



ASSESSMENT REPORT ON ENVIRONMENTAL IMPACT

Technical assistance (design) for the construction of second track on the sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai

The customer of planned economic activity:

Joint-Stock Company "Lithuanian Railways", company code 110053842; Mindaugas str. 12/14, LT 03603 Vilnius, Lithuania; Tel. 8-5-2693300, fax. 8-5-2692028.

> February 2010





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SUMMARY

A considerable attention is paid for the development of railways in the Republic of Lithuania. For the modernization of Vilnius railway bypass both funds of AB "Lithuanian Railways" and European Union are used. DE-CONSULT carried out a feasibility study along with UAB "Vilnius Consult" in July 2007. In 2008, planning of the assessment on the environmental impact was launched.

Project feasibility study has found that it is appropriate to carry out the reconstruction of railways as the slopes of ground embankment are too steep, the top of ground embankment is too narrow, tracks are exposed to leaching, there is subsidence of track bed, there are no lateral ditches, etc. This listing of technical defects does not meet the standard conditions of AB "Lithuanian Railways".

The project for the reconstruction of Vilnius bypass section is within the list of types for the planned economic activities, which have to pass the selection of the assessment on the environmental impact (paragraph 14). The list of types for the planned economic activities which impact on the environment has to be evaluated, or the list of planned economic activities which have to pass the selection of assessment for the environmental impact, embrace the replacement or extension of planned economic activities, including the reconstruction of existing buildings, modification or replacement of manufacturing processes and technologic equipment, change of production method, volume (scale) or type of production, introduction of new technologies and other changes, which are likely to have negative impact on the environment (except the cases indicated in paragraph 10 of Annex 1). Following the selection of assessment of Environmental impact, the final finding of selection received from the Department of Environmental Protection of Vilnius Region of the Ministry of Environment showed that the assessment on the environmental impact is required.

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Organiser of documents for the assessment on environmental impact:

DB-Internacional GmbH, J. Basanavičius str.7, Business Center "B7", Vilnius, phone 8-5-2608376;

UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius 8-5-2395066.

In pursuance of the modernization of Vilnius railway line bypass, negative effects on the existing infrastructure are not anticipated. After all the works provided by the modernization project, the systems of existing power supply, signaling, telecommunications, management and other ones will be improved, and this will lead to the safer traffic of trains, safer working conditions for the rail workers as well as the residents of neighbouring areas.

Current railway track

Pending railway track is currently the single track of 2.7 m in width and 27.156 km in length (see Figure 1).



According to the data of Rolling-stock Department of AB "Lithuanian Railways", the average annual daily traffic heaviness of the railway track section under consideration amounted maximum 22 locomotives per day in 2009. The prognosis for the year 2015 suggests that the heaviness of traffic could increase by up to 33 locomotives per day.

The following railway stations for passengers are under the modernization on Vilnius railway bypass route: Kyviškės, Valčiūnai, Vaidotas, Pušynas and Paneriai.

The following railway stations for freight are under the modernization on Vilnius railway bypass route: Kyviškės, Nemėžis, Valčiūnai, Vaidotas, Pušynas and Paneriai.

The Project

The section of Vilnius railway bypass route of 25.616 km is supposed to be modernised by building second track, the total width with the existing single track is going to be 7.460 meters (see Illustration 1). The construction of new track is planned for 1.540 km (at Paneriai).



Illustration 1. Cross-section of railway double track





ABBREVIATIONS

EAP -- environmental action pPlan

dBA - sound (noise) intensity unit

C -coal

CadnaA -prognostic noise modeling programme

CO₂ –carbon dioxide

CH -- i hydrocarbons

CF, M62, 2M62, ČME -2 – locomotive types

MPL -maximum permissible level

EU – European Union

H₂S –hydrogen sulphide

S – solids

LR – the Republic of Lithuania

N₂ –nitrogen

PP – petrolic products

O₂-oxygen

CVD -cardiovascular diseases

EAI –assessment of environmental impact

SPZ -sanitary protection zone

SO₂ –sulfur dioxide

CTR - technical regulation for construction

AADTI –annual average daily traffic intensiveness

SDR – register of soil deepness



INTRODUCTION

This report deals with the project "The information on mandatory assessment of environmental impact of technical support (planning) for the second sections of the track construction Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai".

Purpose of the report:

- To assess potential direct and indirect environmental impacts;
- To propose some reduction or avoidance measures of significant negative impact;

Goals of the report:

• To select those aspects out of many environmental issues which are important for the participants in the EIA process (including the public);

• To predict possible direct or indirect environmental impact and the alternatives under considertaion in the EIA report;

• To provide measures for reduction or prevention of significant negative impact;

• To ensure environmental aspects to be taken into consideration during the planning, design, construction and operation of activity;

• To provide the customer, responsible authority as well as general public with reliable information about the nature of planned activities on environmental impact before making main decisions;

• To ensure the modernization project to be carried out and implemented on time (2007 to 2013).

Reasoning for preparation of the report:

The technical assistance (design) for the modernization project of second track construction on the sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai (hereinafter - Vilnius railway bypass) is within the target economic activities, which has to pass the selection of assessment type list for environmental impact (item-"14"). The list of target business activities, which have to pass mandatory assessment of environmental impact or the list of planned economic activities, which have to pass selection for assessment on environmental impact, includes change or development of target economic activity, including the reconstruction of existing buildings, modernization or replacement of manufacturing process and technology hardware, change of manufacturing method, volume or type of production (scale), introduction of new technologies and other changes that may have adverse effects on the environment, except for the cases indicated in paragraph 10 of Annex 1). Following the selection of an environmental impact assessment, the final conclusion of selection from Vilnius Regional Environmental Protection Department of Ministry of Environment of LR was received that the assessment of environmental impact is mandatory (Letter No VR -1.7-3637 of 18 December 2008).

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UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius 8-5-2395066.

Information and data during the preparation of assessment report on environmental impact provided by:

- Lithuanian Geology Service Watering-places and their protection areas;
- DB Internacional GmbH data on traffic heaviness, engineering geological exploration;
- AB "Lithuanian Railways" technical characteristics of locomotives, complaints of residents (2005-2008 years), scientific report "Researches of railway noise and vibration" by Vilnius Gediminas Technical University (2007), presentation of available data (noise, vibration, accidents and other emergencies, air pollution, waste, sewage, etc..)
- EPG mbH design proposal for sewage collection and abstraction, technical characteristics of rail track section under modernisation.

This report provides information on the location where the project will be implemented, evaluated the potential impact on people living by railway, landscape areas, surface water, Natura 2000 and protected areas, animals, soil (ground and ballast) and cultural heritage objects. Environmental mitigation measures for negative impacts have been proposed.

Current Lithuanian railway transport sector is still technically, economically, technologically and organizationally far below the forward, modern railway transport systems of the European Union which interact effectively among themselves. During the integration into the European railway network, the technical level of the infrastructure and superstructure is a really important indicator. After the implementation of project, the Vilnius railway track bypass shall meet technical, environmental and safety requirements of the EU.

After a successful implementation of technical-design solutions, Vilnius bypass railway track will provide communication for freight trains at speed of 80 km / h. AB "Lithuanian Railways" has approved pre-project proposals at technical board. Vilnius Railway Bypass project is included in the National Strategy for 2007-2013 m, and its successful implementation will create more job places in the country. Predictable modernization budget for Vilnius railway bypass track id 50 million Euro.

One of the main objectives of this project is to direct trains from the city center of Vilnius, where freight trains move through most currently. The current bypass is only a single track, after the installation of second track, modern technical prerequisites will be created to direct balanced traffic of trains towards the bypass.

Installation of modern railway infrastructure meeting all the environmental, safety and infrastructural requirements of EU in Lithuania will ensure environmentally friendly, cost-effective and safe railway operation in the future.

EIA organizer accomplished assessment of impact on public health, where identified the critical impact factors for people living near railway and locations where technical health-friendly preventive measures described in the following report shall be implemented during the modernization of the railway track.



EIA organizer carried out EIA publicity procedures in accordance with the laws of the Republic of Lithuania, responded to all written suggestions motivated suggestions, met all of the existing foremen acting within the framework of project additionally. Organiser shall provide the EIA report to RAAD Director of Ministry of Environment for final approval. Mandatory report copies of EIA the organizer shall submit to the following entities: County Administration of Vilnius, Municipality Administration of Vilnius District, Municipality Administration of Vilnius City, Vilnius Public Health Centre, territorial department Vilnius of the Cultural Heritage Department, Vilnius County Fire and Rescue Service.



1

PRESENTATION OF GENERAL DATA OF THE PROJECT

1.1 The purpose of project, site for carriage of works, the sequence, life time of object

Technical solutions for Vilnius railway track bypass are approved by technical council of "Lithuanian Railways" on 8 June 2009. Following the successful implementation of design solutions for freight trains, communication at speed of 80 km / h will be provided on the track. Vilnius track bypass project is included in the National Strategy for the years 2007-2013.

Development of technical railway infrastructure and superstructure level is one of the key priorities for integration into the EU transport networks, security of higher quality transport services for freight forwarders and shippers who use transportation services, and improvement of life quality and potential environmental impact.

One of the main objectives of this project is to direct trains from the city center of Vilnius, where freight trains move through most currently. The current bypass is only a single track, after the installation of second track, modern technical prerequisites will be created to direct train traffic towards the bypass

The project is going to be implemented during the years 2011-2013. Reconstructed or newly built railway tracks may be used for an indefinite period of time by updating them periodically.

Projected railway track runs through the territory of Vilnius city and Vilnius district within the Vilnius county. The route length of track under modernization is about 27.156 km in total (see Illustration 2).







Illustration 2. Railway section to be modernized

1.2 Description of technical characteristics of the project and current state

The railway with the power supply, signaling, telecommunications, management and other systems and infrastructure elements as well as stations and station buildings and facilities is now available at the location of target economic activity at present.

The following railway stations for passengers are under the modernization on Vilnius railway bypass route: Kyviškės, Valčiūnai, Vaidotas, Pušynas and Paneriai.

The following railway stations for freight are under the modernization on Vilnius railway bypass route: Kyviškės, Nemėžis, Valčiūnai, Vaidotas, Pušynas and Paneriai.

Vilnius railway bypass reconstruction and modernization project includes the following main works:

- Construction of second track on sections Kyviškės Valčiūnai and Vaidotas (Pušynas) - Paneriai;
- Removal of weak places of railway bed;
- Restoration / renovation of existing bed for target speed of 80 km / hr and axle load of 25 t;
- Reconstruction / modernization of earthworks, drainage systems;



- VILNIUS CONSULT ENGINEERING CONSULTING
- Adjustment of signalling, telecommunications, power supply systems due to the change of track layout and adaptation of overground contant network systems in Paneriai according to the modified track layout;
- Replacement of points for increase of deflection speed and acceleration in Paneriai and Kyviškiai stations, including modifications to the track geometry;
- Re-layout of track sections which are located where the present curvature of geometry of track does not meet the requirements for speed of 80 km / hr.;
- Horizontal and vertical increase of track curves.

Works will be mainly carried out within the railway site, mostly through the broadening of existing bed or seting out a new one for construction of second track (see Illustration 3).



Illustration 3. Site for planned works

Scope of works

Kyviškės station 0+00 km

Reconstruction of Kyviškės station track network via installation of nine points of type R65-927-1/18, with electric point heating. Adaptation of track layout to the new layout of the points, changes of top track design ensuring axle load of 25t, installation of concrete sleepers with elastic fastening on the rubble metal. Adaptation of existing signals, cables to the changed track layout.

Section Kyviškės – Nemėžis (0+00 km – 10+550 km)

Two new tracks in the direction of Valčiūnai shall be built from 0+00 km to 0+500 km, including a new bed with a protective bed layer, providing axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals, cables to the changed track layout and installation of new ones for regulation of cross-rail movement of train traffic.



Existing single track is re-traced via removal of about 1 m in the southern direction from 0+500 km to 1+030 km and the new second is built nearby, <u>within railway site limits</u>. The distance between the track axes is about 5m. Installation of a new track bed with a protective bed layer by ensuring axle load of 25t shall be performed. Installation of concrete sleepers with elastic fastening on the rubble metal is intended to be carried out. Adaptation of existing signals, cables to the changed track layout and installation of new ones for regulation of cross-rail movement of train traffic via new track 0+900 km shall be equipped with new protective point.

Track runs via existing track from 1+030 km to 4+950 km and a new track is built on the existing southern side of the track, within railway site limits. The distance between the track axes is about 5m. Reconstruction of existing track providing axle load of 25t shall be performed. A new track bed with a protective bed layer is installed throughout the laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track. Due to the construction of second track, estude on +250 km and 3+650 km. The culvert located on 3+920 km is developed due to the construction of second track.

Re-tracing of existing track from 4+950 km to 6+750 km and the construction of second track is intended in the southern direction, within railway site limits, except for a section of about 100 m at 5+930 - 6+050 km, where the track slightly runs beyond the site limits. Installation of new double track bed with a protective bed layer, ensuring axle load of 25t shall be performed. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals and cables and installation of new ones for regulation of cross-rail movement of train traffic via new track is inteded.

Track runs along the existing track from 6+750 km to 10+550 km and second new track is built in the southern direction of existing track, <u>within railway site limits</u>. The distance between the track axes is about 5m. Reconstruction of existing track, providing axle load of 25t shall be carried out. A new track bed with a protective bed layeris installed throughout the laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal is intended. Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track. Two regional roads crossing, located at 8+948 km and 10+230 km, extension and adaptation due to the construction of second road. The culvert located on 7+216 and 7+550 km is developed due to the construction of second track.

Nemėžis station (10+550 km - 11+900 km)

Track runs via existing track through Nemėžis station, the third northern branch of track of the station is dismantled; new second track is built on the existing south side of the track. The distance between the track axes is about 5m. Reconstruction of existing track, providing axle load of 25t shall be carried out. A new track bed with a protective bed layeris installed throughout the laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal is intended.





Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track.

Section Nemėžis – Valčiūnai (11+900 km – 21+150 km)

Re-laying of existing track from 11+900 km to 12+750 km in the southern direction and construction of second new track is intended <u>within railway site limits</u>. Existing track section located at the re-laying site is dismantled. Installation of new double track bed with a protective bed layer, ensuring the axle load of 25t is intended. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals and cables and installation of new ones for regulation of cross-rail movement of train traffic via new track is intended as well.

Track runs via existing track from 12+750 km to 17+550 km, but newly-laid track moves into the northern direction, within railway site limits. The distance between the track axes is about 5m. Reconstruction of existing track is intended by ensuring axle load of 25t. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track. Due to the construction of second track, development and adaptation of two track level-crossing of regional importance, situated on 13+515 km. Due to the poor technical condition, the construction of a new bridge on 15 +150 km is intended instead of the existing bridge.

Re-laying of existing track from 17+550 km to 17+850 km in the northern direction is intended, and the newly laid track moves in the southern direction again, <u>within railway site limits</u>. The distance between the track axes is about 5m. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal is intended. Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track.

Track from 17+850 km to 21+150 km runs via the existing track and a new second track is built on southern side of existing track, <u>within railway site limits</u>. The distance between the track axes is about 5m. Reconstruction of existing tracks, providing axle load of 25t is intended. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals, cables to the double track section and installation of new ones for regulation of cross-rail movement of train traffic via new track. Due to the construction of second track, development and adaptation of Vilnius-Lyda track level crossing of regional importance, situated on 18+455 km.

Valčiūnai station (21+150 - 22+850 km)

Re-laying of existing track from 21+150 km to 21+850 km in the southern direction, and construction of new second track is intended <u>within railway site limits</u>. The distance between the track axes is about 5m. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal is intended. Adaptation of existing signals, cables to the double track section and installation of new



ones for regulation of cross-rail movement of train traffic via new track. Level-crossing, located on 21+586 km shall be moved and developed.

Track runs from 21+850 km to 22+850 km via existing double track through the rearrangement of layout of station track points, providing protective installation of spurs and reconstruction of existing tracks, providing axle load of 25t.

Section Valčiūnai – Vaidotai (22+850 km – 25+000 km)

A new double track off Vaidotai is built from 22+850 km to 23+400 km, <u>within railway</u> <u>site limits</u>. The distance between the track axes is about 5m. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals and cables to the double track section is intended.

Three-way track to Vaidotai begins from 23+400 km leaving the existing track on the right, and two new tracks shall be built nearby. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals and cables to the new layout of tracks is intended.

Rearrangement of tracks of Vaidotai station is intended from 24+500 km to 25+000 km through the installation of 9 new points. Adaptation of existing signals and cables to the new layout of tracks is intended.

Section Vaidotai (Pušynas) - Paneriai (0 + 000 km - 9+016 km) Track from 0+000 km to 2+700 km runs via existing double track fron the station Vaidotai to Pušynas stop. Reconstruction of track is intended by ensuring axle load of 25t and maximum speed of 80 km / h.

A new layout of tracks from Pušynas stop towards Paneriai is intended. The existing connecting track Vaidotai - Paneriai in the direction of Lentvaris (track "L") is expected to be dismantled, by building a new double track section instead, which shall join the main line Vilnius - Kaunas. A new track bed with a protective bed layer is installed throughout the new laying section of track, ensuring axle load of 25t. Connection plan of new track "L" (double) to the main line Vilnius-Kaunas is intended. Installation of concrete sleepers with elastic fastening on the rubble metal shall be carried out. Adaptation of existing signals and cables to connection of double track section section to the main line Paneriai, and installation of new ones on the new track is intended, too. Due to changes in road layout, connective track "G" Pušynas – Paneriai shall be relaid. Due to the construction of new double track section, the building of one railway bridge and a highway overbridge is intended.

General works on Vilnius railway bypass

The modernization of the upper structure of the existing track (where necessary), to the extent possible, will be subject to "on-track" approach by using modern machinery. Recycling of old materials is installed in these machine and is carried out at the site of reconstruction works. The upper layer of metal is removed from the track construction for processing / cleaning. At the same time, a protective layer of bed is formed,



renewed rubble metal is inserted and unused old material is removed. The works, which will be carried out on the rail, will not have any impact on the surrounding lanscape.

The replacement of existing points is intended through dismantlement of existing points, excavation of rubble metal and addition of another 30 cm thick layer of rubble metal.

Adjustment works of signaling equipment will be carried out in existing areas of railways, excepto for re-laying sites, where the railway site goes outside its limits, and basically shall cover transfer of existing infrastructure, cabling, etc., therefore there will not be any impact on the environment due to these works.

Water abstraction from the earth embankment is intended through thr discharge of surface water via open ditches into existing or newly installed ditches beside the newly laid second track.

Embankment slopes are intended to be strengthened with organic geotextile material, by pouring vegetable soil and planting grass.

New pollution sources will not be developed in relation to the current situation, thus the environmental benefit of the project can be identified in parallel with the potential impact of the project. As in most civil engineering works, the environmental impact of railway presence is felt the most during the construction.

1.3 Description of used forecasting techniques for environmental impact

Versions

Two railway modernization versions have been analysed: "project-based version" - modernised railway and "O" version, i.e. non-modernised railway. "O" and "project-based version" are different in heaviness of traffic and average running speed (Table 1), which affects different noise levels. Both versions have been analysed using predictive heaviness of traffic of the year 2015. To assess how the situation will change in comparison to the year 2005, we have chosen another version – non-modernised railway track, i.e. the current situation.

Track	Length of track (km)	Situation in 2005 (pairs of trains ¹)	Forecast situation 2015 (train pairs)	Growth rate (%)
Kyviškės- Valčiūnai/Vaidotai	28	17	44	153
Vilnius-Valčiūnai	-	3	5	67

Table 1. Heaviness of rail traffic on Vilnius bypass, data of 2005 and projected for 2015

^{*2005} traffic data in accordance with feasibility study carried out by German company DE-CONSULT in February 2007.





	attent to fait the			
Valčiūnai/Vaidotai-Paneriai	12	38	59	55

' Number of trains running in one direction. In fact, there is twice as many trains, e.g. 17 pairs of trains means 17 trains forward and 17 back.

Assessment techniques

Environmental components under assessment are grouped into two main groups:

- Human and social environment (air quality, noise, land use, immovable cultural values).
- Physical and live nature (soil, water, landscape, biodirversity, resources of animate and inanimate nature).

Model for assessment process of project environmental impact is schematically presented in Table 2.

Impact object	Environmental	Planned activity			
	components	Railway track building	Railway track operation	Maintenance of railway track	
Human and	Air quality	+	+		
social	Noise	+	+		
environment	Land use	+			
	Cultural heritage	+	+		
Physical and live	Water	+	+	+	
nature	Soil	+	+	+	
	Biodiversity	+	+	+	
	Landscape	+	+		
	Flora	+	+		
	Fauna	+	+		
	Minerals	+			
Impact on public	Air quality		+		
nealth	Noise		+		
	Soil				

 Table 2.
 Assessment model for planned activities of the environmental impact

NOISE

<u>Calculations of existing and projected noise level in the environment of concerned the track</u>

Under the order of UAB "Vilnius Consult" the modeling of noise level of current and prospective situation (2008 and 2015) has been carried out. This modeling was carried out by "Acesoft" noise professionals by using the program CadnaA for prospective noise.

