satisfy overriding public interests, including social or economic interests."

The Riga Airport Master Plan has been prepared in accordance with the requirements of applicable legislation. No activities are envisaged that would negatively affect the ecological functions and integrity of Natura 2000 sites. No Natura 2000 sites are located within the airport development area, and the projects included in the Master Plan will not affect the boundaries of European protected nature areas. The prepared document does not conflict with the objectives for the establishment and protection of specially protected nature territories and does not plan actions listed in the cases referred to in Sections 43(6), (7) and (8) of the Law "On Specially Protected Nature Territories".

However, it should be taken into account that airport operations and their development may create indirect impacts, such as increased transport flows and background air pollution, diffuse pollution risks from runoff that could affect surrounding water resources, noise, etc.

Such potential indirect impacts have already been taken into account in the Master Plan (Chapters 5–6) and assessed in Chapter 7 of the SEIA Environmental Report, which envisages a range of prevention and mitigation measures (e.g. collection systems for de-icing fluids, the introduction of apron power supply systems, noise management plans, etc.). Therefore, it can be concluded that:

- no direct impact on Natura 2000 sites is expected,
- compensatory measures are not required, as impacts are prevented or mitigated through the planned solutions.

10. Assessment of potential significant transboundary impacts of the RIX Riga Airport Master Plan implementation

Riga Airport development projects are implemented within the territory of Latvia, and no direct impact on the environment of other countries is expected. The activities envisaged in the Master Plan – expansion of the terminal and apron, development of the access junction and development of the Airport City Business Park – are locally limited and do not affect the territories or water bodies of other countries.

At the same time, it should be recognised that several impact dimensions are inherently transboundary:

- Climate change – GHG emissions affect the environment not only in Latvia but also in other countries. The Riga Airport Sustainability Strategy 2022–2030 envisages a reduction in emission intensity per passenger, electrification of ground equipment, integration with Rail Baltica and other measures.
- Biodiversity – bird migration routes cross the Baltic region, therefore airport bird risk management and monitoring form part of broader transboundary nature conservation efforts.

Given that the implementation of the Master Plan does not foresee direct impacts on the territories of neighbouring countries, transboundary impacts are not expected and the application of an international consultation procedure is not required. Nevertheless, in the fields of climate and biodiversity the airport will continue to operate in accordance with international commitments and cooperation at the Baltic level.

11. Planned measures to ensure monitoring of the implementation of the RIX Riga Airport Master Plan

The Law “On Environmental Impact Assessment” provides that the competent authority, within the time limit set by the Cabinet of Ministers, issues an opinion on the Environmental Report and also determines the deadlines within which the developer, after the approval of the planning document, submits a report to the competent authority on the direct or indirect environmental impacts of the implementation of the planning document, including impacts not foreseen in the Environmental Report (monitoring report). Cabinet of Ministers Regulation No. 157 of 23 March 2004 “Procedures for Carrying out Strategic Environmental Assessment” further specifies that monitoring shall use national statistical data, information obtained through environmental monitoring, as well as other information available to the authority responsible for preparing the planning document

Riga Airport already provides a comprehensive and multifaceted monitoring and reporting system. It regularly submits reports to the State Environmental Service, the Latvian Environment, Geology and Meteorology Centre and other institutions on air quality, noise levels, water and soil quality, waste management and greenhouse gas emissions. In parallel with these reports, **annual sustainability reports** are also prepared, publicly reflecting not only environmental aspects but also social and governance aspects, thereby ensuring a high level of transparency and public awareness.

Taking this situation into account, the authors of the Environmental Report consider it appropriate to avoid duplication with existing reports and data flows within the monitoring system of the Environmental Report. The objective of the monitoring programme is to focus on the area of impact that is most significant for the quality of life of the population in the context of Riga Airport development **– the impact of noise on residential areas.**

The monitoring report on noise impacts will be prepared based on the **results of the Strategic Noise Map** (SNM) and data from noise monitoring stations. The next SNM will be prepared in 2027, and accordingly the monitoring report will be prepared at the end of 2027 or in 2028. To ensure consistency, subsequent monitoring reports will be synchronised with the SNM preparation cycle, avoiding discrepancies between available data and the content of the reports. The next monitoring report after 2027 is expected in 2033, in line with the preparation of the next SNM.

This approach ensures:

- efficient use of resources and avoidance of unnecessary administrative burden;
- a clear and measurable linkage of indicators with the impact assessment of the Master Plan;
- a high level of public awareness, supported by sustainability reports, publicly available SNMs and Noise Action Plans;
- transparency and reliability, as monitoring data are based on nationally established methodologies and are reflected in various reports and publications.

