Construction of the European standard gauge public railway infrastructure line 
Rail Baltica

Summary of the environmental impact assessment report

Initiator of the intended activity: Ministry of Transport of the Republic of Latvia

EIA Report prepared by: General Partnership “RB Latvija“
“Estonian, Latvian & Lithuanian Environment” Ltd

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Introduction

The environmental impact assessment of the intended activity „Construction of European gauge width public use railway infrastructure Rail Baltica“ is carried out within the project „Detailed technical study and environmental impact assessment of the Latvian section of the European gauge railway line Rail Baltica“, which is assigned by the Ministry of Transport of the Republic of Latvia to the general partnership „RB Latvija“. Initiator of the intended activity is the Ministry of Transport of the Republic of Latvia.

The environmental impact assessment of the intended activity „Construction of European gauge width public use railway infrastructure Rail Baltica“ and environmental impact assessment report (hereinafter – EIA Report) is prepared by the General Partnership „RB Latvija“ in cooperation with SIA “Estonian, Latvian & Lithuanian Environment”.

Environmental impact assessment of the intended activity was commenced on 22 October 2014 with a letter from the initiator – Ministry of Transport – to the State Environmental Bureau (hereinafter – Bureau), and based on this letter the Bureau made the decision No.487 of 20 October 2014 on the application of environmental impact assessment procedure according to Article 4 of the Law On Environmental Impact Assessment and Article 9 of Annex 1 of the law „Objects requiring impact assessment“.

Considering the scope of the intended activity, the Bureau made a decision No.3-02/122 of 26 January 2014 „On the transboundary impact of an activity, which is subject to environmental impact assessment procedure“, where the intended activity:

- in a context of mutual and cumulative impacts may cause substantial transboundary impact in the Republic of Lithuania, Republic of Estonia, and Republic of Poland.

EIA Report, which covers also an assessment in the context of transboundary impacts, is prepared based on valid legal acts, and international conventions in the field of environmental protection ratified in Latvia, and the programme for environmental impact assessment (hereinafter – EIA Programme) of 11 May 2015 by the Bureau on the construction of European gauge width public use railway infrastructure Rail Baltica.

According to EIA Programme the EIA Report consists of two parts:
I. General part of EIA Report, which includes description of the intended activity in principle, alternatives of intended activity, assesses its compatibility with planning documents and legal acts, provides information on compensation mechanisms, public discussions, and an assessment and forecast of the mutual and cumulative impact due to implementation of Rail Baltica in the Baltic States.

II. Assessment part of the EIA Report, which describes current situation, intended activity, its optional solutions and related activities, the location and its vicinity, covers the assessment of existing environmental condition, describes potential impact on environment by the intended activity, assesses limiting and restricting factors, planned measures for the prevention and reduction of impact, provides a comparison of alternatives, and justifies the selected solution.

The EIA Report has been drafted with the help of experts representing various fields: transport infrastructure and engineering structures, hydrology, geology, hydrogeology, seismology, ornithology, along with experts assessing the impact on habitats, noise, landscapes, heritage, mammals, tourism, and electromagnetic radiation.

1. Intended activity and its relation to other existing and planned activities. Implementation schedule

Rail Baltica is envisaged as a fast and eco-friendly railway connection with Europe by constructing European gauge electrified railway line for public use aimed at combined passenger and cargo traffic. Rail Baltica project is often called as a symbolic return of the Baltic States to Europe (up to WWII the Baltic States were already connected with European capitals by 1,435 mm standard gauge railways).

Rail Baltica is a railway transport project aiming to integrate all three Baltic States in the European railway network, and it covers four Member States – Poland, Lithuania, Latvia, and Estonia, indirectly – also Finland with a route extension Tallinn – Helsinki.

In Latvia and the other two Baltic States the 1,520 mm Russian standard gauge railways are present, while in the majority of Member States the gauge width amounts to 1,435 mm. Therefore, the existing railway network and rolling stock in the Baltic States is not compatible with the railway network in Poland and Germany.

After regaining their independence the Baltic States came up with an idea in the late 1990s of connecting the Baltic States with the „heart of Europe“; the idea was to restore the direct link of Baltic States with the European railway network by building a new 1,435 mm railway or European standard gauge railway in the Baltic States, which would connect the major cities Tallinn – Riga – Kaunas – Warsaw – Berlin (with an extension up to Venice in future). The route includes Finland indirectly, since there are plans to build an underwater tunnel accommodating a railway line running from Tallinn to Helsinki, or develop a train ferry between these cities, thus extending the project impact also up to the Nordic countries.
Rail Baltica – Baltic railway, the construction of which will ensure independence of the Baltic transport system and population mobility due to a safe, modern, fast, and eco-friendly transport mode, and will create potential for new growth, jobs, and increased competitiveness.

Speaking of project benefits, it is stressed that the Baltic railway infrastructure will now be linked with the European railway area. With the implementation of Rail Baltica project 16 years from now there will be a high quality railway link between the Baltic States and the largest Western European economy, administrative, and culture centres. There will be opportunities for the development of new cargo corridor (north – south), and logistics services. Due to the new railway network not only the railway transportation capacities will be increased, but also the speed; and as regards passenger transportation, it will allow for reduction of journey times, road traffic on the Via Baltica, and on the major highways of Germany and Poland.

The project will become a significant driver for the transport and logistics industry with at least 13 million tons per year allowing for new foreign trade flows between the EU countries and, probably in a more distant future, for the linkage of the transportation corridor with Eurasian countries. The advantages of the project will be appreciated by at least five million passengers per year.

It is envisaged that till the second half of 2016 a detailed technical study of the Rail Baltica Latvian section will be carried out. This study will prepare engineering solutions for technically, economically and legally feasible alignment options of the planned Rail Baltica line, the related engineering studies and an EIA will be carried out to allow commencement of the preparatory works for the building design of the railway line and the related land expropriation by 2019, so to commence construction by 2020, to open the connection Tallinn – Riga – Kaunas by 2025, and to launch the link with Warsaw by 2030. Project implementation deadlines are more related to the course of the joint project implementation by all three Baltic States, since the project shall be considered and implemented not as a single section in Latvia, but rather as a common project in Latvia, Lithuania, and Estonia.

According to the feasibility study prepared by the UK company AECOM Ltd in 2011 to implement one of the most ambitious and largest joint projects of the Baltic States, all three Baltic States will have to contribute 3.68 billion Euro, and Latvia – 1.27 billion Euro. In addition to national contribution more than 80% of the project financing is covered by the European Union.

Rail Baltica shall reach a total length of 729 km, with nearly 265 km running through Latvia. Maximum driving speed for international passenger trains shall be 240 km/h, while the average – 170 km/h. The journey from Tallinn to Lithuanian-Polish border with a passenger train shall last for an estimate of 4 hours.

1.2 Justification and description of EIA alternative solutions

The principal alignment of Rail Baltica railway line was selected and the socio-economic justification was elaborated within the feasibility study jointly
commissioned by all three Baltic States – Feasibility study on the European standard width railway line in Estonia, Latvia and Lithuania (Rail Baltica corridor), which was carried out during 2010 – 2011 by the UK-based consulting company AECOM Ltd. The resulting principal alignment of Rail Baltica from the feasibility study is shown in Figure 1.
Figure 1. Alignment corridor of the European gauge railway line Rail Baltica as set by the feasibility study
Source: Feasibility study on the European standard width railway line in Estonia, Latvia and Lithuania (Rail Baltica corridor); AECOM, 2011.

To carry out the environmental impact assessment route alignment alternatives were selected by analysing roughly 50 initial route options elaborated based on the results of the feasibility study.

To analyse and compare the route options a multi-criteria analysis was performed, and the quantitative and qualitative analysis of the impact of environmental, economic, technical, and legal aspects on the four key stakeholder groups was carried out:

- **users (passengers, freight forwarding companies)** (journey time, ease of the airport connection, room for future links to harbours, industrial areas, odds to establish regional traffic),
- **infrastructure managers** (AS “RB Rail”, incl. relevant gross and net investment by the Latvia-founded enterprise SIA „Eiropas dzelzceļa līnijas“, railway infrastructure operation costs),
- **environment and society** (impact on inhabitants and businesses, i.e. properties to be expropriated and/or encumbered, where the economic activity is hindered or facilitated, access to properties and to sites of public significance, etc., Natura 2000 areas, protected nature objects and territories, culture monuments, etc.),
- **state and municipalities** (impact on the operation of State and municipal service providers and infrastructure holders).

Within the EIA the intended activity covers: construction of railway line infrastructure in Latvia from the border with Estonia to the border with Lithuania, incl. a European standard gauge link to Riga central station and the Airport Riga, construction of other related infrastructure (railway stations, cargo terminal, maintenance facilities, etc.), installation of power supply facilities for the railway infrastructure, reconstruction of other infrastructure at crossings and junctions (roads, gas mains, etc.) The envisaged railway line crosses the River Daugava at two places – in Riga and near the town Saulkalne in Salaspils and Kekava municipalities.

EIA considers a 300 m wide corridor, except for Riga where a 50 m wide corridor is being assessed, the width of which has been widened at some places (crossing with roads, gas mains, power supply lines, oil pipe, relevant territories for the construction of maintenance terminal, wagon depot, and multimodal terminal) to prepare in parallel feasible engineering solutions both for infrastructure crossing (with road network, power supply lines and gas mains), and accommodation of particular railway infrastructure elements, and providing access.

As part of the EIA an exact alignment of Rail Baltica within a 60 m wide partition zone instead of the initially proposed 300 m corridor was elaborated. In some places
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(overtaking stations) the partition zone of Rail Baltica may reach 80 m, while elsewhere, for instance, in residential settlements, it may be only 20 m wide.

Figure 2. Rail Baltica route alignment alternatives approved for the EIA process

The following alternatives of Rail Baltica railway line is analysed within the environmental impact assessment:

- Alternative A – Rail Baltica railway line starting at the Estonian-Latvian border, going through Salacgrīva, Limbaži, Sēja, Inčukalns, Ropaži, Garkalne, Stopini, Salaspils municipalities, Riga city, Mārupe, Olaine, Šķekava, Baldone, Iecava, Bauska municipalities, up to the Latvian-Lithuanian border,
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- Alternative B – Rail Baltica railway line section in Salacgrīva, Limbaži, Sēja, Baldone, Iecava, Bauska municipalities, which do not overlap with Alternative A,
- Alternative C consisting of some sections in Salacgrīva, Limbaži, and Mārupe municipalities, i.e.
  - Alternative C1 – Rail Baltica railway line section in Limbaži municipality, which does not overlap with Alternatives A and B,
  - Alternative C3 – Rail Baltica railway line section in Mārupe municipality, which does not overlap with Alternatives A and B,
  - Alternative C4 – Rail Baltica railway line section in Salacgrīva municipality, which does not overlap with Alternatives A and B,
  - Alternative C5 – Rail Baltica railway line section in Salacgrīva and Limbaži municipalities, which does not overlap with Alternatives A and B.

Section A1
Length of the section is 3 km.

The section starts on the junction of the Latvian-Estonian border with the river Blusupīte, then runs over the northern end of Salacgrīva municipality, and is mainly led along forest areas.

This section crosses the landscape protection area within the Northern Vidzeme Biosphere Reserve.
Rail Baltica railway line shall have a junction with the state road P15 Ainaži – Matiši.

From this point onwards Rail Baltica railway line splits into two alternatives.