AIR

<u>Pollution dispersion of of existing and forecast air in the environment of railway track</u> The calculations have been carried out under ADMS Urban model and the quantity of pollutants emitted by diesel locomotives have been calculated, too. Air quality rated by years of 2009 and 2015, after the assessment of the new locomotive fleet.

OTHER ENVIRONMENTAL COMPONENTS HAVE BEEN EVALUATED IN DESRIPTIVE WAY, ON THE BASIS OF INFORMATION WHICH HAS BEEN ANALYSED AND PRESENTED BY:





- Analysis of metal, soil and water contamination has been carried out by UAB "Projektana", studies have been evaluated by UAB "Baltic DGE Soil and Environment";
- Vibration level measurements have been carried out by the National Public Health Laboratory;
- Noise level measurements have been carried out by the National Public Health Laboratory;
- Analysis of area biodiversity have been carried out by specialist of Lithuanian Nature Fund;
- Geological engineering description of area has been presented by EPG mbH.

1.4 Brief description of possible significant environmental impact by planned economic activity

Significant impact on the environment and public health of planned economic activity is unforeseeable, however, negligible impact may be, for the reduction of which various technical engineering and environmental measures shall be applied.

The main effect is likely due to the increased train traffic which will slightly increase by the noise of traffic. However, for the reduction of such noise, the noise extenuating walls are going to be installed (settlements) and the windows of increased sound insulation in single houses are going to replace existing windows. These measures will ensure acceptable noise levels in the living environment and improve the existing noise situation.

Significant impact on the natural environment and biodiversity is not expected, in individual cases the positive effect is expected, since during the preparation of the project for railway line modernization, cleaning / replacement of contaminated metal, modernisation / installation of drainage and sewage systems, installation of partial treatment systems by the streams, reinforcement of bed embankment is intended to be carried out.

All the above-mentioned and other possible measures of reduction of significant environmental impact by target economic activity will provide a safe and environmentally friendly operation of the railway in the future.





2 DESCRIPTION OF THE PLACE FOR TARGET ECONOMIC ACTIVITY

2.1 Geographic location, characteristics of landscape and natural resources

Legal regulation

EUROPEAN LANDSCAPE CONVENTION. FLORENCE, 20 OCTOBER 2000;

ORDER NO. D1-35 BY MINISTRY OF ENVIRONMENT CONCERNING APPROVAL OF THE PROVISIONS FOR THE USE, PLANNING AND PROTECTION OF RECREATIONAL AREAS, 20 JANUARY 2004, VILNIUS;

DECISION NO. 343 BY THE GOVERNMENT OF THE REPUBLIC OF LITHUANIA CONCERNING THE APPROVAL FOR THE USE OF SPECIAL AGRICULTURAL AND FORESTRY CONDITIONS, 26 SEPTEMBER 2007, VILNIUS.

Modernization project is planned to be carried out on the section Kyviškės Valčiūnai and Vaidotas (Pusynas)-Paneriai, which belongs to Vilnius city and district municipalities.

Issue area is characterized by a wide network of residential settlements and many isolated planted homesteads. The entire area consists of dry darined areas, mainly used as pastures, with small areas of arable land. There are not much natural grasslands remaining intact by human. It is possible to distinguish forest, grassland, agri-environment, urban environment and hydroecosystems.

Vilnius railway bypass line falls into the hilly Baltic upland section. These areas are characterized by the following background: agriculture and forestry farms, soils of poor economic value are common, difficult farming conditions.

At the end of the route in question, new section of railway of about 1,540 m of is intended to be built. The building of this new section will cover about 61,655m², part of the new railway line (approximately 24.744m2) will go through the Paneriai forest. Reconstructive value of the plantations will be calculated during the implementation of technical project.

2.2 Geological characteristics of the site

For the formation of general view of geological conditions of the research section, maps of the *Geolis* Information System have been reviewed, which are on the website of Lithuanian Geological Service.

For description of the geomorphological and geological conditions of Vilnius bypass, the study section can be divided into six sections:

Section A (Vilnius bypass km 0+000–km 3+900, Vilnius-Kėna km 17+000–km 18+000). Here the railway passes Kyviškiai morainic plain, which belongs to the Northern plains region of Vilnius plain subdistrict. Prevailing soils - till and loam, sand, and by Kyvės stream (km 1 +120) - alluvial sand.



<u>Section B (km 3+90 – km 8+000).</u>

The railway crosses hilly morainic crest of Rukainiai along the Šaterninkų stream valley, then the railway winds along this last glaciation mountain ridge, which belongs to Vilnia plain, along the southern border or Veliučioniai moraine array of the penultimate glaciation, belonging to Medininkai upland subdivision of Ašmena upland region. The predominant soils - moraine loam, loams; at Šaterninkai (km 3 +920), and Murlė (km 7 +540) streams - alluvial sand; in the stratification areas of fluvioglacial sediment – sand of various grains. Turf or turfened sand may stratify in shallow descent areas.

Section C (km 8+000 - km 12+700).

Railway section passes Veliučioniai moraine array, which belongs to Ašmena upland region of Medininkai upland. Soils - moraine loams, loams. From 10+200 km (Black side streets) the railway track starts falling down the left slope to dry valley of river Nemėžis. Nemėžis stream is crossed before the Minsk highway (12.46 km).

Section D (km 12+700 - km 17+800).

At this section the railway crosses the river Nemėžis dry valley, then goes along the right edge of the valley. Soils – dealluvial and alluvial clayey sand, loam, sand, turfy sand.

The Nemėžis stream separates Veliučioniai morainic array present in the east from Nemėžis moraine plateau streaching in the west. Both of them belong to Ašmena eminence region of Medininkai hills. Sometimes the railway goes up to Nemėžio plateau from the Nemėžis valley, where soils are moraine loam and loam.

Sector E (km 17+800 - km 24+600).

The rail passes Juodšiliai fluvioglacial - limnoglacial plain belonging to Southeast plains region of Vokės-Merkys plain. Soils – sands of various grains. At 19+270 km the railway crosses a stream, where shouldstratify alluvial fine sand, and sometimes there may be turfened sand, too. At 23+600 km - 24 +300 km the railway goes down the slope to Vokės old valley, where clayey sand and loam dominate.

From geotechnical point of view, wetlands and stream valleys ares the most sensitive sites, since there the weak soils such as peat or sludge may occur. It is necessary to clarify these points during the inspection of the area (focusing on the nature of terrain, flora, etc.). Having misdoubted that the soil was weak, some additional tests were carried out, which determine the extent of weak soil stratification.

The possibility of hypothetical presence of swampy places has been assessed through the examination of sites and geomorphological maps as well as Quaternary maps. The most likely that swampy places are at these sections:

- km 4+600 km 5+700 (Šeterninkai stream valley);
- km 7+400 km 8+000;
- km 8+600 km 8+800;
- km 24+700 km 26+700.

Geological conditions



The railway section crosses the peripheral sections of upper and middle pleistocene moraine structures, which are characterized by re-stratisfaction of complex sand and clay soils, and crosses several streams in the valleys. Streams are small, but their drifts and part of slopes contain turf and layers of turfened soils.

Vilnius railway bypass section crosses the geomorphological areas of fluvioglacial plains of last glaciation and moraine uplands of penultimate glaciation.

Vilnius railway bypass section Paneriai-Juodšiliai falls into the territory of geomorphological districts of the southeast plain region of geomorphological region of Voké-Merkys plain sub-region of hollow of the lower reaches of Voké and Juodšiliais fluvioglacial limnoglacial plain. Fliuvioglacial terrain type is dominant, the surface sediment are mainly composed of sand of different coarseness, the dominant terrain height is from 150.0 to 155.0 m above the sea level.

The eastern section of the bypass from Juodšiliai to Kyviškės crosses the territory of Ašmena upland geomorphological region of Medininkai upland sub-region of Nemėžis moraine plateau and Vėliučioniai moraine array geomorphological districts. Dominating terrain type – glacial, prevailing surface sediments - moraine loam and loam, the dominant terrain height above the sea level - about 200.0 m. (see Annex 1).

The pending section includes turfy sod podzol gley soils. Predominant texture is sandy loams and light loams. Under pollution and the vulnerability caused by the rail, the sod soils are classified as of average vulnerability.

2.3 Hydrologic-hydrogeologic characteristics of the site

Groundwater

At Vilnius railway bypass section Paneriai-Juodšiliai, the groundwater stratifies inside sands of different grains of fliuvioglacial origin. Stratifaction depth of ground water varies from 5 to 10 years The dominant hydrochemical water type – hydrocarbonaceous calcium magnesium, total mineralization of water is up to 360-440 mg / I. Groundwater is powered by atmospheric precipitation. Filtration rate of soils is from 2.0 to 10.0 m / d, and the filtration permeability of aquifers is up to 50-30 m2 / d. Aquifers are drained by streams and reclamation ditches. At the eastern bypass section Juodšiliai-Kyviškės, the groundwater is stowed by the part of the upper sandier loam or sandy loam, sandy pebbles in morain. The ground water is most common in the areas of outspread of moraine structures. Dominating stratification depth of ground water - up to 5 m above the ground, river valleys – up to 1-2 m above the ground surface, at elevations the ground water can be found in the depth of up to 20 m (see Annex 1).

Quaternary interlayer water horizons are spread unevenly around the Vilnius railway bypass section. Due to the unevenness of aquitardy layers, the hydraulic connection between interlayer horizons and ground water occurs in many places. Up to 5 more or less maintained water horizons distinguish in the Quaternary sediment thickening. Their amount does not usually exceed two in river valleys, and 5 horizons on elevations. Aquifers are unevenly distributed, their lithology, thickness, and wateriness is very changeable. Water hydrochemical type - hydrocarbonaceous calcium magnesium, total mineralization of water - up to 800 mg / l.



Pools of surface-water

Vilnius railway bypass crosses the following rivers and streams: 1.1 km - Kyvė, 3.9 km - Šaternikis, 7.5 km - Murlė, 10.5 km - Nemėža, 12.3 km - Nemėža. The latter three are assigned to the small tributaries of the Neris river sub-basin water pools.

Currently, the surface (rain) water is derived from the roads to the existing ditches. The purpose of side ditches along the rails is to collect to the surface (rain) water drained from the ground bed and upper track construction and allow it to flow into the lower areas or into specific outflow locations along longitudinal gradient.

2.4 Meteorological and climatic conditions of the site

Vilnius track bypass line, like the rest of Lithuania, is in a zone of temperate cool climate with medium warmth in summer and medium coldness in winter. The average temperature of the warmest month July is about 17°C, the coldest month January - about -5°C. The temperature change between temperatures of adjascent days in winter can reach up to -20°C. Lithuania used to have very hot summers, when the weather used to get warm up to 30°C, and also very cold winters when the weather became cold up to -20°C and at nights even up to -30°C. Most rainfall is in summer (up to 50% of annual precipitation), because of sudden storms, squalls and rain. Less rainfall is in autumn and winter. The least rain is in spring, mostly because of anticyclones dominating at that time.

Lithuanian climate is determined by solar radiation and atmospheric circulation as a whole. Lithuania total average solar radiation is 3370 MJ / m^2 , the average surface emissivity is up to 1470 MJ / m^2 and an average annual temperature is about +6°C.

As the Vilnius railway bypass lasts only for about 25 km from east to west, the climate changes in this section are not very noticeable. Average climatic data of Vilnius and its surroundings is presented in Table 3.

	Vilnius
Average temperature [°C] of the coldest month of the year (January)	-5,9
Average temperature [°C] of the warmestmonth of the year (July)	17,5
Average day temperature passing 0 ^o C (while warming) date [month, day]	III 25
Average day temperature passing 0 °C (while freezing) date [month, day]	XI 20
Last frosts in spring [month, day]	V 20
First frosts in winter [month, day]	IX 25
Lowest temperature in winter (average) [°C]	-25,5
Absolute lowest weather temperature in winter [°C]	-38
Formation date of permanent frost [month, day]	XII 5-10
Date of permanent frost decline [month, day]	IV 6-9
Maximum thickness of frost in soil [cm]	100
Average annual rainfall [mm]	620
Average rainfall during the warm season [mm]	440
Average rainfall during the cold season [mm]	180
Formation date of permanent snow cover [month, day]	XII 20
Maximum thickness of snow cover [cm]	30
Ddate of snow cover decline [month, day]	III 10-15
Number of days when there is fog in summer [days]	10
Number of days when there is fog in winter [days]	20-30

Table 3. Basic climatic data





Number of days when there is fog during the year [days]	60-80
Maximum wind speed estimated (once per 20 years) [m/s]	25

The following table presents the average or extreme values during the observation period till 1980, using data from the Atlas of Lithuanian SSR. Global climate change over the last decades: the average annual temperature is increasing, air mass flow direction is changing, which results in abnormal climatic phenomena. Air transfer from the Atlantic Ocean often occurs in winters in Lithuania, therefore the winter is mild, stable snow cover is formed only for a short period of time. In the summers, air transfer from the continent forms more often than usual, and therefore the periods of drought last longer.



Illustration 4. Climate regioning in Lithuania

2.5 Data on flora and fauna of the site

Vilnius railway bypass Kyviškės - Valčiūnai section and section Vaidotais (Pušynas) -Paneriai of the corridor IXB pending modernisation is located in poor areas nalturally. These are mainly urban areas affected by anthropogenic activities. The areas used for agricultural purposes with inserts of single groves and the forming plashes temporarily flooded in spring extend on both sides of the line of Kyviškiai-Valčiūnai section.

Fauna. Amphibia spawning grounds – these are generally edges of greater water pools, riverside bogs, shallow water pools. Amphibia need the water to be heated quickly and easily. The main threat for spawning grounds – it is their contamination by chemical substances. Terrestrial habitation of amphibia differ in their species, but the main criteria - a little fragmented territory, where there is enough food (insects and other invertebrates), shelters.



There are 27 culverts on the bypass section, the project provides for their extension, cleaning, maintenance and control. It will be more accessible to wildlife. After the modernization and adaption of the culverts, the fragmentation and isolation of population of not only amphibia but also small mammals: weasels, martens, beavers and other animals will be reduced.

Flora. Up to 20 types of adventitious plants are found on the railway track beds (Assessment of habitations under protection in Vilnius city and preparation of protection regulations. Institute of Ecology of Vilnius University. Vilnius, 2005). Some of them, like Syvers artemisia (Artemisia sieversiana), common ragweed (Ambrosia artemisifolia) survive only for a few years, because they do not nurture seeds under conditions of our climate. Other adventitious types vegetate in constantly supervised railway track area. Maintenance of bed by mowing it periodically would slow the spread of invasive plants before they have nurtured and spread their seeds.

2.6 Data on the antropogenic environment

The largest anthropogenic sources of pollution are industry, energy, transport and agriculture. The greates effect comes from stationary pollution sources (industry, energetics), and from mobile ones – the vehicles.

Transport is a specific and dynamic source of pollution. Its caused physical pollution falls into all urban areas: the residential and industrial areas, hospitals and recreational areas.

The negative impact of transport on the environment and the public can occur in three areas: environmental pollution, quality of life, use of resources. About 50-70 percent of total nitrogen oxides, about 50 percent of carbon monoxide and about 40 percent of volatile organic compound emissions are thrown into the environment by the transport. (Also exude CH, SO2, H2 S, C, N2, O2, CO2, H2O, H2, solids PM). Target economic activity will not increase air pollution, on the contrary, it will be reduce by the reduction of fuel consumption amount by locomotives. After the modernization of the railway, the train speed will increase, better conditions for the operation of much more modern trains, faster passing for long trains will be made as well as the durationof train stand will be reduced and the traffic will be diverted from the city.

2.7 Description of railways level-crossings

Vilnius railway bypass of target modernization intersects with the following car roads:

- In Pupeliai village with Upelis and Žiedas streets. This level-crossing is not going to be reconstructed substantially, whereas the car traffic is very small through it. However, while preparing the second-track project, all measures for traffic safety and management will be provided to ensure safe vehicular and pedestrian crossing and passage across the double railway track.
- Car road No 106 of state significance Naujoji Vilnia-Rudamina-Paneriai or Pergalės street in Grigaičiai. Currently, the said level-crossing is loaded enough, that is, average annual daily traffic intensiveness (VMPEI) of cars crossing it makes about



3500 cars, 10% out of which is freight transport. Due to the lack of well-developed infrastructure and sometimes after closing of the level crossing by VMPEI results in automobile rows in Grigaičių village. The existing building and the village (Grigaičiai) layout as well as the network of streets do not permit any technical capacity to install level-crossings of different levels here. However, after the implementation of provided engineering, traffic control and signaling development measures in the Vilnius railway bypass modernization project, and after the construction of the second rail track, the closure time of level-crossings will reduce and the rail crossing time will reduce, too. Therefore, a number of cars will decrease significantly, and thus the noise and air pollution caused by both traffic and waiting time will decrease as well.

- Car road No 101 of state significance Vilnius-Šumskas. Currently, the said levelcrossing is loaded enough, that is, the VMPEI of car traffic crossing it is about 3500 cars, 10% out of which is freight transport. Due to the lack of well-developed infrastructure and sometimes after closing of the level crossing by VMPEI results in automobile rows. However, after the implementation of provided engineering, traffic control and signaling development measures in the Vilnius railway bypass modernization project, and after the construction of the second rail track, the closure time of level-crossings will reduce and the rail crossing time will reduce, too. Therefore, a number of cars will decrease significantly, and thus the noise and air pollution caused by both traffic and waiting time will decrease as well.
- Car road No A3 of state significance Vilnius-Minskas. This road runs over the Vilnius railway bypass line, so no car traffic disruption caused by train traffic is not present and will not be present in the future, i.e. after the implementation of the railway modernization project.
- Dvaro street in Nemėžis. This level-crossing will not be reconstructed as the traffic through it is negligible. However, the development of second-track project will provide for all traffic safety and management measures to ensure safe vehicular and pedestrian crossing and the passage across double track.
- Car road No A16 of state significance Vilnius-Lyda. VMPEI across this levelcrossing is about 5500 cars, 500 out of which is freight transport. Due to enough speed of trains, there are no car rows on this level-crossing, and this level-crossing is not in the developed area, therefore increased air pollution and noise is not present. After the implementation of provided engineering, traffic control and signaling development measures in the Vilnius railway bypass modernization project, after the removal of adjascent station and construction of the second rail track, the closure time of level-crossings will reduce and the rail crossing time will reduce, too.
- Car road No 106 of state significance Naujoji Vilnia-Rudamina-Paneriai or Baltosios Vokės street in Juodšiliai. Currently, the said level-crossing is loaded enough, that is, the traffic (VMPEI) accros it makes approximately 4600 cars, 10% out of which is freight transport. Due to the lack of well-developed infrastructure and sometimes after closing of the level crossing by VMPEI results in automobile rows in Juodšiliai village. The existing development and the village (Grigaičiai) layout and the network





of streets, thus technical possibilities to install level-crossing of different levels are not given, without planning documents of territories and withdrawing the land for public needs. After the implementation of provided engineering, traffic control and signaling development measures in the Vilnius railway bypass modernization project, after the removal of adjascent station and construction of the second rail track, the closure time of level-crossings will reduce and the rail crossing time will reduce, too. It is additionally intended to carry out the reconstruction of the current tunnel passing over the tunnel at the railway station Juodšiliai by adapting it to safe movement of car traffic and pedestrians, so as to ensure an uninterrupted movement of local traffic. Thus, a number of cars will decrease significantly, as well as noise and air pollution caused by traffic and waiting time will reduce, too. Intensity of traffic, especially transit, through Juodšiliai level crossing will be significantly reduced, because the Lithuanian Road Administration has developed and approved specific plan for Vilnius southern car bypass. This bypass will connect Gariūnai with Minsk highway by rounding Juodšiliai, Rudamina and other settlements. In addition, another major transport infrastructure modernization project has been completed - continuation of Žirniai street of Vilnius city (Vilnius southern (inner) bypass, which will become a major transit traffic artery in Minsk direction and will significantly reduce automobile traffic through Juodšiliai village after the completion of Lazdynai bridge reconstruction.

 Car road No 106 of state significance Naujoji Vilnia-Rudamina-Paneriai orBaltosios Vokės street in Vaidotai. This road runs over the Vilnius railway bypass line, so no car traffic disruption caused by train traffic is not present and will not be present in the future, i.e. after the implementation of the railway modernization project.





3 DESCRIPTION OF POSSIBLE SIGNIFICANT IMPACT ON VARIOUS ENVIRONMENTAL COMPONENTS BY TARGET ECONOMIC ACTIVITY

3.1 Description of aquatic impact on the envirnment

Legal regulation

LAND 9-2002 "REQUIREMENTS FOR TREATMENT OF SOIL AND GROUNDWATER CONTAMINATED WITH PETROLIUM PRODUCTS AND LIMITATION OF POLLUTION";

LITHUANIAN HYGIENE STANDARD HN 44:2006 "DETERMINATION AND MAINTENANCE OF SANITARY PROTECTION ZONES FOR WATERING-PLACES" 17 JULY 2006 July 17 NO. V-613

Current situation

Surface water.

