

THE EUROPEAN GAUGE RAILWAY LINE BETWEEN KAUNAS AND THE LITHUANIAN-LATVIAN STATE BORDER ENVIRONMENTAL IMPACT ASSESSMENT Environmental Impact Assessment Report

The organiser (developer)
of the proposed economic
activity:

The Ministry of Transport and
Communications of the Republic of
Lithuania
JSC Lithuanian Railways

The author of the
Environmental Impact
documents:

AECOM Infrastructure &
Environment UK Limited Branch



Europos Sąjungos bendrai finansuota
Transeuropinis transporto tinklas (TEN-T)



The organiser (developer) of the proposed economic activity: **The Ministry of Transport and Communications of the Republic of Lithuania
JSC Lithuanian Railways**

The author of the Environmental Impact documents: **AECOM Infrastructure & Environment UK Limited Branch**

The title of the project: **European gauge railway line between Kaunas and the Lithuanian-Latvian border. Environmental Impact Assessment**

The name of the document: **Environmental Impact Assessment Report**

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ABBREVIATIONS

1+450KM	The kilometre of the railway line route (1.45 km)
AECOM Feasibility Study	The feasibility study of the European gauge railway line (Rail Baltica) in Estonia, Latvia, and Lithuania (the author: AECOM and SIA SAVANT)
Responsible Authority or Agency	The Environmental Protection Agency, the institution authorised by the Government of the Republic of Lithuania, coordinating the process of the environmental impact assessment and performing other functions established by the EIA Law
EU	European Union
Natura 2000 – European Ecological Network	The general network of protected areas of the European Community importance comprising of sites important for the protection of habitats and birds and intended to preserve, maintain and, if necessary, reproduce natural types of habitats, animal and plant species within the area of the European Community
GIS	Geographic Information Systems
SCI	Site of Community Importance
SPA	Special Protection Area
pop.	Population
HN	Hygiene standard (<i>Lithuanian: Higienos norma</i>)
Kaunas FEZ	Kaunas Free Economic Zone
KUN	Kaunas International Airport
LCWSC	Locomotive and Carriage/Wagon Service Centre
City Mun.	City Municipality
EIA	Environmental Impact Assessment
EIA Law	The Law of the Republic of Lithuania on Environmental Impact Assessment of the Proposed Economic Activity
EIA Programme	The Programme of Environmental Impact Assessment of the Proposed Economic Activity
Proposed Economic Activity or PEA	The envisaged activity, including the construction of structures, reconstruction of existing structures, production of products, implementation, modernisation, and replacement of the production process and technological equipment, change of the production quantity (scope) or type, extraction of subsurface resources and use of other natural resources, as well as economic activities of land management, forest management, and water management envisaged in the projects and other economic activities which may have

	an impact on the environment
The organiser (developer) of the proposed economic activity	JSC Lithuanian Railways planning the economic activity for which the environmental impact assessment procedures established in the EIA Law are performed
Potential Natura 2000 sites	The sites meeting the selection criteria established for sites important to the protection of natural habitats and included in the list approved by the Minister of Environment
Author of the Environmental Impact Assessment Documents	AECOM, the legal entity authorised by the organiser (developer) of the proposed economic activity, which possesses specialists with respective higher education and qualification in the field that corresponds the specifics of the Environmental Impact Assessment Documents and their sections
Environmental Impact Assessment Entities	State and municipal institutions considering environmental impact assessment programmes and reports and providing conclusions according to their competence
Environmental Impact	The expected change of the environment caused by the proposed economic activity
Project	The construction of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border
Distr. Mun.	District Municipality
Rail Baltica Railway Line	The European gauge railway line Warsaw – Kaunas – Riga – Tallinn – Helsinki
Author of the Special Plan	AECOM Infrastructure & Environment UK Limited Branch (former URS Infrastructure & Environment UK Limited Branch)
Special Plan	The Special Plan of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border
Decision	The reasoned document, in the established form, adopted by the responsible authority, specifying whether the proposed economic activity, taking into account the provisions of the relevant laws and other legal acts, character of activities and/or environmental impact, is either permitted or non-permitted in the selected place
TEN-T	Trans-European Transport Network
TSI	Technical Specification for Interoperability
The public	One or more natural or legal persons, their associations, organisations or groups

1. INFORMATION ON THE ORGANISER (EMPLOYER) OF THE PROPOSED ECONOMIC ACTIVITY

The name of the proposed economic activity

The construction and operation of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border

The organiser of the proposed economic activity

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The grounds of the EIA

Pursuant to Paragraph 5 of Article 7 of the Law on Environmental Impact Assessment of the Proposed Economic Activity, “the organiser (developer) of the proposed economic activity may initiate an environmental impact assessment without a screening procedure”, the EIA Organiser instructed to perform the EIA by Order No 3-260 of the Minister of Transport and Communications of the Republic of Lithuania dated 26 June 2014 “Regarding the amendment of the approval of the planning works for the Special Plan of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border”.

The proposed economic activity (the construction and operation of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border) is specified in Paragraph 8.5 of Annex 1 “List of the proposed economic activities subject to an environmental impact assessment” to the Law on Environmental Impact Assessment of the Proposed Economic Activity – “Infrastructure facilities: Construction of main public railways”.

Beginning and end of the EIA Procedure

- ▶ Beginning: 2015 Quarter 2;
- ▶ End: 2016 Quarter 4;

Stage

The EIA of the proposed economic activity shall be performed in parallel to the stage of the preparation of the Special Plan of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border. The EIA Report uses the information of the Special Plan. The main objectives of the Special Plan:

- 1) To prepare the Special Plan;
- 2) Upon selecting the most rational route of the European gauge railway line, to connect the Baltic states with other EU Member States.

The EIA entities providing conclusions on the EIA Report:

- 1) Municipality administrations;
- 2) The Public Health Centres of Kaunas and Panevėžys;
- 3) The Headquarters of the State Fire and Rescue Service of Kaunas and Panevėžys;
- 4) Kaunas and Panevėžys Divisions of the Cultural Heritage Department under the Ministry of Culture;
- 5) The Ministry of Environment of the Republic of Lithuania;
- 6) The Lithuanian Geological Survey under the Ministry of Environment;
- 7) The State Protected Areas Service under the Ministry of Environment.

The decision on the permissibility of the proposed economic activity in the selected place will be taken by the responsible authority – the Environmental Protection Agency (hereinafter referred to as “the Agency”).

2. INFORMATION ON THE AUTHOR OF THE ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENTS

The author of the EIA documents

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3. INFORMATION ON THE PROPOSED ECONOMIC ACTIVITY

3.1. Determination of the alternatives of the proposed economic activity

The main alternatives under consideration of the European gauge railway line from Kaunas to the Lithuanian-Latvian state border (Table Table 1 and Annex 0) shall be established in accordance with the following:

- 1) The results, conclusions, and recommendations of the feasibility study of the European gauge railway line (Rail Baltica) in Estonia, Latvia, and Lithuania (the author: AECOM);
- 2) The results, conclusions, and recommendations of the Strategic Environmental Impact Assessment of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border (the author: Sweco Lietuva);
- 3) The data, results, and conclusions of the Special Plan of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border;
- 4) Minutes No 8-59 of the Ministry of Transport and Communications of the Republic of Lithuania dated 04 May 2016, whereby it was decided to abandon, in the prepared Special Plan of the European gauge railway

5) line from Kaunas to the Lithuanian and Latvian state border, the solutions of the 1435 mm gauge tracks and locomotive and carriage/wagon service centre near the town of Neveronys and village of Pabiržis and to respectively update the Special Plan and the Environmental Impact Assessment Report;

6) the solutions of the Feasibility Study for the Installation of Panevėžys Railway Freight Regional Terminal (the logistics centre at Rail Baltica).

Table 1. Main alternatives under consideration

Alternative No 1: Rokai – Palemonas (Kaunas City Mun.) – Neveronys (Kaunas Distr. Mun.) – Dijokiškiai (Jonava Distr. Mun.) – Pagiriai (Kėdainiai Distr. Mun.) – Ramygala – Upytė – Janališkiai (Panevėžys Distr. Mun.) – Pušalotas – Joniškėlis – Vaškai – Kiemėnai – Dagiai (Pasvalys Distr. Mun.);

Alternative No 2: Rokai – Palemonas (Kaunas City Mun.) – Neveronys (Kaunas Distr. Mun.) – Dijokiškiai (Jonava Distr. Mun.) – Pagiriai (Kėdainiai Distr. Mun.) – Ramygala – Upytė – Janališkiai (Panevėžys Distr. Mun.) – Pušalotas – Joniškėlis – Vaškai – Kiemėnai – Kamardė (Pasvalys Distr. Mun.);

This EIA Report does not consider the environmental impact related to the activities of the envisaged LCWSC and 1435 mm gauge tracks. The impact of these facilities is to be assessed during other projects. Having started the preparation of the projects for the LCWSC and 1435 mm gauge tracks, the organiser of the proposed economic activity (JSC Lithuanian Railways) will inform the public in accordance with the established procedure.

The main alternatives under consideration coincide in the territories of Kaunas Distr. Mun., Kaunas City Mun., Jonava Distr. Mun., Kėdainiai Distr. Mun., and Panevėžys Distr. Mun., but differ in the territory of Pasvalys Distr. Mun. in respect of the point (place) of crossing the border with the Republic of Latvia. In the case of Alternative No 1, the border crossing point is near the territory of the village of Dagiai (Pasvalys Distr. Mun.), in the case of Alternative No 2 – near the territory of the village of Kamardė (Pasvalys Distr. Mun.). The routes of the railway line are arranged respectively.

It should be noted that Alternatives No 3 and No 4 identified in the Concept of the Special Plan of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border and in the SEA Report are not considered any longer because the railway line route through Panevėžys Distr. Mun. was abandoned, and crossing of the Lithuanian and Latvian state border near Kiemėnai (Pasvalys Distr. Mun.) and Majėnai (Pasvalys Distr. Mun.) was not approved by the state representatives of Latvia (Annex 0).

3.2. Railway technical characteristics

The technical characteristics of the planned railway line have been established in accordance with Paragraph 4.2.1 of Commission Regulation (EU) No 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the ‘infrastructure’ subsystem of the rail system in the European Union (TSI):

- ▶ the planned railway line is P2-F1 (passenger and freight transport combined traffic);
- ▶ axle load – 22.5 t;
- ▶ gauge – GC;
- ▶ railway line speed – 200-250 km/h for passenger trains and 100-120 km/h for freight trains;
- ▶ train length – 740-1050 m;

- ▶ usable platform length – 200–400 m.

The planned railway line will be an electrified and double-track line, with a 1435 mm gauge, with stations in Kaunas and Panevėžys. To supply the railway line with electric power, there are plans to install transformer stations each 1 km. For the electrification of the railway line, there are plans to construct electric traction substations.

Both alternatives provide for organising passenger traffic by the sections Jiesia – Kaunas Station and Palemonas Station – Kaunas Station. Kaunas Railway Station would service only passenger transport. Freight railway transport would be directed from the central part of Kaunas City by the bypass Jiesia – Rokai – Palemonas of Kaunas Station through the bridge of Kaunas Hydroelectric Power Plant. Freights would be serviced at the 1435 mm gauge tracks constructed in the place selected during other projects as well as at Kaunas Public Logistics Centre. In those cases when the section Rokai – Palemonas or the bridge of Kaunas Hydroelectric Power Plant is under repair or at the time of emergencies at Kaunas Hydroelectric Power Plant, freight traffic would be organised through Kaunas Railway Station. From the end of Palemonas tracks (near Main Road A1), a new double-track 1435 mm gauge railway line is planned according to Alternatives 1-2. It will stretch through the territories of Kaunas City Mun., Kaunas Distr. Mun., Jonava Distr. Mun., Kėdainiai Distr. Mun., Panevėžys Distr. Mun., and Pasvalys Distr. Mun.

The raw materials, materials, energy and technological resources planned to be used in the course of the construction works of the planned railway line:

- ▶ sand,
- ▶ sand-gravel mix,
- ▶ rubble,
- ▶ reinforced concrete sleepers,
- ▶ railway rails,
- ▶ bridge construction materials,
- ▶ noise mitigation measures,
- ▶ traffic control measures,
- ▶ road construction materials,
- ▶ electric power.

The planned train traffic intensity of the railway line from Kaunas to the Lithuanian and Latvian state border in 2020–2040 is presented in Table Table 2. It should be noted that passenger train traffic is planned approximately from 6:00 to 24:00 with intervals of 2 hours. It is planned to organise freight train traffic during night-time, from 24:00 to 6:00. On Sundays, railway line inspection and maintenance work is planned, so the timetable of passenger trains is set to be different from other days of the week (Table Table 2) [7]:

Table 2. Train traffic intensity, trains per day (the source: AECOM study)

Year	Freight trains	Passenger trains	Total
2020	13	18	31
2030	18	18	36
2040	24	18	42

The railway line is planned to be constructed in state and private land. It is also planned that the railway line will cross forests, so the construction of the railway line is also planned on forest land.

3.2.1. Territory of Kaunas City Mun.

The solutions established in the territory of Kaunas City Mun. by the Special Plan and this EIA Report or other projects are not changed, and no new solutions are planned, so no detailed environmental impact assessment is performed. Therefore, the decision on the possibilities of the PEA adopted by Document No (2.6)-A4-2882 of the Agency dated 09/07/2014 remains to be in force.

It should be noted that the 1435 mm gauge railway planned in the territory of Kaunas City Mun. will cross Palemonas tracks of Kaunas Railway Station through the north-west part, connecting Kaunas Public Logistics Terminal (Kaunas Inter-modal Terminal).

3.2.2. Territory of Kaunas Distr. Mun.

Alternatives 1-2 planned at the territory of Kaunas Distr. Mun. begin from Main Road of National Significance A1 Vilnius – Kaunas – Klaipėda road viaduct (1+450 KM). After A1 road viaduct, 4 railway tracks are planned: 2 tracks of 1435 mm gauge and 2 existing tracks of 1520 mm gauge.

It should be noted that the 1435 mm gauge railway line planned throughout the territory of the municipality is a double-track line. The railway line will be built in parallel to 1520 mm gauge railway line Palemonas – Gaižiūnai, near the residential areas of the village of Neveronys and the village of Pabiržis and the territories of Kaunas Free Economic Zone (hereinafter referred to as “Kaunas FEZ”) and Kaunas International Airport (hereinafter referred to as “KUN”).

Territories of the village of Neveronys and village of Pabiržis. The existing railway crossing of Regional Road No 1918 Palemonas – Neveronys – Ramučiai near the territory of the village of Neveronys and village of Pabiržis is to be abandoned. Instead of it, the tunnel of Regional Road No 1918 is to be built (2+950 KM). For pedestrian and cyclist traffic, an underground crossing is to be built through 1520 mm gauge railway in the place (2+712 KM). In accordance with Minutes No 8-59 of the Ministry of Transport and Communications of the Republic of Lithuania dated 04 May 2016, the solutions of the 1435 mm gauge tracks and locomotive and carriage/wagon service centre near the town of Neveronys and village of Pabiržis are abandoned and are no longer considered in this EIA Report.

KUN Station. According to the Addition to AECOM Feasibility Study, wherein Vilnius branch line is analysed, it is planned to build a passenger railway station at the territory (6+000 KM) near KUN (hereinafter referred to as “KUN Station”). KUN Station would be designated to service Kaunas International Airport and would have direct transport

connection with the Airport by public transport. For KUN Station, 2 station reception and departure tracks (usable length of 500 m) at both side of the main 1435 mm gauge tracks. Near the station tracks, platforms with a usable length of 400 m are to be built, which will be connected by an underground passenger crossing. 4 protective blind passes with a usable length 50.0 m each are envisaged at the station for diverting and stopping uncontrolled trains, detached train parts, and separate rolling stock.

Branch line Vilnius – Kaunas. The connection of the European gauge railway line Vilnius – Kaunas is planned to be built after KUN Station (6+500 KM). Further possibilities of the development of branch line Vilnius – Kaunas will be evaluated during Vilnius – Kaunas project of Rail Baltica.

1520 mm gauge railway line Palemonas – Gaižiūnai. The following works are planned: the alignment of the elevations of the planned 1435 mm gauge railway line and existing 1520 mm gauge railway line Palemonas – Gaižiūnai, building of the crossing of the planned 1435 mm railway line from Kaunas to the Lithuanian and Latvian state border and 1435 mm gauge branch line Vilnius – Kaunas as well as readjustment of the elevations of the existing 1520 mm gauge railway line Palemonas – Gaižiūnai and works for minor, up to 2-5 m wide, bending of the track (planned position change). All the aforementioned works will be performed within the existing 1520 mm gauge railway line Palemonas – Gaižiūnai.

Kaunas FEZ. Connection points of the sidings (switch points) are planned to connect Kaunas FEZ. A connection point (switch) of the 1435 mm gauge railway line is planned before KUN Station (at the side of the village of Neveronys, 5+250 KM), and the connection point (switch) of the 1520 mm gauge railway line from the sliding to Kaunas Gas Distribution Station (at 1+550 KM). The development of the aforementioned sidings in technical, environmental impact, human health impact, and other respects should be developed during separate projects.

3.2.3. Territory of Jonava Distr. Mun.

The parameters of the route. At the territory of Jonava Distr. Mun., Alternatives 1-2 of the planned railway route (they coincide) stretch through the western territory of Jonava Distr. Mun. to 48+800 KM. It should be noted that the solution through the western territory of Jonava Distr. Mun. is the update of the route of Alternative A of AECOM Feasibility Study through the eastern territory of Jonava Distr. Mun. In the western part of the municipality, the route is planned with regard to the limited development possibilities available in the eastern part and the difficult geological conditions – the area of the confluence of the Neris and Šventoji rivers, two Natura 2000 sites, as well as the intensely operating Gaižiūnai Military Training Area, for which a protective area of national defence objects with strict activity limitations is established, and the sanitary protective areas of Rukla Water Site.