Section A2
Length of the section is 34 km.

Section A2 of the alternative A crosses Salacgrīva and Limbaži municipalities, and runs mostly along forest areas. Section A2 crosses
- rivers: Salaca, Svētupe, Unģenurga, Vitrupe, Lielurga,
- 110kV power transmission line.

It crosses the nature park zone within the nature park NATURA 2000 area „Salacas ieleja”/Valley of River Salaca, and the regulated regime zone within the nature reserve NATURA 2000 area „Vitrupes ieleja”/Valley of River Vitrupe. This section crosses the landscape protection area within the Northern Vidzeme Biosphere Reserve.

Section B2
Length of the section is 35 km.

Section B2 of the alternative B crosses Salacgrīva municipality, and runs further closer to the town Salacgrīva and Salacgrīva harbour, allowing for the development of a
crossing over the river Salaca in a single traffic corridor with the planned Salacgrīva by-pass. In comparison with alternative A, it affects more agricultural lands and areas with scattered single farmsteads, while the rest of the alignment runs through forest lands. The section crosses

- state roads V144 Salacgrīva – Vecsalaca, P12 Limbaži – Salacgrīva, V138 Lāņi – Ųķirbiži – Jelgavkrasti,
- rivers: Salaca, Svētupe, Unģenurga, Vitrupe, Lielurga,
- 110kV power transmission line.

It crosses the neutral zone of the nature park NATURA 2000 area „Salacas ieleja“/Valley of River Salaca, runs next to the nature reserve NATURA 2000 area „Vitrupes ieleja“/Valley of River Vitrupe, where the edge of the 300 m corridor of the Rail Baltica line affects its nature reserve zone.

This section crosses the landscape protection area within the Northern Vidzeme Biosphere Reserve.

**Alternative C5**
Length of the section is 27 km.

It crosses the territories of Salacgrīva parish within the Salacgrīva municipality, and the Vīķene parish within the Limbaži municipality. It does not affect existing development along the road A1 Riga (Baltezers) – Estonian border (Ainaži), diverts away from the town Svētciems, runs through forest lands and crosses fewer roads.

Alternative C5 crosses the nature reserve NATURA 2000 area „Vitrupes ieleja“/Valley of River Vitrupe in its nature reserve zone.

**Section A3**
Length of the section is 51 km.

Section A3 of the alternative A starts in Salacgrīva municipality, crosses Limbaži municipality, and continues in Sēja municipality. This section is located further away from the coastline and runs through remoter areas; it affects relatively lesser residential settlements and agricultural lands than section B3 of alternative B. The section crosses

- Kurliņupe, Lieupe, Aģe, Augštilta grāvis, Ųķišupe, Ķidurga, Pēterupe, and Puska rivers,

In Skulte parish, starting from Stiene, after the section crosses the existing 110kV power transmission line there starts alternative B1 of the Estonia-Latvia third power transmission network interconnection from Sindi (Kilingi-Nõmme), Estonia, to
Salaspils (or Riga TEC-2) sub-stations in Latvia, which is planned in a single corridor with the Rail Baltica line.

In Sēja municipality section A3 diverts away from NATURA 2000 area – the protected landscape area „Ādaži“ at the eastern end; this area is also the military training area „Ādaži“ of the National Armed Forces.
This section crosses the neutral zone within the Northern Vidzeme Biosphere Reserve.

**Section B3**
Length of the section is 51 km.

Section B3 of alternative B in Salacgrīva and Limbaži municipality, from river Kurliņupe to Skulte, runs parallel to the road E67/A1 Riga (Baltezers) – Estonian border (Ainaži), and crosses

- railway line Zemitāni – Skulte,
- rivers: Kurliņupe, Zaķupe, Liepupe, Mazupīte, Aģe, Ķīšupe, Pēterupe, Žagaturga, and Puska.

In Salacgrīva municipality the section crosses a rather densely populated area next to the road E67/A1 in Liepupe parish, and here it crosses also the villages Jelgavkrasti, Liepupe, and Mustkalni. Further it runs mostly through forest areas in Sēja municipality. In Sēja municipality section B3 comes close to the nature reserve NATURA 2000 area „Dzelvēs–Kroņa purvs“/Dzelve–Kroņa Bog.

In Limbaži municipality, not far from the town Skulte, and after the section B3 of alternative B has crossed the existing 110 kV power transmission line, there starts the alternative 1B of Estonia-Latvia third power transmission network interconnection, which is planned in a single corridor with the Rail Baltica line.
This section crosses the neutral zone within the Northern Vidzeme Biosphere Reserve.
In Inčukalns municipality section B3 of alternative B crosses the gas supply main „Riga – Line 2 of Inčukalns underground gas storage facility“.

**Alternative C4**
Length of the section is 12 km.

It crosses Liepupe parish in Salacgrīva municipality, running through forest lands and affecting the residential settlement (near Dravnieki) less than the northern part of section A3 of alternative A in Melbārži, and it less affects the existing transport infrastructure, since it crosses only one municipal road.Alternative C4 crosses the neutral zone within the Northern Vidzeme Biosphere Reserve.

**Alternative C1**
Length of the section is 15 km.
Alternative C1 allows diverting alternative A closer to Skulte, and further running on alternative B. It crosses the roads V132 Priedulāji – Pakalni and V128 Straupė – Lēdurga – Vidriži – Skulte, as well as rivers Tora and Puska. This section crosses also the 110 kV power transmission line.
This section pre-dominantly runs through agricultural lands, affecting some forest segments. For 4 km it runs on the land partition section of the former railway line Riga – Rūjiena (via Limbaži).

Section A4
Length of the section is 41 km.

Section A4 starts in Sēja municipality, where alternative B merges with alternative A, and further it crosses the territories of Inčukalns, Garkalne, Ropaži, Stopiņi, Salaspils, and Ķekava municipalities. This section affects residential settlements and agricultural lands, and crosses forest lands. Section A4 crosses:
- gas mains near Krievupe, not far from Mucenieki and at Saulkalne,
- 110 kV and 330 kV power transmission lines,
- railway lines Riga – Valka, Riga – Ērgļi (is not being used) and Riga – Krustpils,
- the rivers Gauja and Daugava (water reservoir of Riga hydro power plant),
- rivers Straujupīte, Krievupe, Tumšupe, Lielā Jugla, Ķivuljurga, Mazā Jugla.

Railway bridges are envisaged to cross the rivers Gauja and Daugava (water reservoir of Riga hydro power plant) allowing for the relevant clearance underneath and respecting the maximum water marks.

In this section Rail Baltica forms a single transport corridor with envisaged section A4 Saulkalne – Bauska (Ārce) of the state main road E67 (project „Construction of the section A4 Saulkalne – Bauska (Ārce) of the state main road E67“) crossing the water reservoir of Riga hydro power plant.

Where section A4 crosses the existing railway line Riga – Valka (SE side) a railway infrastructure maintenance facility is planned, and to ensure its operation a link with the Rail Baltica railway line and the railway line Riga – Valka shall be established. Maintenance facility is described in more detail in Chapter 1.6.2.

Where the section A4 crosses the existing railway line Riga – Krustpils (NE side) in Saulkalne a multimodal freight terminal is planned, and to ensure its operation a link with the Rail Baltica railway line and the railway line Riga – Krustpils shall be established. In this territory there is also not extracted rock gypsum quarry. SIA „Knauf“ envisages to finish extraction before commencement of Rail Baltica implementation. In this territory there are also gas mains of AS „Latvijas Gāze“, which shall be partially reconstructed and moved before the extraction of rock gypsum and
the construction of Rail Baltica can be started. Detailed information is provided in Chapter 1.6.2.

Section A4 up to the former Riga – Ėrgļi railway line is located within a single corridor with alternative 1B of the Estonia-Latvia third power transmission network interconnection.

Section A4 in Inčukalns municipality crosses the edge of the pollution distribution area of the Northern acid tar pond. It is envisaged that before commencing the construction of Rail Baltica railway line the acid tar pond cleaning up works will be finished, although these have been terminated for now.

**Section A5**

Length of the section is 71 km.

Section A5 of alternative A (Riga section) starts near Upeslejas in Stopiņi municipality. After crossing the road A4 Riga By-pass (Baltezers – Saulkalne) and the river Mazā Jugla the section A5 runs along the former railway line Riga – Ėrgļi partition zone next to (on its northern side) the existing 1,520 mm gauge tracks, crossing the road P5 Ulbroka – Ogre, and running next to the area of gardening cooperative society „Enerģētikis“ at its northern end, and next to the Riga combined heat and power plant (TEC-2) at its northern end. Up to Riga TEC-2 Rail Baltica railway line is planned to be located within a single corridor with alternative 1B of the Estonia-Latvia third power transmission network interconnection.

In the section between TEC-2 and Riga Preču-2 railway station it crosses the existing railway line Riga – Saurieši and shall run next to the existing 1,520 mm gauge tracks (on its southern side).

Before Krustpils Street the Rail Baltica railway line is led on a fly-over, which crosses Krustpils Street, Šķirotava shunting-yard, and the tracks of railway line Riga – Krustpils. Before Dienvidu Bridge the Rail Baltica railway line is led at grade with the existing railway tracks and continues along the partition zone of the railway line Riga – Krustpils up to the Riga Central station. It is envisaged that in Riga Central station the Rail Baltica railway line will be located in the southern side of the station. In the section from Wagon yard up to Riga Central station the existing 1,520 mm gauge tracks shall be rebuilt to make space for the Rail Baltica link to the Riga Central station.

There shall be a new bridge built over the river Daugava, next to the existing railway bridge, upstream of Daugava.

Further the section A5 runs along the partition zone of railway line Riga – Tukums II, and it shall be led through a new tunnel going underneath the existing railway partition zone. Underneath the existing 1,520 mm rail tracks the route will be led into the tunnel in Torņakalns and come outside in the section between Liepājas Street and Ventspils Street.
After coming outside and crossing the road A10 Riga – Ventspils (K.Ulmaņa Gatve) section A5 will continue its way up to Airport Riga. Further it runs through Mārupe municipality, where it crosses the road P132 Riga – Jaunmārupe, Vētras, area of the former fur-farm, and then runs to the road A5 Riga By-pass (Salaspils – Babīte) and by crossing the roads V13 Tiraine – Jaunolaine, A8 Riga – Jelgava – Lithuanian border (Meitene), V7 Baloži – Plakanciems – Iecava and the railway line Riga – Jelgava, it continues within a single transport corridor with the road A6 between Mārupe and Olaine municipalities up to the border with Ķekava municipality. Afterwards, the section A5 runs next to Katrīnmuiža in its NE end in Ķekava parish and crosses the road V6 Ķekava – Plakanciems, where it merges with the road A7 Riga – Bauska – Lithuanian border (Grenctāle), and runs with it within a single corridor until section A5 connects to section A6 of alternative A or section B6 of alternative B.

Since the joint stock company „Latvijas Valsts ceļi“/ Latvian State Road Administration intends several road reconstruction/ new construction projects close to Riga, the single transport corridor development principle is used for section A5 of Rail Baltica for the following projects:

- Reconstruction of road A5 Riga by-pass (Salaspils - Babīte) section km 11,6 (A7) – km 34,6 (A9),
- Construction of the by-pass (E67) (Ķekava by-pass) within the state main road A7 Riga – Bauska – Lithuanian border (Grenctāle) in the section from 10.5 km to 24.0 km,
- Construction of the section Kranciems – Slāvu Roundabout (Eastern link into Riga) of the major road E22.