The entire target track of reconstruction is 27.156 km. Preliminary design works provide abstraction of surface water sewage along existing and newly designed side ditches (see Illustration 5). On the left side of the railway line Kyviškės – Paneriai the sewage abstraction of 11.911 km is planned, while on the right – of 15.025 km (see Annex 3).

Vilnius railway bypass crosses the following rivers and streams: 1.1 km - Kyvė, 3.9 km - Šaternikis, 7.5 km - Murlė, 10.5 km - Nemėža, 12.5 km - Nemėža, 19.3 km – Bevardis stream (a tributary of Vokė). The latter three are assigned to small tributaries of the Neris river sub-basin water pool.

Currently, the surface (rain) water from the existing roads is lead to the ditches. The purpose of side ditches along the rails is to collect to the surface (rain) water drained from the ground bed and upper track construction and allow it to flow into the lower areas or into specific outflow locations along longitudinal gradient.



Illustration 5. Cross-section of railway sewage drainage system



Some sections of the line include vestigial ditches, but they do not perform their basic functions to flush the surface water into the lower places along the ditches, as they are overgrown with wasted vegetation, poured over by used or existing rubble metal, fail to keep the necessary form. In order to allow thewater to drain from the beds into the lower areas, ditches need to be cleaned. The ditches must also have adequate longitudinal slope. In areas where there is a high ground water level, it is proposed to install water sewage system, as it is shown in illustration 5, consisting of a geotextile filter with a drainage tube (diameter 160 mm or 200mm). Through the application of such abstraction system for surface water, water collection manholes are installed for a space of 50 m.

Drainage must be provided at the places where the water is standstill by the ground bed sole or wet places are present. It is necessary to drain such places for the water being standstill by the bed sole standing would not saturate the ambankment. It is necessary to make water resurrections in these areas, i.e. to distance standing water from the ground bed sole and install under-ditch drainage so as to lower the level of groundwater of existent height. Before such works, it is necessary to assess detailed geological and hydrological analysis (reports on "Engineering geological researches" and "Analysis on metal, soil and water contamination by petrolic products").

As it was already mentioned, the railway line is crossed by five streams, one of them crosses Nemėža line twice (at 10.5 km and 12.5 km). The installation of surface water treatment plants is intended at these two sites (10.5 km and 12.5 km), since they are designed the drainage ditches have been designed up to them. This will prevent the surface sewage sludge from getting into the river water, and which will be protected from a possible lack of transparency. Annex No.3 includes the sites for water treatment plants (8 in total) and the model scheme for water treatment plant, the debits of which will be calculate during the technical project, because this equipment is assembled from single parts. During the technical project, all the technical engineering potentials will be analyzed in detail. Prognostic amount of rain water nearby water treatment facilities are presented in Table 4:

No	Number of receiver	Description of planned release of waste water and the source	Type / Technical data of outfall	Marking of oufall location	Maximum intended amount of waste water discharge m ³ /h m ³ /d m ³ /m
1	2	3	4	5	6 7 8
1	Receiver 1 Nemėža (10,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	12,30 61,50 600,06
2	<u>Receiver 2</u> Nemėža (10,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	18,67 93,35 910,81
3	<u>Receiver 3</u> Nemėža (10,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	12,85 64,25 626,88
4	Receiver 4	Rain water	Passage type	At the end of	8,13 40,65 396,63

Table 4. Data on water sources / outfalls



No	Number of receiver	Description of planned release of waste water and the source	Type / Technical data of outfall	Marking of oufall location	Maximum intended amount of waste water discharge m ³ /h m ³ /d m ³ /m
	Nemėža (10,5km)	drainage from bed	with proper capacity	drainage ditch	
5	<u>Receiver 5</u> Nemėža (12,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	4,49 72,45 706,93
6	<u>Receiver 6</u> Nemėža (12,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	76,40 381,98 3727,07
7	<u>Receiver 7</u> Nemėža (12,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	17,78 88,89 867,32
8	<u>Receiver 8</u> Nemėža (12,5km)	Rain water drainage from bed	Passage type with proper capacity	At the end of drainage ditch	56,83 284,16 2772,59

At the culverts of other rivers (Kyvė, Murlė, Šaternikis and Bevardis), surface water treatment plants are not going to be installed, as water drains are not designed and access of silt is not available. Reinforcement of embankment slope is expected to be carried out at all streams and culverts, to protect them from possible erosion and stoppage of culverts. Slopes are expected to be reinforced with geotextile. More detailed amount of materials and technical characteristics will be selected during technical project.

Table 5 shows the flow rates of 19 culverts and the total rate of the whole bed. Abstraction of surface water sewage by the remaining culverts is intended to be carried out to the adjacent area (within limits of railway site), as water pollution is not predicted.

No.	Culvert (km)	Waste-	Waste-water amount			
		water	maximum hourly,	maximum	Average annual,	
		source	m ³ /h	daily, m ³ /d	m³/m	
1	Culvert	Rain water	160,19	800,96	7815,06	
	1+110,91	from bed				
2	Culvert	Rain water	85,17	425,86	4155,16	
	1+489,58	from bed				
3	Culvert	Rain water	81,96	409,79	3998,36	
	2+066,37	from bed				
4	Culvert	Rain water	117,27	586,37	5721,28	
	2+896,21	from bed				
5	Culvert	Rain water	222,22	111,08	10840,95	
	5+009,07	from bed				
6	Culvert	Rain water	81,22	406,12	3962,59	
	6+872,14	from bed				
7	Culvert	Rain water	117,19	585,97	5717,40	
	8+203,73	from bed				
8	Culvert	Rain water	41,16	205,79	2007,94	
	9+207,99	from bed				
9	Culvert	Rain water	64,23	321,17	3133,69	
	9+648,82	from bed				

Table 5. Runoff amount





No.	Culvert (km)	Waste-	Waste-water amount			
		water	maximum h	ourly,	maximum	Average annual,
		source	m³/h		daily, m ³ /d	m ³ /m
10	Culvert	Rain water	46,66		233,28	2276,14
	10+136,48	from bed				
11	Culvert	Rain water	54,95		259,75	2534,38
	10+508,52	from bed				
	direction k.p.Km		12,30		61,50	600,06
	direction d.p.		18,67		93,35	910,81
	Km		12,85		64,25	626,88
	k.p. before Km		8,13		40,65	396,63
	d.p. before Km					
10					170.00	4700.44
12	Culvert	Rain water	35,32		176,60	1723,11
	11+092,88	from bed				
10	Culvert	Doin water	105 50		907.40	9072.01
13		from hod	105,50		027,49	0073,91
	127410,47	nom beu				
	direction k n Km		56.83		284 16	2772 59
	direction d p		76 40		381 98	3727 07
	Km		17 78		88 89	867.32
	k.p. before Km		14 49		72 45	706.93
	d.p. before Km		1 1,10		,	100,00
14	Culvert	Rain water	70,33		351,63	3430,91
	13+248,42	from bed			,	,
15	Culvert	Rain water	36,41		182,07	1776,44
	13+686,44	from bed				
16	Culvert	Rain water	113,12		565,59	5518,58
	16+420,74	from bed				
17	Culvert	Rain water	147,20		736,00	7181,30
	17+384,17	from bed				
18	Culvert	Rain water	152,13		760,66	7421,84
	19+225,25	from bed				
19	Culvert	Rain water	103,13		515,66	5031,41
	20+494,40	from bed				
20	Entire bed area	Rain water	2346,54		11732,70	114477,60
		from bed				

Assessment for the pollution of Vilnius railway bypass section water with oil products has been made to order of UAB "Vilnius Consult" in 2008. 21 metal, 15 bed and 10 water samples have been delivered to the laboratory UAB "Vandens tyrimai" ("Water Research"), which is authorized to investigate petroleum products in the soil (see Annex No1), too. Assessment of water contamination with oil products has been measured in comparison with the existing standard of Lithuania - LAND 9-2002 "Requirements for treatment of soil and groundwater contaminated with petroleum products and limitation of pollution".

The results on diluted gasoline and diesel hydrocarbons sets in the water are provided in Table 6, test sites – in illustration 6.





Illustration 6. Sites for water sampling

No	Section	Station	Picket	Description	C ₆ -C ₁₀ amount*	C ₁₀ -C ₂₈ amount**
				_	mg,	/
1	Kyviškės– Nemėžis	Kyviškių st.	1+114	Behind culverts, in streamline direction, stream	<0,01	<0,05
2	Kyviškės– Nemėžis		3+921	Behind culverts, in streamline direction, stream falling into 3 protection area of watering- place	<0,01	<0,05
3	Kyviškės– Nemėžis		5+230	Behind culverts, in streamline direction, stream	<0,01	<0,05
4	Kyviškės– Nemėžis		7+461	Behind culverts, in streamline direction, stream	<0,01	<0,05
5	Kyviškės– Nemėžis	Nemėžio st.	10+533	Behind culverts, in streamline direction, ditch (Nemėžis station)	<0,01	<0,05
6	Kyviškės– Nemėžis	Nemėžio st.	10+533	Behind culverts, in streamline direction, ditch	<0,01	<0,05
7	Nemėžis– Valčiūnai		12+463	Behind culverts, in streamline direction, stream Nemėžėlė	<0,01	<0,05
8	Nemėžis– Valčiūnai		12+463	Drainage ditch is near	<0,01	<0,05
9	Nemėžis– Valčiūnai		19+260	Behind culverts, in streamline direction, stream	<0,01	<0,05
10	Nemėžis– Valčiūnai		19+260	Manhole	<0,01	<0,05
MPL***						15

Table 6. Study results of hydrocarbon of diluted gasoline and diesel sequence.

Notes: C6-C10 * amount - the amount of hydrocarbon fuel sequence (including aromatics) - method of analysis, C10-C28 ** amount - the amount of hydrocarbons in diesel sequence (analytical method EPA



8015B: 1996). *** MPL - LAND 9-2002 " Requirements on cleaning and pollution limitation of soil and groundwater contamination by petroleum products", for commercial and industrialized areas

The evaluation of the results received, aromatic, gasoline and diesel hydrocarbons sets were not found in all analyzed water samples. Their values are lower than the sensitivity limit of the analytical method. Therefore, water pollution from the target economic activity is not predicted.

During the modernization, cleaning of the existing side ditches is intended, at re-tracing places – installation of new ditches, water collection and sewage ducts, reconstruction or installation of drainage systems (especially in station areas).

Measures for reduction of adverse impacts

In the part of technical project "Environmental protection", the collection and release of water will be designed according to the requirements of STR 1.05.05:2004, taking into account protection areas of watering-places listed below.

<u>**Groundwater.**</u> The railway section under modernization falls into protection areas of 2 watering-places, 3 watering-places distant not more than 0.5 km. (see Table 7 and Annex No 2) and they do not have any determined SPZ bars (se Annex No2, Lithuanian Geological Service, letter No 1.7-2837).

Thickness of Quaternary sediments in the Voke river valley is 85-95 m. This complex contains groundwater aquifers and 2-3 moraine and the same intermoraine aquifers. Groundwater aquifer in the Voke valley is in alluvium sediments, the thickness of which by the railway is from 12.6 to 17.6. In aeration zone and upper part of aquifer consists of coarse sand with gravel and pebbles, with a thickness of up to 9.5. Sand of medium coarse and fine sand with gravel admixture stratifies deeper. In the zone of riverside, rocks of coarse fraction stratify in underpart of aquifer which has close hydraulic connection with the river Voke.

Number of watering- place	Name	Distance from railway	Address	SPZ lanes of watering-places for established and registered SDR
<u>141</u>	Vilnius (A.Panerių) mining hole 13/2378	112 m	Vilnius, Paneriai	1; 2; 3;
<u>124</u>	<u>Vilnius(Trakų Vokės)</u>	1490 m	Vilnius, Paneriai	1; 2; 3;
<u>3661</u>	<u>Grigaičiai (Vilniaus r.)</u>	76 m	Vilniaus rajonas	absent
<u>3783</u>	<u>Juodšiliai (Vilniaus r.)</u>	520 m	Durpių str., Vilnius region	absent
<u>3782</u>	<u>Juodšiliai Šv. Uršulės</u> (Vilniaus r.)	530 m	Vilnius region	absent

Table 7. Watering-places located by the modernized railway track

Vilnius (Aukštieji Paneriai) watering-place is assigned to IIb1 subgroup and <u>is not used</u> since 01/03/2003, as a suspicious smell of drugs has been noticed. The target bypass section of the northern part falls into II SPZ microbial pollution restriction zone of



Aukštieji Paneriai, and watering-place of strict regime 1 bar goes along the edge of railway line (see Annex No2). Water is supplied by pipelines from Trakai Vokė watering-place No 124 (place where <u>water extraction</u> is performed) to Aukštieji Paneriai pump-station (distance of 1.9 km.). From 141 water-places water is distributed among the water users only.

Monitoring of groundwater in borehole 13 / 2378 is conducted in Aukštieji Paneriai watering-place No 141 (data in Annex No2). Monitoring studies were conducted and the results were systemized by UAB "Vilniaus hidrogeologija" ("Vilnius hydrogeology"). The studies of groundwater monitoring in the borehole 13/2378 were presented in 2008; they meet all the requirements for the groundwater (see Annex No. 2, the table "Macrocomplex composition of groundwater").



Illustration 7. Wastewater treatment plants at Aukštieji Paneriai watering-place

It is intended to install sand catcher with trap for petroleum products nearby the settlement of Aukštieji Paneriai, which ensure the protection of surface and ground water from petroleum products.

For collection of surface water in II zone of Aukštieji Paneriai watering-place, we recommend to apply wastewater treatment system, i.e. to install reinforced concrete risers in the places where the surface wastewater will be collected between the rails, to install sewage drains between the rails by connecting with pipes to the sewage drain on bed, to install sand catcher and petroleum trap (see Illustration 8). The system to be applied on the site where the railway branch is, due to the stop and intensity of traffic.







Illustration 8. Oil-recovery system in railways

As an example, we can take UAB "Traidenis" that produces and installs water treatment plants for contaminated surface water treatment with a capacity of 1 l/s to 70 l/s. Consolidation of several systems allows to create a coherent, integrated wastewater treatment system of capacity more than 70 l/s. The separators of sand - dirt and petrolic products are produced as separate products in the system. In systems, technological elements can be mounted in both vertical and horizontal cylindrical fiberglass container (conformity declaration is attached in Annex No 3).



Horizontal petrolic trap

Operating principle

The system consists of three chambers. Primarily, sewage water flow goes to the first chamber – glass bowler, where the water is cooled down, particles of great hydraulic coarse deposit on the bottom. From the glass bowler the sewage gets into the second chamber, where emulged petroleum present in water joins into larger droplets by means of coalescent filter, which emerge on the water surface more rapidly. Then the sewage get into the third chamber, equipped with additional absorbing filters "FIBROIL". Wastewater treated up to 5 mg / l.





The system has two security systems: an automatic locking device and an automatic alarm. Automatic locking device prevents accidental effusion of petroleum product before their removal timely (after excess of permitted amount of pollutants in the plant). Automatic alarm signals about the marginal layer thickness of accumulated petrolium products.

Advantages of systems:

- removes more than 95% od pollutants;
- serviceable, lightweight fiberglass construction;
- easily maintained;
- insensitive to the instantaneous increase in the concentration of petrolium products
- no internal moving parts, which would be difficult to maintain;
- durable;
- leakproof;
- compact.

Surface sewage is cleaned for 100%, or only the most contaminated parts. The most contaminated part of sewage will be cleaned, the distribution manhole with line edging will be fitted before treatment systems. Usually, such system is designed so as to clean 30% of the peak sewage flow.

During the technical project, all technical engineering opportunities will be analyzed in detail, forecast amount of rain water will be evaluated and the exact location where it will be equipped with trap for petroleum products will provided.

A small part of target construction of new railway tracks at Paneriai falls into the 3rd protection zone of watering-places of Aukštieji Paneriai and Trakų Vokė (Fig. žr.9.). Surface water treatment system and surface water sewage drains are also provided for in this location. (see Annex No3).



Illustration 9. New track construction site at Paneriai


Maximum permitted level of pollution with petroleum products (the DLL) is determined according to the location of contaminated media and fractional composition of hydrocarbons. It is considered that the groundwater contamination exceeds the MPL, when the concentration of hydrocarbons dissolved in water exceed the values specified in Table 8.

Sensitivity of territory to pollution				MPL, mg/l				
		Noture offeritory use		Light hydrocarbons				
Categ ory	Sensitivity level	ivalure olientory use	Petrol sequence C ₆ -C ₁₀	Diesel fuel sequence C ₁₀ -C ₂₈	mixtur e C ₆ -C ₂₈	Heavy hydrocarbons C>28		
А	Very sensitive	Potable groundwater sources (as well as proven ground water pools), SPZ strict regime lanes for water extraction in unexploited aquifers.	0,1	0,3	0,3	0,3		
В	sensitive	Lilimitation lanes of SPZ bacteriological contamination of potable groundwater sources of agricultural cultivation area (Restriction of exploited aquifers) and riverside protection zone of surface water pools	1	1	1	1		
с	Medium sensitive	Limitation lanes of SPZ on chemical pollution restrictions of residential, recreational, forest areas, quarries, potable groundwater sources (not used in aquifers), surface water protection zones and other protected areas.	10	5	10	1		
D	Little sensitive	Commercial and industrial use areas, car roads, which are provided the security lanes, oil output (oil drilling platform), and others.	30	30	30	1		
E	insensitive	Territories of petroleum and liquid PP, storage, processing and loading sites (store, petrol stations, terminals, etc) railway beds within the limits, pipeline pumping stations	50	15	50	1		

Table 8. MPL of groundwater contamination with petroleum hydrocarbons

Notes. 1. Individual hydrocarbon concentrations in water of drinking underground water sources SPZ used in aquifers may not exceed the MPL for drinking water, and hydrocarbon concentration of separate fractional set may not exceed the background level set out in the standards.

2. In case of old contamination it is proven that the contours of pollution range are stable or range of pollution retreats under the sway of selfcleaning processes, for the areas of category B (except SAZ bacteriological contamination restriction zone of watering-places) the requirements of category C are applied, and for C and D - E category - the MPL requirements.

If it is found that contamination by hydrocarbons of deeper ground soil layers is higher than MPL, in C, D and E areas the contaminated soil has to be cleaned on the spot, or after having it dug out – on specially equipped disposal sites for contaminated soil. It may also be insulated using means for pollution dispersion restraint. In the event of PP free layer, in the soil layer, the contamination by hydrocarbon has to be removed (or isolated) in all cases and in all areas, regardless of their sensitivity category. Underground water itself can be cleaned / unseparated if it is found that groundwater pollution range will not expand after the elimination of pollution-intensive spawns.

Received results on hydrocarbons (petroleum products) are presented in Tables 4-5. The tables also provide the information accumulated during sampling: sampling date and depth. In all Tables of metal and bed soil sample test results piquetage ("mileage") is indicated in decimal form.





After the analysis of current railway track soil (15 samples), metal (19) and water (10), enlarged water pollution of soil and surface during the economic activity is not predicted (see Annex No1 "Analysis of metal, surface and ground water contamination with petroleum products").

Collection and abstraction of surface water is intended:

- sewage abstraction is intended on the left side of railway line Kyviškės Paneriai for 11.911 km, while on the right for 15.025 km;
- installation of drainage ditches or modernisation of existing ones;
- surface water treatment plant installation at Nemėža (10 +508 km) and Nemėža (12 +470 km) stream;
- installation of traps for petroleum products is planned at II-III protection zone at watering-place of Aukštieji Paneriai, and at the target new railway construction site (from 1.490 to 3.281 km);
 - reinforcement of bed slopes on all streams;

- it is proposed to install water sewage system, as it is shown in Illustration 5, consisting of a geotextile filter with a drainage pipe (diameter 160 mm or 200mm). through the application of such surface water sewage system, water drains are installed for a space of 50 m.