Structures. The structures (railway and road viaducts, bridges, green bridges and animal passes) planned in the territory of Jonava Distr. Mun. as well as their locations and parameters are presented in Table Table 3. The building points of animal passes are presented in Annex 0.

Table 3. Structures in the territory of Jonava Distr. Mun. and their parameters

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
1.	Road of local significance	7,763.77	Railway viaduct	15.00		14.83
2.	Vėsa	9,279.89	Bridge	100.00	47.500	11.00
3.	Šešuva	9,518.04	Bridge	300.00	65.760	11.00
4.	Road No 1504	10,685.62	Railway viaduct	32.00		12.00
5.	Road of local significance	13,255.35	Railway viaduct	9.50		14.50
6.	Green bridge	14,619.80	Green bridge	31.00		50.00
7.	Road A6	18,665.68	Railway viaduct	95.00		12.50
8.	Neris, Road No 1915	20,260.11	Bridge	1,700.00	33.000	15.00
9.	Road No 1505	22,035.51	Road viaduct	75.06	87.157	12.75
8.	Road No 1516	25,632.97	Road viaduct	15.50	76.356	12.75
9.	Road No 144	29,176.79	Railway viaduct	15.13	69.392	17.72
10.	Railway line Kaišiadorys – Gaižiūnai – Radviliškis – Šiauliai	29,242.00	Railway viaduct	50.00	69.068	11.00
11.	Road No 1513	34,749.78	Road viaduct	73.08	72.537	12.75
12.	Road of local significance	41,224.04	Road viaduct	70.02	73.222	12.75
13.	Road No 145	44,003.12	Road viaduct	59.20	79.960	12.75

For the electrification of the railway line, it is planned to construct an electric traction substation at 29+750 KM.

3.2.4. Territory of Kėdainiai Distr. Mun.

The parameters of the route. At the territory of Kėdainiai Distr. Mun., Alternatives 1-2 of the planned railway route coincide and stretch through the eastern territory of Kėdainiai Distr. Mun. to 65+350 KM. A double-track, electrified railway line is planned throughout the territory of the municipality.

Intermediate station (passing station). An intermediate station (passing station) for trains to pass each other is planned in the territory of Kėdainiai Distr. Mun. It is planned that at this intermediate station, a passenger train running at a higher speed (up to 250 km/h) will pass a freight train running at a lower speed (up to 120 km/h).

The kilometre mark of the building column line of the intermediate station is 63+074 KM. The place of the intermediate railway station – passing point – was selected taking into account the entirety of the route horizontal elements, existing ground terrain, longitudinal profile, and distances as well as the traffic intensity between the train separation points.

The planned intermediate station (passing station) consists of two main tracks (No I and No II) and two reception and departure tracks (No 3 and No 4). The usable length of the main tracks and reception tracks is planned to be 1050 m. At the intermediate stations, it is planned to expand the inter-track spaces to 5.6 m. Four protective blind passes No 5, No 6, No 7, and No 8 with a usable length 50.0 m each are envisaged at the station for diverting and stopping uncontrolled trains, detached train parts, and separate rolling stock. It should be noted that in the long term of Rail Baltica project, upon the emergence of a sufficient local freight and passenger flow, passenger and freight transport operations may be performed at the intermediate station, for which purpose loading ramps, platforms, and waiting pavilions would be built.

Structures. The structures (railway and road viaducts, bridges, green bridges and animal passes) planned in the territory of Kėdainiai Distr. Mun. as well as their locations and parameters are presented in Table Table 4. The building points of animal passes are presented in Annex 0.

Table 4. Structures in the territory of Jonava Distr. Mun. and their parameters

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
1.	Obelis	51,824.16	Bridge	45.00	68.510	11.00
2.	Road No 3017	52,455.02	Railway viaduct	18.00		14.81
3.	Road of local significance	57,504.45	Road viaduct	15.50		12.75
4.	Road of local significance	64,921.48	Railway viaduct	15.00		14.49

3.2.5. Territory of Panevėžys Distr. Mun.

The parameters of the route. At the territory of Panevėžys Distr. Mun., Alternatives 1-2 of the planned railway route coincide and stretch through the central and western territory of Panevėžys Distr. Mun. to 116+750 KM. A double-track, electrified railway line is planned throughout the territory of the municipality.

Panevėžys Passenger Station of the 1435 mm gauge track. The passenger station of the 1435 mm gauge track is envisaged at the planned 1435 mm gauge railway line, crossing of the 1520 mm gauge railway line Radviliškis – Panevėžys – Obeliai – state boarder and Road of National Significance A9 Panevėžys – Šiauliai, near Rudikėliai (104+700 KM of the route). Road transportation to the 1435 mm gauge track railway line passenger station is

organised by Road A9 of national significance Panevėžys – Šiauliai and Regional Road No 3013 Berčiūnai – Dragonys – Gailiūnai from the village of Berčiūnai.

The planned station consists of two main tracks (No I and No II), two reception and departure tracks (No 3 and No 4), and sidetrack-blind pass No 5 intended for the standing of railway infrastructure rolling stock. The usable length of the main tracks and reception and departure tracks is planned to be 1050 m and that of the sidetrack blind pass is planned to be 300 m. At the external side of the outmost reception and departure tracks, 400 m long platforms are planned. Connection between the platforms of both stations is ensured by the planned underground passenger crossing. Four protective blind passes No 6, No 7, No 8, and No 9 with a usable length 50.0 m each are envisaged at the station for diverting and stopping uncontrolled trains, detached train parts, and separate rolling stock.

Intermediate station (passing station). An intermediate station (passing station) for trains to pass each other is planned to be constructed in the territory of Panevėžys Distr. Mun. near the 1435 mm gauge Panevėžys Railway Station. It is planned that at this intermediate station, a passenger train running at a higher speed (up to 250 km/h) will pass a freight train running at a lower speed (up to 120 km/h). The kilometre mark of the building column line of the intermediate station is 105+533 KM. The place of the intermediate railway station – passing point – was selected taking into account the entirety of the route horizontal elements, existing ground terrain, longitudinal profile, and distances as well as the traffic intensity between the train separation points.

The planned intermediate station (passing station) consists of two main tracks (No I and No II) and two reception and departure tracks (No 3 and No 4). The usable length of the main tracks and reception tracks is planned to be 1050 m. At the intermediate stations, it is planned to expand the inter-track spaces to 5.6 m. Four protective blind passes No 5, No 6, No 7, and No 8 with a usable length 50.0 m each are envisaged at the station for diverting and stopping uncontrolled trains, detached train parts, and separate rolling stock.

Panevėžys Freight Station of the 1435 mm gauge track. The 1435 mm gauge Panevėžys Freight Station is planned to be constructed upon the emergence of a potential freight flow. The aforementioned station would be constructed by expanding the intermediate station (passing station). The kilometre mark of the building column line of the station is 105+533 KM. For the freight station, two additional tracks No 13 and No 14 with a usable length of 1,050 m would be constructed. By means of a connecting track the station would be connected with the planned Panevėžys Railway Freight Terminal.

Road transportation to the 1435 mm gauge freight station would be organised by Road A9 of national significance Panevėžys – Šiauliai and Regional Road No 3013 Berčiūnai – Dragonys – Gailiūnai from the village of Berčiūnai.

Panevėžys Railway Freight Terminal. Panevėžys Railway Freight Regional Terminal is planned to be constructed upon emergence of a potential investor and sufficient freight flow. It is planned that Panevėžys Railway Freight Regional Terminal would be an inter-modal railway freight terminal envisaged near Gustoniai Railway Station (Auriliškiai, Rudikėliai, Panevėžys Distr. Mun.), at 103+500 KM of the planned 1435 mm gauge railway line.

The planned inter-modal railway freight terminal would be intended for the loading of containers over the 1435 mm gauge railway track – 1520 mm gauge railway track – road transport. For this purpose, a 1435 mm gauge freight station would be built near Rudikėliai and Berčiūnai (105+533 KM) and the existing 1520 mm gauge Gustoniai Station would be adapted. A 1520 mm gauge siding would be built from Gustoniai Freight Station to the

inter-modal railway terminal. In longer term, a viaduct of the Main Road A9 Panevėžys – Šiauliai over the existing 1520 mm gauge railway line is envisaged (Annex 0).

Structures. The structures (railway and road viaducts, bridges, green bridges and animal passes) planned in the territory of Panevėžys Distr. Mun. as well as their locations and parameters are presented in Table Table 5. The building points of animal passes are presented in Annex 0.

Table 5. Structures in the territory of Jonava Distr. Mun. and their parameters

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
1.	Green bridge	66,208.15	Green bridge	31.00		50.00
2.	Road No 3022	68,602.78	Railway viaduct	15.18		14.50
3.	Road No 1204	73,207.16	Road viaduct	59.00		12.75
4.	Road No 3023	76,259.58	Railway viaduct	15.00		14.50
5.	Green bridge	77,000.00	Green bridge	31.00		50.00
6.	Road of local significance	79,107.53	Road viaduct	62.83		9.50
7.	Road A8	82,924.70	Railway viaduct	80.00		11.00
8.	Road of local significance	89,353.65	Railway viaduct	11.10		14.61
9.	Animal pass	91,201.88	Green bridge	31.00		50.00
10.	Road No 195	94,955.21	Road viaduct	15.75		12.75
11.	Road A17	94,955.22	Road viaduct	79.00		12.75
12.	Road of local significance	99,285.85	Railway viaduct	12.75		16.41
13.	Nevėžis	99,531.15	Bridge	100.00	37.010	12.50
14.	Road No 3002	100,593.53	Railway viaduct	18.00		16.44
15.	Road A9	102,611.18	Railway viaduct	56.00		12.50
134	Railway line Radviliškis – Panevėžys – Obeliai – the state border	102,981.96	Railway viaduct	18.50		13.45

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
136	Road of local significance	103,731.90	Railway viaduct	20.00		18.09
143	Road of local significance	110,449.58	Railway viaduct	12.75		13.31
148	Road No 3013	115,904.06	Railway viaduct	16.00		13.17

For the electrification of the railway line, it is planned to construct an electric traction substation at 110+000 KM.

3.2.6. Territory of Pasvalys Distr. Mun.

The parameters of the route. At the territory of Jonava Distr. Mun., Alternatives 1-2 of the planned railway route coincide and stretch through the western territory of Pasvalys Distr. Mun. to 160+500 KM. From 160+500 KM, the routes separate:

- ▶ Alternative No 1 stretches towards the territory of the village of Dagiai and ends at 168+390 KM;
- ▶ Alternative No 2 stretches towards the territory of the village of Kamardė and ends at 167+120 KM.

A double-track, electrified railway line is planned throughout the territory of the municipality.

Intermediate station (passing station). A reserve intermediate station (passing station) for trains to pass each other is planned in the territory of Pasvalys Distr. Mun. between the town of Joniškėlis and Meškalauskis. The kilometre mark of the building column line of the intermediate station would be 134+461 KM. It should be noted that the intermediate station in the territory of Pasvalys Distr. Mun. would be constructed only in case of additional demand, if it is established that the arrangement of the intermediate stations in Kėdainiai Distr. Mun. and Panevėžys Distr. Mun. is insufficient. It should also be noted that in the long term of Rail Baltica project, upon the emergence of a sufficient local freight and passenger flow, passenger and freight transport operations could be performed at the intermediate station, for which purpose loading ramps, platforms, and waiting pavilions would be built.

Structures. The structures (railway and road viaducts, bridges, green bridges and animal passes) planned in the territory of Pasvalys Distr. Mun. as well as their locations and parameters are presented in Table Table 6 and Table Table 7. The building points of animal passes are presented in Annex 0.

Table 6. Structures in the territory of Pasvalys Distr. Mun. and their parameters (Alternative 1)

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
1.	Road of local significance	118,620.18	Road viaduct	15.50		9.50

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
2.	Green bridge	120,838.38	Green bridge	31.00		50.00
3.	Road of local significance	123,797.88	Road viaduct	16.22		9.50
4.	Road No 2904	125,376.03	Road viaduct	61.29		12.75
5.	Narrow-gauge railway	127,593.79	Railway viaduct	80.00		11.71
6.	Road of local significance	128,685.58	Railway viaduct	12.84		13.95
7.	Road No 150	133,767.21	Road viaduct	59.00		12.75
8.	Connecting track	133,768.80	Road viaduct	15.50		12.75
9.	Narrow-gauge railway	133,777.91	Road viaduct	10.00		12.75
10.	Narrow-gauge railway	135,521.94	Railway viaduct	15.50		6.91
11.	Road of local significance	135,540.67	Road viaduct	15.50		10.59
12.	Mūša	137,578.88	Bridge	225.00	32.200	11.00
13.	Road No 3109	139,164.55	Road viaduct	15.50		10.08
14.	Animal pass	142,591.35	Green bridge	31.00		50.00
15.	Road of local significance	144,544.90	Road viaduct	15.50		12.75
16.	Road of local significance	147,322.80	Road viaduct	15.40		12.85
17.	Road No 3107	151,190.90	Railway viaduct	16.00		14.81
18.	Road No 209	152,535.96	Railway viaduct	16.00		15.07
19.	Road No 3104	153,592.70	Railway viaduct	24.00		14.90
20.	Road No 3105	160,837.90	Road viaduct	19.36		12.75
21.	Green bridge	163,867.81	Green bridge	31.00		50.00
22.	Road of local significance	165,696.28	Railway viaduct	19.27		15.31
23.	Road of local significance	167,331.94	Railway viaduct	12.75		14.46
24.	Mūša	168,390.00	Bridge	150.00	15.000	11.00

Table 7. Structures in the territory of Pasvalys Distr. Mun. and their parameters (Alternative 2)

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)

Item No	Obstacle	Stake, KM	Solution	Dimension of the structure (width, length of the bridge, viaduct)		
				Length of the bridge, viaduct (m)	Bottom alt.	Length of the bridge (m)
1.	Mūša	167,120.00	Bridge	150.00	15.000	11.00

3.3. Description of forming pollutants

It is planned that pollutants will form during the period of the construction and operation of the railway line. A detailed description of the pollutants to form is presented in Sections 4 and 5.

3.4. Description of waste formation and waste management

Construction waste will form in the course of the construction works of the railway line, rearrangement of roads and railways and their structures, dismantling of enclosures, signal poles, and road signs of roads, and demolition of temporary structures. In accordance with the Waste Management Regulations, the wastes to form shall be classified in Section 17 “Construction and demolition waste (including soil excavated from contaminated sites)” of the List of Waste: 17 01 01 – concrete, 17 02 01 – wood, 17 02 02 – glass, 17 02 03 – plastic, 17 03 02 – bituminous mixtures, 17 04 05 – iron and steel, 17 05 04 – soil and stones, and other waste. It should be noted that at this stage of the project, it is not possible to accurately determine the types and quantities of waste to form. Therefore, such quantities can be determined only in the course of the preparation of the planned railway line technical designs. It is planned to manage all that waste so that prevent it from damaging the environment. All the construction waste will be transferred to waste management entities – undertakings or other legal entities managing waste in accordance with the procedure established by the Law on Waste Management and other legal acts of the Republic of Lithuania.

It should also be noted that during construction, in the course of the construction of the railways and roads, large quantities of excess earth, fertile soil, crushed stone, gravel, and sand will form. All of these materials are planned to be used for the building of railway and road embankments and/or track formations as well as for the plantation of areas damaged during construction.

4. ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED ECONOMIC ACTIVITY AND MEASURES TO MITIGATE THE IMPACT

4.1. Ambient air

Negative impact during the construction period

Direct adverse short-term impact to the ambient air is planned during the period of the construction of the railway line due to the operation of construction machinery and heavy vehicles (trucks, cranes, graders, loaders, and other machinery). During these period, non-intense emissions of carbon dioxides (CO₂), carbon monoxides (CO), non-methane volatile organic compounds (NMVOC), nitrogen oxides (NO_x), di-nitrogen monoxides (N₂O), and solid particles (KD_{2,5}, KD₁₀) into the ambient air are planned.

It should be noted that the emissions into the air planned during the construction period will take place in open areas, where air pollutants dissipate sufficiently quickly owing to wind and a low built-up density (no canyon effect is planned). Also, in comparison to pollution in central streets of major cities, the planned emission into the air will take place from a relatively small number of sources (about 10–15). Therefore, the negative impact will be short-term and will not exceed the limit rates of air pollution. During the construction period, no cumulative, synergistic negative impact is expected.

However, it should be noted that during the construction period, dustiness in public and residential areas may increase due to the traffic of heavy trucks.

Negative impact during the operation period

During the period of the operation of the railway line, no negative impact on the ambient air is expected. Taking into account the fact that the whole planned line will be electrified, i.e. no locomotives with internal combustion engines will be used, no emissions into the air from railway vehicles are expected, and such emissions are not considered any further.

It is also important to note that due to the fact that the traffic of electrified trains planned in the railway line is to take over a part of passengers and freights currently transported by road, a decrease in emission into the air from transport, i.e. long-term positive impact in the territories of the Republic of Lithuania and the Republic of Latvia, is expected.

Measures to mitigate the negative impact

The roads planned to be used during the construction period shall be maintained so that to prevent any increase in dustiness in the public and residential environment. In order to reduce the dustiness, the roads, which will be used for the traffic of heavy trucks engaged in construction, should have asphalt or concrete pavement. When roads with gravel-sand surfaces are used for the construction of the railway line, it is necessary to apply dustiness mitigation measures, such as gravel-sand surface binders (water-absorbing salts, calcium lignosulphonate, and bituminous emulsion binders).