No.	Environmental aspect	Indicators
1.	Noise	1) Strategic Noise Map indicators (exceedances of limit values): area (km^2) and number of affected population for Lday >65 dBA, Levening >60 dBA, Lnight >55 dBA (SNM + Central Statistical Bureau of Latvia data; synchronisation in 2027/2033);

No.	Environmental aspect	Indicators
		2) Strategic Noise Map indicators: area (km²) and number of affected population for Lden >55 dBA and Lnight >50 dBA (SNM + Central Statistical Bureau of Latvia data; synchronisation in 2027/2033); 3) Annual indicators and trends of Lden / Lday / Levening / Lnight at fixed noise monitoring stations (TMS1, TMS2B, TMS3, TMS4) (Riga Airport monitoring); 4) Frequency of exceedances (number of days per year above limit values; Riga Airport / SES data); 5) Number and share of night flights (23.00–07.00) (Riga Airport operational data); 6) Fleet distribution by noise certification classes / share of quieter aircraft (Riga Airport operational data); 7) Implemented compensation measures in affected areas (number of insulated buildings; length of noise barriers in metres; Riga Airport / municipal data); 8) Public information: number of published noise summaries / SNM updates and meetings with Riga and Mārupe (Riga Airport, municipal action plans).
2.	Air quality and climate	1) GHG emissions inventory (Scope 1–2) and annual changes, linked to the Net Zero roadmap (Riga Airport sustainability reports); 2) ACI Airport Carbon Accreditation (ACA) level / progress towards level 5 (Riga Airport sustainability reports);
3.	Water resources (de-icing systems and stormwater runoff)	1) Consumption of de-icing agents and collected volumes (t/%, Riga airport monitoring); 2) Runoff/discharge water quality indicators according to permit parameters (e.g. COD, BOD; Riga Airport / LEGMC / State Environmental Service).
4.	Soil and hazardous substances	1) Recorded spill incidents and mitigation measures (Riga Airport / State Environmental Service); 2) Volume of contaminated soil/absorbents removed (t; Riga Airport / State Environmental Service).
5.	Biodiversity and aviation safety	1) Bird strike rate (incidents per 10,000 movements; Riga Airport safety/operations data); 2) Number of wildlife observations and implemented habitat management measures (mowing, control of water accumulation; cooperation between Riga Airport and the Nature Conservation Agency); 3) Area of compensated habitats (km²), in accordance with agreements between Riga Airport and the Nature Conservation Agency; 4) Quality assessment of restored/managed habitats (expert reports, Nature Conservation Agency / OZOLS database data); 5) Regularity and results of habitat monitoring measures (e.g. mowing, control of invasive species).
6.	Waste management	1) Total volume of waste generated and share of sorting/recycling, sorted waste per passenger (%; Riga Airport / LEGMC); 2) Volume and disposal flows of hazardous waste (t; Riga Airport / State Environmental Service)
7.	Energy and efficiency	1) Electricity consumption and share of renewable electricity (%; Riga Airport sustainability reports); 2) Implementation of energy efficiency projects (number / savings in MWh; Riga Airport).
9.	Public health and transparency	1) Noise complaints received (number/year, subject, response time; Riga Airport / State Environmental Service);

No.	Environmental aspect	Indicators
		2) Number of published environmental/noise reports and their availability online (Riga Airport).

Table 30: Implementation monitoring indicators

12. Summary

The Strategic Environmental Assessment of the Riga Airport Master Plan 2025–2050 has been prepared to evaluate the potential impacts of the planned development on the environment, human health and natural resources, as well as to identify measures for mitigating negative effects. The Plan envisages the development of airport infrastructure in three phases: 2025–2030, 2031–2040 and 2041–2050, including the expansion of aircraft taxiways and aprons, construction of a new terminal, multimodal access solutions and the development of related infrastructure. The indicated periods are indicative, as actual infrastructure development will depend on the growth in passenger numbers and flight movements rather than specific calendar years.

Current situation and main trends

The airport territory is intensively used and characterised by a high level of anthropogenic impact. Most development projects are implemented within the area of existing infrastructure, which reduces the risk of significant additional impacts on specially protected nature territories (Natura 2000). At the same time, several Natura 2000 sites are located near the airport, including the nature reserve “Babīte Lake” and the nature park “Beberbeķi”, whose natural values require continuous monitoring and the implementation of mitigation measures.

During the period from 2017 to 2024, the noise levels generated by airport operations have generally decreased, mainly due to the modernisation of airline fleets and the introduction of newer, quieter aircraft (for example, *Airbus A220-300*). These changes have significantly reduced noise impacts on surrounding residents.

Impacts on environmental factors

Air quality

The main source of impacts is the operation of aircraft engines during the landing and take-off (LTO) cycle, as well as during manoeuvring on the apron. Additional pollution is generated by ground transport (passenger and cargo handling equipment, private and rental vehicles) and construction activities. The negative impact will be mitigated by measures that provide for a gradual transition to sustainable aviation fuel (SAF), the use of electric buses and electric apron equipment, as well as ensuring external power supply for stationary aircraft, thus reducing emissions from auxiliary equipment. With fleet renewal (for example, the transition to *Airbus A220-300* aircraft), a significant reduction in air pollutant emissions is expected.