3.2 Description of soil impact

Legal regulation

CONDITIONS FOR SPECIAL USE OF LAND AND FOREST, approved by GOVERNMENT DECREE No. 343 OF THE REPUBLIC OF LITHUANIA on 26 September 2007., Vilnius;

Nr. V-114; LITHUANIAN HYGIENE STANDARD HN 60:2004 "MAXIMUM PERMISSIBLE CONCENTRATION OF HAZARDOUS CHEMICALS IN SOIL" No. V-114, 8 March 2004;

LAND 9-2002 "REQUIREMENTS FOR TREATMENT OF SOIL AND GROUNDWATER CONTAMINATED WITH PETROLIUM PRODUCTS AND LIMITATION OF POLLUTION". DECREE NO-6110F MINISTER OF ENVIRONMENT of 27 November 2002, Vilniua;

Current situation

AB "Lithuanian Railways" practice to clean the contaminated track metal on the site, i.e. without digging it up and without taking it to problem-oriented soil treatment plant. During the cleaning of upper section of track construction metal of the locomotive depot of Vilnius Vaidotai shop side, the section of 20 m heavily polluted with petroleum products was chosen. Bio-product "Hydrobreak" solution of 2% has been used for cleaning, after the treatment in 2-week interval, the pollution of rubble reduced on an average of more than 90%. Later, universal "Simple Green" product was used for cleaning on sections 729 m of Vaidotai station odd track and 159.4 m of first arrival track of Vilnius station, which was sprayed on the contaminated spot by high-pressure pump. After the treatment with cleaner, the surfaces were washed by high pressure pump with hot water (about 50-60 degrees C) and bacteria was sown. After treatment, the analysis showed



that pollutants of petroleum products were resolved, and the pollution did not get into the deeper soil layers (deeper than 1 m), where the pollution is limited by the normative document LAND 9-2002.

During the construction of the track, impacts on soil may include:

- Removal of the layer of fertile soil. Thickness of fertile soil is 20-50 cm. For the construction of new railway line (At Paneriai), 61,655 m2 of fertile soil will be removed.
- Soil compression. Soil compression may happen due to heavy machinery, which reduces the susceptibility of soil to absorb wastewater.
- Soil erosion. Soil erosion and soil surface collection is possible because of the removal of the top layer of soil and flora destruction. Soil erosion can take place over a period from topsoil gathering till soil stabilization. Uncontrolled erosion and sliding sediment can cause problems: ground water contamination, water penetrates into the soil more easily.
- Soil contamination. Soil contamination may be due to improper use of construction materials and waste.

Proposed measures:

- To choose a suitable place for storage of fertile soil, which will be subsequently used for planting vegetation.
- During the construction, the area with open soil surface area should be minimized. At the same time, be unstabilised areas should be kept as less as possible.
- After the works, it is urgently necessary to stabilize the region (to reinforce). Removed fertile soil for seeding of fast growing vegetation should be used after stabilization.
- During the modernization of railway, storage sites for building materials and waste should be properly prepared (isolated).
- To install sewage abstraction in order to avoid railway sewage getting directly into cultivated fields.

Currently, main pollution of railway station is visible at the places of exit signals of locomotive stops at the stations (up to 50 m).

In general, the maximum permitted level (MRS) is determined according to the following criteria:

- contaminated media location (area sensitivity to pollution);
- lithologic composition of soil;
- fractional composition of hydrocarbons;
- soil sorption capacity.

Under LAND 9-2002 (see Annex 1), railway roadbed within the bed area belong to dead area (category E). Surface layer (up to 1.0 m deep) in the lithologic composition of soil litologinę is ignored. Deeper soil layer (from 1.0 m deep) MPL depends on the lithology of soil: in sandy coarse-grained soils it is less, and clayey - bigger. Maximum sorption of petroleum products can (hold) do clayey, and the least - gross shingly soil. Sorbavimo opportunities are greater in dry soil.



Shown results (see Table 9) of the samples are the ones, which were presented to the UAB "Baltic DGE Soil and Environment" on 09/12/2008 and received later (06/10/2008) (see Annex 4).

Table 9. Results of study of metal contamination with hydrocarbon on Vilnius railway bypass section.

Mileage, km	Sample No	mg NP /kg dry soil
0,09	nr.1	51
0,21	nr.2	5050
0,35	nr.3	66
0,40	nr.22	379
5,35	nr.4	119
5,90	nr.5	298
10,55	nr.6	135
10,60	nr.7	7840
11,77	nr.8	238
11,81	nr.9	0
12,29	nr.10	752
17,7	nr.11	340
21,3	nr.12	263
21,6	nr.13	195
23,1	nr.14	853
23,3	nr.15	2280
23,5	nr.16	129
23,7	nr.17	872
23,9	nr.18	752
24,1	nr.19	647
24,5	nr.20	975
LAND 9–200	2*	5000

Note. * Ratio LAND 9-2002 (Decree No. 611 of Minister of Ministry of Environment on 27 November 2002) Darkened - hydrocarbon concentration exceeds MPL

Concentration of petrolium products was found in metal of Vilnius railway bypass at 0.21 and 10.6 kilometers (samples No 2 and No 7). It is up to 1.6 times more than the limitation under LAND 9-2002. Metal contaminated by petroleum products will be moved and sold to waste handlers (see Chapter 3.15 "Waste"). It will be cleaned by biological means, and after the cleaning, will not be re-used (after treatment may not meet the requirements of the normative).

Petroleum products (PP) are light and heavy hydrocarbons. The total hydrocarbon content in soil, without determination of their fractional composition, is treated as the total amount of hydrocarbons of gasoline set (C6-C10), under which a maximum permissible level (MPL) of soil and groundwater contamination by petroleum products is applied, beyond which it is necessary to reduce contamination to the level corresponding to the requirements of LAND 9-2002 (Decree No 611 of Minister of Ministry of the Environment on 27 November 2002) standards.

Under LAND 9-2002, railway track within the bed area belong to dead area (category E), so the MPL must not exceed 5 g NP / kg of dry soil (5000 mg NP / kg dry soil).



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Proposed measures for reduction of adverse impact

- During the modernization, it is recommended to keep excavated fertile soil layer on the territory of the railway; after the completion of works, to use fertile soil layer for arrangement of embankments;
- During the modernization, the area with open soil surface area should be minimized. At the same time, unstabilised areas should be kept as less as possible.
- After the completion of works, it is urgently necessary to stabilize the region (reinforcement). Removed fertile soil for seeding of fast growing vegetation should be used after stabilization.
- To install sewage abstraction in order to avoid railway sewage getting directly into cultivated fields.
- Properly prepare (isolate) storage sites for fertile layer, construction material and waste. After the construction, it is necessary to redomesticate temporary sites to replant destroyed freen plantation (grass, bushes);
- In the event of emergency, to provide measures in case of oil spills from mechanisms. During the modernization, petroleum products absorbing material should be kept (sawdust, sand), special containers for the collection of grease.

If the land surface or deeper soil contamination exceeds MPL, and it needs to be cleaned, or the spread of pollution has to be limitted (isolated), when the hydrocarbon concentration in soil exceeds the values specified in Annex 1. Contaminated soil must be cleaned up to levels on the site or excavated and removed to special places for disposal of contaminated soil.

If the soil is cleaned from hydrocarbon "ex situ" (Remove the contaminated medium from the wild and unconfined site specific installations clean) up to 2 g / kg / sg, it can be used in areas of D and E category, after having informed the Regional Environmental Protection Department of the Ministry of Environment.

If it is found that the contamination by hydrocarbons of deeper layers of the ground soil exceeds MPL, contaminated soil in C, D and E areas has to be cleaned on the site, or after its excavation – in places specially equipped for contaminated soil disposal. It may also be insolated using pollution dispersion restraints. In case of free layer of petrolium products (PP), contamination by hydrocarbon must be removed (or isolated) in the soil layer in all cases and in all areas, regardless of their sensitivity category.

During the modernisation of railway line, significant soil pollution is umpredictable. The increased pollution of the soil is possible only during construction, thus while implementing target activities, it is suggested to introduce protection measures against soil pollution and erosion.

3.3 Description of impact on local flora

Up to 20 types of adventitious plants are found on the beds of railway tracks (Assessment of protected habitat in Vilnius city and preparation of regulations for protection. Institute of Ecology of Vilnius University. Vilnius, 2005). Some of them like Syvers artemisia (Artemisia sieversiana), common ragweed (Ambrosia artemisifolia) survive only for a few years because they do not nurture seeds under our climate conditions. Other adventitious types vegetate in the area of the railway track which is



constantly supervised. Bed maintenance, if regularly mowed, would slow the spread of invasive plants before they nurtured their and spread their seeds.

Potential woodland habitats are registered in Paneriai forest for some 300 m from the bypass, so the modernisation would not affect them.

3.4 Description of impact on local fauna

Bypass modernisation will have little impact on the fauna. Almost all of the bypass line is located in an urbanized area, where only the large mammals wander in, but do not domicile. Possibility of collision with locomotives is accidental. The traces of activities of small mammals were found by the streams. The impact on these animals: hedgegogs, ermines, weasels, martens would be mitigated, if culverts were properly modernised.

There are 27 culverts on bypas section, the project provides for their extension and rehabilitation. During the modernisation works, they should be equipped with more than 1 m in diameter culverts. Most of the culverts are dry, so it will be just enough to increase the diameter, so that small mammals and amphibians could pass through them. Some culverts are modernised during previous projects.

Proposed measures for reduction of adverse impact

Adaptation of existing culverts for small animals. Most of the culverts are not suitable for migration of small mammals, amphibians because of poor technical condition: they are dilapidated, concrete is run down, holes are blocked with segments broken away or choked up with soil, as well as are poorly or completely unsupervised: culverts contain plenty of rubbish, holes are overgrown with grass and bushes. This readblocks the passage of wild fauna. In spring, if flooded with water or after stronger rains, culverts are suitable for only part of the wild animals, like muskrats and beavers, but unsuitable for small mammals living on land: weasels, martens, as well as amphibians, reptiles. Some holes of culverts are raised above the ground level, therefore they are beyond the reach of animals.

3.5 Description of impact on landscape

Legal regulation

EUROPEAN LANDSCAPE CONVENTION. FLORENCE, 20 OCTOBER 2000, Republic of Lithuania signed the Convention on 20 October 2000;

ORDER NO. D1-35 OF MINISTER OF ENVIRONMENT OF THE REPUBLIC OF LITHUANIA ON APPROVAL OF THE PROVISIONS FOR THE USE, PLANNING AND PROTECTION OF RECREATIONAL AREAS, 20 January 2004, VILNIUS;

DECREE NO. 343 OF THE GOVERNMENT OF THE REPUBLIC OF LITHUANIA ON APPROVAL OF SPECIAL CONDITIONS FOR THE USE OF LAND AND FOREST, 26 September 2007, VILNIUS.

Current situation of railway

Vilnius bypass line falls into the Baltic hilly elevation section. For the background use, these areas are characterized by farming and forestry farm, soils of low economic value and difficult farming conditions.



Conclusion

Railway Modernization will not have any significant impact on the landscape. Most of the works are carried out in the railway protection zone, and the works carried out on re-tracing site, will have no impact on the landscape. The place for noise wall construction will be chosen by adjusting the location with local architects and surveying local residents, taking into account the visual and aesthetic impact.

3.6 Description of impact on public health

Assessment of health impact carried out in accordance with the following statutory instruments:

• ORDER NO V-511 BY MINISTER OF HEALTH OF THE REPUBLIC OF LITHUANIA ON THE REPLACEMENT OF THE ORDER NO V-50 OF 31 JANUARY 2003 "REGARDING THE APPROVAL OF ASSESSMENT CASES AND ASSESSMENT PROCEDURES OF IMPACT ON PUBLIC HEALTH UNFORESEN IN THE LAW ON ASSESSMENT OF ENVIRONMENTAL IMPACT BY TARGET ECONOMIC ACTIVITIES OF THE REPUBLIC OF LITHUANIA" OF 5 JULY 2004.

• ORDER NO. V-491 BY MINISTER OF HEALTH OF THE REPUBLIC OF LITHUANIA ON THE APPROVAL OF METHODICAL ASSESSMENT OF IMPACT ON PUBLIC HEALTH, OF 1 JULY 2004.

• DESCRIPTION OF ASSESSMENT PROCEDURE OF NOISE IMPACT ON PUBLIC HEALTH, order No. V-596 by the Minister of Health of the Republic of Lithuania of 07.21.2005.

State Health Care Accreditation Agency under the Ministry of Health enabled UAB "Vilnius Consult" to carry out the assessment of impact on public health (License No.5 of 16 /10/2009).

The modernization project is planned to be carried out on section Kyviškės-Valčiūnai and Vaidotai (Pušynas) - Paneriai, which is within the municipalities of Vilnius city and Vilnius district.

The EIA organiser has identified the probability of adverse impact on public health by this project and has assessed the spatial extent of the impact, impact categories, social environment and demographic rates. EIA organiser carried out the survey of population in accordance with the standard questionnaire on 10-18/08/2009. <u>The residents of Grigaičiai</u>. Nemėžis, Juodšiliai villages and single farm house located near the railway were surveyed.

3.6.1 Demographicrates and morbidity

The EIA organiser partially identified residents traveling to the location. Data analysis on the population was carried out in accordance with the maps, Lithuanian Health Information Centre, SVEIDRA data.

Vilnius county is the largest one in Lithuania. Almost a quarter of the total population of the country live there. In 2008-2009, the county had 849.815 thousand permanent residents. 65.7 per cent of county residents live in Vilnius. The birthrate in Vilnius is higher than in Vilnius region and Lithuania. In comparison with the year 2007, the



birthrate increased from 9.6 to 10.5. in Lithuania in 2008. There is a significant decrease of infant mortality rate in Vilnius and Vilnius region, in comparison with the year 2007, it is from 6.2 to 3.2, and it is lower than Lithuanian one. In 2008, natural growth of population in Vilnius increased from -1 (2007) to 1.6.

According to the statistics, provision of health care resources in Vilnius city and Vilnius county is one of the best in Republic.

Table 10. Demographic and morbidity rates in the area of Vilnius and Vilnius city, years 2008-2009.

Rates	Lithuania	Vilnius district	Vilnius city
Population 2009.01.01	3349872	849815	558165
Children 0-17y.o.	653736	154707	97137
Adults	2696136	695108	461028
Birthrate for1000 population, %	10,5	11,6	12,2
Death-rate of infants under 1 year, for 1000 born alive	5	3,8	3,2
Death-rate for 1000 population	13,1	12,6	10,6
Natural increase for 1000 population	-2,6	-1	1,6
Registered cases for 1000 population	1814,9	1870,6	1884,0

In 2008, demographic indicators improved in Lithuania: the births increased by 2.9 thousand., deaths decreased by 1.8 thousand. [21].

Place name					Children (0-17 y.o.)			
	Registere	For	Newly	For	Registere	For	Newly	For
	d	1000	registered	1000	d	1000	registe	1000
	morbidity	populati	morbiditie	populati	morbidity	children	red	children
	in total	on	s (+)	on	in total		morbid	
	(+, -)				(+, -)		ities	
							(+)	
In Lithuania in	4889925	1814,9	2507163	930,5	1478014	2226,6	1170710	1763,6
total								
In cities in total	2323177	1912,0	1192319	981,3	682694	2559.7	520915	1953,1
In districts in total	2566748	1735,1	1314844	888,8	795320	2002,8	649795	1636,3
Vilnius county	1296514	1870,6	722478	1042,4	371319	2382,8	308412	1979,1
Vilnius	865644	1884,0	481078	1047,0	247386	2537,8	202676	2079,1
Šalčininkai distr.	52195	82,8	30176	1030.7	18093	2220,3	14955	1835,2
Širvintai distr.	26300	1711,4	16398	1067,0	7332	2016,0	6769	1861,2
Švenčioniai distr.	43073	1730,8	21523	864,9	10384	1847,0	8514	1514,4
Trakai distr.	59663	2077,0	36337	1265,0	20178	2750,9	17502	2386,1
Ukmerge distr.	78667	2126,0	39745	1074,1	18878	2199,2	17134	1996,0
Vilnius distr.	125473	1652,4	74367	979,3	37617	1911,8	31363	1594,0
Elektrenai munic.	45499	2026,1	22854	1017,7	11451	2140,8	9499	1775,9

 Table 11. Morbidity of population in countries and municipalities in 2008

The overall morbidity is growing in Vilnius county and Vilnius city, and it is similar to those in other districts of Lithuania [22].



Mortality rates in Lithuania, both in Vilnius city and Vilnius county in 2008 are lower, in comparison with the year 2007. Mortality rate of Vilnius city is less than mortality rates in Vilnius county and in Lithuania.



Illustration 10. Structure of causes of death in Vilnius city and Vilnius county in 2008. (LSIS, 2009m.) [22].

Structure of causes of death in Vilnius city and Vilnius county does not differ, but the mortality from cancer in higher in Vilnius city.

Demographic data on the population in the investigated area of Vilnius railway bypass collected after the accomplishment of the questionnaire, and they presented in Chapter "Results and Discussion". The largest age group of the investigated area is made by employed respondents and students (65 percent) of the age - 18-65 (Chapter "Results and Discussion").

3.6.1.1 Analysis of influencing factors on health (quantitative assessment)

EIA organiser has found that the implementation of the project stipulates the physical social and psychological environment factors that may affect the quality of health and life.

Physical environmental factors: air, water, soil quality, change in noise level and vibration.

Psychological factors include potential conflicts and frustration effects.

Social factors: property, mobility.

3.6.1.2 Quality of air

Limit values (concentration in ambient air) for air pollution by sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide have been set by the Order No. 591/640 by the Minister of the Environment and the Minister of Health of the Republic of Lithuania on 11 December 2001 "Concerning the determination of standards for



pollution levels of ambient air" (Official Gazette, 2001, No. 108-3827) in order to control and reduce harmful effects on human health and the environment.

After the examination of railway transport pollutants (carbon monoxide, nitrogen oxides, sulfur dioxide, solids, volatile organic compounds) distribution of concentration in the ambient air within the household, and having found that these levels will not exceed the limit values, the EIA organiser predicts that the target facility will not have high negative impact on human health. Measures for reduction of air pollution are not provided for in this project (see Annex No.5 "Air pollution dispersion maps").

3.6.1.3 Quality of water and soil

Increased risks to humans, soil and surface water pollution is not provided for in the project and therefore, impact on health under these aspects is not carried out (see Annex No1).

3.6.1.4 Impact of vibration on health

Vibration - repetitive movements solid body on the balance position. Vibrations is transmitted through the support surface of standing, seated or lying human into his body.

When the train passes, vibration occurs on the bed embankment, which is transmitted to the environment. In comparison with passenger trains, freight trains cause much higher vibrations, despite their low speed.

Strong vibrations, which cause resonance in the large mass of soil, usually occur in frequency range of 3.5 - 6Hz. In solid soils (e.g. moraine), the dominant vibration frequency is of 25-35 Hz. The level of vibration is lower and the spread in the soil is much less here.

People feel and characterize the low-frequency vibrations very differently, and it largely depends on the physiological and psychological factors, as, for example, lying people are much more sensitive to fluctuations in horizontal movements than the vertical ones, especially if they are experienced at night, when background interference is absent.

Individual sensitivity threshold depends on the mental state and from the occupation at that time. The average value of the sensitivity threshold, namely the level where you can feel the vibrations, is in frequency range of about 0.1-0.3 mm / s, 10-100 Hz.

Psychological effects caused by vibration may show as sleep disturbance, problems while falling asleep, concentration problems, or general fatigue. Sleep disturbance is the most serious health effect caused by vibrations.

Foreign literature says that in rare cases, some people may feel the whole disturbance because of vibration. This question has not been studied to the utmost in the world, so it is impossible for SPZ to determine or adjust according to these feelings.

Physiological effects do not arise solely as a result of vibration of railway transport. However, the vibration can cause cardiac acceleration, more frequent pulse. A small



vibration stimulates the human body, forces the oxidation and reduction reactions, activates the activity of central nervous system and hypophysis, increases the mobility of neural and muscular apparatus.

3.6.1.5 Impact of noise on health

The noise spead by air and ground affects the environment differently. The noise from the railway track spread by the ground travels together with the vibration. The noise spread along the ground reminds boom, it is much lower than the the noise spread in the air.

Noise impact studies have shown that people are more confused of the noise cased by roads, or factories, than railway noise caused by impulsive nature, to the same level (see Annex No 6 "Noise Modeling Report"). This fact has been estimated in some countries (e.g. Germany, Switzerland) and is called the "railway-bonus". For example in Germany, "railway-bonus 5dB" is included in the the Regulations on protection from noise, and is used to assess the noise impact on residents. "Railway bonus" is subtracted from the calculated or measured L_{ekv} (reciprocal noise) values.

Main reasons why people are less confused by railway noise could be as follows:

• Railway noise is with long pauses, in contrast to the road noise, so it is easier to bear.

- The noise caused by trains is repeated periodically. There is evidence that this regularity makes it easier to adapt to the noise (e.g. after getting used to, the noise does not wake up people at night)
- The noise spreading from the railway is of the same loudness, and the sound is of the same nature.

• In comparance with the road noise, the noise caused by railway includes more high-frequency sounds. Sounds of high frequency are much better insulated inside the buildings, therefore the railway noise inside the building is less in case of the same noise levels outside.

Considering the public annoyance (irritation) under the noise influence, in 1990, the World Health Organization announced the permitted noise levels. The main effects resulting under the influence of noise: damage of hearing (hearing weakness), obscurity of speech, sleep disturbances, depravation of academic and other achievements, disorder of physiological functions, psychological problems (exhaustion), social and behavioral changes (irritability, aggressiveness, etc.). The WHO meeting on noise and health indicators (7 to 9 April 2003, Brussels) decided that the main rates to be measured, are as follows:

- Annoyance (noise control directive 2002/49/EC) [23];
- Sleep disturbances (noise control directive 2002/49/EC);

• Morbidity and mortality from cardiovascular diseases (defined by the WHO working group);

• Effects on cognitive development (defined by the WHO working group).