4.2. Surface waters

Environmental impact assessment and forecasting methods involved

The available surface water monitoring data as well as data from GIS and data of the database of the Special Land Use Conditions of the territory of the Republic of Lithuania M 1:10 000 [11] were used for the assessment. In accordance with the Description of the Procedure for the Determination of the Protective Areas of Surface Water Bodies and Coastal Protective Strips, the boundaries of protective areas of surface water bodies and coastal protective strips shall be assessed. In those cases when the proposed economic activity infringes the requirements established in the Special Conditions for the Use of Land and Forest, measures for the mitigation of negative impact shall be provided for.

Negative impact during the construction period

During the construction and operation period, a negative impact is possible due to the operation of leaky construction equipment and vehicles or due to the release of petroleum products or their waste into surface waters

at the time of emergencies. In case of such releases, a negative impact on the quality of surface waters, biodiversity, and public health is possible.

The hydrological regime of water bodies (rivers, channels) to be crossed may be infringed. During the construction period, water channels, reclamation ditches, and water removal ditches may be rearranged, i.e. water removal, flow, and direction may be changed. These solutions may have a long-term negative impact on the hydrological regime of surrounding water bodies and wetlands.

When building passes through and constructing bridges over the water bodies to be crossed as well as when building temporary water dams and water bypasses, the hydrological regime of the water bodies to be crossed, i.e. the water flow, direction, and level, may be temporarily changed. During these works, at the places of the bridge or pass, water turbidity may increase, slopes of the water body may be damaged, and the erosion of the slopes may increase if they are not arranged properly. Due to the above factors, a medium-term negative impact on the flora and fauna of the water bodies is possible.

A high probability of the occurrence of pollution of water bodies and accidents will remain during the whole period of construction. A negative impact is possible due to construction vehicles and equipment as well as due to the release of construction materials and wash-out of fertile soil and earth into surface waters. These factors may have a direct long-term negative impact on public health and aquatic flora and fauna. Also, this pollution of water bodies and accidents may have an indirect long-term impact on public health and condition of the water of surrounding water bodies.

Negative impact during the operation period



During the period of the operation of the railway line, a long-term and medium-term negative impact on surface water bodies and public health is possible due to accidents involving railway vehicles (incidents, train collisions, and leaky wagons and locomotives) as well as pollution of water bodies related to them. At the time of railway accidents, surface waters may be polluted by dangerous goods carried by railway because 25-40% of goods transported by railway are dangerous goods (oil and petroleum products, liquid and bulk fertilisers, chemicals, etc.).

Measures to mitigate the negative impact

In order to avoid a negative impact on surface waters as well as to reduce and compensate the impact or to eliminate its consequences, protective plans were drawn up for the construction, operation, and emergency periods (Table Table 8–Table Table 10).

Table 8. Surface Water Protection Plan for the construction period

Item No	Protective measure	Description of the protective measure
1.	Organisational	1. The following is prohibited in the coastal protective strips of surface water bodies: (a) To store railway construction materials, except for cases of emergencies, when the construction materials or chemicals are intended for emergency response or elimination of its consequences; (b) To remove vegetable soil, except for the cases established in the Law of the Republic of Lithuania on Protected Areas – in the cases of the construction of bridges or passes; (c) To park motor vehicles closer than 25 meters from the bank of the water body;

Item No	Protective measure	Description of the protective measure
		<p>(d) To carry out basic clear-felling of forest, destruction of the forest floor.</p> <p>2. In those cases when a water body is to be crossed and it is necessary to build a temporary site, it is recommended to build a geo-textile barrier.</p>   <p>3. It is prohibited to regulate natural rivers and to change river beds.</p> <p>4. In order to reduce possible pollution of surface water and fertile soil, it is necessary to collect used lubricants from construction mechanisms.</p> <p>5. During construction, it is necessary to keep material and means absorbing petroleum products (sand, saw-dust, special containers for the collection of lubricants).</p> <p>6. The specified environmental protection measures shall be applied during the construction period.</p>
2.	Preventive and temporary measures for the protection against erosion and wash-outs.	The following shall be used for surface stabilisation: mulching, temporary sowing, and use of protective geo-textile coating. The use of temporary slope stabilisation measures is recommended when it is planned to keep the slopes open for a month or longer.



Item No	Protective measure	Description of the protective measure
		  <p data-bbox="619 1111 1516 1189">Places of the release of effluents from drainage pipelines or chutes shall be built with measures reducing the energy of the water flow.</p> <p data-bbox="619 1218 1469 1296">It is necessary to build diverting embankments to divert the effluent flow from the construction site and to protect the slopes of pits and trenches.</p>
3.	Temporary	<p data-bbox="619 1344 1452 1464">In order to reduce the possibility of the release of sludge into surface waters, it is recommended to build protective enclosures, which would contain sludge but would be permeable to water.</p>

Table 9. Surface Water Protection Plan for the operation period

Item No	Protective measure	Description of the protective measure
1.	For surface run-off	<p data-bbox="619 1704 1516 1872">It is prohibited to release surface run-off from bridges directly into water bodies. Run-off collected from the surfaces of bridges should be directed to grass-covered trenches built at the approaches of the bridge, infiltration wells, or other surface run-off treatment facilities.</p> <p data-bbox="619 1906 1485 2027">At railway sections near surface water bodies, it is recommended to use measures to prevent pollutants from direct release into surface or ground water in the event of a spill of dangerous goods.</p> <p data-bbox="619 2060 1490 2134">For the initial treatment of run-off from the railway, it is recommended to build grass-covered railway trenches with a dense grass cover in order to</p>

Item No	Protective measure	Description of the protective measure
		disperse the run-off flow and slow down the flow.

Table 10. Surface Water Protection Plan for the emergency period

Item No	Protective measure	Description of the protective measure
1.	Emergency spill control facilities (to contain spilled materials)	For the containment of spills of dangerous materials, it is necessary to use mechanical traps, dams, thresholds, and embankments. For the effective collection of petroleum hydrocarbons, it is possible to use free-flowing sand, sand bags (to block or divert the flow), and absorbent (absorbent granules, mats, sleeves, and mattresses).

4.3. Subsurface resources and underground and ground water; mineral deposits

Environmental impact assessment and forecasting methods involved

The assessment includes the analysis of the available data and information from the performed engineering geological explorations, geophysical research, drills in the karst region, and underground water.

Irregularities of the geological structure of the soil (landslides, subsidence, and other effects) are limited to the use of the available data for planning, data of the performed exploratory geological investigations, investigations of the suitability of the territory for construction, and GIS calculations.

When performing the assessment of the territories of the railway, the boundaries of the karst region scheme were taken into account. In order to avoid geological conditions unsuitable for construction, the route of the railway line in the karst region near the border with Latvia is assessed.

When planning the railway line in the territory of the karst region, geophysical investigations are performed. According to the results of the aforementioned investigations, 20–30 m deep geological drills are made. For the evaluation of the data from the drills, granulometric studies are performed, and underground water studies are carried out for the evaluation of the underground water.

The assessment of deposits of mineral resources, analysis of available data, use of GIS, and assessment of the position of the railway route alternatives in respect of the deposits of mineral resources are carried out. The possibilities to use and exploit the resources of the deposits of mineral resources to be crossed for the construction of the railway are evaluated.

When performing the assessment of subsurface resources, exploratory engineering geological and geotechnical (EGG) investigations are performed, the purpose of which is to determine the engineering geological conditions of the site in advance. The tasks of the investigation: to drill investigation wells and to take soil samples for granulometric analysis and name identification. Exploratory EGG investigations are performed in accordance with STR 1.04.02:2011 “Engineering geological and geotechnical investigations”.

The impact on geological components, including ground and underground waters, was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative.

During the construction period

During the period of construction of the railway line, the significant direct short-term impact is possible due to the damage of the geological structure of soil. This impact may manifest itself in the subsidence of the railway line and adjacent territories, slides of slopes, and irregularities of the structures of the railway facilities (tracks and bridges) under construction. All these effects may have a medium-term synergistic impact and cause accidents and other emergencies during the construction period.

During the period of the construction of the railway line, deposits of mineral resources and operations in them may be contaminated or hindered otherwise. The aforementioned factors may occur in case the railway line is constructed above deposits of mineral resources or near their territories. All these factors may have a significant direct, long-term and permanent impact on the deposits of mineral resources.

During the operation period

During the period of the operation of the railway line, the significant direct long-term impact is possible due to the damage of the geological structure of soil. This impact may manifest itself in depressions of the railway line and adjacent territories, slides of slopes, and irregularities of the structures of the railway facilities (tracks and bridges) during the operation of the railway line. All these effects may have a long-term synergistic impact and cause train accidents and other emergencies during the operation period.

It is also important to note that in case of Alternative 1, at 165–168 km of the route, karst cavities are possible in the karst region. Therefore, a significant, both direct and indirect, cumulative, synergistic long-term negative impact on the environment is likely. Depressions may cause damage to the structure of the railway infrastructure as long as several kilometres. In case of derailment, ground and underground waters would be contaminated. The contamination of underground waters would cause contamination of underground waters not only in the territory of the Republic of Lithuania, but also, due to the direction of underground water flows, in the territory of the Republic of Latvia.

It is important to note that even without depressions, the derailment of train wagons in the karst region (due to the specific geological structure) and spill of dangerous goods (petroleum products, etc.) from the wagons would also cause the contamination of ground and underground waters, i.e. long-term negative impact on earth interior. Also, during the period of the operation of the railway line, underground waters and water sites may be contaminated. Therefore, a long-term negative impact on public health is possible.

During the period of the operation of the railway line, deposits of mineral resources and operations in them may be hindered. The aforementioned factors may occur should the railway line is constructed and operated above deposits of mineral resources or near their territories. All these factors may have a significant direct, long-term and permanent impact on the deposits of mineral resources.

It should be noted that the karst phenomena and their impact identified in the territory of the Republic of Lithuania may also manifest themselves in the territory of the Republic of Latvia, to which karst phenomena are also typical.

Measures to mitigate the negative impact

In the course of the preparation of the technical design of the railway line, it is necessary to carry out geological investigations and to thoroughly investigate the karst phenomena. Where potential karst sites are detected, the structure of the railway line must be reinforced.

In order to protect underground waters and water sites from contamination, it is necessary to prohibit the arrangement of any construction sites in water site protective areas. The building of storages of hazardous goods and petroleum products, machinery repair and storage sites, and other construction facilities which may have a negative impact on ground and underground waters and on water sites should be prohibited in the protective areas of water bodies unless otherwise is established in preparing the technical design.

In order to avoid the contamination of ground and underground waters, it is necessary to ensure that only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.

In those cases when crossing a deposit of mineral resources is inevitably planned due to other aspects decisive for the position of the route, the deposit of mineral resources must be mined out in accordance with the established procedure.

In order to avoid accidents, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the operation of the railway.

4.4. Fertile soil

Environmental impact assessment and forecasting methods involved

The impact on fertile soil was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative. In assessing the possible impact on fertile soil, the following was used as guidance:

Legal acts:

- ▶ Resolution No 343 of the Government of the Republic of Lithuania dated 12 May 1992 “On the approval of the Special Conditions for the Use of Land and Forest”;
- ▶ Order No D1-694 of the Minister of Environment of the Republic of Lithuania dated 17 November 2009 “Regarding the approval of the environmental protection normative document LAND 9-2009 – Environmental requirements for the management of areas contaminated with petroleum products”;
- ▶ Hygiene Standard HN 60:2004 “Maximum permissible concentrations of hazardous chemical substances”;
- ▶ Resolution No 205 of the Government of the Republic of Lithuania dated 24 February 1999 “Regarding the Land Valuation Procedure”;

Investigations and studies:

- ▶ P. Baltrėnas, P. Vaitiekūnas, Ž. Bačiulytė. *Geležinkelio transporto taršos sunkieji metalai dirvožemyje tyrimai ir įvertinimai* (Investigations and assessments of the contamination of fertile soil with heavy metals from railway transport); Ž. Bačiulytė *Dirvožemio taršos sunkieji metalai tyrimai 2. Tyrimo rezultatai* (Investigations of contamination of fertile soil with heavy metals 2. The results of investigation);
- ▶ VGTU investigations at roads and railways: Baltrėnas P., Kazlauskaitė A., Mikalajūnė A. *Aplinkos apsauga keliuose* (Environmental protection at roads), VGTU, Vilnius, 2012;
- ▶ The type and granulometric composition of fertile soil is described in accordance with the Lithuanian Fertile Soil Map M 1:300000, the database of the National Land Service, 2012;
- ▶ Pivoriūnas D. *Kelių poveikio dirvožemiams vertinimo metodika* (The methodology for the evaluation of the impact of roads on fertile soils). Vilnius, 1995.

Negative impact during the construction period

During the period of the construction of the railway line, it is planned to remove the fertile soil layer at the area of the construction of the railway line. Thus a long-term negative impact on the micro-flora of fertile soil would be caused.

There is a high probability that a part of fertile soil will be compressed by construction machinery and trucks and contaminated with construction materials and waste. Besides, the contamination of fertile soil is possible in case of operation of leaky construction mechanisms and vehicles, spill of construction materials or petroleum products during the construction period. These factors would have a long-term negative impact on fertile soil, the micro-flora of fertile soil, and public health.

Negative impact during the operation period

During the period of the operation of the railway line, in case of accidents involving railway vehicles (incidents, train collision, operation of leaky wagons and locomotives), long-term and medium-term impact is possible on fertile soil and, as a result of the contamination of fertile soil, on public health.

Measures to mitigate the negative impact

Prior to the start of construction works, all fertile soil in the area of construction must be removed and stored separately from other materials in storage piles and be protected from contamination and rain as well as wash-out of surface waters.

In order to avoid contamination of fertile land and accidents, all requirements for construction machinery, rolling stock, infrastructure, and traffic control must be complied with in the course of the operation of the railway.

4.5. Landscape

Environmental impact assessment and forecasting methods involved

The impact on the landscape was assessed for the period of construction of the railway line and for the period of operation of the railway line, in the case of each identified alternative. The assessment was performed in accordance with the following:

- ▶ Order No D1-446 of the Minister of Environment of the Republic of Lithuania dated 21 May 2012 “Regarding the preparation of the National Landscape Management Plan”;
- ▶ The Description of the Lithuanian Landscape Policy;

- ▶ The European Landscape Convention (Florence, 2002);
- ▶ Recommendation CM/Rec(2008)3 of the Committee of Ministers to member states on the guidelines for the implementation of the European Landscape Convention (Adopted by the Committee of Ministers on 6 February 2008 at the 1017th meeting of the Ministers' Deputies);
- ▶ The Concept of the National Landscape Management Plan;
- ▶ The National Landscape Management Plan;
- ▶ The Guidelines for Landscaping for State Roads and Railways.

Negative impact during the construction period

During the period of the construction of the railway line, a short-term impact on the landscape is planned due to the use of construction equipment (cranes, scaffolds, etc.) as well as due to land terrain change works and arrangement of fertile soil storage piles. This impact will be eliminated at the end of the construction period.

Besides, the landscape of the areas will be changed in the course of the arrangement of track formations, bridges and viaducts of the railway line, passenger and freight stations as well as rearrangement of roads. Due to these factors, a long-term negative impact on the landscape is expected.

Negative impact during the operation period

During the period of the operation of the railway line, a negative impact on the landscape is planned due to the expected train traffic in areas where no train traffic was organised before.

It is important to note that in the assessment in respect of the diversity and typology of the landscape, a direct long-term and permanent synergistic negative impact is expected on all areas of the landscape: terrain, physiomorphotops, biomorphotops, technomorphotops, videomorphotops, and geochemical toposystems due to the crossings of the planned railway line with the existing engineering and transport infrastructure.

Measures to mitigate the negative impact

In order to mitigate the negative impact on the landscape, in the course of the preparation of the technical design of the railway line and selecting the structures of railway bridges, noise reduction measures, and other structures, it is necessary to take into account the landscape characteristic to the area.

In order to reduce the anthropogenic contamination of the landscape, the railway line should be planed with railway plantations.

4.6. Protected areas

Environmental impact assessment and forecasting methods involved

In the assessment of the impact of the planned railway on the protected areas of national and European significance, the analysis of available data was performed. With the use of GIS, the schemes of the situation of the protected areas with the planned railway were prepared.

The protected areas which may experience a significant impact from the planned railway line were established upon the identification of the territories of the European ecological network Natura 2000, reserves, parks, biosphere

proving grounds, and other protected areas falling within 3 km strips of the alternatives of the planned railway line routes.

The following was used for the GIS analysis:

- ▶ The data of the State Cadastre of Protected Areas of the Republic of Lithuania;
- ▶ The specified general solutions of the Special Plan of the Planned Railway Line;
- ▶ GDR10LT – geo-reference spatial data of the territory of the Republic of Lithuania M 1:10 000;
- ▶ ORT10LT – digital raster ortophoto-map of the territory of the Republic of Lithuania M 1:10 000;
- ▶ Data of SŽNS_DR10LT – the special database of the Special Land Use Conditions of the territory of the Republic of Lithuania M 1:10 000;
- ▶ Data of LTDBK50000-SR – the space view map colour raster of the territory of the Republic of Lithuania M 1:50 000;
- ▶ Data of the Protected Species Information System (SRIS);
- ▶ GIS data of natural habitats of European Community importance.

Expert assessment was performed in respect on the barrier to be formed by the new railway transport infrastructure to the migration of animals or fragmentation of habitats and integrity of the structure of the natural carcass.

Since the railway line under assessment crosses the Neris River SCI, a Natura 2000 site, at the territory of Jonava Distr. Mun., the inventory of the protected values was performed in the potential area of the impact of the proposed economic activity, i.e. at a 3 km section downstream the river and a 1 km section upstream the river from the point of the potential crossing of the river by the railway.

The impact on the protected areas was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative.