Section A5 crosses the following rivers: Daugava, Bērzene, Dobupīte, Ķekava, Bērzene, Hapaka grāvis, Nerīņa, Kivuļurga, Misa. In Ķekava municipality it crosses the flooding areas of the river Ķekava.

The section crosses also 110 kV and 330 kV power transmission line, and the gas main.

In section A5, next to TEC-2 north off the Rail Baltica railway line, a new passenger railway wagon depot shall be built (more information about the depot is found in Chapter 1.6.2).

In section A5, the envisaged Rail Baltica station in the Riga Central station shall be located on the southern side and by removing the existing railway embankment the existing rail tracks shall be led on a fly-over. Probably, the engineering solution (but not the alignment of alternative A5) will be clarified in the study „Integration of Rail Baltica railway line within Riga Central Multimodal Public Transportation Hub “ by AECOM, which is still ongoing during preparation of the present EIA Report.

**Alternative C3**

Length of the section is 11 km.

Alternative C3 crosses the territory of Mārupe municipality and prevents from affecting the village Vētras, and the railway infrastructure is developed within a single transport corridor with the road A5 (Riga by-pass) starting already from the junction
of roads A5 and P132. Before the junction of roads A5 and P132 the alternative crosses agricultural territories and forest lands.

**Section A6**
Length of the section is 25 km.

Section B6 of alternative B starts in Ķekava municipality, after Rail Baltica crossing with the road P85 Riga hydro power plant – Jaunjelgava, and up to the town Baldone it runs mainly through forest lands. If compared to section B6 of alternative B, it is aligned closer to the town Baldone and further away from the radioactive waste storage site „Radons“. After the crossing with the road P89 Ķekava – Skaistkalne the section A6 runs more on agricultural lands and through residential area. In Baldone municipality it runs further through forest lands, crosses the river Misa, and diverts around the summer cottage village Sarma at its eastern edge. Further the route runs through the forest lands in Iecava municipality up to the railway line Jelgava – Krustpils.

**Section A6 crosses**
- the roads P89 Ķekava – Skaistkalne, V1010 Stūri – Ziemeļi, V9 Iecava – Baldone – Daugmale,
- railway line Jelgava – Krustpils,
- 110kV power transmission line.
- gas main,
- rivers: Ēturga, Bērzene, Meitupe, Ķekaviņa, Milupīte, Misa.

**Section B6**
Length of the section is 26 km.

Section B6 of alternative B starts in Ķekava municipality, after Rail Baltica crossing with the road P85 Riga hydro power plant – Jaunjelgava, and up to the town Baldone it runs through the territory assigned for the development of infrastructure of national significance as designated within the territorial plan of the municipality. If compared to section A6, in this section there are more agricultural lands. It is aligned approximately 300 m off the radioactive waste storage site „Radons.“.

**Section B6 crosses**
- the roads P89 Ķekava – Skaistkalne, V1010 Stūri – Ziemeļi, V9 Iecava – Baldone – Daugmale, P92 Iecava – Stelpe,
- railway line Jelgava – Krustpils,
- 110kV power transmission line and gas main,
- rivers: Ēturga, Bērzene, Sūnupe, Ķekaviņa, Misa.

In this section **Rail Baltica** forms a single transport corridor with section A4 Saulkalne – Bauska (Ārce) of the state main road E67 (project „Construction of the section A4 Saulkalne – Bauska (Ārce) of the state main road E67“).

**Section A7**
Length of the section is 10 km.

Section A7 of alternative A crosses Iecava municipality. Here it runs mainly through low populated agricultural lands, and affects also forest lands. The section crosses Zoskalns (Speķa) bog and Suņu bog.

Section A7 crosses the roads P92 Iecava – Stelpe, V1047 Iecava – Lambārte, V1040 access road to Iecava retirement home and the rivers: Vērģupe, Iecava.

In this section Rail Baltica forms a single transport corridor with section A4 Saulkalne – Bauska (Ārce) of the state main road E67 (project „Construction of the section A4 Saulkalne – Bauska (Ārce) of the state main road E67“).

Section A8
Length of the section is 27 km.

Section A8 of alternative A crosses Bauska municipality and runs to the Latvian-Lithuanian border. Section A8 is aligned in a way to divert it further away from the road A7/E67 Riga – Bauska – Lithuanian border (Grenctāle), since the adjoining areas thereof are relatively densely populated, and to lead it through areas of less fertile agricultural lands and humid forests in the watershed between the rivers Mūsa and Mēmele.

Section A8 crosses
- rivers: Mēmele, Stabulīte, Ceraukste, Mūsa.

In this section Rail Baltica forms a single transport corridor with section A4 Saulkalne – Bauska (Ārce) of the state main road E67 (project „Construction of the section A4 Saulkalne – Bauska (Ārce) of the state main road E67“).

Section B8
Length of the section is 27 km.

Section A8 of alternative A crosses Bauska municipality and runs to the Latvian-Lithuanian border. The section runs along the territory assigned for the development of infrastructure of national significance as designated within the territorial plan of Bauska municipality. Starting from Ārce in Ceraukste parish this section is aligned in a single transport corridor with the road 7/E67 Riga – Bauska – Lithuanian border (Grenctāle), and it crosses the relatively densely populated areas next to the road.
Summary of the environmental impact assessment for construction of the European standard gauge public railway infrastructure line Rail Baltica in context of transboundary impacts

Section B8 crosses
- 110kV power transmission line.
- gas mains running from Riga to Panevezys (LT),
- rivers: Dole, Mēmele, Stabulīte, Ceraukste, Mūsa.

3. Content of EIA Report

Environmental Impact Assessment (EIA Report), which includes also an assessment in context of transboundary impacts, is prepared according to EIA programme for an environmental impact assessment for construction of the European standard gauge public railway infrastructure line Rail Baltica of 11 May 2015 issued by the Bureau, as well as according to the order No.3-01/1839 of 30 October 2015 on the amendments to the Programme for an environmental impact assessment issued on 15 May 2015.

The general part of EIA Report includes:
- a concise description of the nature of the Intended activity by specifying the main parameters of the activity, alternatives and route corridors defined for assessment, correlation with other existing and planned activities including in a transboundary context;
- Justification of alternatives defined for the environmental impact assessment;
- Analysis of compliance of the Intended activity and alternative solutions with the national, regional and local government territorial planning documents and other development planning documents, including compliance with the sustainable development strategy, sector development guidelines, as well as an assessment of compliance with the laws and regulations stipulating requirements for the Intended activity;
- analysis of the existing and additionally required compensation schemes in order to determine fair compensation for real estates that are required and subject to alienation for public needs, and for the losses caused to indirectly affected real estates or real estates that have faced restrictions of the economic activity or any other indirect losses or restrictions of use, including as a result of the environmental impact caused by implementation of the Intended activity;
- a general assessment/forecast on the potential cross-country and overall transboundary environmental impact of implementation of the Intended activity taking into consideration both the transboundary nature of the Intended activity and the objectives and purpose of its implementation, as well as changes in the traffic and passenger flow.
Assessment part of EIA Report covers the description of current situation, intended activity, its alternatives and related activities, i.e.:

- detailed description of the existing railway network, its relation to and integration within the Latvian railway network and the north-south transport corridor of TEN-T network,
- overview of the relation of the intended activity with other planned activities, which includes construction of new railway lines, reconstruction of existing roads, construction of new road sections, construction of new 330 kV power transmission line within a single corridor with Rail Baltica from Limbaži municipality to Salaspils and Stopiņi municipalities, envisaged development projects of Airport Riga by 2020, extraction of gypsium in the mineral deposit „Saulkalne“ in Salaspils municipality,
- description of limiting and hindering factors, including property ownership issues, existing use and build-up of the territory of intended activity, commercial sites. Description of existing traffic infrastructure, public utilities’ structures and communications which are crossed by intended activity in context of possible limiting and hindering factors, an overview of water bodies, specially protected nature areas, risk objects, and polluted areas, which might affect the implementation conditions of the intended activity,
- detailed description of Rail Baltica track and objects and solutions related to it,
- overview of any potential changes in the traffic flow in Riga and Latvia.

The assessment part of EIA Report includes also description of the location and its vicinity, and description of the existing environment condition with a characterization of:

- properties, which are affected by partition section of Rail Baltica and which will be affected by encumbrances imposed by related infrastructure of Rail Baltica, such as the envisaged 110 kV power transmission line from Skulte to Salacgrīva,
- air quality and noise levels in the location and vicinity of the intended activity,
- hydrogeological conditions, rivers, drainages, and land reclamation systems, odds of territories being flooded,
- geological, hydrogeological and geotechnical conditions, as well as contemporary geological processes,
- quality of soil and groundwaters,
- nature values of adjacent territories, specially protected nature areas nearby and to be crossed, specially protected species and habitats, microreserves,
- wildlife migration corridors, and nesting, gathering grounds,
- adjacent landscape and heritage values,
- polluted and potentially polluted areas, risk objects.
The EIA Report provides an assessment of the possible impact on environment by
the intended activity both during construction and operational phases with a focus on

- forecast inconveniences and disturbances at the construction sites and their vicinity,
- impact on the hydrological regime and drainage conditions of the surrounding territory,
- impact of tunnel construction on the hydrogeological conditions and nearby vicinity,
- impact on quality of crossed watercourses, fish fauna and water ecosystem,
- probability and significance of changes in the contemporary geological processes, including karst processes, river bank denudation and landslides,
- potential impact of changes in the hydrogeological conditions on the resources and quality of potable underground water,
- changes in the soil quality at the location of intended activity and direct vicinity,
- significance of territory fragmentation and a barrier effect,
- impact on air quality during construction and operation,
- impact of noise during construction and operation, possible noise reduction measures,
- vibration dissemination during construction and operation,
- changes and significance of the changes in the level of an electromagnetic field,
- impact on biodiversity and specially protected nature territories,
- impact on surrounding landscape and heritage environment,
- possible risks to environment and human health,
- expected transboundary impact, its significance, and the projected limitations and conditions in the implementation of the intended activity,
- interconnected and cumulative impact, and short-term and permanent impacts,
- public opinion and attitude.

EIA Report includes a characterization of limiting factors, which may restrict the implementation of intended activity, as well as measures to reduce and prevent impact during the technical design, construction, and operational stages. The Report covers a comparison of Rail Baltica alternatives, which was carried out within the EIA, thus providing justification for the preferred Rail Baltica alignment in the territory of Latvia.

4. Latvian–Estonian and Latvian–Lithuanian border crossing sites

Since Rail Baltica will be a European gauge railway line connecting all three Baltic States, the agreement between countries on the border crossing sites is significant. This chapter provides an overview of the solutions, status, and potential problems of Latvian-Estonian and Latvian-Lithuanian border crossing sites with a characterization of the status as at early August 2015. However, it shall be noted
that the authorities involved in project implementation in all three countries are continuing their work at coordination of the border crossing issues.

Initially the border crossing sites were selected and agreed upon between all three Baltic States in 2011 within the project „Feasibility study on the European standard width railway line in Estonia, Latvia and Lithuania (Rail Baltica corridor)” commissioned by the ministries of transport in Estonia, Latvia, and Lithuania and carried out by AECOM Ltd (see Figure 3).