The subjective assessment of noise annoyance is very common, which consists of fear and anger, because of the damage to humans (Cohen & Weinstein, 1981) [24].



Annoyance (irritation) - the survey revealed the dissatisfaction of the community with the local noise exposure. In various cultures, the degree of irritation from exposure to noise is different.

The noise impact studies in Germany and other European countries showed that severe annoyance occurs when the noise level is > 55 dB, the health effects occur when the noise level is > 65 dBA [25].



In Europe: L_{dn}; In Germany: L_{dav}

Illustration 11. Noise exposure in Europe and Germany. Irritation and health effects dependence on the noise level [25]

Survey study shows frequency of ischemic heart disease, when outside noise level (6-22 hrs.) exceeds 65-70dB. The risk of ischemic heart disease increases when greatly irritated part of respondents is being assessed.

The literature indicates that hearing loss is possible when a person is exposed to more than 70dB L_{Aekv24} ; communication problems may occur when $L_{Aeq} > 55$ dBA., sleep disturbance - when indoor noise level exceeds 30 dBA.

The origin of dissatisfaction affects quality of life of people, severe irritation can cause health effects. Dissatisfaction occurs when noise prevents the routine activities: relaxing, talking, listening to radio, watching TV. During the day, the the noise inside room should not exceed 40 dB (A), because otherwise it will disrupt the normal activities [26].

It was found that noise exposure causes the body of human to be in permanent defensive state – this influences the decline of human immunity, rise of blood pressure, disorder of thyroid function, increase of nervous exhaustion and hearing.

Noise impact on the population the site pending is evaluated by means of calculation and fulfilment of survey.



The impact of noise on public health assessment is carried out <u>by means of calculation</u> under the following model:

Step I. Calculation of noise level.

Step II. Identification of households in high noise zones in the current and target situation

Step III. Determination of noise doze for people.

Step IV. Irritation of people due to the noise and prognozed disorders of health after the implementation of project.

Step I. CALCULATION OF NOISE LEVEL

Calculation of noise level caused by railway traffic is provided in Chapter 5.8.

Health impact assessment because of the changes of noise situation has been made considering the marginal values for permissible reciprocal noise level for residential and public buildings in the environment, indicated in the hygiene standard HN 33:2007 "Acoustic Noise. Limit values of noise in residential and public buildings and their surroundings."

Table 12. Permitted noise limit values in residential and public buildings and their environment [27].

Name of object	Sound level, the equivalent sound level, dBA	Maximum sound level, dBA	Day time, val.
001 The residential bedrooms	45	55	6–18
	40	50	18–22
	35	45	22–6
003 Buildings, classrooms, training rooms and classes for public purpose	65	70	
007 In the environment of	65	70	6–18
residential and public buildings	60	65	18–22
	55	60	22–6

Recommendations by European Parliament and the Commission 2002/49/EC on management of environmental noise assessment and the recommendation by the Commision of 6 August 2003 for the calculation of railway noise have been applied: the Dutch national calculation methodology "Reken-en Meetvoorshrift Railverkeerslawai '06, Minesterie vokshuisvesting, Ruimtelijke en Ordening Mileubeheer, on 20 November 1996. This method is implemented in the program Cadna A by German company Datakustik GmbH. It has been used for the assessment of rail noise in this project.

The estimated equivalent noise level in the height of 2 m above the ground. The results of calculations are represented on the maps showing the distribution of noise during the day and at night separately. Calculated railway noise levels in the current situation and the target situation at night are higher than during the day for about 1dB, and have reached permissible limit values during the night for a space of approximately 60m from the track for the current situation, and the target situation - 160 meters from the track, without noise reduction measures.



Reciprocal noise spreas in the height of 2 m is provided in Annex No 6.

In the home environment pending, the households located next to the track in the current situation and in the "Project" version fall within the noise level areas L_{night} 60-65 dB, 55-60 dB L_{night} and provided in the table below.

Step II. IDENTIFICATION OF HOUSEHOLDS IN HIGH NOISE ZONES IN THE CURRENT AND TARGET SITUATION

able 13. Hous	enoius railing into	the <u>current (2009) b</u> ypas	s night nigh		
Existing night noise	Site, track km	ON THE LEFT SIDE OF (from Kyviškiai)	TRACK	ON THE RIGHT SIDE OF TRACK (from Kyviškiai)	
(m)2009 m.		Description; distance from bypass axis, m	Number of buildings falling within the noise zone, unt.	Description; distance from bypass axis, m	Number of building s falling within the noise zone, unt.
>60dBA (up to 30 m	6,200-7,400	Pergalės 35, Grigaičiai (~28m)	1	-	-
from track	13,500	-	-	Geležinkelio str. (~8m.)	1
axis)	18,100-18,400	Katiliškės (~22-24m.)	2	-	-
	19,950	-	-	Baraškų vil. (~26m.)	1
	21,800-23,100	-	-	Pušų str., Reisleravos str., Juodšilių k. (~17- 19m.)	6
	24,000-24,200	Eišiškių str. (~21m.)	1	-	-
	30,600-30,800	-	-	Baltosios Vokės str., Miško str. Aukštieji Paneriai (~39m, ~48m)	2
	N	umber of households i	n total:		18
55-60dBA	1,100-1,400	Didžioji str.(~40m)	1	Didžioji str.(~57m)	1
(up to 80 m from track	2,950-3,300	Žiedo str., Pupeliai (~59-86m.)	3	-	-
axis)	4,600	Aukštoji str. (opposite Didieji Karklėnai), (~41m)	1	-	-
	6,200-7,400	Pergalės str., Geležinkelio str., Grigaičiai (~37m)	3	Pergalės 38 A, Grigaičiai (~60m)	1
	8,800-9,200	Versmių str. (~80m)	2	-	-
	10,400-11,700	Pakalniškės (~60-70m)	2	-	
	12,700-13,500	-	-	Geležinkelio str., Nemėžis (~60m)	2
	15,400-15,600	-	-	Katiliškių str. (~54-68m)	2
	16,400	-	-	Katiliškių str. (~44m)	1
	16 400 16 700	-	-	Katiliškių str. (~33-66m)	3
	10,400-10,700				
	17,800	nearby Kineliai (~50- 73m)	2	-	-
	17,800 18,100-18,400	nearby Kineliai (~50- 73m) nearby Kineliai (~39- 68m)	2 3	-	-
	18,400-18,700 17,800 18,100-18,400 18,800-19,400	nearby Kineliai (~50- 73m) nearby Kineliai (~39- 68m) -	2 3 -	- Liepkalnio str., Baraškai vil.(~78m)	- - 1

Table 13. Households falling into the current (2009) bypass night high noise zone.





Existing night noise level (dBA) and area (m)2009 m.	Site, track km	ON THE LEFT SIDE OF (from Kyviškiai)	ON THE LEFT SIDE OF TRACK (from Kyviškiai)		TRACK	
		Description; distance from bypass axis, m	Number of buildings falling within the noise zone, unt.	Description; distance from bypass axis, m	Number of building s falling within the noise zone, unt.	
	21,800-23,100	Mickevičiaus str., Juodšilių vil. (~48, ~65- 80m)	9	Pušų g., Reisleravos str., Juodšiliai vil. (~40- 80m)	13	
	23,100-23,700	-	-	Reisleravos str. (~44- 82m)	2	
	24,000-24,200	Eišiškių str. (~50m)	1	-	-	
	25,200-25,400	-	-	Baltosios Vokės garden str. (~50m)	2	
	26,200-26,400	-	-	Baltosios Vokės str. (~34m, ~86m)	2	
	26,700-26,900	-	-	Baltosios Vokės str. (~33m)	3	
Number of households in total:						

In the current situation, ~ 78 households and ~ 188 of population (2.4 person per 1 household) are within the enlarged noise zone.

Table 14. Households falling into the target	(2009) bypass night high noise zone.
--	--------------------------------------

Forecast	Site, track km	ON THE LEFT SIDE OF	ON THE RIGHT SIDE OF			
"Project" <u>night</u>		(from Kyviškiai)	(from Kyviškiai)		TRACK	
noise level				(from Kyviškiai)		
(dBA) and area		Description: distance	Number of		Descripti	
(m), 2015		from bypass axis m	buildings		on [.]	
(,, =0.0		nom bypace axie, m	falling within		distance	
			the poice zero		from	
			the noise zone,		Irom	
			unt.		bypass	
					axis, m	
>60dBA	1,100-1,400	Didžioji str.(~40m)	1	Didžioji	1	
(up to 75 m		-		str.(~57m)		
from track	4.600	Aukštoji str. (opposite	1	-	-	
axis)	,	Didieji Karklėnai)				
		$(\sim 41 \text{m})$				
	6 200 7 400	Porgolós str	2	Dorgalós 38 A	1	
	0,200-7,400	Coložinkolio otr	5		•	
		Gelezińkelio str.,		(~60m)		
		Grigaiciai (~28-40m)				
	10,400-11,700	Pakalniškės (~60-70m)	2	-	-	
	12,700-13,500	-	-	Geležinkelio str.,	3	
				Nemėžis (~8-		
				60m)		
	16.400	-	T_	Katiliškiu str	1	
	10,400			(14m)	•	
	47.000	naarbu Kinaliai (50	0	(~++11)		
	17,800	hearby Kineliai (~50-	2	-	-	
		73m)				
	18,100-18,400	nearby Kineliai (~39-	3	-	-	
		68m)				
	19,500-19,600	Baraškų vil. (~32m,	2	-	-	
		~34m)				
	19 950		-	Barašku vil	1	
	10,000			$(\sim 26m)$		
				(~2011)	1	





Forecast	Site, track km	ON THE LEFT SIDE OF	TRACK	ON THE RIGHT S	IDE OF
"Project" <u>night</u> noise level		(from Kyviškiai)	TRACK (from Kyviškiai)		
(dBA) and area (m), 2015		Description; distance from bypass axis, m	Number of buildings falling within the noise zone, unt.		Descripti on; distance from bypass axis, m
	21,500-23,100	Mickevičiaus str. (~50- 75m)	4	Pušų str., Reisleravos str., Juodšiliai (~17- 75m)	15
	23,100-23,700	-	-	Reisleravos str. (~44m, ~82m)	2
	24,000-24,200	Eišiškių str. (~21-50m)	2	-	-
	26,200-26,400	-	-	Baltosios Vokės str. (~34m)	1
	30,600-30,800	-	-	Baltosios Vokės str., Minsko str. (~39m, ~48m)	2
	Nun	nber of households in tot	al:		47
(Number of ho	useholds falling into	over normal noise zone	after installation	of acoustic walls)	(20)
55-60dBA	1,100-1,400	Didžioji str.(~85m)	1	-	-
(up to 160 m from track	2,950-3,300	Ziedo str., Pupeliai (~59-86m.)	3	-	-
axis)	4,600-5,000	Aukštoji str. (~60m)	1	Didieji Karklėnai. (~55-86m)	2
	6,200-7,400	Pergalės str., Geležinkelio str. (~60- 140m)	16	-	-
	8,800-9,200	Versmių str. (~80m, ~98m)	2	-	-
	10,400-11,700	Pakalniškės (~100- 160m)	24	-	
	11,300-11,500	-	-	Nemėžis (~118m)	1
	12,700-13,500	Senojo kelio str., Dvaro str. (~148-158m)	3	Geležinkelio str., Nemėžis (~60- 100m)	10
	15,400-15,600	-	-	Katiliškių strg. (~54m, ~68m)	2
	16,000-16,200	-	-	Katiliškių strg. (~142m)	1
	16,400-16,700	-	-	Katiliškių str. (~40-66m)	3
	18,800-19,400	-	-	Liepkalnio g. (~75-157m)	5
	19,200	Baraškų k. (~80m)	1	-	-
	21,500-23,100	Mickevičius strg., Juodšiliai vil. (~125-150m)	16 (1 school)	Pušų str., Reisleravos str. Juodšiliai vil. (~70-130m)	17
	23,100-23,700	Juodšiliai vil. Level crossing (~100m)	1	Reisleravos str. (~82-100m)	6
	24,000-24 200	Fišiškiu str. (~78-90m)	2	-	-
	25,200-25,400	- -	-	Baltosios Vokės garden str. (~86m)	2
	26,200-26,400	-	-	Baltosios Vokės	3





Forecast "Project" <u>night</u> noise level	Site, track km	ON THE LEFT SIDE OF ⁻ (from Kyviškiai)	ON THE RIGHT SI TRACK (from Kyviškiai)	DE OF		
(dBA) and area (m), 2015		Description; distance from bypass axis, m	Number of buildings falling within		Descripti on; distance	
			the noise zone,		from	
			unt.		bypass	
					axis, m	
	Nun	nber of households in tot	al:		122	
(Number of ho	(Number of households falling into over normal noise zone after installation of acoustic walls)				(39)	
		- number of households which are subject to installation of noise level reduction acoustic walls				

~ 169 households, ~ 406 of population (2.4 person per 1 household) are within the enlarged noise zone of the "Project". After the construction of noise barriers, ~ 59 individual households (160m away from the track axis) fall within enlarged noise zone.

Step III. DETERMINATION OF NOISE DOZE FOR PEOPLE

Table 15. Number of households and the population falling into particular noise zone during the night, and fluctuation during the implementation (2015) or non-implementation (2009m.)

Noise level	Noise dose	Current situation		Project after implementation of measures		Noise level reduces/ decreases	
dBA	D	house	residents	houses	residents	house	resident
		S				S	S
60-65	1,1-1,18	18	43	20	48	2	5
55-60	1,0 - 1,09	60	144	39	94	21	50

Reduction of houses and people falling into particular noise zone
Increase of houses and people falling into particular noise zone

After the increase of train traffic, but having constructed the noise barriers, the same dose of noise, when the noise level is of 60-65 dB, will be received by 2 more households, and in the noise zone of 55-60 dB, the same noise dose will be received by 21 households (50 people) less than in the current situation.

To reduce the damage of noise, vibration to health involves the following measures used in the project:

- Replacement of old locomotives by new ones, which meet the guidelines established by the International Union of Railways (UIC), after the evaluation of the technical conditions of traction equipment;
- Turning of wheels for locomotives and wagons;
- Replacement of brake pads of metal freight carriages by the composite ones recommended by the International Union of Railways (UIC),;
- Use of long rails in the track construction;
- Rail grinding;





- Installation of modern bed;
- Appropriate selection of track geometry, installation of track pit;

- Installation of noise absorbing walls, with a high indicator of acoustic insulation DL_R -30 dBt;

• Installation of low acoustic absorbent walls (-6 -9 dB), if necessary, on both sides of the track;

- Plantation of greenery on the territory of single households (-5dBA);
- Installation of windows with increased noise insulation, a noise keeping airholes in single households (30dBA), form the side of the railway;
- Noise monitoring.

Considering that the noise can not be summed arithmetically, and while planning the railway lines / tracks, when a new source is planned to be nearby the existing one, the noise levels will increase a little, but additional noise will not be generated within a former quieter area.

Step IV. IRRITATION AND DISORDERS OF HEALTH

After the implementation of the project and application of compensatory measures to reduce the noise, the people living near the track will get less noise dose than before the implementation of the project. Higher than 65 dBA noise level is unpredictable, when the negative health symptoms are shown.

EIA organiser does not deny that irritation and individual sleep disorders can be available, but they are expected to decline after the construction of acoustic walls and the application of engineering and technical measures for the reduction of noise, and the operation of new locomotives ER20 of company Siemens.

People feel differently <u>the problems of understanding</u>. This is particularly dependent on the age. It may be more difficult to communicate for older people in case of 45 dBA, while for the younger and middle-aged - in excess of 65 dBA. The problems of understanding in the environment (outside) may arise for residents living in the area of noise (60-65 dBA), thus, the suggestion is made for individual households to be greened. EIA organizer <u>does not forecast any hearing disorders caused by the railway noise for people</u>.

<u>Annoyance</u> because of noise also depends on the individual human features and sensitivity to noise. People will feel irritation during the day more than at night. The following curve presents the evaluation on how the noise caused by the rail may annoy people on the average.





Illustration 12. Dependence of annoyed (a) and strongly annoyed (b) part of population on the noise level [28].

According to the curve, not all the residents living in the high-noise zone(55-60dB) may feel annoyance due to the noise caused by the railway. Up to 15% of population is annoyed and up to 5% of the population is strongly annoyed (in theory).

Table 16. Number of annoyed (S%) and strongly annoyed (LS%) persons because of air transport, vehicles, rail transport. Studies carried out in Holland showed the public irritation level from noise [28]

l dun	Air transport		Vehicles		Rail transport	
Lavn	%, S	%, LS	%, S	%, LS	%, S	%, LS
45	11	1	6	1	3	0
50	19	5	11	4	5	1
55	28	10	18	6	10	2
60	38	17	26	10	15	5
65	48	26	35	16	23	9
70	60	37	47	25	34	14
75	73	49	61	37	47	23

According to the epidemiological studies described by Babish [29], it is believed that outside traffic noise level (duringday time), in excess of 65 dB(A), increases the risk of coronary heart disease (CHD; International Classification of Diseases ICD code 410-414) or myocardial infarction (MI, ICD 410) [29] for approximately 20%. This means that about 2-3% of all cases of ISD or MI could be caused by transport (road, rail, air) noise exposure, and the risk of human lifetime is of 20:1,000. The risk of ischemic heart disease and relative risk increase from 1.1 to 1.5 (statistically unreliable) when greatly annoyed respondents are evaluated in case of traffic noise level of 65-70 dBA, in comparison with the noise level of 51-55 dB (6-22h).

Analysis of households falling into the noise area of > 60-65dBA (18 households in <u>current situation</u>), and calculation of the population (43 people) showed that it includes the ones who are exposed to the noise level and have increased risk to get CVD. On



the grounds of literary analysis, the assessment of <u>greatly annoyed</u> population (9%) showed that the relative risk to get either CVD or MI for 4 residents is 1.2 if the noise level is > 65dBA.

Higher than 65 dBA noise level in target situation is unpredictable in habitable environment, when the negative health symptoms may occur.

The population data base for the identification of number of population in each building has not been prepared yet in Lithuania, therefore the assessment of risk on the basis of noise maps is possible only where there is a little housing, during the survey by means of questionnaire. Degree of population irritation to the noise caused by the operation of existing rail has been determined during the survey. During the reconstruction of the track, implementation of engineering and legal measures, a significant impact and possibility to get cardio-vascular diseases caused by the noise caused by the rail is not forecast.

<u>Sleep disorders</u> will be felt more by the people living in the area of 60-65dBA. When the ambient noise level is 65 dBA, it is possible to reduce it up to 35 dBA after building new windows.



Illustration 13. Dependence of noise dose-sleep disturbances [30]

Although sleep disturbance at night may cause lots of health effects, but the question on sleep disturbance was raised only in 1998, for the first time, and in 2003 repeatedly, it is not widely studied accordingly [31].

According to this curve, 5% of the population may have severe sleep disturbance during the operation of the existing track.

The degree of sleep disorders was determined during the population surveys ("Results and Discussion").

Findings of EIA organiser: people should not suffer from higher sleep disturbances due to the noise caused by the railway, after the building of windows with increased noise insulation, greening of homestead areas, installation of acoustic walls in the settlements.





3.6.1.6 Safe traffic

After the implementation of the project, the traffic safety measures are prognosticated at the railway track section under consideration:

• The reconstruction of the underground passages in Grigaičiai village and Juodšiliai village is provided;

• The installation of a ground-level pedestrian crossing in the village Juodšiliai (Eišiškės street) is intended, which would meet all the requirements of traffic safety and would create safe conditions for communication of people.

• The installation of noise walls on the rail bypass sections (6.200 to 7.400 km, 10.400 to 11.700 km, 12.700 to 13.500 km, 21.500 to 23.100 km (see Annex No 6) will perform the function of defensive walls and the protection for the residents.

After the implementation of the project dealt with, the better security for population is planned on the railway bypass track section.

3.6.1.7 Psychological impact

The psychological impact is expected due to the noise and other inconveniences of living at the track. During the meetings with the public, part of people whose houses will become closer to the bypass, expressed concern (see Annex No 5, Part C "Motivated proposals").

Residents commented on the acoustic walls, windows of increased sound insulation, insulation of buildings and the mbenakment in the settlement of Rudamina.

During the development of the project in stages, co-operation with people by the designers and customer is provided for, which will help to deal with the prombems concerning the implementation of installation of approach roads, noise countermeasures. The main objective of this cooperation is to take into account wishes of people depending on possibilities, and to ensure that the project is implemented by providing the least possible stress for the surrounding people.

Psychological impact and potential conflicts were exmined during the survey.