Negative impact during the construction and operation period

Impact on Natura 2000 sites:

Neris River SCI. It is crossed by the planned railway line at 20.0-21.0 km, in the territory of Jonava Distr. Mun. The following are protected in the Neris River SCI: 3260 – Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation; Salmo salar; Rhodeus sericeus; Cobitis taenia; Cottus gobio; Ophiogomphus cecilia; Aspius aspius; Lutra; Lampetra fluviatilis. The area of the protected area: 2398.52 ha.

Impact during the construction period: A medium-term negative impact is possible during the period of the construction of the railway line (the bridge over the Neris River). A negative impact may arise from the change of the hydrological regime (damming, water bypasses), emergency situations (contamination of water), damage to river slopes and banks (possible erosion in future), and change of the river bed. The detailed impact is described in Sections 4.6 and 4.7.

Impact during the operation period: A medium-term negative impact is possible during the period of the operation of the railway line. A negative impact may arise due to train accidents, incidents, and other emergency situations (contamination of water).

Rūneikiai Forest SCI. It is located 734 m from the stretch 54.0-55.0 km of the planned railway line, in the territory of Kėdainiai Distr. Mun. The following is protected in the Rūneikiai Forest SCI: 7230 – Alkaline fens; 9020 – Fennoscandian hemiboreal natural old broad-leaved deciduous forests. The area of the protected area: 56.84 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the Regulations of Community Habitats or Sites Important to the Protection of Birds and the requirements for the protection and management of territories specified therein.

Lepšynė Forest SCI. It is located 50 m from the stretch 130.0–131.0 km of the planned railway line, in the territory of Pasvalys Distr. Mun. The following is protected in the Lepšynė Forest SCI: 9020 – Fennoscandian hemiboreal natural old broad-leaved deciduous forests; 9080 – Fennoscandian deciduous swamp woods. The area of the protected area: 206.60 ha.

Impact during the construction period: A medium-term direct negative impact is possible during the period of the construction of the planned railway line. A negative impact may arise due to the destruction of forest or its contamination with construction materials during the period of construction.

Impact during the operation period: A medium-term negative impact is possible during the period of the operation of the railway line. A negative impact may arise due to train accidents, incidents, and other emergency situations (contamination of forest).

Grūžiai Forest (SCI). It is located 131 m from the stretch 143.0–144.0 km of the planned railway line, in the territory of Pasvalys Distr. Mun. Grūžiai Forest is classified as 9020 – Fennoscandian hemiboreal natural old broad-leaved deciduous forests. The area of the protected area: 78.87 ha.

Impact during the construction period: No impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the Regulations of Community Habitats or Sites Important to the Protection of Birds and the requirements for the protection and management of territories specified therein.

An indirect negative impact is possible. A negative impact may arise due to the destruction of forest or its contamination with construction materials during the period of construction.

Impact during the operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the Regulations of Community Habitats or Sites Important to the Protection of Birds and the requirements for the protection and management of territories specified therein.

A negative impact may arise due to train accidents, incidents, and other emergency situations (contamination of forest).

Impact on reserves:

Kulva Geomorphologic Reserve. It is located 2023 m from the stretch 22.0–23.0 km of the planned railway line, in the territory of Jonava Distr. Mun. The objective of the establishment of the Reserve is the protection of the

moraine mound and the terrain of the erosion valley of the Neris river. The significance of the Reserve: National. The area of the protected area: 800.60 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the requirements of the Law on Protected Areas.

Šėta Botanical Reserve. It is located 1165 m from the stretch 47.0–48.0 km of the planned railway line, in the territory of Kėdainiai Distr. Mun. The objective of the establishment of the Reserve is to preserve the unique deciduous forest characteristic to the central Lithuania, which has retained its primitive structure. The significance of the Reserve: Municipal. The area of the protected area: 193.08 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the requirements of the Law on Protected Areas.

Žeimeliai Forest Oak Genetic Reserve. It is located 59 m from the stretch 49.0–50.0 km of the planned railway line, in the territory of Kėdainiai Distr. Mun. The purpose of the establishment of the Reserve is to preserve the genetic diversity of the population of the pedunculate oak (*Quercus robur* L.) under the changing environmental conditions and to ensure the self-reproduction of this population or its reproduction with the use of propagating material. The significance of the Reserve: National. The area of the protected area: 15.27 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the solutions of the planned railway do not infringe the requirements of the Law on Protected Areas.

Runeikiai Forest Telmathologic Reserve. It is located 734 m from the stretch 49.0–50.0 km of the planned railway line, in the territory of Jonava Distr. Mun. The purpose of the establishment of the Reserve is to preserve the ecosystem of the remaining intermediate-type marsh, its hydrological regime, flora and fauna (cranes, eggars, and rare insects). The significance of the Reserve: Municipal. The area of the protected area: 56.84 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the planned railway do not infringe the requirements of the Law on Protected Areas.

Sanžilė Landscape Reserve. It is located 1958 m from the stretch 101.0–102.0 km of the planned railway line, in the territory of Panevėžys Distr. Mun. The significance of the Reserve: Municipal. The area of the protected area: 805.24 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the planned railway do not infringe the requirements of the Law on Protected Areas.

Lepšynė Botanical Reserve. It is located 50 m from the stretch 130.0–131.0 km of the planned railway line, in the territory of Pasvalys Distr. Mun. The objective of the establishment of the Reserve is to preserve the vegetation complex of the broad-leaved forest of Mūša-Nemunėlis lowlands with habitats of rare plant species. The significance of the Reserve: National. The area of the protected area: 206.60 ha.

Impact during the construction period: A medium-term direct negative impact is possible during the period of the construction of the planned railway line. A negative impact may arise due to the destruction of forest or its contamination with construction materials during the period of construction.

Impact during the operation period: A medium-term negative impact is possible during the period of the operation of the railway line. A negative impact may arise due to train accidents, incidents, and other emergency situations (contamination of forest).

Girelė Botanical Reserve. It is located 2459 m from the stretch 136.0–137.0 km of the planned railway line, in the territory of Pasvalys Distr. Mun. The objective of establishing the Reserve is to preserve the reference sample of natural meadows with plants included on the Red List (*Dactylorhiza baltica*, Anthoxanthum meadows with *Carex flacca*, *Dactylorhiza incarnata*, and *Platanthera bifolia*). The significance of the Reserve: Municipal. The area of the protected area: 19.11 ha.

Impact during the construction and operation period: No negative impact is planned because the planned railway line does not cross or border on the protected area. Besides, the planned railway do not infringe the requirements of the Law on Protected Areas.

Measures to mitigate the negative impact

On Natura 2000 sites

The Neris River SCI

Measures to mitigate the negative impact during the construction period:

- ▶ When selecting the technical solutions of the railway bridge over the Neris River, it is necessary to seek minimal contact with the Neris River. It means that bridge supports should not be installed in water, which would affect the hydrological regime and river bed of Neris. Taking this into account, the proposed type of the bridge is cable-stayed bridge.
- ▶ In order to avoid damage to the river slopes and banks (possible erosion in future), it is necessary to reinforce the slopes and plant them with vegetation after the completion of construction works.
- ▶ In order to avoid the contamination of the Neris river, it is necessary to ensure that only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.
- ▶ In order to avoid the contamination of the Neris river, it is necessary to ensure that no construction sites or construction material storage sites are arranged within and near the protected areas.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of water caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Lepšynė Forest SCI

Measures to mitigate the negative impact during the construction period:

- ▶ When building water withdrawal from the railway line, it is necessary to ensure that surface water is not released into the protected area.
- ▶ It is necessary to ensure that no construction work is carried out in the protected area.
- ▶ It is necessary to ensure that no construction materials are released into the protected area.
- ▶ It is necessary to ensure that no construction sites or construction material storage sites are built in the protected area.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Grūžiai Forest (SCI)

Measures to mitigate the negative impact during the construction period:

- ▶ When building water withdrawal from the railway line, it is necessary to ensure that surface water is not released into the protected area.
- ▶ It is necessary to ensure that no construction work is carried out in the protected area.
- ▶ It is necessary to ensure that no construction materials are released into the protected area.
- ▶ It is necessary to ensure that no construction sites or construction material storage sites are built in the protected area.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

On reserves

Kulva Geomorphologic Reserve. No measures are planned because no negative impact on the protected area is expected.

Šėta Botanical Reserve. No measures are planned because no negative impact on the protected area is expected.

Runeikai Forest Telmathologic Reserve. No measures are planned because no negative impact on the protected area is expected.

Sanžilė Landscape Reserve. No measures are planned because no negative impact on the protected area is expected.

Lepšynė Botanical Reserve.

Measures to mitigate the negative impact during the construction period:

- ▶ When building water withdrawal from the railway line, it is necessary to ensure that surface water is not released into the protected area.
- ▶ It is necessary to ensure that no construction work is carried out in the protected area.
- ▶ It is necessary to ensure that no construction materials are released into the protected area.
- ▶ It is necessary to ensure that no construction sites or construction material storage sites are built in the protected area.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Girelė Botanical Reserve. No measures are planned because no negative impact on the protected area is expected.

Conditions for the implementation of the impact mitigation measures

- ▶ In the protected areas, impact mitigation measures should be used before the beginning of the construction and operation of the railway.

- ▶ It is necessary to ensure that the surface water diverted from the railway and its construction sites is not released into the protected areas.

Conclusions

- ▶ The implementation of the environmental impact mitigation measures shall not infringe the requirements of the Law on Protected Areas.
- ▶ In the course of the preparation of the technical designs of the planned railway, which would change the technical parameters of the railway line surface water management, waste management, and other related technical parameters, the environmental impact mitigation measures shall be updated accordingly.

4.7. Flora

Environmental impact assessment and forecasting methods involved

In assessing the impact of the planned railway on the flora, the analysis of the State Cadastre of Protected Areas, forest layouts, and environmental management plans was performed and exploratory and inventory investigations of the flora were carried out. With the use of GIS, the possible schemes of the propagation of flora (forests) were determined.

The flora in the protected areas which may experience a significant impact from the planned railway line was established upon the identification of the territories of the European ecological network Natura 2000, reserves, parks, biosphere proving grounds, other protected areas, and forests falling within 3 km strips of the alternatives of the planned railway line routes.

The following was used for the GIS analysis:

- ▶ The boundaries of the areas of forests of national significance;
- ▶ Data of the Forest Cadastre;
- ▶ The State Cadastre of Protected Areas of the Republic of Lithuania;
- ▶ The specified general solutions of the Special Plan of the Planned Railway Line;
- ▶ GDR10LT – the collection of geo-reference spatial data of the territory of the Republic of Lithuania M 1:10 000;
- ▶ ORT10LT – digital raster ortophoto-map of the territory of the Republic of Lithuania M 1:10 000;
- ▶ SŽNS_DR10LT – the special database of the Special Land Use Conditions of the territory of the Republic of Lithuania M 1:10 000;
- ▶ Data of LTDBK50000-SR – the space view map colour raster of the territory of the Republic of Lithuania M 1:50 000;
- ▶ Data of the Protected Species Information System (SRIS);
- ▶ The natural habitats of European Community importance.

The impact on the flora was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative.

Negative impact during the construction period

In the assessment of the negative impact on the flora in the protected areas as well as on objects of natural heritage, it should be noted that the flora will not be destroyed in the aforementioned territories. The only exception is planned only in the Natura 2000 site – the Neris River – Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation. The biggest habitat was recorded on the left bank of the river near the planned bridge. Therefore, it is possible that a part of this habitat will be destroyed by the structures of the bridge. Also, as a result of a long-term intense sedimentation, a negative impact on the communities of *Ranunculus fluitans* and *Callitriche-Batrachion* is possible due to the reduced amount of light received through the water column.

In other cases, no negative impact on the flora of the protected areas and objects of natural heritage is expected during the period of the construction of the railway line.

It should also be noted that during the period of the construction of the railway, it is inevitably planned to cross (destroy) forests, agricultural lands, and meadows. It is planned that when the railway line crosses the territory of forest or meadows, strips of forests (around 50–100 m in width) located within the railway strip will be removed.

Negative impact during the operation period

In assessing a negative impact on the flora during the period of the operation of the railway line, it should be noted that no negative impact is expected.

Measures to mitigate the negative impact

When transforming the forest land into other lands, forest cutting will be performed at another time than during the vegetation period and at another time than during the hatching period.

4.8. Fauna

Environmental impact assessment and forecasting methods involved

In assessing the impact of the planned railway on the fauna, the analysis of the State Cadastre of Protected Areas, forest layouts, and environmental management plans was performed and exploratory and inventory investigations of the fauna were carried out. With the use of GIS, the possible schemes of the propagation of fauna were determined.

In assessing the impact of the planned railway on the fauna, the analysis of the available data (State Cadastre of Protected Areas, forest layouts, and environmental management plans) was performed. With the use of GIS, the possible schemes of the propagation of fauna were determined.

The protected areas which may experience a significant impact from the planned railway line were established upon the identification of the territories of the European ecological network Natura 2000, reserves, parks, biosphere proving grounds, and other protected areas falling within 3 km strips of the alternatives of the planned railway line routes.

The following was used for the GIS analysis:

- ▶ The boundaries of the areas of forests of national significance;
- ▶ Data of the Forest Cadastre;
- ▶ The State Cadastre of Protected Areas of the Republic of Lithuania;
- ▶ The specified general solutions of the Special Plan of the Planned Railway Line;

- ▶ GDR10LT – the collection of geo-reference spatial data of the territory of the Republic of Lithuania M 1:10 000;
- ▶ ORT10LT – digital raster ortophoto-map of the territory of the Republic of Lithuania M 1:10 000;
- ▶ SŽNS_DR10LT – the special database of the Special Land Use Conditions of the territory of the Republic of Lithuania M 1:10 000;
- ▶ Data of LTDBK50000-SR – the space view map colour raster of the territory of the Republic of Lithuania M 1:50 000;
- ▶ Data of the Protected Species Information System (SRIS);
- ▶ The natural habitats of European Community importance.

Expert assessment was performed regarding the barrier effect of the new railway transport infrastructure on the migration of animals or fragmentation of habitats and integrity of the structure of the natural carcass and loss of the territory. In order to evaluate the migration of animals, local investigations were carried out in identifying animal footprints and trails. Besides, representatives of hunter clubs were surveyed on possible animal migration corridors. Habitats of amphibians and reptiles as well as shelters of other animals, various spawning sites were assessed by monitoring.

The impact on the biodiversity was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative.

Negative impact during the construction and operation period

The potential impact on the fauna was determined by assessing the fauna protected in the protected areas as well as other fauna in forest and other territories, which will be affected during the construction and operation of the railway line.

Fish (*Salmo salar*, *Rhodeus sericeus*, *Cobitis taenia*, *Cottus gobio*, *Aspius aspius*, and *Lampetra fluviatilis*).

Impact during the construction period. A short-term negative impact is possible due to the change of the local habitats of the fish. It is possible that the fish, as especially sensitive representatives of fauna, may temporarily leave the existing local habitats due to the possible noise from construction equipment and contamination of water and air. In the case of *Salmo salar* (from 1 September to 31 October) and *Lampetra fluviatilis* (from 1 April to 31 May), a medium-term negative impact is possible during the spawning due to the disruption of the functionality of the migration corridor. In the case of *Cobitis taenia* and *Rhodeus sericeus*, an impact – destruction of physical habitats – is possible due to construction works.

Impact during the operation period. A long-term negative impact is possible due to the change of the habitats of the fish. It is possible that the fish may abandon the existing local habitats due to the possible noise from trains and changes in river bed.

Lutra lutra

Impact during the construction period: A short-term negative impact is possible due to the change of the local habitats of *Lutra lutra*. It is possible that *Lutra lutra*, as rather sensitive animals, may temporarily leave the existing local habitats due to the possible noise from construction equipment and contamination of water and air.

Impact during the operation period: A long-term negative impact is possible due to the change of the habitats of Lutra lutra. It is possible that Lutra lutra, as rather sensitive animals, may abandon the existing local habitats due to the possible noise from trains.

It should be noted that no traces of Lutra lutra were found upon performing investigations of the habitats of Lutra lutra in the territory under analysis.

Grus grus

Impact during the construction period: A short-term negative impact is possible due to the change of the local habitats of Grus grus. It is possible that Grus grus, as rather sensitive birds, may abandon the existing habitats due to the possible noise from construction equipment and contamination of air.

Impact during the operation period: A long-term negative impact is possible due to the change of the local habitats of Grus grus. It is possible that Grus grus, as rather sensitive birds, may abandon the existing local habitats due to the possible noise.

Insects (Ophiogomphus cecilia, Gryllotalpa gryllotalpa, Lasiocampidae).

Impact during the construction period: A long-term negative impact is possible due to the destruction of the habitats of the insects. It is possible that the insects will die or abandon (if capable) the existing habitats due to the possible mechanical impact of construction equipment.

Impact during the operation period: No negative impact on the habitats of insects is planned. It is hardly likely that the insects may abandon the existing habitats due to the possible noise or vibration.

Mammals (Alces alces, Capreolus capreolus, Lepus europaeus, Sus scrofa, and Vulpes vulpes).

Impact during the construction period: A short-term negative impact is possible due to the change of the local habitats of the mammals. It is possible that the mammals, as rather sensitive animals, will abandon the existing habitats due to the possible noise from construction equipment and contamination of air.

Impact during the operation period: A long-term negative impact is possible due to the change of the local habitats of the mammals. It is possible that the mammals, as rather sensitive animals, may abandon the existing local habitats due to the possible noise and vibration.

Reptiles (snakes, lizards, and water snakes).

Impact during the construction period: A short-term negative impact is possible due to the change of the local habitats of the mammals. It is possible that the mammals, as rather sensitive animals, will abandon the existing habitats due to the possible noise from construction equipment and contamination of air.

Impact during the operation period: A long-term negative impact is possible due to the change of the local habitats of the mammals. It is possible that the mammals, as rather sensitive animals, may abandon the existing local habitats due to the possible noise and vibration.