Climate change

Airport operations are a significant source of greenhouse gas (GHG) emissions, mainly related to aviation fuel consumption. In 2023, approximately 70% of the airport’s carbon footprint was generated by aircraft emissions during the LTO cycle. The Master Plan aims to increase the share of renewable energy, reduce the use of fossil fuels, introduce energy-efficient technologies in buildings and infrastructure, and continue monitoring the carbon footprint, moving towards the Net Zero 2035 goal. The planned measures reduce both total GHG emissions (CO_2 and others) and emissions per passenger or cargo unit, ensuring alignment with climate objectives.

Water resources

The main risks are related to the pollution of rainwater runoff, especially during the winter season when de-icing and anti-skid substances are used. A potential threat is their entry into groundwater and nearby watercourses. The Master Plan envisages the expansion of rainwater collection, treatment and monitoring systems to reduce pollution risks.

Soil and land use

The planned development projects are concentrated in already urbanised areas, thereby limiting the fragmentation of natural areas and the loss of habitats. Impacts on soil are mainly related to construction activities and potential spill incidents, which are to be controlled through the implementation of pollution prevention measures and monitoring.

Biodiversity

Impacts are local, with the most significant related to the southern apron expansion, which partly affects the protected habitat *2180 "Wooded coastal dunes".* Compensation measures for habitat conservation and restoration are planned in cooperation with the Nature Conservation Agency. A positive aspect is the reduction of bird concentration near the airfield, thereby lowering the risk of bird strikes with aircraft and improving aviation safety.

Landscape and cultural heritage

The main visual effects are related to the expansion of the terminal, aprons and commercial facilities within the airport territory. As the structures are located in an existing industrial environment, no significant impact on the landscape or the city skyline is expected. No negative impacts on cultural heritage sites are anticipated, and visual elements will remain consistent with the character of the area.

Noise

Noise is the most significant negative impact on the surrounding environment and the quality of life of residents. Strategic Noise Maps show that the affected areas are mainly located in the populated areas of Mārupe Municipality – Spilve (the most affected area), Mežāres, Jaunmārupe, Skulte and Vētras – as well as the neighbourhoods of Mūkupurvs and Imanta in Riga City. The greatest impact occurs during the evening and night periods, when stricter noise limit values apply. Noise may cause sleep disturbance and health risks (including an increased likelihood of cardiovascular diseases).

Several measures are planned to mitigate the impact:

- implementation of noise control and management measures in accordance with the Airport Noise Reduction Action Plan;
- optimisation of operational procedures (for example, flights with optimal vertical profiles and turns in locations where they most effectively reduce noise levels);
- regular environmental noise monitoring to ensure the timely identification and mitigation of noise impacts.

It should also be emphasised that the modernisation of airline fleets, which takes place independently of the airport's direct influence, significantly contributes to reducing noise levels in the airport surroundings. Airlines are gradually introducing next-generation aircraft with lower noise emissions.

In the long term, fleet renewal and infrastructure improvements, combined with effective noise management, are expected to reduce impacts on residents. In the subsequent stages of development, particular attention will need to be given to reducing noise impacts, ensuring compliance with noise limit values and protecting the quality of life of residents.

Recommendations and mitigation measures

The Master Plan provides for an integrated approach: projects are implemented only when there is actual demand, thus reducing unnecessary impacts; monitoring and noise management systems are improved during development; compensation measures for habitat conservation are implemented in cooperation with the Nature Conservation Agency; it is planned to promote public involvement and transparent information flow.

The implementation of the Riga Airport Master Plan until 2050 is generally not associated with irreversible negative impacts on the environment. The impacts are local and manageable. The greatest attention should be given to limiting noise and protecting the quality of life of residents. With the proper implementation of monitoring, mitigation and compensation measures, airport development can proceed in a sustainable and socially acceptable manner.

Assessment of development alternatives

The solutions (alternatives) selected in the Riga Airport Master Plan – maintaining the existing runway and taxiway system with optimisation options, the gradual expansion of the terminal and apron towards the south-east (with the southern double-sided parallel pier), and integrated access through the Rail Baltica railway connection together with improvements to road access infrastructure – ensure a balance between capacity growth, safety, the promotion of sustainable mobility and the management of environmental impacts. This approach is based on maximising the use of existing infrastructure, limiting additional land take, reducing transport and noise pressure on residents and contributing to the reduction of pollutant emissions. As a result, development is proportionate, controllable and consistent with international environmental and climate objectives.

Possible compensation measures

The Riga Airport Master Plan does not foresee direct impacts on Natura 2000 sites, therefore compensatory measures are not required. Potential indirect impacts are expected to be prevented or mitigated through the solutions provided in the Plan.

Potential significant transboundary impacts

Riga Airport development projects are implemented within the territory of Latvia, and no direct impacts on the environment of other countries are expected. The activities envisaged in the Master Plan – expansion of the terminal and apron, development of the access junction and development of the Airport City Business Park – are locally limited and do not affect the territories or water bodies of other countries.

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