3.6.2 Qualitative assessment of impact on public health

3.6.2.1 Research methods and material

For the assessment of factors environmental impact on the life quality and health of residents by the railway bypass Kyviškės-Valčiūnai and Vaidotai-Paneriai, the households located nearby the railway have been selected. Residential builds are situated in a short distance from the railway track.

Noise calculations show that noise level at different distances from the axis of the railway at all selected points for the study was not exceeded.

The calculated noise level is shown in Annex No 6, by presenting the noise zones in accordance with ISO 1996-2:1994, every 5dB. Noise zones are depicted in different colors, as it is shown in the Annex. Every house on the noise map is situated within relative noise level zone.

The study assumes that a high noise zone is when the noise level is $L_{night} \ge 55$ dBA.



In each noise level zone, households - of respondents living within the high zone noise are identified at the intervals of 5 dBA (\geq 55dB at night), 55-60dB, 60-65dBA.

<u>Study time:</u> 10 – 18 August 2009.

<u>Study object:</u> the residents living nearby the determined noise zones of railway bypass. <u>Factors studied:</u> subjective assessment of life qualiy and health relating with impact of noise/vibration.

Study methods: questionnaire survey and data analysis.

The residents of households (homesteads), falling into the high-noise zone (55-65dBA) have been interviewed. Total number of surveyed is N = 85. At random, the respondents available within the sanitary zone established under the noise levels have been surveyed, through individual completing of the questionnaire, on the subjective assessment of environment, the quality of life and health noise and air pollution impacts.

During the formation of questionnaire, WHO questionnaire was used for subjective assessment of life quality and health, ISO / TS 15666:2003 standard, which harmonizes assessment of irritation, description for assessment procedures of the noise impact on public health have been also used.

The questionnaire containes 20 questions. Some questions were intended to clarify the socio-demographic characteristics of respondents (age, work status, etc..), another series of questions is designed to ascertain the evaluation of home environment, assessment of dissatisfaction, negative feelings, complaints and life quality under the impact of physical factors of target economic activity [32].

Main variables (X):

• Physical and environmental assessment and satisfaction with it related to noise and air pollution. Rating measurement scale has been used. In this case, the feature is outlined by asking whether your physical environment is healthy: 1) No, 2) Ssomewhat, 3) On average, 4) Very, 5) Particularly.

• Personal assessment of noise level of the living environment and at home, living in the noise zones L_{night} 55-60 dBA, L_{night} 60-65dBA. Rating measurement scale. Features are indicated by: 1) Very low, 2) Low, 3) Average, 4) High, 5) Very high.

• Irritation because of noise during the day (recommended by noise directive 2002/49/EC). The aim is to establish the number of very and strongly annoyed people in the population, because they fall into the risk groups susceptible to other diseases, as a response to the irritation. Features are indicated by: 1) No, 2) Somewhat, 3) On average, 4) Very, 5) Strongly.

• Sleep disturbance during the night (we recommend the Noise Directive 2002/49/EC). This is one of the most important variables causing a number of complaints (Order No 438. List on environment and health indicators). Rating measurement scale. Features are indicated by: 1) No, 2) Somewhat, 3) On average, 4) Very, 5) Strongly.

• Negative feelings affecting the life quality and health effects are indicated by each respondent having marked them in the questionnaire.

• Assessment of environmental factors for the estimated impact on the life quality. Features are indicated by: 1) Yes 2) No 3) Do not know.





• Approval of railway modernization and the construction project of II track. Features are indicated by: 1) Yes 2) No 3) Other.

3.6.2.2 Results and their scope

3.6.2.2.1 Demographic-social characteristics of respondents

The total number of subjects N is made by 85 respondents from 40 households located nearby the railway.

Table 17. Distribution of subjects living in the railway bypass sanitary protection zone

Respondents	Number of subjects, N					
	Men		Women		Both genders	
	Abs.	%	Abs.	%	Abs.	%
Constantly living	35	41,2	50	58,8	85	100
Visiting and on holidays	-	-	-	-	-	-
In total	35	100	50	100	85	100

Abs.- absoliute numbers.

100 % of respondents constantly live in this place.



Illustration 14. Distribution of respondents according to gender in population being studied, %

Distribution of respondents by gender in exploratory population: 41% of men and 59% of women, there is no significant difference. (18% women more than men).

Table 18. Average age of respondents by gender

Feature	Gender	n	Average age of subjects
Age	1 men	35	44,5
	2 women	50	49

Average age of respondents is 47 years, from 7 to 88 years. Age groups:

Aye yroups.

a) <18m. -10 respondents; 12%.b) 18-65m.- 55 respondents, 65%.

c) >65m - 20 respondents, 23%.

c) >65m - 20 respondents, 23%.

The largest group of respondents is aged 18-65.





m	ent?"						
		n	proc.				
	Variables		1 no, retired	27	32		
	feature		2 working	31	36		
			3 temporaray not working	14	16		
			4 studying	13	15		
			In total	85	100		





Illustration 15. Occupation of population aged 7-88

48% of respondents stay throughout the day in exploratory place. 52% of respondents are working and studying, and only return in the evening.

3.6.2.2.2 Home and recreation environment of respondents

For life quality of population, it is very important the nearest home environment. Not only the approach to the environment is important, but also the degree (strength) of the environmental impact, which shows the impact on quality of life.

100% of the respondents live in this environment permanently, 48% of the respondents (retired and temporarily unemployed) spend the whole day at home.

		U								
	Ν	Average	Lived	in	one	place	Lived	in	one	place
			minimu	lm			maxim	um		
Live at the same	85	31 year			1 yea	ar			88 ye	ears
place for years										

Table 20. Average age of respondents living in the area

68% of respondents live in the survey area, the current home for more than 15 years. The average life time in one place is 31 year.

The data of studies conducted in Europe [33] shows that the noise impact on cases of cardiovascular disease is the greater as long as the life time within a noisy environment. The researchers in Germany examined the extent of the risks caused by noise, where it is assumed that the noise impact is developing and becoming stronger when people live in the noise impact area for more than 15 years, but the results did not confirm the following hypothesis. The data of studies carried out in German shows



that the average life at a single location is for 16.5 years and that 47% of German citizens live in their current household for more than 15 years.

Vilnius Public Health Center conducted the study of health and housing in the city of Vilnius. According to the survey, it was found that the more frequent complaints on the noise, the worse the housing and its environment is evaluated [34].

The investigation found the attractiveness and conditions of residence located nearby the railway within the noise impact zone of 55-65 dBA.

Table 21. Distribution of respondents who answered the question: "Are you satisfied with your living conditions?"

		Versions of responces	n	Per cent		
Variables o feature	of	1 greatly dissatisfied	0	0		
		2 dissatisfied	20	23		
		3 medium satisfied	34	40,5		
				4 satisfied	31	36,5
		5 greatly satisfied	0	0		
		In total	85	100		



Illustration 15. Evaluation section of satisfaction of respondents with living place conditions

 Table 22. Distribution of respondents who answered the question: "Do you like living in that place?"

		Versions of responces	n	Per cent			
Variables of feature	of	1 no	0	0			
		2 a litle	1	1,2			
					3 average	16	18.8
		4 very	68	80			
	5 particularly	5 particularly	0	0			
		In total	85	100			

77% of respondents indicated they are satisfied and very satisfied with the conditions of residence, 80% of respondents indicated that they really like living in that place, though



they live in a noisy environment, within high-noise zone, where the noise level is L_{night} > 55 dBA.

All the retired and temporarily unemployed (48% of respondents) are most exposed to the noise in the home environment during the day.

 Table 23. Distribution of respondents who answered the question: "Are you satisfied with physical environment?"

	Versions of responces	n	Per cent
Variables of	1 greatly dissatisfied	1	1,2
feature	2 dissatisfied	18	21,2
	3 medium satisfied	40	47,0
	4 satisfied	26	30,6
	5 greatly satisfied	0	0
	In total	85	100



Illustration 16. Evaluation section of satisfaction of respondents with physical environment (air pollution, noise)

77.6% of the respondents are satisfied with the physical environment on average and satisfied with it. Respondents in Juodšiliai village indicated that when trains stop to pass another train, there is a smell of petrolic products from the tanks (physically obsolete Russian fleet park). 72% of respondents in their questionnaires indicate that the environment is noisy, 67% - complaint of railway noise. Respondents are not satisfied with the current track noise. 23% of respondents feel the vibration that is transmitted together with the sound wave.

Table 24. Distribution of respondents who answered the question: "What do you think of environment noise outside (living environment)?"

	Ver	sions of responces	n	Per cent	
Variables	of	1 very low	0	0	
feature		are 2 low	2 low	9	10,6
		3 average	34	40	
		4 high	41	48,2	





5 very high	1	1,2
In total	85	100

25 lentelė. Distribution of respondents who answered the question: "What do you think of noise level environment at home?"

V	ersions of responces	n	Per cent
Variables of	1 very low	1	0
feature	2 low	22	26
	3 average	46	54
	4 high	16	20
	5 very high	0	0
	In total	85	100





Illustration 17. Evaluation section of environmental noise outside and at home by respondents

Only 10.6% of respondents indicated that the noise level of ambient residence environment is low, 50% of them thinkd that the noise in the environment is very high and average at home, the noise level of 20% of respondents inside the houses is high.

After the construction of II railway bypass track and the modernization of the existing track and the use of modern noise level reduction measures, the level of noise in home environment will be reduced (Table 49):



• ~ 110 households will have the noise level reduced <u>in the environment (outside)</u> to an acceptable after the building of acoustic walls (~ 30dBA);

• individual households will have the noise level reduced <u>at home</u> to an acceptable level after the building of increased sound insulation windows, and the noise outside will be reduced after having the area planted with greenery properly (5dBA).

3.6.2.2.3 Effects of dissatisfaction, sleep disturbance and health of respondents

The link between the public irritation and railway noise level is shown under the dependence on dose - response (McKennel, 1963, Griffiths & Langdon.1968; Scultz, 1978), in case of a high noise level, it is associate with a high level of irritation (Field, 1944; Miedema, 1998). Miedema and Vos (1999) found the data from irritation and traffic noise level of population that great irritation emerges and grows from 42dBA Ldn of noise level in home environment, the WHO definition is of 50-55 dB [35].

Epidemiological studies demonstrate that the irritation does not depend on the age (Henk Miedema, 2001) [36]. It is noted that the results of the examination of population irritation living nearby the new track are better than those living at the old track, because people have not been accustomed to the noise yet.

During the study via surveys, the EIA organizer identified dissatisfaction of community with the noise in individual areas at the existing track, through the assessment of annoyance and sleep disturbance levels of the population.

After the reconstruction of existing rail bypass, application of technological innovations for the installation of all the rail tracks and bed, and after the installatin of noise and vibration mitigation measures, the noise level in the nearest <u>living environment</u> will decrease.

In the view of EIA organizer, there should be less communication, sleep disturbance problems for the people living in the railway environment. Irritation, annoyeance effects because of noise is expected to be lower. Stressful reactions resulting in the formation of mental health effects are not foreseen.

By means of interview of population via questionnaire, the EIA organiser tried to ascertain the subjective approach of residents towards the environmental factors caused by target economic activity, and possible dissatisfaction. The resulting dissatisfaction affects the quality of life and mental health.

Psychological impact and potential conflicts have been investigated by means of survey. During the survey, the EIA organizer found that people have already been primed about the project.

Table 26. Distribution of respondents who answered the question: "Do you feel annoyance (irritation) because of the noise from railway when you are at home?"

	٧	ersions of responces	n	Per cent
Variables	of	1 no	31	36,5
feature		2 a litle	20	23,5
		3 average	22	25,9







Illustration 18. Evaluation section of annoyance of respondents while being under influence of noise at home during day time, in noise zone $L_{day} > 60 \text{ dBA}$

Our study showed that in case of high noise level of 55-65dBA during the day, 14% of the respondents feel strong irritation when they are at home, on average irritated - 26%.

Studies conducted in the Netherlands showed that in case of noise level of L_{DVN} 60dB, severe irritation is of 5%; when L_{DVN} 65dBA, severe irritation is of 10%, on average irritated - 23% of the respondents ("Position Paper on Dose Response Relationships Between Transportation Noise and Annoyance" EC).

During the study, most household environments surveyed where the noise level was 60dB. The degree of irritation in Lithuania because of the railway noise <u>during the day</u> is higher than in the Netherlands, and may be explained by poor building structures and their insulating properties.

According to a survey questionnaire, 12 respondents suffering from severe annoyance during the day, have increased risk of CVD, the relative risk is 1.2 (although this relative risk is unreliable statistically).

On the residential territory of the railway bypass under consideration, the risk of coronary heart disease and MI due to the noise impact shall be reduced after the adoption of noise mitigation measures, for example, construction of noise remissive walls, building of windows of good acoustic performance, plantation of the area and the reduction of the noise by 10-30 dB in the living environment.

WHO points out that a good night's sleep is when the noise level does not exceed 30 dBA as a continuous background noise (WHO, Technical meeting on sleep and health 22-24 January 2004 in Bonn, Germany).



Sleep disturbance becomes significant when the noise level indoors reaches 35 dBA. Sleep is mostly disturbed by unexpected, unusual sounds, uneven levels of noise. Lithuanian hygiene standard HN 33:2007 states that the allowable noise level outside at night (22-06 hrs.) is 55 dBA, inside - 35dBA.

27 lentelė. Distribution of respondents who answered the question: "Do you feel sleep disturbance because of the noise from railways? "

	١	ersions of responces	n	Per cent
Variables feature	of	1 no	46	54
		2 a litle	10	11,8
		3 average	22	26
		4 very	6	7
		5 particularly	1	1,2
		In total	85	100



Illustration 19. Evaluation section of annoyance of respondents while being under influence of noise at home at night time, in noise zone $L_{night} > 55 \text{ dBA}$

The study found that people tolerate the railway noise impact at night better than a day. 54% of respondents living in the noise area $L_{night} > 55$ dBA, do not feel any sleep disturbance, 8% of them feel the sleep disturbance strongly / very much.

The noise caused by the railway noise discontents the annoyance of population because of sleep disturbance much less than road traffic noise (e.g. due to the highway noise, severe sleep disturbance is felt by 44.4% of respondents in Vievis town, when $\underline{L}_{night} > 55 \text{ dB}$.

The studies in the Netherlands showed that 4-5% of the population feel strong sleep disturbance because of the railway, when L_{night} 55-60dB [30].

Sleep and rest influence the life quality of human. The respondents who suffer medium or severe sleep disturbance, may feel tired and not getting much sleep in the morning. This signifies their learning and working capacity. When the sleep is disturbed regularly, fatigue and headache may occur.

Table 28. Distribution of respondents who answered the question:"What complaints do you have concerning the noise caused by railways?"

Versions of responces	n	Per cent
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Variables o	of	1 Feel nothing	50	58,8
feature		2 Causes communication problems	10	11,76
		3 Cannot concentrate	5	5,88
		4 Feel tiredness	4	4,7
		5 Causes nervous strain, stress	12	14,12
		6 You are in a bad mood	0	0
		7 You are nervous	3	3,52
		8 Troubles to perform everyday work	2	2,35
		9 Sleep more badly	17	20
		In total	85	121,13





60% of respondents living near the railway have no complaints about the railway noise. 40% made main complaints that they sleep badly, it causes nervous tension, communication problems when they are outdoors.

Table 29. Distribution of respondents who answered the question: "Are you satisfied with your health?"

	Versions of responces	n	Per cent
Variables of feature	1 greatly dissatisfied	2	2,35
	2 dissatisfied	15	17,65
	3 medium satisfied	17	20
	4 satisfied	51	60
	5 greatly satisfied	0	0
	In total	85	100







Illustration 21. Evaluation section of respondents' health (L_{night} >55 dBA)

80% of respondents living in the area of high noise zone are on average satisfied and satisfied with their health.

 Table 30. Respondents who answered the question: "Do you approve the project for modernization of railway and contruction of second track?" "



Illustration 22. Opinion of respondents while evaluating the project for reconstruction of railway (L_{night} >55 dBA)

During the questionnaire survey, the EIA organizer found that all respondents would like the ambient noise to be less, the respondents are not satisfied with the current situation. 80% of the respondents support the project for modernization of the railway and the construction of second track, taking into account that the negative impact mitigation measures will be installed in the populated areas. They hope that the implementation of appropriate countermeasures will make their environment healthier.



The survey results show that the implementation of this project should not lead to conflict situations.

70% of respondents stated that the target activity should not affect their life quality and health adversely.

FINDINGS ON THE SURVEY OF RESPONDENTS CONCERNING POSSIBLE IMPACT ON QUALITY OF LIFE AND HEALTH:

- Most part of respondents (65%) makes the age group of 18-65 years. 48% of unemployed respondents work outside their own farm and gardens and spend the whole day in that place and are exposed to the noise all day long. 68% of respondents live in the current apartment for > 15 years.
- The majority of respondents (77%) living in a noisy environment have indicated that they are satisfied and very satisfied with the lving conditions of the place and they like this place very much (80%).
- 77.6% of the respondents are on average satisfied and satisfied with the physical environment. 72% indicate that the environment is noisy, they complain about the railway noise, 23% feel the vibration. 20% of respondents indicate a high level of noise at home.
- While modeling the noise levels on the track Kyviškės-Paneriai, the ration of *dose response* of established study is: 14% of respondents living in high noise zone of 55-65dBA closest to the track feel strong annoyance, 8% feel a strong sleep disturbance, 54% do not feel anything during the night. It has been determined the dissatisfaction with the railway noise is less than with the highway noise when L n 55 -65 dB (in comparison with the results on the noise of irritation of Vilnius-Kaunas highway).
- 60% of respondents living in the area of high noise zone of ≥ 55dB have no complaints, 40% expressed a variety of complaints resulting under the influence of noise: for 14% it causes nervous tension, 20% sleep badly at night, 12% fell communication problems. 80% of the respondents are on average satisfied and satisfied with their health.
- Respondents are not satisfied with the current track noise and they expect highnoise-reduction measures to be used. 80% of the respondents support the project for modernization and the construction of second railway track through the installation of adverse impact mitigation measures.
- After the modernization of the existing track and the use of modern countermeasures for reduction of noise level, the noise levels shall decrease in residential environment. 70% of respondents indicated that the target activities will not affect their quality of life and health adversely.

3.6.3 Findings on assessment of impact on public health

Having considered the analysis of factors affecting health by target economic activity and the results of the survey of respondents, EIA organizer has formulated the following conclusions:

1. "Project" version does not include unpredictable noise level higher than 65 dBA in habitable environment, where negative health symptoms may be displayed. After the construction of II track railway of railway bypass, modernisation of the existing track and use of modern countermeasures to reduce the noise level, the noise level and vibration will change (Table11) in habitable environment:



• the outside noise level (field) will be reduced to the safe level after the installation of noise walls (acoustic insulation rate DLR ~ 30dBA) for the households (~ 110) in the settlements;

• for individual households, the <u>inside</u> noise level will be reduced to the safe level after the installation of windows with good acoustic characteristics and the noise keeping airholes. The noise reduction outside will be reached after the planting of area (~ 5dBA), detailed information on planting will be provided for in the planting project. The proposed bar of green plantation consisting of thujas of H=1.8m high, which will be planted in chess order for a space of 1 m from one another, in three rows.

The noise will decrease to acceptable level at night (55dB), after the construction of acoustic walls <u>for 4 m from the railway track</u> in the settlements, at the sections: a) 6.200 to 7.400 km, b) 10.400 to 11.700 km, c), 12.700 to 13.500 km, D) 21.500 - 23.100 km (see Annex No 6).

2. EIA organizer does not forecast any adverse effects on human health due to physical and psychological factors:

• Disorders of understanding and sleeping should not occur for the people living in such environment.

• Due to the noise, impact of annoyance – irritation is expected to be lower.

• After the installation of the windows of increased acoustic insulation, planting of greenery in homestead area, installation of acoustic walls in the settlements, people should not suffer significant sleep disturbances from the railway noise.

• Sressful reactions, resulting in the formation of mental health effects, are not expected.

3. After the implementation of project, the people living next to the railway will get less noise dose than before the implementation of the project.

4. The results of survey showed that there will not be any conflict situations due to the implementation of the project. During the development of the project in stages, the cooperation between the designers and client with people is expected, which will include the matters concerning the installation of access roads, noise countermeasures.

5. 80% of respondents support the project on the modernization of railway track and construction of the second track through the installation of measures for reduction of adverse impact.

6. Having implemented the project, better security of the population is forecast within section of the railway bypass track pending:

• It is due to reconstruct underground passages in Grigaičiai and Juodšiliai villages.

• It is the contemplation to install a single ground-level pedestrian crossing in the village Juodšiliai (Eišiškės street), which woul meet all the requirements for traffic safety.

• Target installation of the noise walls within rail bypass sections a) 6.200 to 7.400 km, b) 10.400 to 11.700 km, c), 12.700 to 13.500 km, D) 21.500 to 23.100 km (see Annex No6) will play a defensive wall function fot the protection of the population.

• After the introduction of noise countermeasures, the measurements of noise level, noise monitoring and assessment shall be carried out.