Upon the installation of the railway line, the whole of which will be enclosed by a fence, a barrier will be formed to the migration of mammals, fragmentation of habitats, and fragmentation of the natural carcass. Therefore, a long-term negative impact is possible.

Taking into account the fact that the whole railway line will be enclosed by a fence, no negative impact due to the death or injuries of mammals by overriding or hitting is planned.

Measures to mitigate the negative impact

It is recommended that the construction works of the bridge over the Neris river (Neris river SCI), which are related to the physical impact on the bottom substrate or severe vibrations, should not be carried out from April 1 to May 31 and from September 1 to October 31. It is also recommended to avoid intense water sedimentation during the construction of poles and to use sediment barriers for the purpose. It is suggested to carry out these works using pontoons.

Birds and large mammals

Measures to mitigate the consequences during the construction period:

- ▶ Not to carry out construction works during the period of breeding of birds and large mammals, i.e. March – June.

Salmo salar

Measures to mitigate the consequences during the construction period:

- ▶ Not to carry out construction works during the period of migration of *Salmo salar*, i.e. September 1 to October 31.
- ▶ It is necessary to prevent the disturbance of the hydrological regime of the Neris river.
- ▶ In order to avoid damage to the river slopes and banks (possible erosion in future), it is necessary to reinforce the slopes and plant them with vegetation after the completion of construction works.
- ▶ It is necessary to prevent the disturbance of the river bed.
- ▶ In order to avoid the contamination of the Neris river, it is necessary to ensure that only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.

Measures to mitigate the consequences during the operation period:

- ▶ For the avoidance of train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Salmo salar, Rhodeus sericeus, Cobitis taenia, Cottus gobio, Aspius aspius, and Lampetra fluviatilis

Measures to mitigate the consequences during the construction period:

- ▶ It is necessary to prevent the disturbance of the hydrological regime of the Neris river.

- ▶ In order to avoid damage to the river slopes and banks (possible erosion in future), it is necessary to reinforce the slopes and plant them with vegetation after the completion of construction works.
- ▶ Not to carry out construction works during the period of migration of *Lampetra fluviatilis*, i.e. from April 1 to May 31.
- ▶ It is necessary to prevent the disturbance of the river bed.
- ▶ In order to avoid the contamination of the Neris river, it is necessary to ensure that only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.

Measures to mitigate the consequences during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Lutra lutra

Measures to mitigate the consequences during the construction period:

- ▶ It is necessary to prevent the disturbance of the hydrological regime of the Neris river.
- ▶ In order to avoid damage to the river slopes and banks (possible erosion in future), it is necessary to reinforce the slopes and plant them with vegetation after the completion of construction works.
- ▶ It is necessary to prevent the disturbance of the river bed.
- ▶ In order to avoid the contamination of the Neris river, it is necessary to ensure than only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.

Measures to mitigate the consequences during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situations and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Grus grus

Measures to mitigate the consequences during the construction period:

- ▶ In order to avoid the contamination of air, it is necessary to ensure than only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.
- ▶ In the course of the performance of construction works, it is necessary to use temporary noise barriers.

Measures to mitigate the consequences during the operation period:

- ▶ In order to avoid air pollution during the operation period, only electrical trains shall be used for passenger and freight transportation.

Mammals (Alces alces, Capreolus capreolus, Lepus europaeus, Sus scrofa, and Vulpes vulpes)

Measures to mitigate the consequences during the operation period:

- ▶ In order to avoid a barrier to the migration of mammals, fragmentation of habitats, and fragmentation of the natural carcass, it is planned to build mammal passes and green bridges. The places of green bridges and animal passes are planned taking into account the forest territories to be crossed by the planned railway line route alternatives, possible animal migration corridors to be crossed, and protected areas to be separated. The locations of passes and green bridges for larger mammals are specified in Annex 0 and Table Table 11. For smaller mammals, it is planned to build smaller-diameter passes at a distance of 2–5 km in the areas of their migration.
- ▶ In order to avoid the death and injuries of mammals that may be run over or hit by trains, it is planned to enclose the whole railway line with a fence.

Table 11. Established places for building animal passes and green bridges

Structure	Place of the railway line, km
Green bridge	14+619
Green bridge	66+208
Green bridge	77+000
Animal pass	91+201
Green bridge	120+838
Animal pass	142+591
Green bridge	163+867

Amphibians and reptiles. In order to mitigate the negative impact on amphibians and reptiles, it is necessary to preserve their existing habitats without disturbing the hydrological regime of these habitats.

In order to mitigate the fragmentation of the habitats of amphibians, it is planned to build passes adapted for the migration of amphibians and reptiles.

4.9. Values of cultural heritage

Environmental impact assessment and forecasting methods involved

In assessing the impact of the planned railway line on values of cultural heritage, the following was performed:

- ▶ The analysis of available data, investigations, review, calculations, use of GIS, and assessment, determination, and implementation of requirements for the protection of values of cultural heritage;

- ▶ The assessment of the possible impact of Rail Baltica on the complex of the Narrow-gauge Railway (the unique code in the Register of Cultural values – 21898) not only in the mechanical sense (whether or not it will affect the valuable features) but also further possibility to use this complex for the purposes of cultural tourism or other purposes;
- ▶ The assessment of the change of the accessibility (for pedestrians and by car) of certain objects of cultural heritage, whether noise caused by trains will allow to develop recreational activities at certain objects of cultural heritage, i.e. to use them as resources;
- ▶ The assessment in respect of visual pollution, especially at those sections where it is planned to install sufficiently high structures (e.g. viaducts, telecommunication and illumination towers, etc.) and whether they fall within the established protective areas of objects of cultural heritage or are located close to them (at a distance of 500 m from objects of cultural heritage);
- ▶ The assessment of how the solutions of the Special Plan under preparation are associated with the solutions of the General Plan of the Republic of Lithuania approved by Resolution No IX-1154 of the Seimas of the Republic of Lithuania dated 29/10/2002 as well as the General Plans of Kaunas County and Panevėžys County and separate municipalities, which also establish requirements for the protection of cultural heritage;
- ▶ The assessment in respect of archaeological heritage – archaeological explorations specified in the Archaeological Investigation Project are performed. Archaeological chamber and field works are carried out. The objective of chamber works is to determine, using information from archive sources and literature, in which territories more intense explorations are required and to identify objects of heritage of other types (village cemeteries, sites of mythological heritage, etc.). Besides, the verification of old cartography sources is performed (mostly medium-scale maps of the tsarist Russia dating back to the end of the nineteenth century). At the second stage, field works are performed, during which the most promising areas identified at the first stage are explored more intensely, while others – less intensely. General conclusions are provided to systematise data collected during both stages.
- ▶ For the performance of the aforementioned assessments, specialists in archaeological, engineering, and architectural/urban heritage, who have a qualification category of a specialist in expert assessment, or researchers in these fields of heritage were engaged and consulted.

Negative impact during the construction and operation period

The possible negative impact on values of cultural heritage was determined by assessing the distances of the values of cultural heritage from the planned railway line. In this way, the values of cultural heritage, which may experience a negative impact during the construction and operation of the railway line, were identified.

Alternatives 1-2. The stone with the footprints of “the Bear” and “the Calf” (Jonava Distr. Mun.), code 2010 (protected by the State), area – 16.68 ha. **It borders on** the 6.0–7.0 km section of the planned railway line. The planned railway line is to be built within the boundaries of the existing railway.

Impact: A direct long-term negative impact is possible during the construction period, i.e. partial or entire destruction of the value of cultural heritage (hereinafter referred as “the value”) during the construction period. Presently, the value of cultural heritage is limited by the existing 1520 mm gauge railway line from the right side. The planned railway line is to be built to the left from the 1520 mm gauge railway line. However, it is planned to shift the 1520 mm gauge railway line to the right in order to accommodate the planned the 1435 mm gauge railway line.

Impact on accessibility: Transport to/from the value by road and on foot is organised from the eastern side of the value by the existing roads. Therefore, the planned railway line will not have any negative impact on the accessibility of the value.

Impact on adaptability: Presently, the value of cultural heritage is limited by the existing railway line. Therefore, the planned railway line will not have any negative impact on the adaptability of the value in future.

Alternatives 1-2. Kučiai (Bistrampolis) Manor House (Panevėžys Distr. Mun., Kučiai Village, Ramygala Subdistrict), code 385, area – 10.8317 ha, **distance – 683 m** at 83.0–84.0 km.

Impact on the value: No impact is planned; the western part of the value is limited by Main Road A8; there is no common border with the planned railway line; no visual pollution is expected.

Impact on accessibility: No impact is planned; the western part of the value is limited by Main Road A8; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the western part of the value is limited by Main Road A8; there is no common border with the planned railway line.

Alternatives 1-2. Ornamental sculpture “Nevėžis” (Panevėžys Distr. Mun., Papušiai Village, Panevėžys Subdistrict), code 15357, **distance – 436 m** at 99.0 – 100.0 km.

Impact on the value: A long-term negative impact is possible due to the visual pollution from the planned railway line. It should be noted that the value has no common borders with the planned railway line.

Impact on accessibility: A long-term negative impact on accessibility is possible from the eastern part of the value as a result of the elimination of the road of local significance near the planned railway line.

Alternatives 1-2. Papušiai Mound (Panevėžys Distr. Mun., Papušiai Village, Panevėžys Subdistrict), state-protected, code 20527, area – 5055 m², **distance – 686 m** at 100.0–101.0 km.

Impact on the value: A long-term negative impact is possible due to the visual pollution from the planned railway line. It should be noted that the value has no common borders with the planned railway line.

Impact on accessibility: A long-term negative impact on accessibility is possible from the eastern part of the value as a result of the elimination of the road of local significance near the planned railway line.

Alternatives 1-2. Monument Gailiūnai, Medikoniai, Voverinė Mound, the so-called Milžinkapis (Panevėžys Distr. Mun., Gailiūnai Village, Panevėžys Subdistrict), state-protected, code 16281, area – 32546 m², **distance – 928 m** at 117.0–118.0 km.

Impact on the value: No impact is planned; the southern part of the value is limited by Regional Road No 3013; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the southern part of the value is limited by Regional Road No 3013; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Alternatives 1-2. Burial mound, the so-called Milžinkapis (Pasvalys Distr. Mun., Ožkyčiai Village, Pušalotas Subdistrict), code 6630, area – 316 m², **distance – 229 m** at 120.0–121.0 km.

Impact on the value: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: A long-term indirect negative impact on accessibility of the value is possible from the eastern part because there are plans to close the traffic at the section Kidžioniai – Ožkyčiai. In order to reduce the negative impact, it is planned to build a road viaduct at 118+481 KM of the route.

Alternatives 1-2. Burial mound, the so-called Prancūzkalnis, Napoleon Hat (Pasvalys Distr. Mun., Šedeikoniai Village, Pušalotas Subdistrict), code 6634, area – 977 m², **distance – 739 m** at 122.0–123.0 km.

Impact on the value: No impact is planned; the eastern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: A long-term indirect negative impact on accessibility of the value is possible. The accessibility of the value is ensured. Besides, the road of local significance is to be rearranged in order to ensure accessibility from the northern and southern part. The planned railway line will not have any significant negative consequences for the accessibility of the value.

Alternatives 1-2. Pušalotas Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21924, **distance – 961 m** at 124.0–125.0 km.

Impact on the value: No impact is planned; the eastern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Impact on adaptability: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Alternatives 1-2. Commodity Warehouse of Pušalotas Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21925, **distance – 956 m** at 124.0–125.0 km.

Impact on the value: No impact is planned; the eastern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Impact on adaptability: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Alternatives 1-2. House of Pušalotas Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21926, **distance – 974 m** at 123.0–124.0 km.

Impact on the value: No impact is planned; the eastern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Impact on adaptability: No impact is planned; the eastern part of the value is limited by a road of local significance, which connects to Regional Road No 2904. The planned railway line will not have any significant negative impact on the accessibility of the value.

Alternatives 1-2. Fragments of the former manor house (Pasvalys Distr. Mun., Kaukliai Village, Pušalotas Subdistrict), code 426, area – 50976 m², **distance – 303 m** at 124.0–125.0 km.

Impact on the value: A long-term negative impact is possible due to the visual pollution from the planned railway line; the value has no common border with the planned railway line.

Impact on accessibility: A long-term indirect negative impact is possible; the value is accessible from all sides; the access road of the eastern part will be rearranged with the installation of a road viaduct. Upon the installation of the road viaduct, the planned railway line will not have any significant negative impact on the accessibility of the value.

Impact on adaptability: A long-term indirect negative impact is possible; the value is accessible from all sides; the access road of the eastern part will be rearranged with the installation of a road viaduct. The planned railway line will not have any major negative impact on the accessibility of the value.

Alternatives 1-2. Narrow-gauge Railway Complex (Panevėžys City Mun., Panevėžys City; Panevėžys District, Pasvalys District, Biržai District, Pakruojis District, Anykščiai District), state-protected, code 21898, area – 1098021 m², the value **is crossed** at 126.0–127.0 km.

Impact on the value: A direct long-term negative impact is possible during the construction and operation period if the value is crossed at the same level. In this case, the narrow-gauge railway line could not be restored as a value.

Impact on accessibility: Presently, the value of cultural heritage is limited by the planned railway line; the value is accessible from the northern part with building a road pass; the planned railway line will have no negative impact on the accessibility of the value.

Impact on adaptability: Presently, the value of cultural heritage is crossed by the planned railway line. However, it is planned to build a railway bridge for the railway line, so the planned railway line will not have any negative impact on the adaptability of the value in future.

Alternatives 1-2. Burial mound, the so-called Kapeliai (Pasvalys Distr. Mun., Maldučioniai Village, Pušalotas Subdistrict), code 6627, area – 806 m², **distance – 61 m** at 127.0–128.0 km.

Impact on the value: A long-term negative impact is planned; the value of cultural heritage is located from the planned railway line at a distance of 60 m; therefore, all requirements for the preservation of the value of cultural heritage must be complied with during the construction period.

Impact on accessibility: No negative impact on the accessibility of the value is planned. The value will remain accessible from Regional Road No 2904 Linkuva – Joniškėlis – Pumpėnai. It should be noted that the crossing point of the planned railway and Regional Road No 2904 is planned at a distance of 2.5 km to the south from the value; therefore, no visual pollution to the value is planned from the road viaduct to be installed.

Alternatives 1-2. Vaitkūnai Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Vaitkūnai Village, Pušalotas Subdistrict), state-protected, code 21923, **distance – 175 m** at 128.0–129.0 km.

Impact on the value: No impact is planned; the eastern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the eastern part is limited by a road of local significance. A road viaduct is planned at the eastern part. The planned railway line will not have any major negative impact on the accessibility of the value.

Impact on adaptability: No impact is planned; the eastern part is limited by a road of local significance. A road viaduct is planned at the eastern part. The planned railway line will not have any major negative impact on the accessibility of the value.

Alternatives 1-2. Narrow-gauge Railway Complex (Panevėžys City Mun., Panevėžys City; Panevėžys District, Pasvalys District, Biržai District, Pakruojis District, Anykščiai District), state-protected, code 21898, area – 1098021 m², the value **is crossed** at 134.0 – 135.0 km.

Impact on the value: A direct long-term negative impact is possible during the construction and operation period if the value is crossed at the same level. In this case, the narrow-gauge railway line could not be restored as a value.

Impact on accessibility: Presently, the value of cultural heritage is limited by the planned railway line; the value is accessible from the northern part with building a road pass; the planned railway line will have no negative impact on the accessibility of the value.

Impact on adaptability: Presently, the value of cultural heritage is crossed by the planned railway line. However, it is planned to build a railway bridge for the railway line, so the planned railway line will not have any negative impact on the adaptability of the value in future.

Alternatives 1-2. Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict, Stoties Street 7), state-protected, code 21913, **distance – 828 m** at 134.0–135.0 km.

Impact on the value: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Alternatives 1-2. Commodity Warehouse of Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict, Stoties Street 7), state-protected, code 21914, **distance – 814 m** at 134.0–135.0 km.

Impact on the value: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Alternatives 1-2. First Semaphore of Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict), state-protected, code 21915, **distance – 353 m** at 134.0–135.0 km.

Impact on the value: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the western part of the value is limited by a road of local significance; additional accessibility is planned from the eastern part; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the southern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Alternatives 1-2. Second Semaphore of Joniškėlis Station of the Narrow-gauge Railway Complex

(Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict), state-protected, code 21916, **distance – 460 m** at 134.0–135.0 km.

Impact on the value: No impact is planned; the northern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the northern part of the value is limited by a road of local significance; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the northern part of the value is limited by a road of local significance; there is no common border with the planned railway line.

Alternatives 1-2. Joniškėlis Manor House (Pasvalys Distr. Mun., Joniškėlis Village, Joniškėlis Area Subdistrict), state-protected, code 424, area – 7.93 ha, **distance – 612 m** at 136.0–137.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line.

Impact on accessibility: No impact is planned; the value has no common borders with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the value has no common borders with the planned railway line.

Alternatives 1-2. Burial mound, the so-called Velniakalnis (Pasvalys Distr. Mun., Kriaušiškių Village, Vaškai Subdistrict), state-protected, code 6601, area – 2.77 ha, **distance – 524 m** at 144.0 – 145.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line.

Impact on accessibility: No impact is planned; the territory of the value is crossed by Velniakalnio Street; the existing access ways will not be eliminated.

Alternatives 1-2. Cemetery II (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 11080, area – 630 m², **distance – 572 m** at 150.0–151.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line; the established protective area of the object of cultural heritage is not infringed.

Impact on accessibility: No impact is planned; the existing access ways built at the territory of Vaškai Town will not be eliminated.

Impact on adaptability: No impact is planned; the value has no common borders with the planned railway line.

Alternatives 1-2. Cemetery (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 11079, area – 349 m², **distance – 921 m** at 150.0–151.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line; the established protective area of the object of cultural heritage is not infringed.