4.1. Crossing of the Latvian–Estonian border
Latvian-Estonian border crossing shall be installed in Salacgrīva municipality in the territory of Latvia and in Parnu County in the territory of Estonia, and it was selected in mid-2014 as part of inter-governmental cooperation agreeing on the best
mutually acceptable solution out of the 3 border crossing solutions suggested by Estonia (see Figure 4).

Figure 4. Latvian-Estonian border crossing site of the railway infrastructure line Rail Baltica

The Ministry of Transport of the Republic of Latvia and the Ministry of Transport of the Republic of Estonia have agreed and exchanged border crossing coordinates, which is an approval that they will respect the agreement in further project development and will not change it unilaterally, thus ensuring compatibility of the Latvian and Estonian sections of Rail Baltica.

4.2. Crossing of the Latvian–Lithuanian border

As part of the present EIA and taking into account the findings of the 2011 study Latvia analyses the Latvian-Lithuanian border crossing points near Grenctāle in Bauska municipality, Latvia, and Dagiai in Pasvalys District, Lithuania (see Figure 5). In this place the border overlaps with the river Müsa. On 26 January 2015 State
Environmental Bureau has made the decision No.3-02/122 „On the transboundary impact of an activity, which is subject to environmental impact assessment procedure”, establishing transboundary impact by the construction of European standard gauge public railway infrastructure line Rail Baltica. According to Article 20 of Environmental Impact Assessment Law a notification to the Republic of Lithuania, Republic of Estonia, and Republic of Poland regarding commencement of EIA procedure in a context of transboundary impact was sent on 5 February 2015.

Figure 5. Border crossing sites of the Latvian section of Rail Baltica

Republic of Lithuania has commenced the strategic environmental assessment (SEA) procedure for the European standard gauge railway line Kaunas – Lithuanian/Latvian national border special plan, and the EIA for Rail Baltica Lithuanian section.

Within SEA the Republic of Lithuania assesses 4 alternative border crossing sites, where Alternative 1 overlaps with the border crossing site assessed by Latvia, but crosses the karst area of Northern Lithuania. Other border crossing sites are: Alternative 2 Kamarde, Alternative 3 Kiemena, and Alternative 4 Majenai; in the public discussion of the Environmental Report it was indicated that the most feasible alternative for border crossing sites are Dagiai and Kamarde.
In June 2015 the Republic of Lithuania has commenced EIA procedure for the construction of European standard gauge public railway infrastructure line Rail Baltica Lithuanian section, and it offers two alternative border crossing sites, i.e.: Dagiai and Kamrade, out of which Dagiai crossing ensures compatibility of the Rail Baltica Latvian and Lithuanian sections.

In parallel there are expert task forces organised of the relevant authorities in order to elaborate and agree on common approach in the selection of a border crossing site, since it shall be ensured that both national sections of Rail Baltica are mutually linked. At present (early October 2015) both countries are finetuning the border crossing site coordinates of Alternative A of Latvian section and Alternative 1 of Lithuanian section to conclude an agreement on a common solution of the Rail Baltica Latvian-Lithuanian border crossing site.

5. Existing environmental condition at the locations of implementation of intended activity

5.1. Directly and indirectly affected properties
Information about land plots to be expropriate in directly affected properties is prepared according to the project progress stage during the drafting of EIA Report, and shall be deemed informative. However, there is information collated about buildings, which will be located in the Rail Baltica partition zone and which have to be demolished, if the relevant alternative is preferred. All alternatives affect in total 38 buildings.

Those properties, which are either crossed by 110 kV power transmission line in the section Skulte – Salacgrīva or affected by its protective zones, as well as by protective zones around traction power substations are considered as properties indirectly affected by Rail Baltica at the current project development stage.

5.2. Air quality in the location and vicinity of the intended activity
In the implementation site of intended activity and its vicinity data on air pollution with particles PM$_{10}$ and particles PM$_{2.5}$ was analysed, since traffic of electrified trains cause slight emissions of these substances due to wear and tear of brakes and wheels, and due to repeated suspension of particles. The assessment established that the present air pollution (PM$_{10}$ and PM$_{2.5}$ particles) in the implementation site of intended activity and its vicinity outside Riga and in the border are is significantly lower than the statutory thresholds of air quality to protect human health (see Figure 6).
5.3. **Assessment of existing noise level in the location and vicinity of the intended activity**

To characterize the existing noise level in the vicinity of Rail Baltica partition zone, the key types of noise sources and their noise emissions were identified during elaboration of the EIA Report. Key noise sources in the vicinity of the intended activity are the state main, regional, and local roads, streets, existing rail tracks, Airport Riga, and industrial noise sources. Considering the background pollution level, it was established that in the vicinity of significant noise sources such as state main roads and rail tracks, as well as in Riga, a relatively high noise pollution level is registered already now.

5.4. **Assessment of hydrogeological conditions**

Rail Baltica crosses 3 river basin districts – Gauja, Daugava, and Lielupe. All alternatives cross 6 large rivers (Salaca, Gauja, Daugava, Iecava, Müsa, and Mēmele). In terms of hydrogeological conditions, difficult crossing sites are deemed the big rivers Daugava and Gauja, especially Daugava in the section of water reservoir of the Riga hydropower plant, where the crossing spans would be very long.

In areas of intensive agricultural activities, such as the Zemgale Region in the section from river Iecava to the border with the Republic of Lithuania, land reclamation systems are maintained in a better technical condition than in the rest of Rail Baltica sections, where the land reclamation systems are blocked up, largely overgrown, many beaver dams are found, resulting in hindered water flow within these.

1 [http://www.emep.int/mscw/index_mscw.html](http://www.emep.int/mscw/index_mscw.html)
Territories where the land reclamation systems are installed in the Rail Baltica partition zones and their vicinity, as well as the flooding areas of water courses are shown in the website https://elle.maps.arcgis.com/apps/webappviewer/index.html?id=589d9282f1c44b66b1ce67826d56a570.

5.5. **Assessment of geological conditions**

Quaternary sediments in the northern section of Rail Baltica mainly consist of glacial and limno-glacial sediments of Latvian suite, while in the section in Sēja, Inčukalns, and Ropaži municipality the Quaternary sediments are more diverse and consist of bog, paludified peat deposits, alluvial sediments in river valleys, eolian sand dunes, in the earth surface of Baltic Ice Lake there are predominantly loamy soil and sandy loam. The total thickness of the quaternary sediment layer in this section varies between 10 m and 30 m.

For the majority of the Rail Baltica central section, on the base of the quaternary layer, underneath the limno-glacial sand, there is the glacial morain loamy soil and sandy loam of Latvian suite. The glacial sandy loam and loamy soil of Latvian suite are visible on the surface only on both banks of the water reservoir of Riga hydro power plant. The thickness of the Quaternary sediments in this section varies between 5 m and 45 m.

Composition of Quaternary sediments in the southern section of Rail Baltica is similar to the above mentioned sections, with the only exception that the thickness of Quaternary deposits in the vicinity of Iecava does not exceed 15 m. In the Latvian-Lithuanian border area it reaches a thickness of 25 m.

Pre-Quaternary sediments in the northern section consist mainly of sandstones with aleirolite and clay inclusions. In this section, after crossing of river Gauja, sandstones from Amata suite and dolomites from Plavīnu suite are seen on the surface of pre-Quaternary sediments. In Riga section the pre-Quaternary sediments consist mainly of dolomitic marl, dolomites, and clay with gypsum inclusions. Pre-Quaternary rocks in the southern section of Rail Baltica mostly consist of dolomitic marl, aleirolites, clay, and sandstones.

5.6. **Assessment of technical geological conditions**

In terms of technical geological conditions, special attention within the EIA was paid to paludified areas and bogs, where peat and soil with organic admixtures was found, and flooding areas of rivers, where there might be silty soils with poor carrying capacity. Some isolated, local areas of this nature are found for the whole length of Rail Baltica route.

5.7. **Contemporary geological processes**

There are some isolated places on the Rail Baltica track, where there are possible or have been established contemporary geological processes – karst processes, landslides and landslip creation on river banks, paludification processes. Landslides
and landslips may form on the banks of the following rivers – Salaca (section A2), Vitrupe (section B2), valley of Kurlinupe (section A3), Misa (sections A6 and B6), Iecava (section A7), Mūsa (sections A8 and B8), Mēmele (sections A8 and B8), and Ceraukste (section A8).

Karst processes are possible
- on section A4 in the vicinity of Saurieši, Saulkalne, and Salaspils,
- on section A6, which crosses Baldone municipality and is a known place for karst processes.

The intensity of these processes is not very high – 1 sinkhole per 1 km² over 20 – 100 years is formed. In Baldone municipality the karst process activity is even lower, since underneath a 15 – 20 m thick Quaternary moraine loamy soil and sandy loam layer there are dolomites of Daugava suite, and not the Salaspils suite rocks containing gypsum inclusions. Daugava suite dolomites are more difficult to dissolve and are more resistant to karst formation. Thus karst process formation within Rail Baltica route is of low probability.

Section A8 crosses Bauska municipality, where in the vicinity of Skaistkalne there are established active contemporary karst processes. This territory does not affect Rail Baltica route. It shall also be noted that in Lithuania the Rail Baltica line crosses Northern Lithuanian karst territory. Within the project extra geological surveys were carried out; these surveys approved the geological composition established already within earlier studies. Moreover, neither signs of long ceased karst process, nor nowadays active karst and suffosion processes were established, which indicates that this territory is suitable for construction of a railway line in terms of geological conditions and probability of formation of contemporary geological processes. Operation of the railway line is also not related to any extra risks, which might be caused by unfavourable geological conditions or development of contemporary geological processes.

5.8. Characterization of potable water extraction sources

In territories crossed by Rail Baltica, starting from Liepupe parish in Salacgrīva municipality (section A3 and B3) up to Bauska municipality (section A8 and B8) predominantly Gauja horizon is used for extraction of potable water. In the northern part of the route (section A1, A2, B2, and Alternative C5) predominantly Arukila and Burtnieki horizon waters are used for extraction of potable water.

Within a distance of 100 m from the Rail Baltica partition zone the following boreholes (potable water extraction deposits) are located
- “Saurieši”, address: Stopiņi municipality, village Saurieši, "Lielkazāri",
- “Mazā Matīsa iela (Riga)”, address: Riga, 2 Mazā Matīsa Street,
- “Šķirotava (Riga)”, address: Riga, 63 Krustpils Street,
- “Šampētera iela (Riga)”, address: Riga, 1 Šampētera Street.

Construction area of Rail Baltica in Latvia is located within the territories with low and moderate groundwater pollution risk.
5.9. **Characterization of the quality of soil and groundwaters**

The intended activity mainly crosses non-residential territories, except for Riga section, where only in some places historical pollution of soil and groundwaters might be present. These places are:

- filling station of locomotive engines at the Vagon Park of State JSC „Latvijas Dzelzceļš“, Riga. Section A5 crosses it or runs in close proximity of it,
- Northern acid tar pond located in Inčukalns municipality. It is crossed by section A4.

5.10. **Nature values of adjacent territories, specially protected nature areas nearby and to be crossed, specially protected species and habitats, microreserves**

The railway infrastructure line Rail Baltica crosses 3 specially protected nature areas (SPNA) and is located in various distances from another 20 SPNAs (see Figure 7). The following SPNAs are to be crossed: Northern Vidzeme Biosphere Reserve, nature park “Salacas ieleja”/Valley of River Salaca, and nature reserve “Vitrupes ieleja”/Valley of River Vitrupe. The nature park “Salacas ieleja”, and nature reserve “Vitrupes ieleja” are specially protected nature areas of European significance or Natura 2000 areas.