Rail transport falls within the assessment list of cases not provided for in the legislation of environmental impact on public health by target economic activity (code under types of classification of economic activities 60.1.) approved by the Order Nr.V-50 by the Ministry of Health of the Republic of Lithuania on 31 January 2003. (Official Gazette, 2003, No.18-794).

This list includes the determination of sanitary protection zones referred to the indicated economic activities under the ORDER No V-586 BY THE MINISTRY OF HEALTH OF THE REPUBLIC OF LITHUANIA "On establishment of the limits for sanitary protection zones and approval of the regime rules" on 19 August 2004, considering the change of the order No V-1052 of 21 December 2009, which repeals SPZ for the rail transport. EIA organiser took account of the requirements of the paragraphs 19.1-19.4 of this order and evaluated the physical and chemical pollution.

In this case, chemical and biological contamination does not exceed the ambient pollution norms.

EIA organizer has assessed physical pollution - noise level in populated areas, and the measures for noise level reduction.

If the noise level exceeds the level within the habitable environment of railway bypass, effective implementation of compensatory measures have been accepted and provided.

EIA organiser has determined that:

• Noise level will be reduced to acceptable levels at night (55dB), after the construction of acoustic wall in the settlements, <u>for a space of 4 m from the railway track</u>, at the sections: a) 6.200 to 7.400 km, b) 10.400 to 11.700 km, c), 12.700 to 13.500 km, D) 21.500 -23.100 km (Annex X). Location for noise reduction walls has been chosen next to the groups of houses (when there are 5 or more houses).

• The noise level will be reduced in habitable environment for the individual residential homes falling into the spread of high-noise zone, after the planting these homesteads densely (5 7dBA), indoor noise level will be reduced, after the installation of windows with increased acoustic insulation (30dBA) with the acoustic airhole.

Note: The measures for impact reduction (acoustic walls, windows, planting) may be revised during the preparation of the technical designs of individual project parts.

* Protective green bar is going to be built <u>by individual residential households</u>. It is proposed to built the bar of green plantation consisting of thujas of height of H=1.8 m, planted in chess order for a space of 1 m from each other, according to the requirements of paragraphs 2.9, 5.4 of Chapter VIII of STR 2.06.01:1999 "Communication systems of cities, towns and villages". Detailed information on the the planting will be presented in the planting project.

3.7 Description of impact on air quality

Legal regulation

Ambient air pollution standards are established concerning the Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. In essence, this is the latest directive, which combines the previous directives. Another act regulating air quality will soon be created on its basis, and moved to the Lithuanian legislation database. During the assessment of impact on



ambient air by means of modeling, the following specified laws and other relevant sublegislative acts (orders) have been followed.

Orders:

Law on Environmental Protection of the Republic of Lithuania (Official Gazette, 1992, No5-75, 1996, No. 57-1335, 1997, No 65-1540, 2000, No 39-1093 in 2002, No 2-49, 2003 No 61-2763, 2004, No 36-1179, No 60-2121, 2005, No 47-1558).

Law on Environmental Monitoring of the Republic of Lithuania (Official Gazette, 1997, No 112-2824, 2006, No 57-2025).

Law on Ambient Air Protection of the Republic of Lithuania (Official Gazette, 1999, No 98-2813).

Orders by the Minister of Environment:

No 596 "Regarding to the assessment of ambient air quality" (Official Gazette, 2001, No 106-3828; 2002, No 81-3499)

No 517 "Regarding to the approval of assessment programme on ambient air quality" (Official Gazette, 2003, No 103-4618);

No D1-30 "Regarding to the change of the order No 517 by the Minister of Environment of 23 October 2003 "Concerning the approval of assessment programme on ambient air quality" (Official Gazette, 2005, No 14-440);

No D1-653 "Regarding to the policy of calculation models for spread of pollutants, data of background ambient air pollution and meteorological data for the assessment of impact on ambient air by economic activities" (Official Gazette, 2007, No 127-5189).

No D1-366 "Regarding to the change of the order No D1-653 by the Minister of Environment of 30 November 2007 "Regarding to the policy of calculation models for spread of pollutants, data of background ambient air pollution and meteorological data for the assessment of impact on ambient air by economic activities" (Official Gazette, 2008, No 79-3137).

No 715 "Regarding to the approval of the LAND 18-2003/M-03 methodology for evaluation of the pollutants emitted into the atmosphere from locomotives and diesel trains" (Official Gazette, 2004, No 37-1211).

Orders by the Minister of Environment and the Minister of Health:

No 591/640 "Regarding to the determination of standards for ambient air pollution" (Official Gazette, 2001, No 106-3827);

No D1-329/V-469 "Regarding to the replacement of the Order No 471/582 by Minister of Environment of the Republic of Lithuania and Minister of Health of the Republic of Lithuania on 30 October 2000 "Regarding to the approval of the list on emissions, which quantity in ambient air is measured in accordance with the criteria of the European Union, and determination of limit values for ambient air pollution" (Official Gazette, 2007 No67-2627).

Order by the Minister of Health:

No V-362 "Regarding to the approval of the Lithuanian Hygiene Standard HN 35:2007" Maximum permitted concentration of chemicals (pollutants) within ambient air of residences" (Official Gazette, 2007, No 55-2162).

Orders by the Director of Environment Protection Agency:

No Av-112 "On the approval of recommendations for the use of background ambient air pollution data for the assessment of impact on ambient air by economic activities" (Official Gazette, 2008, Nr. 82-3286).


No Av-200 "Regarding to the approval for the recommendation on the selection of calculation models for the assessment of impact of spread of pollutants on the ambient air by economic activity" (Official Gazette, 2008, No 143-5768).

	Average		Date in effect
		Nitrogen dioxide	
Hourly average limit value for the protection of human health	1 hour	200 µg g/ m ³ of NO2 should not be exceeded more than 18 times per artificial year	2010 01 01
Annual limit value for the protection of human health	Artificial year	40 µg/m ³ NO ₂	2010 01 01
	•	Particulates	•
Daily limit value for the protection of human health	24 hours	50 μg/ m ³ of KD ₁₀ NO2 should not be exceeded more than 35 times per artificial year	2005 01 01
Annual limit value for the protection of human health	Artificial year	40 μg/m ³ KD ₁₀	2005 01 01
		Carbon monoxide	·
Limit value for the protection of human health	Daily maximum 8- hour average	10 mg/ m ³	2005 01 01
		Sulfur dDioxide	
Limit value for the protection of human health	1 hour	350 µg/m ³ should not be exceeded more than 24 times per artificial year	2005 01 01
Daily limit value for the protection of human health	24 hours	125 µg/m ³ should not be exceeded more than 3 times per artificial year	2005 01 01
		Benzene	
Limit value for the protection of human health	Artificial year	5 µg/m³	2010 01 01

 According to national criteria for the norm of hydrocarbons in ambient air is 5 mg/m³ (0,5 hr.) ir 1,5 mg/m³ (24 hrs.).

ASSESSMENT OF AIR QUALITY BY MEANS OF SIMULATION

Analyzed area

Nemėžis village has been chosen for the analysis of the site (Nemėžis eld., municipality of Vilnius district). The village is crossed by the highway and railway. During the assessment of local air pollution, locomotive and car emissions were estimated and the maximum and average annual average concentration of ambient air pollutants from these sources in the analysis area was simulated, in the area of approximately 4 km x 4 km.







Illustration 23. Place of analysed site -Nemėžis village

The calculations were made using ADMS Urban Model of new generation (Great Britain). Through the application of this model, the exhaust gases by dispersion were measured (nitrogen dioxide - NO_2 , carbon monoxide - CO, sulfur dioxide - SO_2 , volatile organic compounds as hydrocarbons, particulates S_{10}) from the linear pollution sources in the ambient air. The background concentrations of pollutants of the area analyzed were input into the model, and air pollution was calculated from the linear sources only, i.e. locomotives running along the railway track and cars going along highway and main streets of the village. The impact of locomotives (on 4.5 km railway section at Nemėžis settlement) and cars (on A3 motorway section from Vilnius nearby Nemėžis settlements) on the ambient air in the current situation (2008-2009) and prospective situation (2015) was estimated by means of simulation. Both for assessment of the current situation and the prospective scenario meteorological data of 2008 was used, which showed weather conditions during those years. While assessing air pollution, the local relief features were taken into account, too.

Topographic data and maps of the site

During the simulation of ambient air quality on the analysed area, area roughness coefficient was estimated. It was chosen equal to 0.5 (which means that the roughness factor conforms the so-called "open-suburban" environment).

During the calculation of the dispersion of pollutants in ambient air by means of simulation, the influence of landscape of site (Nemėžis set.) and district (part of the area of Vilnius district) were also evaluated: the height of areas were measured by topographical step of 20 m. Developing appropriate file format for Urban ADMS model, it was based on the geoinformation database GDB200 (State Enterprise "GIS-Centre").

Maps showing the concentrations of pollutants around the village Nemėžio will be displayed through orthophotography cutout of the year 2005 from ORT10LT database



(the National Land Service under the Ministry of Agriculture). Thematic maps on the air pollution are given in the Annex No 5.

Background concentrations

Background NO2, CO, SO2, PM10, and location (Nemėžio village, Vilnius district) concentrations which were obtained from the thematic maps by means of simulation, and which are described on the website of Environmental Protection Agency:

http://oras.gamta.lt/cms/index?rubricId=63ad0be0-bced-43f6-9018-20cabe3403e3.

The background concentration of volatile organic compounds was measured as a total expression of volatile organic compounds with an average annual concentrations measured in Naujoji Vilnia (municipality of Vilniusdistrict) by using the indicated study method. This data is also taken from the website of Environmental Protection Agency: http://oras.gamta.lt/files/Indikatoriniu_tyrimu_duomenys.pdf.

Thus, for the current (2008-2009) and prospective (2015) situations, the following background concentrations of the site were set: NO_2 15 µg/m³; CO 0,3 mg/m³; SO₂ 1,1 µg/m³; KD₁₀ 15 µg/m³ and total annual average concentration of hydrocarbons (benzene, toluene, ethylbenzene, ortho-, para- meta- xylene) - C_XH_X 5,8 µg/m³.

Meteorological data

ADMS-Urban model hourly meteorological input data is obtained from the Lithuanian Hydrometeorological Service. Both for the calculations of current and prospective situations meteorological data of the year 2008 from Vilnius Meteorological Station (it was founded in Trakai Vokė) was used. They are set in the following order: Air temperature in the height of 2 m (°C), wind speed (m / s) and direction (degrees) in the height of 10 m, cloudiness (points), relative humidity (%), Monin-Obukhov length (m / 1) defining the atmospheric stability class. Hourly data was obtained by means of interpolation from the annual monitoring data which were recorded every 3 hours. Below some average and extreme weather parameters of elements are presented, and atmospheric stability class from Vilnius MS meteorological data arrays of the year 2008 is estimated.

Voor 2009	Average air temperature	Average wind speed at	Average relative	
1 eai 2000	Average all temperature	Average wind speed at	Average Telative	
	at 1 pm , ⁰C	1 pm, m/s	humidity at 1 pm , %	
July	21,2	3,2	54	
January	-1,0	4,9	84	
2008 metai	Average monthly air	Average monthly wind	Average monthly	
	temperature, °C	speed , m/s	relative humidity, %	
July	17,8	2,3	70	
January	-1,6	4,6	86	
2008 metai	Maximum / minimum	Maximum one-hour avg.	Maximum one-hour air	
	one-hour air	wind speed, m/s	humidity , %	
	temperature, °C		-	
July	27,8 (maks.)	7	-	
January	-16,1 (min.)	9	-	
	Average annual air	Average annual wind	Average annual relative	
	temperature, °C	speed , m/s	humidity , %	
Year 2008	7,9	3,3	78	

 Table 32. 2008 Vilnius MS medium and extreme weather data during warmest and coldest months

Table 33. Atmospheric stability class of Vilnius MS in 2008 (according to LHMS data)



Atmospheric stability class	Length of Moninov-Obukhov, m ⁻¹	Duration, %
Unstable (pollution dissipates quickly and well because of the intensive convection)	From o -0,3 to -0,01	14
Neutral (the largest concentration is located far from the source)	From o -0,0099 to 0,002	31
Stable (contaminants tend to accumulate in the ambient air)	from 0,00201 to 0,2	47
Very stable (contaminants accumulate in height of certain temperature inversion and almost do not disperse)	from 0,20001 to 2	8

Emissions of linear pollution sources (locomotives)

Initial data for calculation of emissions

Data used for the calculation of pollutant emissions (g / m / s) from the locomotives:

- Average annual daily traffic intensiveness (number of locomotives per day),
- Mileage (km)
- Fuel quality (% of sulfur content in fuel),
- Fuel consumption (t/m),
- Other factors assessing the average locomotive engine life and fuel costs due to climate conditions in Lithuania. Potential difference in train weights and different running speeds has not been taken into account: the rate of 1 was are used for their assessment.
- Technical characteristics and some parameters: the height of locomotive stack (m), the width of locomotive stack (m), temperature of smoke released from the stack (° C), and the exhaust velocity (m / s).

Data on the flow of railway transport, used fuel and intended to be used, locomotives characteristics and other were obtained from the professionals of Freight Transport Board, Directorate of Freight Transport and Vilnius locomotive depot of AB "Lithuanian Railways".

Emissions of linear pollution sources (cars)

Data used for the calculation of pollutant emissions (g/km/s) from cars:

- Average annual daily traffic intensiveness (number of cars per day),
- Average driving speed on single sections of road and streets (km/h),
- Number of cars every hour per day course (relative profile in respect of average hourly day average),
- Number of heavy vehicles every hour per day course (relative profile in respect of average hourly day average),
- Factors of motor transport emissions built into the model (ADMS Urban scenario in 2004 to assess the current situation and ADMS Urban prospective scenarios of 2010 to assess the prospective situation),
- Road type (highway, city street),
- Fuel quality (% of sulfur content in fuel), Concentrations of contaminants from the linear source were modeled 1.8 m above the ground, i.e., within the height of human breathing. These results are compared to ambient air pollution standards set for protection of human health.

I. Current situation (2008-2009 m.). Input data for calculation of air pollution



The territory, where the reconstruction and modernization of the railway bypass is planned is described as anthropogenically affected area. The agricultural activity is carried out there. In the view of air quality, this area is classified as a relatively clean suburban area, except for the area at the western part of the railway section, which can be affected by the Vilnius city and industrial enterprises located on from Grigiškės to Savanoriai avenue, in regard to the air pollution.

Currently, 50% of type 2M62K and 50% of type 2M62M locomotives go along the railway track Kyviškės-Paneriai (including the village Nemėžis) of 27.156 km, and the number of carried trains is distributed evenly. Diesel cost per day is approximately 5797 kg. Total daily run of all trains is 726 km, diesel fuel cost per kilometer - 7.985 kg., per year - 2115.591 t is used. 11 pairs of trains are carried along the said section (22 locomotives in both directions).

 Table 34. Calculation of emission of pollution into the atmosphere from diesel locomotives in the current situation

Name of pollutants	Comparati ve pollution emitted from the engine exhaust	Total amount of pollutant , t	K1 rate for train weight	K2 rate for the average age of engines	K3 rate for the average driving speed	K4 rate for climate conditions	Final amount of pollutants emitted into the atmosphere, t
<u> </u>	gas, kg/t	44.054	4	1.0	4	0.05	47.00
00	19,5	41,254		1,2	1	0,95	47,03
NO _X	92,7	196,115	1	0,95	1	0,95	176,994
CH	2,0	4,231	1	1,2	1	0,95	4,823
KD	0,6	1,269	1	1,2	1	0,95	1,447
SO ₂	Formula						0,127
Pollutants in total							

K2 – for engines older than 5 years, the factor is 0.95, for other ones - 1.2.

Final amount of emissions is calculated by multiplying total amount of emissions by factors.

Calculation of sulphur dioxide is the made under the following formula:

 $W_{SO2} = 2^*S^*Q^*K5$

S – sulfur content in fuel, after the consumption of one tonne

Q – amount of fuel consumed, in tonnes

K5 –factor which evaluates the peculiarities of thrust rolling-stock engine design. This factor is equal to 1, but if the exhaust system is equipped with soot trap, then it is equal to 0,8.

So, if diesel contains 0.003% of sulfur (according to the certificate, diesel of such sulfur content is used by locomotives at the locomotive depot in Radviliskis fleet namely), then W $_{SO2} = 2*0,00003*2115,591*1 = 0,127$ t.





Table 35. Data of linear source (i.e., locomotive emissions) input into ADMS-Urban model. The current situation

Name of pollutants	Final amount of pollutants emitted into the atmosphere on section of 33 km, tonnes	Final amount of pollutants emitted into the atmosphere on sedction of 1 km, tonnes per year)	Final amount of pollutants emitted into the atmosphere on sedction of 1 km, grammes per year)	The input emissions g / m / s (grammes per meter per second per year)	Linear source height above the ground 4.7 m	Linear source manhole width 0.5 m	gas temperatu re in chimney 509 °Cr 388 °C
CO	47,03	1,425	1425152	0,000045191			
NO _X	176,994	5,363	5363455	0,000171			
CH	4,823	0,146	146152	0,000004634			
KD	1,447	0,044	43848	0,00000139]		
SO ₂	0,127	0,004	3848	0,00000122			

Exhaust gas temperature from the locomotive stack is calculated according to the driving conditions (uphill, slope) and engine load. Thus, the exhaust gas temperature of 509 °C was set for the northern part of rail track section (Kyviškės - Nemėžis) and 388 °C for the southern of rail track section (Nemėžis - Paneriai).

Table 36a. Motor data on road A3. Current situation

Road section	VMPEI, auto/1 h.	Cars	Trucks	Freight tr. part per cent.	Average speed, km/h
A3 Vilnius- Nemėžis	793	719	74	9.3	59,1

Average driving speed is calculated as follows: (0,91*60)+(0,09*50) = 59,1 km/h Emission factors: ADMS-Urban, type - the highway, the scenario of the year 2004. Street width - 35 metres.

VMVEI – annual average hourly traffic intensity, calculated from the annual average of daily traffic

Table 36b. Current situation, 2008-2009

Road section	VMPEI, auto/1 h.	Cars	Trucks	Freight tr. part per cent.	Average speed, km/h
A3 through Nemėžis, Vilnius-Minskas	472	403	69	14.5	78.5

Cars make 0.85 of the total flow and go at speed of 80 km/h. Heavy vehicles make 0.15 of the total flow and go at speed of 70 km/h Average driving speed is calculated as follows: (0,85*80)+(0,15*70) = 78,5 km/h Emission factors: ADMS-Urban, type - the highway, the year 2004. Street width - 35 metres.

II. Prospective situation (2015 m.) Input data for calculation of air pollution.



It is planned that in the prospective situation, the flow of trains on the railway track section Kyviškės - Paneriai (including the section of railway through Nemėžis settlement) will increase by 30%, in comparison with the current intensity of the trains on the railway track. Train traffic should increase up to 33 units per day (in both directions). The flows will be formed by the locomotives of types: 25% - 2M62K, 25% - 2M62M, 25% - 2ER20CF, 25% - ER20CF. The cost of diesel per day shall reach approximately 8,382 kg, total train mileage per day shall be 1089 km, diesel fuel cost per kilometer - 7.697 kg. During the year 3,059.43 tons of fuel shall be used.

Table 37. Calculation of pollution emissions into the atmosphere from diesel locomotives in a prospective situation

Name of pollutants	Comparative pollution emitted from the engine exhaust gas, kg/t	Total amount of pollutant, t	K1 rate for train weight	K2 rate for the average age of engines	K3 rate for the average driving speed	K4 rate for climate conditions	Final amount of pollutants emitted into the atmosphere, t	
CO	19,5	59,659	1	1,1	1	0,95	62,344	
NO _X	92,7	283,609	1	0,975	1	0,95	262,693	
CH	2,0	6,119	1	1,1	1	0,95	6,394	
KD	0,6	1,836	1	1,1	1	0,95	1,919	
SO ₂	Formula						0,184	
Pollutants i	Pollutants in total 333,534							

K2 – for engines older than 5 years, the factor is 0.95, for other ones - 1.2. Final amount of emissions is calculated by multiplying total amount of emissions by factors. K2 factor in this case is non-standard - such as derivatives, because both the old and new trains (engines) shall run along the section.

Calculation of sulphur dioxide is the made under the following formula:

 $W_{SO2} = 2*S*Q*K5$

S – sulfur content in fuel, after the consumption of one tonne

Q - amount of fuel consumed, in tonnes

K5 –factor which evaluates the peculiarities of thrust rolling-stock engine design. This factor is equal to 1, but if the exhaust system is equipped with soot trap, then it is equal to 0,8.