Impact on accessibility: No impact is planned; the existing access ways built at the territory of Vaškai Town will not be eliminated.

Impact on adaptability: No impact is planned; the value falls within the urbanised territory of Vaškai Town and has no common border with the planned railway line.

Alternatives 1-2. Vaškai (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 17120, area – 11.20 ha, **distance – 747 m** at 150.0–151.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line.

Impact on accessibility: No impact is planned; the existing access ways of the value will not be eliminated; the accessibility of the town is ensured by building railway bridges over Regional Road 3107, at 151.0–152.0 km, and over the National Road 209, at 152.0–153.0 km.

Impact on adaptability: No impact is planned; the value has no common borders with the planned railway line.

Alternatives 1-2. Windmill (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), state-protected, code 16045, area – 1.55 ha, **distance – 710 m** at 150.0–151.0 km.

Impact on the value: No impact is planned; the value has no common borders with the planned railway line; the protective area of the value is not infringed.

Impact on accessibility: No impact is planned; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the value has no common borders with the planned railway line.

Alternative 1. Former Manor House (Pasvalys Distr. Mun., Baltpamūšis Village, Saločiai Subdistrict), included in the Register, code 414, **distance – 425 m** at 166.0–167.0 km.

Impact on the value: No impact is planned; the western part of the value is limited by Regional Road No 3120; there is no common border with the planned railway line.

Impact on accessibility: No impact is planned; the western part of the value is limited by Regional Road No 3013, over which a railway bridge is planned; there is no common border with the planned railway line; the existing access ways will not be eliminated.

Impact on adaptability: No impact is planned; the western part of the value is limited by Regional Road No 3120; there is no common border with the planned railway line.

Measures to mitigate the negative impact

Alternatives 1-2. The stone with the footprints of “the Bear” and “the Calf” (Jonava Distr. Mun.), code 2010 (protected by the State), area – 16.6841 ha. **It borders on** the 18.0–19.0 km section of the planned railway line. The planned railway line is to be built within the boundaries of the existing railway.

Mitigation of negative consequences for the value: In order to prevent infringement of the protective area of the value, it is planned to build a reinforcement of the railway line embankment and track formation and thus to reduce the width of the railway line.

Alternatives 1-2. Kučiai (Bistrampolis) Manor House (Panevėžys Distr. Mun., Kučiai Village, Ramygala Subdistrict), code 385, area – 10.8317 ha, **distance – 683 m** at 82.0–83.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. Ornamental sculpture “Nevėžis” (Panevėžys Distr. Mun., Papušiai Village, Panevėžys Subdistrict), code 15357, **distance – 436 m** at 98.0–99.0 km.

Mitigation of negative consequences for the value: It is envisaged to plant the planned railway line with vegetation.

Mitigation of negative consequences for accessibility: It is planned to rearrange the network of roads of local significance with the building of connecting roads and a railway viaduct at 99–147 KM.

Alternatives 1-2. Papušių Mound (Panevėžys Distr. Mun., Papušiai Village, Panevėžys Subdistrict), state-protected, code 20527, area – 5055 m², **distance – 686 m** at 99.0–100.0 km.

Mitigation of negative consequences for the value: It is envisaged to plant the planned railway line with vegetation.

Mitigation of negative consequences for accessibility: It is planned to rearrange the network of roads of local significance with the building of connecting roads and a railway viaduct at 99–147 KM.

Alternatives 1-2. Monument Gailiūnai, Medikoniai, Voverinė Mound, the so-called Milžinkapis (Panevėžys Distr. Mun., Gailiūnai Village, Panevėžys Subdistrict), state-protected, code 16281, area – 32546 m², **distance – 928 m** at 116.0–117.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. Burial mound, the so-called Milžinkapis (Pasvalys Distr. Mun., Ožkyčiai Village, Pušalotas Subdistrict), code 6630, area – 316 m², distance – 229 m at 119.0–1120.0 km.

Mitigation of negative consequences for accessibility: It is planned to rearrange the road of local significance from the western part and to build a road viaduct at 118–481 KM.

Alternatives 1-2. Burial mound, the so-called Prancūzkalnis, Napoleon Hat (Pasvalys Distr. Mun., Šedeikoniai Village, Pušalotas Subdistrict), code 6634, area – 977 m², distance – 739 m at 121.0–122.0 km.

Mitigation of negative consequences for accessibility: It is planned to rearrange the road of local significance from the northern and southern part.

Alternatives 1-2. Pušalotas Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21924, **distance – 961 m** at 123.0–124.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Commodity Warehouse of Pušalotas Station of the Narrow-gauge Railway Complex

(Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21925, **distance** – 956 m at 123.0–124.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. House of Pušalotas Station of the Narrow-gauge Railway Complex

(Pasvalys Distr. Mun., Pušalotas Town, Pušalotas Subdistrict, Stoties Street), state-protected, code 21926, **distance** – 974 m at 123.0–124.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. Fragments of the former manor house

(Pasvalys Distr. Mun., Kaukliai Village, Pušalotas Subdistrict), code 426, area – 50976 m², distance – 303 m at 123.0–124.0 km.

Mitigation of negative consequences for the value: It is envisaged to plant the planned railway line with vegetation.

Mitigation of negative consequences for accessibility and adaptability: The access road of the eastern part will be rearranged with the installation of a road viaduct.

Alternatives 1-2. Narrow-gauge Railway Complex

(Panevėžys City Mun., Panevėžys City; Panevėžys District, Pasvalys District, Biržai District, Pakruojis District, Anykščiai District), state-protected, code 21898, area – 1098021 m², to be crossed at 126.0–127.0 km.

Mitigation of negative consequences for the value: It is planned to arrange crossing at different levels, by installing a viaduct above the narrow-gauge railway.

Alternatives 1-2. Burial mound, the so-called Kapeliai

(Pasvalys Distr. Mun., Maldučioniai Village, Pušalotas Subdistrict), code 6627, area – 806 m², distance – 61 m at 127.0–128.0 km.

Mitigation of negative consequences for the value: It is envisaged to plant the planned railway line with vegetation and to comply with all requirements for the preservation of the value of cultural heritage.

Mitigation of negative consequences for accessibility: The roads from the eastern part are to be rearranged.

Alternatives 1-2. Vaitkūnai Station of the Narrow-gauge Railway Complex

(Pasvalys Distr. Mun., Vaitkūnai Village, Pušalotas Subdistrict), state-protected, code 21923, **distance** – 175 m at 128.0–129.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. Narrow-gauge Railway Complex

(Panevėžys City Mun., Panevėžys City; Panevėžys District, Pasvalys District, Biržai District, Pakruojis District, Anykščiai District), state-protected, code 21898, area – 1098021 m², to be crossed at 134.0–135.0 km.

Mitigation of negative consequences for the value: It is planned to arrange crossing at different levels, by installing a viaduct above the narrow-gauge railway.

Alternatives 1-2. Joniškėlis Station of the Narrow-gauge Railway Complex

(Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict, Stoties Street 7), state-protected, code 21913, **distance** – 828 m at 134.0–135.0 km.

No negative consequences for the value are planned.

Alternatives 1-2. Commodity Warehouse of Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict, Stoties Street 7), state-protected, code 21914, **distance – 814 m** at 134.0–135.0 km. No negative consequences for the value are planned.

Alternatives 1-2. First Semaphore of Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict), state-protected, code 21915, **distance – 353 m** at 134.0–135.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Second Semaphore of Joniškėlis Station of the Narrow-gauge Railway Complex (Pasvalys Distr. Mun., Joniškėlis Town, Joniškėlis Town Subdistrict), state-protected, code 21916, **distance – 460 m** at 134.0–135.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Joniškėlis Manor House (Pasvalys Distr. Mun., Joniškėlis Village, Joniškėlis Area Subdistrict), state-protected, code 424, area – 7.93 ha, **distance – 612 m** at 136.0–137.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Burial mound, the so-called Velniakalnis (Pasvalys Distr. Mun., Kriaušiškiai Village, Vaškai Subdistrict), state-protected, code 6601, area – 2.77 ha, **distance – 524 m** at 144.0–145.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Cemetery II (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 11080, area – 630 m², **distance – 572 m** at 150.0–151.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Cemetery (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 11079, area – 349 m², **distance – 921 m** at 150.0–151.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Vaškai (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), included in the Register, code 17120, area – 11.20 ha, **distance – 747 m** at 150.0–151.0 km. No negative consequences for the value are planned.

Alternatives 1-2. Windmill (Pasvalys Distr. Mun., Vaškai Town, Vaškai Subdistrict), state-protected, code 16045, area – 1.55 ha, **distance – 710 m** at 150.0–151.0 km. No negative consequences for the value are planned.

Alternative 1. Former Manor House (Pasvalys Distr. Mun., Baltpamūšis Village, Saločiai Subdistrict), included in the Register, code 414, **distance – 425 m** at 166.0–167.0 km.

No negative consequences for the value are planned.

4.10. Hazardous objects

Environmental impact assessment and forecasting methods involved

The methods for the forecasting and assessment of the impact due to hazardous objects are presented in Table Table 12.

Table 12. Methods for the forecasting and assessment of the possible impact

Item No	Object	Methods for the forecasting and assessment of the possible impact
1.	Standard explosives remaining from World War I and World War II at the territory of the track	Data analysis: <ul style="list-style-type: none"> ▶ Data from World War I and World War II ▶ Data of the Map of Contaminated Sites Identified in the Republic of Lithuania drawn up by Juozas Vitkus Engineer Battalion of the Lithuanian Armed Forces; ▶ Comparative statistics of calling in Juozas Vitkus Engineer Battalion of the Lithuanian Armed Forces; ▶ Comparative statistics of calling in Juozas Vitkus Engineer Battalion of the Lithuanian Armed Forces for disposing of explosives;
2.	The main gas pipeline	The assessment of the impact of an explosion or ignition of the main gas pipeline
3.	The main oil pipeline	The assessment of the impact of an explosion or ignition of the main oil pipeline
4.	Panevėžys Petroleum Product Terminal	The assessment of the impact of an explosion or ignition of the oil pipeline of the Petroleum Product Terminal

For the assessment of the impact of an explosion or ignition of the main gas pipeline, main oil pipeline, and Panevėžys Petroleum Product Terminal, the data of the report Buncefield Explosion Mechanism RR718 were used (the author of the Report: the Steel Construction Institute, the United Kingdom, 2009). Pursuant to the aforementioned data, it should be noted that three bands are established for the assessment of the impact of the ignition or explosion of the aforementioned facilities. Depending on the band, the possible impact on human health is determined (Table Table 13).

Table 13. Methods for the forecasting and assessment of the possible impact

Name of the band	Band radius, m	Environmental impact
Band A	Radius of up to 250 m	In the event of the ignition of a vessel of the terminal under overpressure of 250 kPa, a burning cloud may form within a distance of 250 m from the source. The probability of fatal injuries in Band A equals to 1.0.
Band B	Radius of 250 to 400 m	In the event of the ignition of a vessel of the terminal, the fatal injuries in Band 2 is considerably lower than that in Band A because overpressure is 5–25 kPa.

Name of the band	Band radius, m	Environmental impact
Band C	Radius of above 400 m	The possibility of fatal injuries in Band C equals to zero.

Negative impact during the construction and operation period

The causes of the propagation of hazardous objects and possible negative impact are presented in Table Table 14.

Table 14. The causes of the propagation of hazardous objects and possible negative impact

Item No	Object	Impact (causes and sources)	Possible consequences of the impact
1.	Standard explosives remaining from World War I and World War II at the territory of the track;	World War I and World War II, fights for independence, and former explosive and ammunition warehouses and ranges of the Soviet Army;	Short-term impact. In the performance of excavation and soil removal works, there is a major risk of encountering and detonating standard explosives underground, causing injuries to the staff, and damaging the machinery;
			Long-term impact. Standard explosives located within a radius of around 5 m from the track or under the track may detonate from vibration induced by the movement of a train or performance of construction works;
2.	The main gas pipeline	Puncture of the main gas pipeline during construction or operation	A medium-term negative impact due to the interruption of gas supply or long-term negative impact due to the release of gas into the environment and explosion or ignition;
3.	The main oil pipeline	Puncture of the main oil pipeline during construction or operation	A medium-term negative impact due to the interruption of oil supply or long-term negative impact due to the release of oil into the environment and explosion or ignition;
4.	Panevėžys Petroleum Product Terminal	Puncture of oil vessels	A long-term negative impact due to the release of oil into the environment and explosion or ignition.

Measures to mitigate the negative impact

Explosives. In order to ensure the comprehensive protection of working personnel, machinery, and environment, it is necessary to take into account the hazards arising from standard explosives contained in the soil. During the assessment, it was established that particular attention should be paid to the territories of three district municipalities, through which the track of the planned railway line stretches: Kaunas Distr. Mun., Jonava Distr. Mun., and Panevėžys Distr. Mun. At the territories of these municipalities, it is recommended to perform preliminary inspection before carrying out any excavation works.

Panevėžys Petroleum Product Terminal. Panevėžys Petroleum Product Terminal, which is closest to the planned railway line, is located from the planned railway line at a distance of more than 5 km. Closest to the Petroleum Product Terminal is section 103+00-104+00 of the planned railway line, at which Panevėžys Station is planned. Taking into account the big distance between the aforementioned objects as well as the territories of the forests, Berčiūnai Village, and Panevėžys City separating the objects, no negative impact for the planned railway in the event of explosion or ignition of the Petroleum Product Terminal or vice versa is planned. Taking this into account, no measures for the mitigation of the negative impact are established.

The main gas pipeline. At the points of crossing of the planned railway line with main gas pipelines, the reconstruction of the engineering networks is planned with the adaptation of their design to the loads to be caused by railway traffic.

The main oil pipeline. At the points of crossing, the reconstruction of the main oil pipeline is planned with the adaptation of its design to the loads to be caused by railway traffic.

4.11. Public health

Environmental impact assessment and forecasting methods involved

For noise assessment

The assessment of noise from the planned railway line was performed in accordance with the following:

- 1) The requirements of the Lithuanian Hygiene Standard HN 33:2011 “Limit values of noise in residential and public buildings and their environment” establishing the limit values of noise emitted by noise sources in residential and public buildings and their environment applicable in the assessment of the impact of noise on public health;
- 2) The noise guidance of the noise propagation modelling software SoundPLAN 7.3;
- 3) The strategic environmental noise mapping organisation and implementation sample model (the author: Estonian, Latvian & Lithuanian Environment UAB, Vilnius, 2012).

The assessment of noise from the planned railway line and its infrastructure facilities was performed using the licensed noise modelling software SoundPLAN 7.3 developed by the company Braunstein + Berndt GmbH (D-71522 Backnang Germany).

Using this noise modelling software, the modelling of existing noise from roads, railways, and their infrastructure facilities and parking areas and future noise upon the implementation of the project as well as of the noise mitigation measures. In all cases, the noise values $L_{\text{day/evening/night}}$, L_{day} , L_{evening} , and L_{night} were assessed and compared to the maximum permissible noise limit values established in Hygiene Standard HN 33:2011 established for residential and public buildings and their environment as well as those used for the assessment of the results of strategic noise mapping (Table Table 16).

Table 15. Maximum permissible noise limit values in residential and public buildings and their environment

Name of the object	Time of the day, hours	Equivalent sound pressure level (LAeqT), dBA	Maximum sound pressure level (LAFmax), dBA
In the environment of residential buildings (houses) and public buildings (except for catering and cultural buildings) exposed to noise caused by transport	6-18	65	70
	18-22	60	65
	22-6	55	60

Table 16. Maximum permissible noise limit values used for the assessment of the results of strategic noise mapping

Name of the object	L _{day/evening/night} , dBA	L _{day} , dBA	L _{evening} , dBA	L _{night} , dBA
	00:00 – 24:00	06:00 – 18:00	18:00 – 22:00	22:00 – 06:00
In the environment of residential buildings (houses) and public buildings (except for catering and cultural buildings) exposed to noise induced by transport	65	65	60	55

The modelling of the propagation of noise from roads was performed using the Nordic Prediction Model for Road Traffic Noise, (NPM), third edition, 1996; TemaNord 1996:525, adapted for Lithuanian conditions. The modelling of the propagation of noise from railways was performed with the application of the railway noise assessment method RMR 2002 (EU (RMR 2002)); and the modelling of the propagation of noise from the parking areas at Panevėžys Railway Freight Terminal was performed with the application of ISO 9613-2:1996 method.

In all cases, the existing (background) noise formed by noise from the existing roads and noise from the existing railways and their infrastructure was assessed. For the assessment of noise from roads and railways, the data on traffic intensity, traffic composition, and speed received from JSC Lithuanian Railways and the Lithuanian Road Administration under the Ministry of Transport and Communications. Also, in all cases, a 3D surface model was prepared, which allows assessing the altitudes of the existing and planned (designed) surface, and the position and altitude of forests, buildings, including but not limited to residential and public buildings, was determined.

The sources of planned noise: traffic at the new 1435 mm gauge railway line and facilities of its infrastructure (stations and terminals) and noise sources of the roads being rearranged.

The source of the existing background noise: traffic at the existing 1520 mm and 1435 mm gauge railway lines and facilities of their infrastructure (stations, tracks, and terminals) and traffic of the roads and parking areas.

Other sources, such as noise sources of energy and industrial enterprises, are not assessed because they do not border on the planned railway line and are not present in its immediate environment. **In the assessment of noise, the noise limit values were applied in residential buildings, public buildings and in the environment of these buildings, except for catering and cultural buildings, covering the boundaries of the land plots in which the aforementioned buildings are constructed, at a distance not exceeding 40 m from the walls of the buildings.**

Sources of vibration

Vibration is the oscillation or repetitive motion of a solid body around an equilibrium position. In this EIA Report, the whole-body vibration is assessed, i.e. vibration transmitted through the supporting surfaces of a standing, sitting, or lying man into his body and impacting the whole of his body.