Section A2 crosses the nature park zone within the nature park „Salacas ieleja”/Valley of River Salaca, and the regulated mode zone within the protected area „Vitrupes ieleja”/Valley of River Vitrupe. Section B2 crosses the neutral zone within the Nature Park „Salacas ieleja”/Valley of River Salaca, and runs next to the protected area „Vitrupes ieleja”/Valley of River Vitrupe. Alternative C5 crosses the zone of the regulated regime within nature reserve „Vitrupes ieleja”/Valley of River Vitrupe.

Since the intended activity crosses or runs next to forest areas on long sections, the most common protected forest habitats within Rail Baltica corridor are – 91E0* Alluvial forests, 9080* Fennoscandian deciduous swamp woods, 9020* Fennoscandian hemiboreal natural old broad-leaved deciduous forests, 9010* Western Taiga, and other, as well as meadow habitats - 6270* Fennoscandian lowland species-rich dry to mesic grasslands, 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils, 6210 Semi-natural dry grasslands, and other. In the territory of the intended activity the quality of habitats ranges from excellent to poor.
Figure 7. Nature values in the vicinity of Rail Baltica route

Information about microreserves, which are located in close vicinity to the intended activity, is depicted in Figure 8.
Figure 8. Location of microreserves

In the northern section of the route, the valleys of rivers Vitrupe and Salaca are significant bird migration corridors. Section B3 runs next to the nature reserve „Dzelves–Kroņa purvs“/ Dzelve–Kroņa Bog. Although the railway does not cross
directly the protected zone, it might hinder access by animals to the bog during the warm season, during which some animals, such as elks, use the bog as a feeding and relaxation ground.

In order to reduce the impact on wildlife migration corridors, construction of passing places is of particular significance for the big predators – wolves, lynxes, and bears. Their population range is pre-dominantly related to the areas of Latvia richer in forests. Rail Baltica line corridor crosses such areas in several places.

Since Rail Baltica runs across the whole territory of Latvia from north to south, and it leads through forest areas, and meadows, there are nearly all bird species that are typical in Latvia observed in its vicinity, including protected bird species. Within the territory of the intended activity rather often the most common specially protected bird species in Latvia with their specific ecological and biological requirements in respective habitats (such as the white stork *Ciconia ciconia*, corncrake *Crex crex*, crane *Grus grus*, red-backed shrike *Lanius collurio*, red-breasted flycatcher *Ficedula parva*) are found. Specially protected bird species in the territory of the intended activity and its surrounding are not found in considerable number and density. Several mating places of wood grouse are located in the vicinity of the intended activity, in the northern section of Rail Baltica.

5.11. Landscape significance
In terms of landscape importance, most valuable territories are crossed by section A2 and B2, and Alternative C5. These sections cross the valleys of rivers Salaca and Vitrupe, which are classified as unique landscape on the mapping of Latvian landscapes. Also in the municipalities of Inčukalns, Ropaži, and Salaspils several landscape types, which are defined as unique in Latvia, are crossed.

The central section crosses mainly urban landscapes. The southern section crosses pre-dominantly typical plain landscapes.

5.12. Heritage significance
The following sites shall be highlighted on the northern section:
- several sites of heritage value are located close to section B2. Section B2 splits the historical build-up in Salacgrīva and Vecsalaca,
- Close to section A3 there is the national significance archaeology monument Tinīņkalns' ancient graveyard, and the study corridor crosses the protection zone of the ancient graveyard,
- In section B3, in terms of heritage, most important is the vicinity of Liepupe, where several national significance archaeology monuments are located in the vicinity of Rail Baltica,
- Alternative C4 crosses the edge of the protection zone of national significance archaeology monument Tinīņkalns' ancient graveyard,
- Alternative C1 crosses the edge of the protection zone of national significance archaeology monument Stārastu hillfort,
• Section A4 crosses the eastern part of Īņķi ancient graveyard within Murjāni ancient graveyards' group and affects the protection zone of Mound/ Hillfort Mūku.

In Riga section, between river Mazā Jugla and connection to section A4, there might be ancient graveyards. On the right bank of river Daugava, section A5 crosses the Riga City historical centre and its protection zones. As regards Daugava crossing, Rail Baltica crosses the protection zone of Riga City historical centre, where it is highly important to protect the historic skyline of Riga. On the left bank of river Daugava, in the suburb of Torņakalns and close to the existing railway line, there are several culture monuments of heritage value protected by the state. Torņakalns is a significant urban building ensemble with a typical historical build-up, street network, parks, gardens, etc.

Southern section:
• Section A6 crosses the western feet of Sakaini hillfort, which is a national significance archaeology monument, affecting the eventual settlement place, fortifications and other probable objects of heritage importance related to the hillfort infrastructure (ancient crop fields, roads, etc.)
• Section B6 does not cross, but in its proximity there is the protection zone of national significance archaeology monument Sakaini hillfort,
• Section B8 crosses the protection zones of two national significance archaeology monuments – Ragaucku settlement, and medieval graveyards of Mound Ķīķerkalns.

6. Impact during construction and operation stages

6.1. Impact during construction stage

During the construction of Rail Baltica it is envisaged to erect „headquarters“ every 10 km close to state main roads, which will be located on approx. 2 ha large areas to place the relevant infrastructure (staff premises, areas to park construction machinery and construction materials). The headquarters shall be located in places where it is not necessary to cut down trees and undertake major preparatory works.

Major disturbances are to be expected during the construction stage and these can be further subdivided in the following groups (see Table1):
• car and bicycle traffic restrictions,
• restrictions to pedestrians and passengers,
• railway traffic and transportation restrictions,
• power supply interruptions,
• gas supply interruptions,
• water supply, heating supply restrictions,
• communications, internet operation restrictions.

Construction works affect large territories beyond and within residential settlements. Thus these will impose significant disturbances, especially in Riga, its
The central part, and Pārdaugava. However, these shall be short-term. Appropriate planning and organisation of construction works may to some extent reduce disturbance, but it cannot be eliminated. Thus, prior to commencement of construction works the contracting authority, contractors, and the respective municipality shall inform the inhabitants, drivers and other target groups to allow them introducing changes to their routine traffic patterns in due time.

**Table 1. Key disturbances and significance thereof during construction of the intended activity**

<table>
<thead>
<tr>
<th>Type</th>
<th>Characterization and significance of disturbances</th>
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| Disturbances in the operation of existing railway lines | Disturbances will affect the following railway lines:  
- Riga – Zemitāni – Skulte, Riga – Lugaži - national border, Riga Central station – Krustpils, Jelgava – Krustpils, Riga – Jelgava, where temporary disturbances and limitations during construction of two-level crossing are to be expected. These will include mainly train speed limitations; and due to the construction some longer „gaps“ in train traffic might be necessary. The key disturbances are envisaged in the construction of the Šķirotava Park (shunting-yard) crossing, reconstruction of the railway embankment into a fly-over in the section Gogoļa Street – Krasta Street, as well as in case of Torņakalns tunnel construction, where during some construction works train traffic will have to be terminated on some tracks for longer periods. Similar is expected also in the reconstruction of existing rail tracks in the area of Satekles/Daugavpils Street and next to the Vagon Park. It shall be noted that complete stop of train traffic in these sections is not planned. |
| Disturbances in the operation of existing roads | Disturbances in the operation of existing roads can be subdivided in 2 groups:  
- disturbances during construction of two-level crossings,  
- disturbances due to extra traffic flow on circuit road routes, and extra traffic flow due to construction works.  
All road crossings, including state main roads of category A, P, and V, municipal and access roads, are planned as two level crossings, where the railway goes over the road or the road goes over the railway. Potential transport and pedestrian traffic limitations are rather short-term and insignificant. These will be mainly imposed during construction of bridge structures lasting on average for 2 – 6 months.  
During the construction works temporary circuit roads will be built, or the work organisation project will include traffic organisation routing, which will be agreed upon with the relevant authorities. |
| Disturbances in the | During construction of Rail Baltica some power transmission line segments shall be reconstructed and re-allocated at places, |
### Disturbances in the operation of land reclamation systems

To ensure operation of existing land reclamation systems during railway construction it is possible applying both permanent structures, and temporary solutions. In terms of organisation of construction works the most feasible solution shall be identified already as part of elaboration of construction design. Permanent structures are structures, when railway construction works are started particularly with the construction and re-location of designed surface water drainage and groundwater level decrease systems, for example, by digging immediately the designed railway ditches and re-locating the relevant drainage system, which would fulfil its functions during and after construction works. Temporary solutions are solutions, which are suitable for short-term construction periods to lead away surface waters and decrease the groundwater level only within local construction sites, for example, artificial pumping of groundwater and surface water courses, or installation of temporary culverts through a railway embankment which will be dismantled later. Failing to carry out any of the above mentioned activities, this will definitely result in adverse impact on the operation of existing land reclamation systems. During construction works the existing land reclamation systems within the railway track zone will be damaged due to direct excavation works, and due to movements of the heavy-load machinery. Damages to land reclamation systems will result in excessive moistening of adjacent territories, and will significantly burden the construction works due to high groundwater levels and surface water.
6.2. Impact on hydrological regime and drainage conditions

Considering that relocation and reconstruction of existing land reclamation and drainage systems will be included in the construction project of the public use railway infrastructure line Rail Baltica at its crossing or local depression areas, and considering these will be constructed of due quality, adverse impact on the hydrological regime and drainage conditions of the surrounding territories is not expected.

Width and depth of the water reservoir of Riga hydro power plant at the crossing of section A4 is rather big, as a result of which changes (which can be measured in numbers) in the current speed and water level within the natural possible river flow range on river Daugava will not happen, and thus implementation of the intended activity will not affect the hydrogeological regime. In spring, the ice from rivers melts in the water reservoir of Riga hydro power plant, and does not move forward. Thus also the bridge poles will not have an adverse impact on the ice regime of the water reservoir.

Crossing of Rail Baltica section A5 over the river Daugava is planned in a place next to the existing Railway Bridge. If the poles of the new bridge will be located in the same places and in the same location in relation to the river current as these are for the existing bridge, adverse impact on the hydrological and ice regimes are not expected.

6.3. Impact of tunnel construction solutions

Toņakalns tunnel construction is a solution where the bearing sides of the tunnel support on the Devonian rocks, but the tunnel body will be laid on Quaternary sediments, thus the Devonian rocks will be left almost untouched and thus changes in the natural flows within Upper Devonian Daugava, Salaspils, Pļaviņas water horizons are not expected.

During elaboration of construction design a detailed study of the groundwater natural flow from the Quaternary sediments shall be carried out in order to identify, which places are suitable for the tunnel sides being directly supported on Devonian rocks to prevent obstacles in the groundwater flows and to prevent risk of paludification of the adjacent territories after the construction is completed. Where the detailed study findings of the tunnel track establish there is a risk of blocking the natural flow of groundwaters in the Quaternary sediments, the bearing sides of the tunnel shall be supported on Devonian rocks with the help of large-size diameter drilled poles, which allow groundwaters freely flowing around the pole edges.