The classification, regulated parameters, and maximum permissible values of whole-body vibration as well as its measurement requirements in residential and public buildings is established in accordance with the requirements of Hygiene Standard HN 50:2003 “Whole-body vibration: maximum permitted values and measurement requirements in residential and public buildings”.

By the direction of impact, whole-body vibration is divided into directions of the axes of the orthogonal coordinate system into:

- 1) vertical vibration passing from the feet (or buttocks) towards the head (Z axis);
- 2) horizontal vibration passing from the back to the chest (X axis);
- 3) horizontal vibration passing from the right side of the body to the left side (Y axis).

By the time characteristic, vibration is divided into constant and inconstant vibration. Inconstant vibration is further divided into variable, interrupted, and pulse vibration. By the character of the spectrum, vibration is divided into broad-band and narrow-band vibration.

It should be noted that vibration induced by railway transport is of two types, i.e. propagating by air (50–100 Hz) and soil (8–20 Hz) frequency oscillations. In the railway environment, vibration is generated by two main factors: the dynamic force generated by railway transport into the embankment and the response of the soil to these forces. The main indicators determining the extent of vibration in buildings adjacent to railway are the distance to the railway and the design of the building.

According to the data of studies carried out in the railway environment by specialists of Vilnius Gediminas Technical University [9], events of exceeding the maximum permissible values of vibration are found in residential buildings located at a distance of 5–20 metres from the railway. In case of low and medium frequencies, vibration in buildings exceeded the permissible values by 1.5–2 times. It has been found that the permissible values of vibration are not exceeded farther away from the railway. The highest values of vibration induced by railway transport were determined at the time of running of freight trains. When a train passes by buildings located in the immediate vicinity of the railway, high-energy noise may generate the oscillations of the elements of the building structure.

It should be noted that the modelling of vibration values is not performed because the modelling of vibration is not regulated by Hygiene Standard HN 50:2003. Therefore, in preparing the EIA Report for the planned railway line, the assessment of vibration in residential and public buildings is performed with the determination of the distance from the buildings to the source of vibration, i.e. the planned railway.

When performing the vibration calculations of the planned railway, all buildings located within a distance of up to 100 m were identified, and vibration mitigation measures were provided for at the planned railway line near them.

Negative impact during the construction period

Contamination of ambient air. Information on the possible impact on public health due to the contamination of ambient air is presented in Section 4.1.

Contamination of surface, ground, and underground waters. Information on the possible impact on public health due to the contamination of surface, ground, and underground waters is presented in Sections 4.2–4.3.

Contamination of soil. Information on the possible impact on public health due to the contamination of soil is presented in Section 4.4.

Noise. In accordance with the noise propagation modelling results, the residential and public territories in which the limit values of noise are exceeded were determined. The noise propagation maps are presented in Annex 0.

Vibration. Similarly, for the application of vibration measures, residential and public buildings located within a distance of up to 100 m from the planned railway line were identified. It is planned that long-term negative consequences for public health may be during the period of the construction of the planned railway line due to exceeding the limit values of noise and vibration.

Electromagnetic radiation. The whole newly planned railway line and its stations will be fully electrified. Therefore, an electrical and electromagnetic field will form near the traction substations and transformer stations and overhead system intended for the electrification of the railway. It should be noted that no electric or electromagnetic field will be generated during the period of the construction of the railway because the aforementioned facilities will not be connected to the power supply network.

Measures to mitigate the negative impact

Planned noise mitigation measures

Upon performing noise propagation modelling and identifying the territories in which the limit values of noise are exceeded, noise mitigation measures were determined (Table Table 17).

Table 17. Noise and vibration mitigation measures

Noise mitigation measure	Efficiency of the measure
Sound-absorbing wall	8 db(A) to 15 dB(A)
Sound-absorbing embankments	8 db(A) to 15 dB(A)
Sound and vibration absorbers	up to 5 dB(A)
Sound and vibration absorbers	up to 5 dB(A)

- ▶ Sound-absorbing walls and embankments are envisaged when limit noise values in the environment of residential and public buildings are exceeded.

- ▶ Sound and vibration absorbers are envisaged in order to protect buildings located closer than 100 m to railway tracks from vibration.

Conditions for the implementation of noise and vibration measures

- ▶ In the protected areas, noise and vibration mitigation measures should be installed before the beginning of the operation of the railway.
- ▶ The efficiency of sound absorbing walls or embankments shall be 8 db(A) to 15 dB(A);
- ▶ The efficiency of sound and vibration absorbers shall be 4 db(A) to 5 dB(A).

Electromagnetic radiation mitigation measures. In order to reduce the impact of electromagnetic radiation on public health, the whole railway is planned to be enclosed. It should be noted that the public will not be able to access the territory of the railway where electric field exceeds 1 kV and where the traction substations, transformer stations, and overhead system will be installed.

The maximum magnetic field indication will be 11.5 μT . To compare, the limit value for the protection of public health reaches 100 μT . It is also important to note that magnetic induction at a distance of 5 m from the railway line will decrease to 10 μT , magnetic induction at a distance of 10 m to 5 μT , at a distance of 20 m to 1 μT , and 25 m to 0.4 μT . Therefore, taking into account the fact that the fence of the railway line will be located at a distance of 25–30 m from the railway axis, the magnetic field to which the public will be exposed will be around 250 times lower than established in Council Recommendation (1999/519/EC) of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).

Conclusions

- ▶ Upon the installation of the envisaged railway noise and vibration mitigation measures, the permissible limits established in HN 33:2011 and HN 50:2003 would not be exceeded;
- ▶ In the course of the preparation of the technical designs of the planned railway, which would change the technical parameters of the railway line, the noise mitigation measures shall be updated accordingly.
- ▶ The noise mitigation measures provided for in this Report for installation near roads and 1520 mm gauge railway lines that are not directly related to the planned 1435 mm gauge railway line and its facilities (stations, tracks, terminals, passing stations, etc.) are provided as a guidance and should be updated during other projects.
- ▶ In order to mitigate the impact of the electric and magnetic field, the railway line must be enclosed. No negative impact of the electric and magnetic field on public health is expected beyond the enclosure of the railway line.

4.12. Social and economic environment

During the construction and operation period, both negative and positive impact on the social and economic environment is possible due to the expected factors:

- ▶ social and economic factors, such as the change of land ownership (negative consequences, establishment of temporary and permanent jobs, growth of trade and production, and increase in the scopes of transport services;
- ▶ factors of the physical environment, such as transportation (mobility of the population – both positive and negative consequences), traffic safety, and emergency situations (the probability of accidents);
- ▶ psychological factors, such as conflict situations, dissatisfaction due to land ownership, environmental and health impact, emergency situations, etc.

Measures to mitigate the negative impact

- ▶ Intense publicity of the future benefits of the project;
- ▶ The effective implementation of measures for the mitigation of the negative impact;
- ▶ The smooth implementation of the following stages of the project – the take-over of land for public needs.

5. ASSESSMENT OF THE TRANSBOUNDARY IMPACT

5.1. Transboundary consultations

Transboundary consultations with representatives of the Republic of Latvia took place from the very beginning of the procedures of the Special Plan and Environmental Impact Assessment. During the transboundary consultations, the discussions were focused on the determination of the crossing point of the Lithuanian-Latvian state border.

The relevance of the determination of the crossing point of the Lithuanian-Latvian state border was dictated by the karst regions located in the Lithuanian-Latvian border area, valuable agricultural lands, objects of cultural heritage and residential areas in the territory of the Republic of Latvia, and risks related to crossing these territories.

It is important to note that the Republic of Latvia prepared EIA procedures for the planned railway line, while the Republic of Lithuania prepared the SEA procedures within the scope of the Special Plan and the EIA procedures. Since the issues of the Special Plan and Environmental Impact Assessment were considered during the transboundary meetings together, and these issues were directly related with each other, the description of the transboundary consultations in respect of the EIA and SEA is presented below together in a chronological order:

- ▶ By Letter No 3-02/203 dated 05/02/2015, the Environmental State Bureau of the Republic of Latvia informed the Ministry of Environment of the Republic of Lithuania about the process of the EIA of the Project for the European Gauge Railway Line Rail Baltica 2 and requested to indicate whether Lithuania was intending to participate in the procedure of the transboundary EIA;
- ▶ By Letter No (10-3)-D8-1817 dated 09/03/2015, the representatives of the Ministry of Environment of the Republic of Lithuania informed the representatives of the Republic of Latvia that it was intending to participate in the procedures of the transboundary EIA and provided proposals on the Report on the EIA of the Project for the European Gauge Railway Line Rail Baltica 2. By the aforementioned letter, it was also proposed to arrange a consultation meeting on the border crossing point, transboundary EIA, and transboundary SEA between the interested Latvian and Lithuanian institutions.

- ▶ By Letter No 3-02/430 dated 20/03/2015, the Environmental State Bureau of the Republic of Latvia proposed the date of the transboundary meeting on the border crossing point, transboundary EIA, and other topics.
- ▶ By Letter No (14-1)-D8-2303 dated 26/03/2015, the Ministry of Environment of the Republic of Lithuania forwarded to the Republic of Latvia the information received from the author of the Special Plan by Letter No VLN-LG-RB-15SP/16 dated 24/03/2015 on the preparation of the Special Plan and the document establishing the scope of the SEA, requesting to answer whether the Republic of Latvia was intending to participate in the transboundary consultations.
- ▶ On 15/04/2015, a bilateral meeting took place in Riga between representatives of the Ministries of Environment, the Ministries of Transport and Communication, and other interested institutions and enterprises of the Republic of Lithuania and the Republic of Latvia on the possible border crossing alternatives.
- ▶ By Letter No 2-1485 dated 17/04/2015, JSC Lithuanian Railways invited representatives of the Latvian Environment, Geology and Meteorology Centre and the Environmental State Bureau of the Republic of Latvia to participate in the meeting planned on 21/04/2015.
- ▶ By Letter No (14-1)-D8-2961 dated 20/04/2015, the Ministry of Environment of the Republic of Lithuania informed the author of the Special Plan that the Republic of Latvia would participate in the transboundary consultations on the SEA Special Plan, while forwarding Information Letter No 7-01/825 dated 07/04/2015 from the representatives of the Republic of Latvia.
- ▶ On 21/04/2015, a transboundary meeting was held in the Bauska Municipality Administration, where the impact of karst processes on the established alternatives of the planned railway line was analysed.
- ▶ By Letter No (14-1)-D8-4463 dated 11/06/2015, the Ministry of Environment of the Republic of Lithuania forwarded Information Letter No 7-01/1072 of the Environmental State Bureau of the Republic of Latvia dated 12/05/2015 regarding the SEA Special Plan to the author of the Special Plan. By Letter No 7-01/1072 dated 12/05/2015, the Environmental State Bureau of the Republic of Latvia provided its remarks on the SEA Special Plan being prepared and on the document establishing its scope.
- ▶ By Letter No (10-3)-D8-4785 dated 25/06/2015, the Ministry of Environment of the Republic of Lithuania addressed the Ministry of Environmental Protection and Regional Development of the Republic of Latvia, requesting to inform whether Latvia would participate in the transboundary process of the EIA of the construction of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border.
- ▶ By Letter No (14-1)-D8-5267 dated 13/07/2015, the Ministry of Environment of the Republic of Lithuania provided the prepared SEA Special Plan Report in the English and Latvian languages, requesting to provide remarks on the aforementioned document. It was also requested to arrange a publicity ensuring procedure and to organise public introduction to the prepared SEA Special Plan Report in the territory of the Republic of Latvia.
- ▶ By Letter No 7-01/1405 dated 20/07/2015, the Environmental State Bureau of the Republic of Latvia informed that the period of orientation of the public with the prepared SEA Special Plan Report was announced as from 20/07/2015 to 21/08/2015, while a public meeting would take place on 30/07/2015.
- ▶ By Letter No 3-01/1434 dated 24/07/2015, the Environmental State Bureau of the Republic of Latvia informed that it would participate in the transboundary process of the EIA and provided its remarks on the EIA Programme.

- ▶ On 30/07/2015, a transboundary public meeting of the Republic of Lithuania and the Republic of Latvia was held in Riga, during which the prepared Report of the SEA Special Plan was introduced to the institutions and interested public of the Republic of Latvia.
- ▶ By Letter No 7-01/1558 dated 24/08/2015, the Environmental State Bureau of the Republic of Latvia provided comments and opinions of the Environmental State Bureau of the Republic of Latvia and the interested public on the Report of the SEA Special Plan. It should be noted that the Republic of Latvia can support only Alternative No 1 of the railway line under the Special Plan.
- ▶ On 16/09/2015, together with Letter No 09-01/3638, the representatives of the Republic of Latvia provided the report on the geological investigations of the planned railway line in Latvia.
- ▶ On 26/11/2015, the Environmental State Bureau of the Republic of Latvia informed about the Report on the EIA of the Project for the European Gauge Railway Line Rail Baltica 2 prepared in Latvia and requested to provide remarks or comments on the EIA of the proposed economic activity. By Letter No (10-3)-D8-9351 dated 14/12/2015, the Ministry of Environment of the Republic of Lithuania also informed that public introduction to the Report on the EIA of the Project for the European Gauge Railway Line Rail Baltica 2 would take place together with the public introduction to the Report on the EIA of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border, in Panevėžys Distr. Mun., on 09/01/2016.
- ▶ By Letter No VLN-LG-RB-16SP97, AECOM provided the Ministry of Environment of the Republic of Lithuania with its proposals on the Report on the EIA of the Project for the Construction of the Infrastructure of the European Gauge Public Railway Line Rail Baltica.
- ▶ On 09/01/2016, a transboundary public meeting of the Republic of Lithuania and the Republic of Latvia was held in Panevėžys Distr. Mun., during which the institutions and interested public of the Republic of Lithuania were introduced to the prepared Report of the EIA of the European gauge railway line from Kaunas to the Lithuanian and Latvian state border and with the Report on the Project for the European Gauge Railway Line Rail Baltica 2.

5.2. Transboundary assessment

The transboundary impact assessment was performed in respect of the neighbouring Republic of Latvia. The transboundary assessment applied an assessment methodology similar to that in the territory of the Republic of Lithuania.

5.3. Ambient air

The transboundary negative impact on the ambient air of the Republic of Latvia and measures for its mitigation during the construction and operation period are established in Section 4.1. It should be noted that due to the fact that the traffic of electrified trains planned in the railway line is to take over a part of passengers and freights currently transported by road, a decrease in emission into the air from transport, i.e. long-term positive impact in the territory of the Republic of Latvia, is expected.

5.4. Surface waters

During the construction and operation period, a negative impact is possible due to the operation of leaky construction equipment and vehicles or during to the release of petroleum products or their waste into surface waters at the time of emergencies (the Mūša (Mūsa) river). In case of such releases, a negative impact on the quality of surface waters, biodiversity, and public health is possible in the territory of the Republic of Latvia.

During the construction period

The hydrological regime of water bodies (rivers, channels) to be crossed may be infringed. During the construction period, water channels, reclamation ditches, and water removal ditches may be rearranged, i.e. water removal, flow, and direction may be changed. These solutions may have a long-term negative impact on the hydrological regime of surrounding water bodies, forests, agricultural lands, and wetlands.

When building passes through and constructing bridges over the water bodies to be crossed (the bridge over the Mūša (Mūsa) river) as well as when building temporary water dams and water bypasses, the hydrological regime of the water bodies to be crossed, i.e. the water flow, direction, and level, may be temporarily changed. During these works, at the places of the bridge or pass, water turbidity may increase, slopes of the water body may be damaged, and the erosion of the slopes would increase if they are not arranged properly. Due to the above factors, a medium-term negative impact on the flora and fauna of the water bodies is possible.

A high probability of the occurrence of pollution of water bodies and accidents will remain during the whole period of construction. A negative impact is possible due to construction vehicles and equipment as well as due to the release of construction materials and wash-out of fertile soil and earth into surface waters. These factors may have a direct long-term negative impact on public health and aquatic flora and fauna. Also, this pollution of water bodies and accidents may have an indirect long-term impact on public health and condition of the water of surrounding water bodies.

During the operation period

During the period of the operation of the railway line, a long-term and medium-term negative impact on surface water bodies and public health is possible due to accidents involving railway vehicles (incidents, train collisions, and leaky wagons and locomotives) as well as pollution of water bodies related to them. At the time of railway accidents, surface waters may be polluted by dangerous goods carried by railway because 25–40% of goods transported by railway are dangerous goods (oil and petroleum products, liquid and bulk fertilisers, chemicals, etc.).

The impact mitigation measures are specified in Section 4.2.

5.5. Subsurface resources and underground and ground water; mineral deposits

The impact on geological components, including ground and underground waters, was assessed for the period of the construction of the railway line and for the period of the operation of the railway line, in the case of each identified alternative. The impact on deposits of mineral resources is not assessed because no information was received stating that the routes identified in the EIA Report cross any such deposits near the territory of the Republic of Latvia.

During the construction period

During the period of the construction of the railway line, the significant direct short-term impact is possible due to the damage of the geological structure of soil. This impact may manifest itself in the subsidence of the railway line and adjacent territories, slides of slopes, and irregularities of the structures of the railway facilities (tracks and bridges) under construction. All these effects may have a medium-term synergistic impact and cause accidents and other emergencies during the construction period.

During the operation period

During the period of the operation of the railway line, the significant direct long-term impact is possible due to the damage of the geological structure of soil. This impact may manifest itself in depressions of the railway line and adjacent territories, slides of slopes, and irregularities of the structures of the railway facilities (tracks and bridges) during the operation of the railway line. All these effects may have a long-term synergistic impact and cause train accidents and other emergencies during the operation period.