6.4. Impact on quality of river Daugava and other crossed watercourses, fish fauna and water ecosystem

Most significant impact on the quality of watercourses, fish fauna, and water ecosystem in general is expected mainly during construction phase, especially in the big rivers, where the bridge piers shall be placed.
Fish spawning migration might be significantly affected by the earthworks in the river, since installation of bridge piers is related to placing additional structures on the river bed, making the river temporarily narrower and changing the current speed at the construction site. Noise level increases, the water becomes cloudy, and the water quality worsens during construction. These factors affect fish behaviour; and additional stress might affect the efficiency of fish spawning.

Bridge piers shall be installed in the rivers Salaca, Svētupe, Lielā Jugla, Mēmele, and Mūsa. The fish fauna significantly differs from one river to another. The rivers Salaca, Svētupe, Gauja, and Lielā Jugla are important spawning rivers for salmon, brown trout, river lampreys, and vimbas, i.e., these are important rivers for migrating and spawning fish species both in autumn and spring. On these rivers restriction to earthworks in the riverbed should be imposed from 1 September to 20 June. Where due to construction technologies or other reasons restrictions cannot be imposed, during fish spawning period the works shall be carried out during daytime, allowing the fish to cross the work area at night. In winter, work restrictions are needed to decrease cloudiness of the water and its potential impact on the spawn development of salmon-like fish in their spawning nests.

In the rivers Mūsa and Mēmele works shall be restricted during spring, from 1 April to 20 June, to protect the spawning species.

Bridge construction is related to extra sedimentation in the river caused by construction works on site, and in the territories around the construction site, where the vegetation is removed or damaged. Sedimentation processes affect the quality and area of habitats. As a result of sedimentation the deepest places in river become shallower, smaller stones and gravel, which are a significant fish spawning substrate, are blocked up. Works on the riverbed destroy zoobenthos organisms, decreasing the natural fishery productivity in the affected riverbed area. This impact is short-term, and within 3–5 years after the construction works will be ended the productivity is restored.

Bridge operation does not affect fish migration, since it is not an obstacle which cannot be overcome.

6.5. Probability and significance of changes in contemporary geological processes
The risk of excessive moistening of adjacent territories to the Rail Baltica partition zone is low, because:

- the earth bed of tracks will be made on a 1–1.5 m high embankment to prevent affecting the existing land reclamation systems, or to leave enough room for installation of culverts under the earth bed of tracks,
- in the implementation of the intended activity the existing water drainage and land reclamation systems will be preserved by installing relevant culverts,
- draining-ditches on both sides of the earth bed of tracks of Rail Baltica partition zone shall be installed.
During environmental impact assessment the rivers, which might be subject to slumping and landslides during construction or operation stages, or where bank denudations are possible have been identified. In the elaboration of technical solutions for crossing rivers and their valleys, these conditions were taken into account, and for several rivers bank strengthening in the area, where the bridge piers on banks are constructed, as well as slope strengthening in the crossing area, are envisaged. Thus the probability of contemporary geological processes is decreased, and the risk of bank slumping and landslides, along with the bank denudation risk is prevented.

Contemporary geological processes related to karst formation in the vicinity of Saurieši, Saulkalne, and Salaspils, are probable in the area crossed by section A4, and on section A6 in the vicinity of Baldone. Neither construction, nor operation of Rail Baltica on sections A4 and A6 are related to decrease of groundwater levels or other works, which might affect directions of groundwater flows contributing to washing out the gypsum rock layer or formation of karst processes.

Section A8 and B8 crosses Bauska municipality, where in the vicinity of Skaistkalne there are established active contemporary karst processes. This territory does not affect Rail Baltica route and thus does not impose extra threats neither in the construction, nor the operation stage. In Lithuania, Rail Baltica continues and crosses the Northern Lithuania karst area. Neither construction, nor operation of the intended activity in Latvia is related to decrease of groundwater levels or changes in the flows, which might affect the hydrological conditions of groundwaters in the border area in Latvia and Lithuania.

6.6. Impact on mineral deposit extraction sites
Section A4 of Rail Baltica in Salaspils municipality crosses the gypsum deposit „Saulkalne“, where gypsum can be extracted only in some smaller areas, which are not encumbered by protective belts are other restrictions. Since within Rail Baltica project re-location of gas mains and related infrastructure of JSC „Latvijas Gāze“ is planned to make room for construction of the railway line and multimodal cargo terminal, „Knauf“ Ltd and the Ministry of Transport are looking for solutions regarding gypsum extraction in the deposit „Saulkalne“ already for many years.

Already now a principal agreement is made on cooperation solutions between the Ministry of Transport and „Knauf“ Ltd, which will be further clarified after finalisation of the project and completion of the EIA for the project „Gypsum extraction and establishment of unsuitable rock dumping places in the deposit „Saulkalne“, Salaspils municipality“ initiated by „Knauf“ Ltd. Cooperation solutions will be agreed with the time schedule, which is included in the grant agreement concluded with the European Commission. In addition to that, findings of the project by the Ministry of Transport „Elaboration of the business plan and technical solutions for the intermodal cargo logistics centre of Rail Baltica railway line in Latvia“ being elaborated by the partnership „AECOM Rail Baltica Latvia Terminal Joint Venture“ will be considered.
6.7. Mutual impact due to the single corridor of Rail Baltica and 330 kV power transmission line

For around 85 km long section in Limbaži, Sēja, Ropaži, Inčukalns, Stopiņi, and Salaspils municipalities (see Fig. 9 – mapping of the power transmission line) it is planned to make a joint Rail Baltica and Estonia-Latvia third power transmission network interconnection, which is a new 330 kV power transmission line and the initiator of which is the JSC „Latvijas Elektriskie tīkli“. Cross-section of the single corridor of both objects and protective belts of their infrastructure objects are depicted in Figure 10.
With the construction of both infrastructure objects – Rail Baltica and 330 kV power transmission line – within a single corridor the following benefits are achieved:

- two linear infrastructure objects are placed within a single corridor, and their protective belts overlap to some extent,
- the territories to be crossed are not divided and fragmented, especially forests, where each infrastructure object would need an individual corridor by cutting down the trees. In general fewer nature values are affected and impact on environment is limited to a smaller area,
- the number of directly affected properties and inhabitants is less than in case both projects would be implemented at different sites,
- the necessary power supply capacity for two planned medium power substations of Rail Baltica (near Skulte and in Salacgrīva) is ensured.

At the same time many restrictions are imposed, for example, extra coordination and agreement between both projects is needed in the course of implementation, the impact at the project implementation site is bigger than in case only one infrastructure object would be built. The key limiting and restricting factors are related to the fact that out of both objects railway is subject to stricter design
standards and conditions (e.g., minimum radii, curves, distances, etc.) than the power transmission line, since the location and height of its poles is relatively easier to be changed and adapted to certain circumstances and conditions.

6.8. Impact on air quality

Calculations of the dispersion of polluting substances indicate that significant impact on air quality during construction (neither of the calculated pollution concentrations of the pollutant exceeds 30% of the respective air quality margin) is not expected. The highest calculated particle PM$_{10}$ and particle PM$_{2.5}$ concentration develops close to the construction and disposal sites, which is caused by activities with bulk cargo, while a relatively higher impact by vehicles is expected in direct proximity of the site where the track is constructed.

According to EIA programme requirements and considering worries by the inhabitants expressed in the initial public discussion, other bibliography sources (scientific publications, projects) were reviewed. According to the bibliography sources wear and tear of brakes and wheels, and re-suspension of particles are listed as potential railway transport emission sources. These emission sources in turn depend on a number of factors such as: train speed, train acceleration, rail curvature, means of breaking (mechanical or regenerating), brake-pad material, rail material, wheel material, contact line material, weight and length of train.

According to calculation results the emissions of PM$_{10}$ and PM$_{2.5}$ particles during operation of the planned railway line will not cause significant increase in the pollution levels. The maximum value of daily concentration of particles PM$_{10}$ at peak Day 36, which was determined at 20 metres off the railway line, might reach 0.23 $\mu$g/m$^3$, while at a distance of 50 metres off the railway axis line the maximum calculated daily concentration of particles PM$_{10}$ amounts to 0.12 $\mu$g/m$^3$. Mapping of daily concentration and distance of particles PM$_{10}$ is presented in Figure 11, where the pollutant concentrations are indicated at a step of 5 metres. As seen in Figure 11, the concentrations decrease rapidly with increasing distance from the railway route axis line, and at a distance of 50 metres these are 5 times lower than within direct proximity to the rails.

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Since the forecasted growth of pollutant concentration (source input) 20 m off the railway axis line is less than 1% of the respective air quality limit value, then even in Riga, where there is the highest background pollution level, such changes are deemed insignificant.

6.9. **Assessment of noise impact**

To assess the impact of noise during construction and operation of railway, key noise sources were identified for each section of the intended activity. During railway construction, within the territory of the intended activity and its surroundings, significant noise impact might be caused by construction machinery and transportation of materials. At the present project stage, exact number of construction machinery and vehicles to be used for construction of the railway line is not known; therefore, calculations were based on forecasted number of construction machinery units per a particular Rail Baltica section, based on experience from work organisation methods in other, similar objects.

At present there are no signs that during Rail Baltica construction works the noise thresholds according to Cabinet of Ministers Regulations No.16 “Procedures for assessment and management of noise” of 7 January 2014 for the noise indicator $L_{day}$ will be exceeded. However, it shall be noted that the inhabitants living close to the envisaged railway line might suffer from short-term noise disturbances during the day, during the construction works.

Significant noise pollution during construction of Rail Baltica railway line will be caused by vehicles transporting the construction materials. At present neither exact materials' transportation routes, nor the amounts of materials to be transported on
particular roads are known, and thus the noise impact by respective vehicles cannot be predicted.

To assess the noise pollution level during railway operation stage and to assess its impact, a calculation model on the envisaged noise was elaborated within the Report. Based on calculation findings, it was established that in the open territories of the principal line (from Estonia to Lithuanian border), where the noise propagation is relatively little affected by the terrain and buildings, the noise level exceeding 45 dB (A) at night will be registered at a distance of 800 – 900 m off the Rail Baltica partition zone axis. Noise level exceeding 50 dB (A) in the evening will be registered at a distance of 600 – 700 m off the partition zone axis, and noise level exceeding 55 dB (A) during the day will be registered at a distance of 300 – 400 m off the partition zone axis.

In the open areas of the Riga section, from Upeslejas to Airport Riga, noise level exceeding 45 dB (A) at night and noise level exceeding 50 dB (A) in the evening will be registered at a distance of up to 200 m off the partition zone axis, noise level exceeding 55 dB (A) during the day will be registered at a distance of up to 100 m off the partition zone axis.

In the open areas of the Riga section, from Airport Riga to Baldone, noise level exceeding 45 dB (A) at night and noise level exceeding 50 dB (A) in the evening will be registered at a distance of up to 300 m off the partition zone axis, noise level exceeding 55 dB (A) during the day will be registered at a distance of up to 160 m off the partition zone axis.

Evaluation of the calculation results led to the conclusion that operation of the envisaged railway line will cause significant noise pollution, and in rural areas, where there are no other significant noise sources, it will become the dominant noise pollution source. Largest areas subject to increased noise impact are the ones at night; therefore, in assessing the noise impact and identifying territories for planning noise reduction measures, the envisaged exceedances of noise thresholds at night were analysed.

Noise reduction measures, which are suitable to reduce noise pollution caused by railway transport, can be subdivided into three groups:

- measures at the noise source,
- measures in the distribution way of noise,
- measures at the receiver.