It is also important to note that in case of Alternative 1, at 165–168 km of the route, karst cavities are possible in the karst region of northern Lithuania. Therefore, a significant, both direct and indirect, cumulative, synergistic long-term negative impact on the environment is possible. Depressions may cause damage to the structure of the railway infrastructure as long as several kilometres. In case of derailment, ground and underground waters would be contaminated. The contamination of underground waters would cause contamination of underground waters not only in the territory of the Republic of Lithuania, but also, due to the direction of underground water flows, in the territory of the Republic of Latvia.

It is important to note that even without depressions, the derailment of train wagons in the karst region (due to the specific geological structure) and spill of dangerous goods (petroleum products, etc.) from the wagons would also cause the contamination of ground and underground waters, i.e. long-term negative impact on subsurface resources. Also, during the period of the operation of the railway line, underground waters and water sites may be contaminated. Therefore, a long-term negative impact on public health is possible.

It should be noted that the karst phenomena and their impact identified in the territory of the Republic of Lithuania may also occur in the territory of the Republic of Latvia, of which karst phenomena are also characteristic.

The impact mitigation measures are presented in Section 4.3.

5.6. Fertile soil

The transboundary negative impact on the fertile soil of the Republic of Latvia and measures for its mitigation during the construction and operation period are established in Section 4.4.

5.7. Landscape

The transboundary negative impact on the landscape of the Republic of Latvia and measures for its mitigation during the construction and operation period are established in Section 4.5.

5.8. Protected areas

The alternatives identified in the EIA Report do not cross or border on any Natura 2000 sites in the Republic of Latvia. However, it should be noted that Alternative No 2 crosses the protected habitats of the Republic of Latvia (6450 – Northern boreal alluvial meadows and 6510 – Lowland hay meadows), and such are also present in the surrounding environment.

Impact during the construction period: A medium-term direct negative impact is possible during the period of the construction of the planned railway line. A negative impact may arise due to the destruction of protected meadows or their contamination with construction materials during the period of construction.

Impact during the operation period: A medium-term negative impact is possible during the period of the operation of the railway line. A negative impact may arise due to train accidents, incidents, and other emergency situations (contamination of protected meadows).

Measures to mitigate the negative impact during the construction period:

- ▶ When building water withdrawal from the railway line, it is necessary to ensure that surface water is not released into the protected area.
- ▶ It is necessary to ensure that no construction work is carried out in the protected area.
- ▶ It is necessary to ensure that no construction materials are released into the protected area.
- ▶ It is necessary to ensure that no construction sites or construction material storage sites are built in the protected area.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situation and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

5.9. Flora

During the construction period

It should also be noted that during the period of the construction of the railway, flora (forests, meadows, and agricultural lands) will be inevitably destroyed in the territory of the Republic of Latvia. It is planned that when the railway line crosses the territory of forest, a strip of forests (around 50–100 m in width) located within the railway strip will be removed.

During the operation period

In assessing a negative impact on the flora during the period of the operation of the railway line, it should be noted that no negative impact is expected.

Measures to mitigate the consequences during the construction period:

- ▶ When transforming the forest land into other lands, forest cutting shall be performed at another time than during the vegetation period and at another time than during the hatching period.

5.10. Fauna

The potential impact on the fauna was determined by assessing the fauna in the territory of the Republic of Latvia, which will be affected during the construction and operation of the railway line.

Fish

Impact during the construction period. A short-term negative impact is possible due to the change of the local habitats of the fish in the Mūša (Mūsa) river. It is possible that the fish, as especially sensitive representatives of fauna, may temporarily leave the existing local habitats due to the possible noise from construction equipment and contamination of water. During the spawning season, a medium-term negative impact on the fish spawning sites is possible.

Impact during the operation period. A long-term negative impact is possible due to the change of the habitats of the fish. It is possible that the fish may abandon the existing local habitats in the Mūša (Mūsa) river due to the possible noise from trains and changes in the river bed.

Measures to mitigate the negative impact during the construction period:

- ▶ It is necessary to prevent the disturbance of the hydrological regime of the Mūša (Mūsa) river.
- ▶ In order to avoid damage to the river slopes and banks (possible erosion in future), it is necessary to reinforce the slopes and plant them with vegetation after the completion of construction works.
- ▶ It is necessary to prevent the disturbance of the river bed.
- ▶ In order to avoid the contamination of the Mūša (Mūsa) river, it is necessary to ensure that only construction machinery and vehicles (trucks, cranes, graders, loaders, and other machinery) meeting environmental and technical requirements are operated during the period of the construction of the railway line.

Measures to mitigate the impact during the operation period:

- ▶ In order to avoid train accidents, incidents, and other emergency situation and the contamination of protected area caused by them, all requirements for rolling stock, infrastructure, and traffic control must be complied with in the course of the period of the operation of the railway line.

Upon the installation of the railway line, the whole of which will be enclosed by a fence, a barrier will be formed to the migration of mammals, fragmentation of habitats, and fragmentation of the natural carcass. Therefore, a long-term negative impact is possible. In order to reduce the negative impact, it is recommended to build green bridges and animal passes. Besides, in order to ensure the migration of amphibians, it is necessary to adapt water withdrawal passes or, where such are not present, to build passes for the migration of amphibians.

However, taking into account the fact that the whole railway line will be enclosed by a fence, no negative impact due to the death or injuries of mammals that may be run over or hit is planned.

5.11. Values of cultural heritage

The possible negative impact on values of cultural heritage was determined by assessing the location of the values of cultural heritage in the territory of the Republic of Latvia. It should be noted that in the case of Alternative No 2, the protective areas of the territory of an object of cultural heritage – Zluktene Ancient Cemetery – located in the territory of the Republic of Latvia (Fig. Fig. 1.).

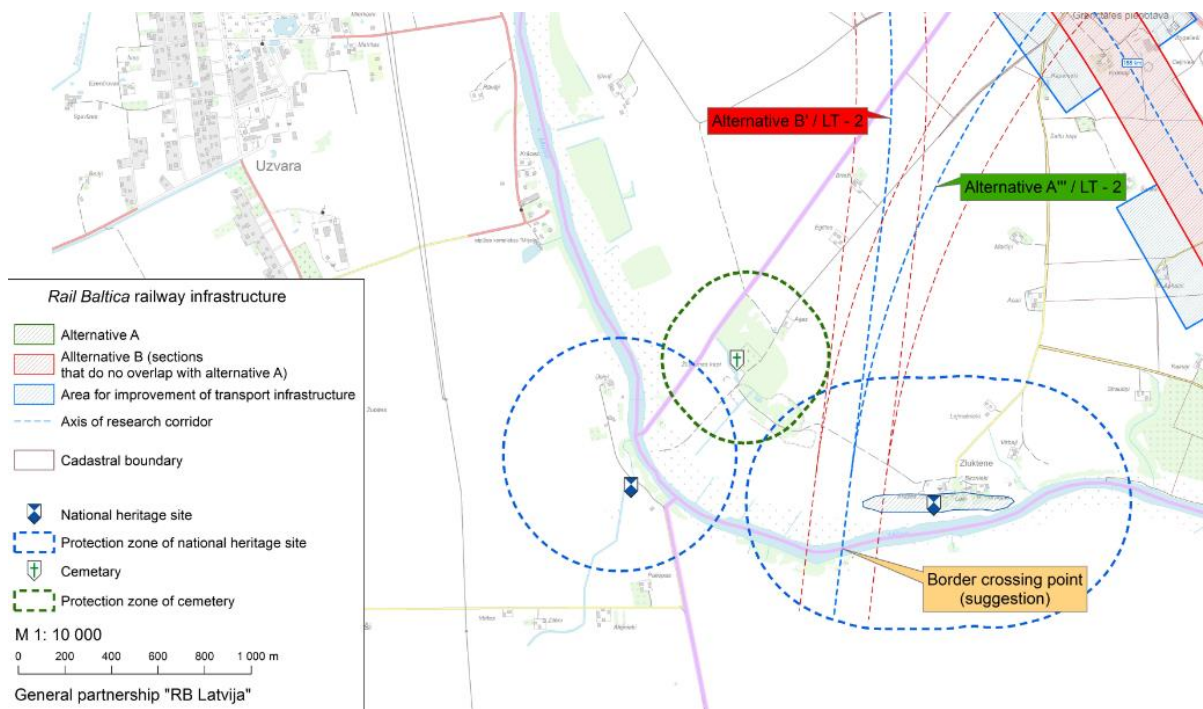


Fig. 1. Values of cultural heritage in the territory of the Republic of Latvia
(source: General Partnership RB Latvija)

Impact on the value: A long-term negative impact is planned on the value of cultural heritage because the exact boundaries of the ancient cemetery have not been explored and determined until now.

Measure for mitigating the negative impact: It is necessary to perform archaeological investigations of the ancient cemetery and to determine the protective boundaries of the ancient cemetery, within which construction works would be prohibited.

5.12. Hazardous objects

No hazardous objects were determined in the territory of the Republic of Latvia; therefore, the possible impact was not assessed. However, it should be noted that hazardous objects identified in the territory of the Republic of Latvia may have a negative impact on the environment in the territory of the Republic of Latvia. Such objects and measures for the mitigation of the negative impact on the environment are established in Section 4.10.

5.13. Public health

Contamination of ambient air. Information on the possible impact on public health due to the contamination of air is presented in Section 5.3.

Contamination of surface, ground, and underground waters. Information on the possible impact on public health due to the contamination of surface, ground, and underground waters is presented in Sections 5.4–5.5.

Contamination of soil. Information on the possible impact on public health due to the contamination of soil is presented in Section 4.4.

Noise and vibration. Noise and vibration from the railway are planned due to the planned railway traffic. For that purpose, noise modelling was performed in the territory of the Republic of Latvia, using the software SoundPLAN, and thus the planned propagation of noise was determined.

In accordance with the noise propagation modelling results and distances to the buildings, the residential and public territories in which the limit values of noise are exceeded were determined and measures for the mitigation of noise and vibration were provided for.

Electromagnetic radiation. The whole newly planned railway line and its stations will be fully electrified. Therefore, a possible negative impact on the public health of the state of Latvia is expected near the transformer stations, traction substations, and overhead system of the railway line during the operation period. The measures for the mitigation of the negative impact on public health are presented in Section 4.11.

5.14. Social and economic environment

During the construction and operation period, both negative and positive impact on the social and economic environment is possible due to the expected factors:

- ▶ social and economic factors, such as the change of land ownership (negative consequences, establishment of temporary and permanent jobs, growth of trade and production, and increase in the scopes of transport services;
- ▶ factors of the physical environment, such as transportation (mobility of the population – both positive and negative consequences), traffic safety, and emergency situations (the probability of accidents);
- ▶ psychological factors, such as conflict situations, dissatisfaction due to land ownership, environmental and health impact, emergency situations, etc.

Measures to mitigate the negative impact

- ▶ Intense publicity of the future benefits of the project;
- ▶ The effective implementation of measures for the mitigation of the negative impact.

6. The Analysis Of The Considered Alternatives With Indication Of The Reasons For Their Selection, Taking Into Account Best Available Production Practices And Potential Environmental Impact

It should be noted that the alternatives considered in the EIA Report coincide and are identical from the stake of Palemonas Station 0+00 KM to the stake 160+500 KM. In assessing the alternatives from 160+500 KM, it should be noted that Alternative No 2 is by 1.27 km shorter; therefore, its implementation would be less expensive. Besides, Alternative No 2 does not cross the territories of the karst region in northern Lithuania. Therefore, its implementation would be more rational from the geological point of view and would involve a lower risk in respect of the potential impact of karst phenomena on the environment and public health.

It should also be noted that even though comprehensive investigations were performed for the section of Alternative No 1 from 165–168 km, which falls within the territory of the karst region of northern Lithuania, and no signs of karst phenomena were found, there still remains a probability of finding such in the preparation of the technical designs of the construction of the railway line and performing further investigations during them. If such signs of karst phenomena are found, the cost of the construction of the railway line would increase considerably.

In assessing the transboundary impact of Alternative No 2 of the railway line, it should be noted that in the territory of the Republic of Latvia, the railway line crosses densely populated areas, valuable agricultural lands, protective areas of objects of cultural heritage, crosses or is located in the immediate surroundings the protected habitats of the Republic of Latvia (6450 – Northern boreal alluvial meadows and 6510 – Lowland hay meadows), and fails to meet the solutions of the territorial planning documents of Zemgale Region. Besides, representatives of the Republic of Latvia have indicated that the border crossing point must coincide with the border crossing point specified in AECOM Feasibility Study and informed that they approve only the route under Alternative No 1. The Environmental State Bureau of the Republic of Latvia and other associated institutions informed about that multiple times (Annex 0 and Annex 0).

Taking into account the requirements of the institutions of the Republic of Latvia and the aforementioned shortcomings of Alternative No 2, Alternative No 1 assessed in this EIA Report is established as the most rational and best possible alternative.

7. POSSIBLE EMERGENCY SITUATIONS AND MEASURES FOR THEIR AVOIDANCE AND ELIMINATION OF THEIR CONSEQUENCES

It should be noted that 25–40% of goods carried by railway are dangerous goods (oil and petroleum products, liquid and bulk fertilisers, chemicals, etc.), i.e. materials and products which, due to their chemical or physical properties, may pose hazard to human health, environment, or property.

In the Republic of Lithuania, the Law on Carriage of Dangerous Goods by Road, Rail and Inland Waterways establishes the legal and organisational fundamentals of the carriage of dangerous goods by railway transport in order to ensure the safe carriage of dangerous goods. It should also be noted that all dangerous goods to be transported are inspected in accordance with the procedure established by the Description of the Procedure for the Control of the Carriage of Dangerous Goods by Road, Rail and Inland Waterway, which, pursuant to Council Directive 95/50/EC of 6 October 1995 on uniform procedures for checks on the transport of dangerous goods by road (Official Journal 2004, Special Edition, Chapter 7, Volume 2, p. 282), is uniform throughout the territory of the EU, including the territories of the countries of Rail Baltica Project.

Besides, all countries involved in the carriage of dangerous goods by rail shall comply with the requirements of Annex C – Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) to the Convention concerning International Carriage by Rail (COTIF). The EU member states are subject to the requirements of Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods.

Therefore, in the events of possible emergency situations, it is necessary to apply the Procedure for the Events of Emergency Situations of JSC Lithuanian Railways, which meets the requirements of all the legal acts referred to in this Section. In short term, the measures for the mitigation of environmental impact provided for in this Report shall be applied.

It should also be noted that a maintenance road is envisaged alongside the whole length of the planned railway line with the purpose of ensuring access to the structures and other objects of infrastructure of the planned railway line. The maintenance tracks are classified among inland roads, so it is not planned to organise public traffic by these roads. However, it should be noted that one of the purposes of these tracks is to ensure access for special-purpose vehicle at the time of emergency situations (in the event of fire, wagon/carriage derailment, spill of dangerous goods, accidents, and incidents). These tracks have connections with all inter-crossing roads of local significance and national significance. Therefore, at the time of emergency situations they can be used for accessing the site of emergency by ambulances, fire-engines, vehicles of environmental protection, civil safety, police, armed forces, or other special-purpose organisations for emergency response.

The whole planned railway line will be a double-track line. Therefore, in the event of an emergency situation it will be possible to pass the obstacle by the other track at stations or station-to-station sections, where dispatcher crossovers will be installed at least every 25 km.

It is also important to note that sidetracks for fire-engine and emergency trains, which would be used in the event of emergency situations (accidents), are planned at the 1435 mm gauge Kaunas Railway Station and 1435 mm gauge Panevėžys Railway Passenger Station. Similarly, sidetracks with service trains are also planned in the neighbouring countries (Poland and Latvia). Therefore, in the event of large-scale emergency situations or emergency situations at border areas, mutual transboundary assistance would be provided.

8. THE ANALYSIS OF THE DATA OF THE PERFORMED ENVIRONMENTAL MONITORING AND OUTLINES OF THE PLANNED ENVIRONMENTAL MONITORING

It should be noted that the alternatives considered in the EIA Report cause a negative impact on the environment. The measures to manage the negative impact include the application of environmental monitoring and systematic monitoring, assessment, and forecasting of changes in the condition of the natural environment and its elements and anthropogenic impact during the period of the construction and operation of the railway line.

The main tasks of the environmental monitoring to be applied would be as follows:

- ▶ To continuously and systematically monitor the condition of the natural environment and its elements in the territory of the railway line and the territory adjacent to it;
- ▶ To systematise, assess, and forecast self-induced and anthropogenic impact-induced changes occurring in the natural environment, natural environment change trends and possible consequences;
- ▶ To accumulate and analyse information on the condition of the natural environment and to provide it to state institutions and the public;
- ▶ To analyse and assess the efficiency of environmental measures being carried out.

In carrying out environmental monitoring, the following would be monitored, assessed, and forecasted:

- ▶ The condition of ambient air, water, subsurface resources, fertile soil, and wild-life;
- ▶ The condition of natural and anthropogenically-affected natural systems (natural habitats, eco-system) and landscape;
- ▶ Physical (noise), chemical (pollution), biological (dead mammals), and other anthropogenic impact and its effects on the natural environment.

The following measures for the monitoring of the implementation of solutions in respect of public health are envisaged:

- ▶ The condition of ambient air, water, subsurface resources, and fertile soil;
- ▶ Physical (noise and vibration), chemical (pollution), and other anthropogenic impact and its effects on public health.

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TEXTUAL AND GRAPHICAL ANNEXES

Annex 1. The Environmental Impact Assessment – drawing.

Annex 2. The qualification data of the authors of the EIA.

Annex 3. A copy of Letter No 7-01/1072 of the Environmental State Bureau of the Republic of Latvia dated 12/05/2015;

Annex 4. Noise propagation maps.

Annex 5. Diagrams of the planned railway facilities of Panevėžys Distr. Mun., M 1:5 000;

Annex 6. A copy of Letter No 7-01/1558 of the Environmental State Bureau of the Republic of Latvia dated 24/08/2015.