It is expected that operation of the envisaged railway line will increase the overall noise level, especially at places, where there are no significant noise sources at present; however, after implementation of efficient noise reduction measures for the protection of residential build-up, the total level of noise impact in residential build-up territories will not increase significantly. Most significant changes affect territories, where conventional noise reduction measures cannot ensure meeting noise threshold requirements. For these territories the recommendation should be
considered, whether or not some residential build-up territories adjacent to the railway partition zone should be preserved; or implementation of more efficient measures shall be planned during the technical design.

6.10. **Assessment of vibrations and impact thereof**

In Latvia there are neither laws, nor regulations stipulating threshold values for vibrations. Within the present EIA the maximum fluctuations stipulated in Part 3 of the German standard DIN 4150\(^3\) are applied.

Dissemination of vibrations was assessed both in the construction stage assuming types of machinery to be used for construction works, and in the operation stage, considering the type and driving speed of trains.

**Table 2. Decrease of speed of maximum vibrations from the vibration source to the threshold value stipulated by standard DIN 4150**

| Structure categories according to DIN 4150 standard | Distance from: | | |
|-----------------------------------------------|----------------|------------|------------|------------|
|                                             | pile driving place | vibratory roller | large-size bulldozer | pneumatic hammer |
| Category 1 (industrial buildings, 40 mm/s)    | 3.0 m            | ~0.9 m      | ~0.4 m      | ~0.2 m      |
| Category 2 (residential and similar buildings, 15 mm/s) | 6.8 m            | ~2.1 m      | ~0.9 m      | ~0.4 m      |
| Category 3 (sensitive buildings and objects, 8 mm/s) | 12.0 m           | ~3.8 m      | ~1.6 m      | ~0.7 m      |

To assess vibrations from railway measurements near existing railway lines were made, but this is a conservative approach, since Rail Baltica will be a newly built railway line, and electric traction trains compliant to European requirements will run on the line.

Based on characteristic features of the envisaged trains for Rail Baltica (train type, driving speed, load on axis, etc.), the vibration dissemination zone was calculated to determine at what distance from the outer rail the vibrations caused by railway traffic will be muffled down to the threshold value according to DIN 4150.

\(^3\) DIN 4150 Erschütterungen im Bauwesen - is a German standard, which describes seismic influence on objects. Part 3 of the standard “Einwirkung auf bauliche Anlagen (DIN 4150, Teil 3)” is applied to assess seismic vibrations coming from various types of vibration objects and various types of buildings. This standard is widely used in Europe.
Table 3. Forecast distances from the outer rail of Rail Baltica railway line up to the place, where the vibration level complies with the threshold value according to DIN 4150

<table>
<thead>
<tr>
<th>Characterization of vibration source</th>
<th>Category 1 (industrial buildings, 40 mm/s)</th>
<th>Category 2 (residential and similar buildings, 15 mm/s)</th>
<th>Category 3 (sensitive buildings and objects, 8 mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger electrical trains on principal track sections</td>
<td>2 m</td>
<td>8 m</td>
<td>20 m</td>
</tr>
<tr>
<td>Passenger electrical trains on Riga section</td>
<td>&lt;1 m</td>
<td>2 m</td>
<td>5 m</td>
</tr>
<tr>
<td>Cargo trains on principal track sections</td>
<td>&lt;1 m</td>
<td>1.8 m</td>
<td>5 m</td>
</tr>
<tr>
<td>Cargo trains on section Baldone – Airport</td>
<td>&lt;1 m</td>
<td>&lt;1 m</td>
<td>1.8 m</td>
</tr>
</tbody>
</table>

Assessing the impact of vibration on the radioactive waste disposal site „Radons“, which is deemed a Category 3 structure, i.e., sensitive buildings and structures, it can be concluded that:

- ground vibrations caused by high speed passenger train are muffled down to a level, which does not impose threats to sensitive buildings and structures, at a distance of 20 m off the rails,
- ground vibrations caused by high speed passenger train in Riga section are muffled down to a level, which does not impose threats to sensitive buildings and structures, at a distance of 5 m off the rails,
- ground vibrations caused by cargo train are muffled down to a level, which does not impose threats to sensitive buildings and structures, at a distance of 5 m off the rails.

6.11. Changes and significance of the changes in the level of an electromagnetic field

In Latvia, similar as in some other EU Member States (although in these this gap is often overcome by conditions and guidelines issued by municipalities or regions) there are no regulatory enactments stipulating the limitation of electromagnetic fields.

Construction of Rail Baltica and the related energy supply infrastructure will mean changes in the electric and magnetic field to ensure the railway line, traction power substations to be built, access contact line, and power supply in the direct proximity of the power transmission line to be newly built. During construction, while the voltage will not be supplied yet, there will not be almost any changes at all.
However, with the commencement of Rail Baltica operation, the electrical field will increase all over the direct proximity of the new line, since in places where there was no high voltage before, now there will be. Except for station platforms, inhabitants will have no chance getting to places where the electrical field exceeds 1 kV, since the Rail Baltica railway line shall have a fencing along the rails for its whole length.

Maximum magnetic field induction at 1 m above the rails is to be expected around 11.5 µT (guidelines for protection of human health is 100 µT). At a distance of 5 m of the Rail Baltica partition zone axis line the magnetic induction will drop to 10 µT, while at a distance of 10 m it will have decreased already down to 5 µT. At a distance of 20 m off the fence the magnetic field induction will be less than 1 µT, while at a distance of 25 m it will be less than 0.4 µT.

Even in unfavourable situation behind the fence, at 1 m height the expected magnetic field will be 10 and more times lower than the defined reference level according to Recommendation 1999/519/EU.

6.12. Impact on biodiversity and specially protected nature territories, and significance of impact

The crossed territories will be directly affected both during railway construction and operation stage. Construction will significantly change or destroy some of the habitats. Railway line will be a fragmenting object for various species’ populations, since it will impose a burden to the migration. The barrier effect can be reduced by installing adequate animal crossings.

The following can be concluded from the assessment of the impact of intended activity on habitats:

- most significant impact is expected on sections, which cross the northern and central parts of Latvia up to water reservoir of Riga hydro power plant, since these sections run mainly across forest lands,
- barrier effect will be caused in forests and in the adjacent territories to Rail Baltica partition zones, changes might be expected in the micro climate (lighting, wind impact, humidity regimen),
- after crossing the water reservoir of Riga hydro power plant, the middle part of the railway line will affect significantly less forest lands and habitats, thus having smaller impact than in its northern sections.
- construction of a railway line in EU protected grassland habitats will destroy these irreversibly; partial habitat destruction or splitting thereof will lead to habitat fragmentation and thus to the decrease in its quality,
- EU protected grassland habitats are also endangered by the barrier effect, since due to the railway embankment the access to grassland fields is limited or if the people who maintain the grasslands move to live in another place, quality and existence of grasslands are endangered by lack of management,
- habitat 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils located in soils that dry up on a regular basis might be endangered by
changes in the hydrological regime, since it needs specific circumstances – seasonally increased groundwater level,
• impact during construction is equally significant for the whole length of the railway line, except for the section going through Riga and the link from Airport Riga to Rail Baltica in Baldone municipality, since the route crosses pre-dominantly residential, degraded, industrial or suitable-for-agriculture territories,
• most significant impact is expected during construction stage, when the respective habitat will be partly or completely destroyed as a result of making and construction the permanent way of railway partition zone. Some impacts can be reduced or prevented with the implementation of relevant measures which are described further below in this chapter,
• Rail Baltica partition zone and the territories of related infrastructure in total affect 123 ha of priority EU specially protected habitats,
• in cases, where Rail Baltica partition zone and the territories of related infrastructure cross some part of a forest habitat there is a risk that this will have an adverse impact on the rest of the habitat, thus losing its potential ecological value,
• impact caused during operation stage is to be expected insignificant or will not be caused at all, if the planned measures to preserve the hydrological regime will be implemented in the territory of intended activity and if the built infrastructure (culverts, box-type bridges, etc.) will be properly maintained,
• during the operation stage significant impact is expected in case of accidents or during rescue, and during removal of the consequences of accidents.

Since Rail Baltica crosses large forest land areas splitting away some forest sections from each other, then this barrier effect will affect migration corridors of the big animals, and the split-away forest sections are not big enough as habitats for the large animals, and this will also create an adverse impact on other wild mammals.

Unlike the existing road and railway network, the partition zone of Rail Baltica railway line will be fenced off with at least 1.8 m high fence. In some places, such as forest areas, the fence height might reach 2.2 – 2.6 m so that the big animals cannot jump over it and endanger the railway traffic after getting on the rails.

Failing to implement impact reducing measures, the wild mammal population will be fragmented and will gradually disappear in some places. Several groups of measures are planned to reduce the impact and allow wild mammals crossing the Rail Baltica corridor – bridges over river valleys with adequate clearance underneath and special animal crossings.

Impact of intended activity on bird fauna is expected already from the moment the permanent way will be made in forest areas, and it will continue in the construction and operation stages. At the same time, assessing the impact of intended activity on bird fauna, it shall be taken into account that in forest areas, in common bird
habitats and in places where the specially protected bird species live, but which are not officially protected sites, there are and will be carried out timber cutting, forest land reclamation, and forest road construction works, which will result in forest fragmentation and extinction of old forest stands, which considerably reduce the significance of these forests to birds (at least in short-term), and especially for specific bird species. Thus the assessment of possible impact on bird fauna is prepared, considering existing situation which might change after construction works will be started, and in some cases, when according to an expert opinion the impact is deemed to be significant, this will be caused not by the construction of Rail Baltica, but other commercial activities in forests.

Most significant impact caused by implementation of the intended activity is

- irreversible loss of bird habitats (loss caused by timber cutting is deemed reversible over a longer period of time) and habitat fragmentation (in case of Rail Baltica – mostly fragmentation of forests),
- bird crashes with trains and railway infrastructure (contact line, power transmission line cables, noise barriers, fencing),
- noise.

6.13. Impact and significance thereof on surrounding landscape

The local landscape will be changed in route crossing points and the surrounding, since new dominant landmarks will be installed.

Implementation of the intended activity will affect also surrounding landscapes (landscape structure), since according to experience regarding construction of linear infrastructure in Latvia and abroad there will be new quarry-pits developed, and various infrastructure objects and elements will be installed near the railway line. As a result, the landscape structure will be fragmented. Presence of the railway line will affect the changes in local residential structure, although these processes are rather inconsistent nowadays.

Where the railway shall go on the border of forest and agriculture lands, it will in future create a distinct border between these two land usage types, and as a result of that the character of border areas of the landscape structure elements will change. In places, where small parts of the agriculture land will be split off, these will naturally turn into forests or will be afforested artificially. However, it shall be noted that at present in many places such agriculture lands are not being used already now for agriculture, and are more or less overgrown.

If power transmission line shall be built next to Rail Baltica partition zone, this will make the railway line more visible. The impact on landscape structure will also be larger, since the wider infrastructure corridor will contribute to landscape fragmentation. Similar will be observed in sections, where the single transport corridors will be created by placing the railway line and road next to each other.
7. Transboundary impact

Considering the scope of the project, construction and operation of Rail Baltica infrastructure line will cause transboundary impact, either direct or indirect, or short-term or permanent. Transboundary impact of Rail Baltica Latvian section mainly presents indirect impact in the territory of Lithuania and Estonia, since Rail Baltica Latvian section in terms of transboundary impact shall be reviewed as a whole and is only a part of the whole project, and thus it has indirect impact on various environmental aspects in the territory of neighbouring countries, but does not have direct transboundary impact, except for few aspects, which are described in Table 4.

Table 4. Impacts of Rail Baltica Latvian section in context of transboundary impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Assessment of the transboundary context of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts related to construction</td>
<td>In terms of transboundary impact indirect short-term impacts related to spread of noise, air pollution, and vibrations is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full. Traffic restriction within the existing road network will cause indirect transboundary impact within the existing road network. Direct, short-term transboundary impacts related to spread of noise, air pollution, and vibrations is insignificant, since the spread decreases at further distance and will affect only the direct border area in the territory of Lithuania. In Bauska municipality, near river Mūsa, the Rail Baltica railway line crosses gas transmission pipe „Riga – Panevezys“ (DN 700 mm). Re-location of the gas pipe at the crossing site will cause indirect transboundary impact, since for the period of construction works the gas transmission over the pipe will be closed. Gas transmission outages might last for 3 to 30 days; and construction is planned during the time having less impact on gas consumers, i.e., during time of the year when heating services are not necessary.</td>
</tr>
<tr>
<td>Impact on fish fauna</td>
<td>Direct, short-term transboundary impact on fish resources in river Mūsa is expected during construction. Operation of railway line will not cause transboundary impact on fish fauna.</td>
</tr>
<tr>
<td>Impact on water bodies</td>
<td>Direct, short-term transboundary impact on rivers Mūsa and Blusupīte is expected during construction. Operation of Rail Baltica may have transboundary impact on water bodies in the border area. Significant adverse transboundary impact is possible in case of an accident, if</td>
</tr>
</tbody>
</table>
leakages of chemicals endangering the water ecosystem or hazardous chemical products are observed. Rail Baltica railway lines

- technical equipment (signalling, telecommunication, traffic safety systems).
- rail design and alignment,
- contemporary rolling stock compliant to safety requirements,
- national and international standards in the design of railway system elements are the key and most important pre-conditions to ensure safe operation of the railway line.

At the start of operation of Rail Baltica railway line or where transportation of hazardous chemical substances or hazardous chemical products are planned, the infrastructure manager shall carry out a risk assessment of the risk caused by railway transport system according to the Railway Law.

<table>
<thead>
<tr>
<th>Impact on probability of contemporary geological processes</th>
<th>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full. Implementation of the intended activity will not cause direct transboundary impact on the probability of contemporary geological processes neither during construction, nor during the operation stage, since it is not related to decrease of groundwater levels or changes in the flows, which might contribute to development of contemporary geological processes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on potable underground water resources and quality thereof</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full. Implementation of the intended activity will not cause direct transboundary impact on the potable underground water resources and quality thereof neither during construction, nor during the operation stage, since it is not related to decrease of groundwater levels or changes in the flows, which might affect potable underground water resources and quality thereof.</td>
</tr>
<tr>
<td>Territory fragmentation and a barrier effect</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
<tr>
<td>Impact on air quality</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
<tr>
<td>Noise propagation</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
</tbody>
</table>
Summary of the environmental impact assessment for construction of the European standard gauge public railway infrastructure line Rail Baltica in context of transboundary impacts

<table>
<thead>
<tr>
<th>Vibration propagation</th>
<th>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in the level of electromagnetic field</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
<tr>
<td>Impact on biodiversity</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
<tr>
<td>Impact on landscapes</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
<tr>
<td>Impact on heritage values</td>
<td>Indirect impact in transboundary terms is expected, which will be caused by construction of Rail Baltica in Lithuania and Estonia to ensure the project implementation in full.</td>
</tr>
</tbody>
</table>

8. **Justification of the preferred Rail Baltica route alternative**

Findings of the EIA demonstrate that any of the alternatives is feasible, except for a part of section A2 of Alternative A, which crosses the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe. Crossing of section A2 causes significant adverse impact on the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe and it can be implemented only in case where section B2 or Alternative C5 according to Cabinet of Ministers Regulations No.300 „Procedures how impact on specially protected nature areas of European significance (Natura 2000) is assessed“ of 19 April 2011 are not defined as suitable, and that the intended activity is implemented to support significant interests (including social or economic interests) of the public, supporting interests of public health protection, supporting interests of public security, supporting interests of environmental protection.

Considering the criteria listed in EIA Report and the advantages and disadvantages of each alternative, the following Rail Baltica route alignment (see Figure 12) is recommended for further project development:

1. Section A1, which crosses the Latvian-Estonian border.
2. Section B2-1, because

**Section A2-1**
- Mainly crosses forest areas, thus affecting and in the partition zone destroying irreversibly the habitats typical in forests.
- Impact on bird fauna

**Section B2-1**
- More than section A2-1 it crosses agricultural lands, thus it will less affect the migration corridors of wild mammals.
- Less significant impact on bird fauna than A2-1.
Summary of the environmental impact assessment for construction of the European standard gauge public railway infrastructure line Rail Baltica in context of transboundary impacts

- More significant impact on Nature Park „Salacas ieleja“/ Valley of River Salaca than section B2-1
- Minimal support from the locals.
- Limited potential in the future to develop both the regional passenger station, and commercial activities nearby the stations, since it is rather far away from Salacgrīva.

- Less significant impact on Nature Park „Salacas ieleja“/ Valley of River Salaca than section A2-1
- Splits the historical build-up in Salacgrīva and Vecsalaca, thus imposing impact on the traditional heritage environment of this area.
- Support by municipality and locals.
- Good potential in the future to develop both the regional passenger station, and commercial activities nearby the stations, since it is located close to Salacgrīva.

3. Combination of sections C5-1 and C5-3 of the alternative C5, because

<table>
<thead>
<tr>
<th>Section A2-2</th>
<th>Section B2-2</th>
<th>Alternative C5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on bird fauna</td>
<td>Impact on bird fauna</td>
<td>Impact on bird fauna</td>
</tr>
<tr>
<td>Crosses forest areas, relatively significant impact on protected habitats.</td>
<td>Crosses forest and agricultural areas, relatively insignificant impact on protected habitats</td>
<td>Crosses intensively used forests, nearly no impact on protected habitats</td>
</tr>
<tr>
<td>Significant adverse impact on habitats located at the crossing site, and on the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe in general, its ecological functions, integrity, establishment and protection purposes.</td>
<td>Insignificant impact on the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe, its ecological functions, integrity, establishment and protection purposes.</td>
<td>With the implementation of measures to reduce impact on the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe as listed in Chaper 5.3 herein, significant adverse impact on the nature reserve „Vitrupes ieleja“/ Valley of River Vitrupe is not expected.</td>
</tr>
<tr>
<td>Minimal support from the locals.</td>
<td></td>
<td>Support by municipality and locals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 12. Recommended Rail Baltica route alignment based on EIA findings
### 4. Alternative C4 and section A3-2

**Section A3-1**
- Insignificant impact on bird fauna
- Indirect impact on habitats, if the hydrological regime is changed
- Close to it there is the Tīņkalns ancient graveyard
- Minimal support from the locals of the section A3-1

**Section B3-1**
- Impact on bird fauna
- Affects more dense residential areas next to the road A1 Riga (Baltezers) – Estonian border (Aīnaži)
- Alignment mainly runs not far from the edge of the large forest arrays. By cutting down trees in the permanent way of Rail Baltica partition zone, a small part of the forest will be split off of the overall forest array
- Splits the historical build-up in Liepupe, causing relatively significant impact
- Minimal support from the locals

**Alternative C4 and section A3-2**
- Alternative C4, just like section A3, fragments the forest array to a lesser extent and thus has a smaller fragmentation impact on bird habitats
- Affects only some protected habitat polygons
- Does not affect the migration corridors of wild mammals nearly at all
- Close to it there is the Tīņkalns ancient graveyard
- Supported by locals and municipality

### 5. Alternative C1 and section B3-2, because

**Section A3-3**
- Runs mainly across intensively managed forest areas and agricultural lands, but does not cause significant impact on protected habitats
- Affects the migration corridors of wild mammals to a lesser extent than section B3
- Affects large polygons of protected habitats
- Limited possibilities to develop regional station or commercial activities in future
- Significantly affects management of the most fertile agricultural lands in

**Alternative C1**
- Partially planned to run across the former railway route, thus impact on habitats is relatively smaller
- Possibility to develop industrial site and station in Skulte
- Supported by entrepreneurs

**Section B3-2**
- relatively significant affects the migration corridors of wild mammals, since it prohibits the wild mammals from accessing the protected area „Dzelves–Kroņa purvs“/ Dzelve–Kroņa Bog.
- Impact on bird fauna
the municipality, the local road network, operation of commercial farms, and future use of single farmsteads.

- Good potential in the future to develop both the regional passenger station, and commercial activities nearby the stations in Skulte.
- Supported by entrepreneurs
- In terms of numbers, affects the properties of natural entities to a lesser extent

6. Section A4, which crosses the territories of Sēja, Inčukalns, Ropaži, Garkalne, Stopiņi, Salaspils, and Ķekava municipalities.

7. Section A5, which crosses the territories of Riga and Stopiņi, Mārupe, Olaine, Ķekava, and Baldone, and connects Riga central station with Airport Riga.

8. Alternative C3 in Mārupe municipality, because

**Section A5-10**
- Affects residential build-up territories in village Vētras
- Has impact on nearby manufacturing territories
- In terms of engineering solutions, a simpler crossing of the road A5 Riga By-pass
- More significant impact on the fragmentation of the territory

**Alternative C3**
- Does not affect the build-up of village Vētras and development perspectives
- Railway infrastructure is built within a single transport corridor with the road A5 Riga By-pass already from the junction of road A5 with road P132 Riga – Jaunmārupe.
- Supported by entrepreneurs
9. Section A6, because

**Section A6**
- Located further off the radioactive waste disposal site „Radons“ than section B6
- Will increase the fragmentation of forest arrays to be crossed and will affect forest habitats; impact on bird habitats is expected
- Affects the mammals’ biocentre of national significance by crossing its buffer zone to a lesser extent than section B6
- Crosses the protection zone of Sakaiņi hillfort, which is a national significance archaeology monument
- Higher potential in future to develop local and regional passenger transportation

**Section B6**
- Borders with the protective belt of the radioactive waste disposal site „Radons“
- Will contribute to fragmentation of small forest arrays by splitting these into smaller portions
- In a longer term, significant impact on forest habitats
- Crosses the core of the mammals' biocentre of national significance
- Insignificant impact on bird fauna
- Does not affect the protection zone of Sakaiņi hillfort

10. Section A7 crossing the area of Iecava municipality.

11. Section A8, because

**Section A8**
- Will not have significant impact on specially protected habitats or species
- Crosses Skultēni forest creating more significant impact on migration corridors; to reduce the impact an animal crossing is planned in this forest
- Insignificant impact on bird fauna
- Forms a single infrastructure corridor with the future section A4 of road E67 (Saulkalne) – Bauska (Ārce)
- Support by municipality and locals
- Lower construction costs
- Connected with Alternative 1 (Dagiai) of the Rail Baltica Lithuanian section.

**Section B8**
- Will not have significant impact on specially protected habitats or species
- Will not have significant impact on migration corridors of wild mammals
- Insignificant impact on bird fauna
- Fragments the Bauska municipality to a greater extent than section A8
- Minimal support by municipality and locals