So, if diesel contains 0.003% of sulfur (according to the certificate, diesel of such sulfur content is used by locomotives at the locomotive depot in Radviliskis fleet namely), then W $_{SO2} = 2*0,00003*3059,43*1 = 0,184$ t





Table 38. Data	of linear so	urce (i.e., loco	motive emissions) input into	ADMS-Urban	model.
Prospective situa	ition					

Name of pollutants	Final amount of pollutants emitted into the atmosphere on section of 33 km, tonnes	Final amount of pollutants emitted into the atmosphere on sedction	Final amount of pollutants emitted into the atmosphere on sedction	The input emissions g / m / s (grammes per meter per second per year)	Linear source height above the ground 4.7 m	Linear source manhol e width 0.5 m	gas temperatu re in chimney 509 °Cr 388 °C
		tonnes	grammes				
CO	62,344	1,889	1889212	0,000059907			I.
NO _X	262,693	7,960	7960394	0,000252422			
CH	6,394	0,194	193758	0,000006144			
KD	1,919	0,058	58152	0,000001844			
SO ₂	0,184	0,006	5576	0,000000177			

Exhaust gas temperature from the locomotive stack is calculated according to the driving conditions (uphill, slope) and engine load. Thus, the exhaust gas temperature of 509 °C was set for the northern part of rail track section (Kyviškės - Nemėžis) and 388 °C for the southern of rail track section (Nemėžis - Paneriai).

 Table 39a.
 Motor data on road A3.
 Perspective situation

Road section	VMPEI, auto/1 h.	Cars	Trucks	Freight tr. part per cent.	Average speed, km/h
A3 Vilnius-Nemėžis	800	720	80	10	60,0

Average driving speed is calculated as follows: (0,9*60)+(0,1*60) = 60 km/h Emission factors: ADMS-Urban, type - the highway, the year 2010. Street width - 35 metres.

Table 39b. Motor data on road A3. Perspective situation

Road section	VMPEI, auto/1 h.	Cars	Trucks	Freight tr. part per cent.	Average speed, km/h
A3 through Nemėžis, Vilnius- Minskas	500	420	80	16	82,6

Average driving speed is calculated as follows: (0,84*85)+(0,16*70) = 82,6 km/h Emission factors: ADMS-Urban, type - the highway, the year 2010. Street width - 35 metres.

Ambient air pollutant concentrations in accordance with simulation data Simulation data reflects background concentrations of area and the impact of trains and cars on air pollution in the local area. Both scenarios take into account the one-year meteorological data and local relief features. Estimated pollutant concentrations and their diffusion in the ambient air is shown in the maps and given in the Annex No. 5.

Table 40. Pollution concentrations in ambient air (two situations in question)

KD 10, μg/m ³	CO, mg/m ³	NO₂, μg/m ³	SO₂, μg/m ³	CH, μg/m ³





	O-2009	Project 2015	O-2009	Project 2015	O-2009	Project 2015	0-2009	Project 2015	O-2009	Project 2015
Bypass	18,1	16,6	0,48	0,42	86,2	8,5	1,12	,13	78,4	50,3
,	(max.	(max.	(max. 8	(max. 8	(max. 1	(max. 1	(max. 1	(max. 1	(max. 1	(max. 1
Nemė-	daily)	daily)	hrs.)	hrs.)	hrs.)	hrs.)	hrs.)	hrs.)	hrs.)	hrs.)
žis	15,8	15,4	0,32	0,32	28,8	26,4	1,10	1,11	9,9 (av.	8,35
village	(av.	(av.	(av.	(av.	(av.	(av.	(av.	(av.	annual)	(av.
	annual)	annual)	annual)	annual)	annual)	annual)	annual)	annual)		annual)

The simulation results underestimate the potential increase of ambient air pollution because of the railway construction and reconstruction works.

Table 41. Pollution emissionon section 27.156 km of railway track Kyviškės Paneriai-t / yr

	Pollutants emitted into the	Pollutants emitted into the atmosphere, tons / year					
	Year 2009	Year 2015					
Pollutants							
	Current situation	Project					
CO	47,03	62,344					
NO _x	176,994	262,693					
SO ₂	0,127	0,184					
KD ₁₀	1,447	1,919					
СН	4,823	6,394					
Pollutants in total	230,421	333,534					
Fuel consumption,							
tons / year	2115,591	3059,43					

Global impact, affecting climate change, is the greenhouse effect, ozone loss caused by carbon dioxide (CO_2). CO_2 emissions from diesel locomotives is very low, in comparison with the road transport, due to the low intensity of the track. Locomotive engine technical characteristics do not indicate average comparative pollution of CO2 in exhaust gas, therefore the emission has not been calculated.

Note:

The simulation results do not reflect the regional pollution, underestimate the loads of long-range transport, does not consider the possible changes in background concentrations in the prospective situation (after the closure of the Ignalina nuclear power plant, the whole country can burn more fuel, resulting in a significant increase of background concentration of sulfur dioxide and other pollutants), as well as due to individual different weather conditions, the results of prospective scenario may differ from the results significantly, which are presented in this report.

Conclusions:

Concentration of pollutants (NO2, CO, SO2, volatile organic compounds, S10) in ambient air of analyzed area (Nemėžio k., Vilniaus r. sav.) does not exceed the limits of standards according to simulation data either under current conditions or under the target terms in prospect.

The load of environmental pollution in the area of projected rail bypass will increase due to the increased traffic volumes (both in the current situation and perspective one) because more pollutants will be emitted into the atmosphere.



On the grounds of simulation data presented in this report, it may be suggested that the concentration of individual pollutants in ambient air of analysed areas will be lower after the implementation of the project, in comparison with the situation without the project, for better fuel combustion and renovation of the fleet of locomotives.

On the grounds of simulation data and the assessment of local air pollution in 2 meters above the ground, it was found that air pollution caused by cars by all substances is higher, except for SO₂, than the pollution from locomotives.

After the lining of the track geometry (uphill-slope) fuel consumption volume of locomotives will reduce, while emissions into the air will be reduced, too.

During the implementation of the railway reconstruction project, it is forecast that local air pollution will increase during the construction, and as a consequence, the average concentrations of pollutants may also increase, especially it may be said about the maximum one-hour concentrations of SO2, NO2, VOC, increase in the total dust and amount of minor solids. Technical project shall provide for such organization of construction that the negative environmental impact would be minimized as much as possible.

Carbon monoxide and sulfur dioxide emissions are not high yet, the concentrations of these pollutants are close to background concentrations even at the sources od pollution, but the change of concentrations of latter substances in ambient air in respect of time, like the remaining pollutants, will depend on both seasonal and the quantity of sources of pollution and intensity of their course of action within the day.

3.8 Description of environmental noise

Legal regulation

VILNIUS; ORDER NO. V-555 BY THE MINISTER OF HEALTH OF LR OF 2 July 2007 REGARDING TO THE APPROVAL OF LITHUANIAN HYGIENE STANDARD HN 33:2007 "ACOUSTIC NOISE.LIMITARY NOISE VALUES IN RESIDENTIAL AND PUBLIC BUILDINGSAND THEIR SUROUNDINGS", VILNIUS;

DIRECTIVE 2002/49/EC OF 25.06.2004 BY THE EUROPEAN PARLIAMENT AND THE COMMISSION REGARDING TO THE ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL NOISE, VILNIUS;

LAW NO. IX-2499 ON NOISE CONTROL OF THE REPUBLIC OF LITHUANIA, 15/05/2006., VILNIUS.

Current situation

The main European railway noise problem is the noise caused by freight rail traffic. It is followed by the noise problem of high-speed trains and intercity trains. Potential for railway noise reduction is high. There are technical measures that can significantly reduce the freight train noise. However, the main problem is economic benefits of implementation of mitigation measures. In other European countries, the rail noise was significantly reduced by several ways. For example, new passenger cars with disc brakes significantly reduced noise level. Using old cast-iron brakes, the wheel surface is damaged, and the surface roughness occurs. Such damaged wheels are 80-10 dBA



noisier in comparison to the wheels with even surface. While using the disc brakes, the wheel surface must be even. Wheel-rail roughness is a major cause of vehicle noise, therefore, it should be focused on the change of simple log iron brakes into the disc ones. The reduction of track articulation through welding into longer ones significantly reduces the noise level locally. These progressive approaches have been used primarily because of the train control requirements, rather than as the noise mitigation measures. New freight wagons must be equipped with disc brakes that could run at speed of up to 80 km / h. This requirement does not applied to vans. Consequently, freight train noise level remains unchanged, i.e. it is not decreasing. Due to the lack of technical progress for freight trains, they are the main cause of railway noise in Europe, and especially during the night. The noise caused by trains when running in curves, along metal railways bridges, passing railway stations, shunting on backup tracks, as well as the noise of brake action – this ia the noise which can be significant locally.

The project aims to divert trains from the city center of Vilnius, where the freight trains run most currently. The current bypass is only a single track, after installation of the second track, the presmises to divert the traffic of trains on thebypass will be created.

At the behest of UAB "Vilnius Consult", the noise level measurements were carried out on 22-31 October 2008. The measurements carried out by the National Public Health Laboratory (see Annex No 7). The purpose of measurements was to determine the noise level nearby the residential buildings through the assessment of the current traffic intensiveness.

Measurements on rail noise were carried out at the residential areas and individual homes closest to Kyviškės, Nemėžis, Valčiūnai railway stations during the day and at night.

11 measuring points were selected for the measurements between Kyviškės and Nemėžis railway stations (Tables 40 and 41). The measurements were carried out when freight trains were passing this railway track.

No.	Place of measurement	No of point	Distance from measuring point to the railway track (m), and other info	Equivalent sound pressure level dB A	Permissible equivalent sound pressure level dB A
	Measurements				
	the day:				
	Freight trains:				
1	Kyviškės, Didžioji str. 47	1	40	79	65
2	Pupeliai, nearby railway track	1-1	5	82	65
3	Between villages 3 Veliučkoniai and Pupelių		37	75	65
4	On railway track	2-1	0	84	65
5	Grigaičiai, Geležinkelio str.5	3	24	77	65
6	Grigaičiai,	3-1	16	77	65

Table 42. Results of measurements during the day



	Pergalės str. 35				
7		3-2	71, behind tree line of 25m in width	59	65
8	Pakalniškės, the house on the corner	3-3	80	71	65
9		4	12	81	65
10	Nemėžis, house No13	5	64, behind tree line of 25m in width	64	65
11	Nemėžis, house No 8	5-1	65	66	65

Table 43. Results of measurements at night

No.	Place of measurement	No of point	Distance from measuring point to the railway track (m), and other info	Equivalent sound pressure level dB A	Permissible equivalent sound pressure level dB A
	<u>Measurements</u> <u>carried out at</u> <u>night:</u>				
	Freight trains:				
1	Kyviškės, Didžioji str. 47	1	40	74	55
2	Pupeliai, nearby railway track	1-1	5	84	55
3	Between villages Veliučkoniai and Pupeliai	2	37	78	55
4	On railway track	2-1	0	81	55
5	Grigaičiai, Geležinkelio str.5	3	24	68	55
6	Grigaičiai, Pergalės str. 35	3-1	16	77	55

Findings of noise measurements between Kyviškės and Nemėžis railway stations:

1. The railway noise exceeded acceptable noise levels (ANL) at all the selected sites of measurement at the spans, except for 3-2 and 5 measurement points, and the measuring point 5-1 is slightly exceeded.

2. Mostly, ANL is exceeded on the measuring site 2-1 located on the railway track, during the day up to 19 dBA. At night ANL is also the most exceeded (26 dBA).

3. Mostly, ANL is exceeded on the measuring site 1-1 located at a distance of 5 km from the railway track, during the day up to 17 dBA. And at night this ANL is also the most exceeded (29 dBA).

4. The permissible noise level does not exceed the measuring site 3-2 located 71 meters away from the railway, and was about 59 dBA.

19 measuring points were selected for the measurements between Nemėžis and Vaidotai railway stations (see Annex No 7). Data of obtained results is given in Tables 42 and 43.

				Distance from		Permissible
	Place of	No	of	measuring point to	Equivalent sound	equivalent
No.	measurement	poi	nt	the railway track (m),	pressure level dB A	sound pressure
				and other info		level dB A

Table 44. Results of measurements during the day (freight trains)



	Measurements carried out during the day:				
	Freight trains:				
1	Juodšiliai, Pušų str. 17	10	60, behind the building	67	65

Table 45. Results of measurements during the day (passenger train)

No.	Place of measurement	No of point	Distance from measuring point to the railway track (m), and other info	Equivalent sound pressure level dB A	Permissible equivalent sound pressure level dB A
	Measurements carried out during the day:				
	Passenger trains:				
1	Barkiškės, Mickevičiaus str. 41V	9-5	83, behind the car road and tree line of 7m in width	65	65
2	Juodšiliai, Pušų str. 17	10	60, behind the building	74	65
3	Barkiškės, Mickevičiaus str. 10 (school)	11-1	74, behind car road	58	65

Findings of noise measurements between Nemežis and Vaidotai railway stations

1. The railway noise exceeded acceptable noise levels (ANL) at all the selected sites of measurement at the spans, except for 9-5 and 11-1 measurement points.

2. The permissible noise level does not exceed the measuring site 9-5 located 83 meters away from the railway, and was about 65 dBA

3. The permissible noise level was exceeded due to the passenger trains more than because of the freight trains.

In order to reduce the adverse environmental impact by railway transport, AB "Lithuanian Railways", as one of the manager of noise sources, is implementing a series of technical measures in line with its nature – it builds non-joint rails, modernizes rolling-stock through the repairs of major tracks and modernization, is also planning to install noise inhibition walls and takes other measures.

Target impact

Increased speed and traffic of trains may increase noise levels in adjacent areas, but the main objective of modernization of railway lines is the reduction of noise in the areas bordering with the railway, thus various measures will be subject to the reduction of adverse impacts.

At the behest of UAB "Vilnius Consult", the simulation of noise level for current and prospective situation was carried out (2008 and 2015). Simulation was carried out by a Polish company Acesoft Company Limited. This simulation was performed using the prognostic noise programme CadnaA.

Main objectives were:





To carry out the simulation of noise:

- current;
- target without noise reduction means;
- target with noise reduction means.

Tentatively identify key parameters for the noise mitigation wall. Tentatively identify other noise mitigation measures.

It was recommended to perform noise simulation on the whole track during the day (at 6 am -6 pm) and at night (10 pm-6 am). Simplified calculations of the noise level were carried out, which determined maximum noise level dBA isolines at daytime and at nighttime. The calculations shall be made 2 m above the ground (because of low buildings).

The noise level defined in the Law No. V-555 by the Minister of Health "Lithuanian Hygiene Standard HN 33:2007 – "Aacoustic noise, limitary noise values in residential and public buildings and their surroundings", July 7 2007, is given in the table below:

Name of object	Equivalent sound level, dBA	Time of day, hour.
007 In the environment of	65	6-18
residential and public	60	18-22
buildings	55	22-6

The sites for noise reduction walls is selected nearby homestead group (minimum 5 houses), where the noise level calculated for the target situation will increase by 5 dB than the allowable noise level (see Chapter 4.6.2). (Note: 3 dB is the minimum difference of sound level that people can feel). This means that individual houses were not included in the discussions, only the homestead groups at least five homes. Individual homes, where the noise level is higher than permissible, shall have the windows replaced with increased acoustic insulation windows reflecting the existing authentic wooden window division. Windows of increased insulation reduce the noise to 30dBA, their technical specifications are presented in asjustment act. Sixty-two individual houses, which fall within the increased noise diffusion zones, were identified and the "Adjustment act on window replacement with increased acoustic windows" (see Annex No 8) is ready for each of them.

For the calculations of the walls, noise map with the calculated prospective acoustic noise at night was used, because conditions at night are more susceptible.

Annex No 6 provides the simulation results. Maps were calculated in three cases and two related time intervals (during the day and at night):

- 1. for current situation;
- 2. for target without noise reduction walls;
- 3. for target with noise reduction walls.

Detailed maps of the whole track in electronic format are given at the end of Annexes in the CD case. The total railway length is divided into 5 parts for the picturesquesness. Each map is to scale of 1:20 000. In addition, every section is calculated from the initial Kyviškės point (coordinates: x = 5997941; y = 6060391).



Results of main calculations:

1. Higher the noise level in the current and target situation is at night-time;

2. Noise level of target situation is an average higher by 4 dB (for the increase of the number and speed of trains);

3. Permissible noise level at night of current situation is approximately 60m from the railway, and increases by 5 dB beyond the allowable rate of 30m from the railway track (where the land surface is relatively even);

4. Permissible noise level at night for target situation is approximately 160m from the railway, and increases by 5 dB beyond the allowable rate of 75 m away from the railway track (where the land surface is relatively even).

Means for reduction of adverse impact

The most common measures for noise reduction in the spread on the track acoustic walls. They are built at the new and existing railrways. Effective wall reduces the noise level by ~ 30-35 dB. In each case, wall height, length, location, absorption properties is chosen (by calculation). It is best to build the walls at the source of noise or the receiver (residential houses). Much attention should be given to designs so that these buildings would not become visual pollution. The effectiveness of acoustic walls may be limited by the track layout (e.g., a lot of railway tracks). They are not effective near the block of flats. During the application of noise mitigation measures, complex measures should be applied first, i.e. the measures limitting the noise inside its sources (trains and tracks) together with the measures of noise spread on the track. As during the modernization it is currently planned to replace the upper track construction fully and operate entirely new, modern Siemens locomotives, these factors will significantly reduce noise emissions from the sources themselves, by evaluating that main noise caused by rolling-stock depends on the rolling-stock wheels and the smoothness of track surface. Accordingly, a strict monitoring of maintenance during the operation shall be carried out, and the resulting defects are to be removed in time.

The noise level caused by railway sources of noise in the environment may also be reduced by means of the following types:

- means for trains and their elements;
- means for rails and rolling-stock.

The main sources of railway noise is the noise of rplling-stock, engines of locomotivestows and aerodynamics. It is possible to control these sources of noise by applying the new design or modifying the existing items. The reached noise level shall be maintained by the maintenance of rolling-stock and rails.

Rolling-stock:

- Surface of rails and wheels. The level of made noise will be minimal if the surface of rails and wheels is even.
- Braking system (disk, drum brakes or brakes with composite logs).
- Proper maintenance of rails and wheels.
- Design of rails and wheels.
- Smaller wheels. Buffers of wheels. Optimal wheel geometry.
- Less number of wheels.
- Disc brakes.
- Optimal design of rails. Buffers of rails together with selection of rail "pads".





- Screens (secondary means) may reduce the spreading noise.
- Casings (for wheels, carriages, for van/aerodynamic noise).
- Low-level acoustic walls built close to rails.

Naujo dizaino ratai ir bėgiai kita gera priemonė po paviršiaus priežiūros. Vagonai su mažesniais ir mažesniu ratų skaičiumi bei "tylesni" bėgiai ilgalaikė, bet naudinga investicija.

Engines of locomotives and tows:

- Dysel locomotives. New noiseless design or potential modernization.
 - Proper geometry of suction and exhaustion system.
 - Effective covering of engine. Isolation of vibration.
 - Selected lower components: compressors, fans.
- Electric locomotives and fast trains. Big problem is the noise caused by cooling system. This problem should be dealt with at the stage of design, but the modification is also possible.
 - Removal of aerodynamic obstacles or the reduction in sunction and exhaustion systems and other piping.
 - o More silent fans.
 - o Effectiveness of fans.
- While driving at low speed or drive, there is a problem of noise. The solution is a new design.

Protective embankment

It is proposed to replace the windows with a higher acoustic factor (Rw = 40dB) for six individual houses in Rudamina settlement, located in sanitary protection zone. The rest of the settlement Rudamina is distant from the railway line for more than 500 m and does not fall into high-noise zone under the results of noise simulation, so this measure is simply <u>an additional measure</u> considering the request of the community of Rudamina. The installation of embankment off the settlement of Rudamina will not only reduce the noise level (about 10dB), but also improve the aesthetic view from the railway.

Having dealt with the site for installation of embankment and land ownership issues, technical project for installation of embankment, where will indicate the precise calculations of noise reduction effectiveness of engineering building will be prepared, and accurate information about its parameters shall be provided. According to the data of Center of registers of 17/12/2009, the land site where the target embankment is expected to be built, is not formed and unregistered. Illustration No 25 shows the possible site for the embankment.



Illustration 24. Tentative scheme of embankment







Illustration 25. Tentative site of embankment

Conclusion

The sites for noise reduction were selected nearby the following household groups: 6.200 to 7.400 km 10.400 to 11.700 km 12.700 to 13.500 km and 21.500 to 23.100 km. The total estimated preliminary length of acoustic wall ~ 4.900 km.

Individual homes, where the noise level is higher than the permissible, shall have the windows changed into high acoustic isolation windows. Total number of identified residential houses is 62.

Possible installation of embankment at Rudamina settlement (about 800 m).

3.9 Description of environmental vibration

Legal regulations

ORDER BY THE MINISTER OF ENVIRONMENT ON THE LITHUANIAN HYGIENE STANDARD HN 50:2003 "VIBRATION AFFECTION THE ENTIRE BODY OF HUMAN: MAXIMUM PERMISSIBLE VALUES AND REQUIREMENTS FOR MEASUREMENTS IN RESIDENTIAL AND PUBLIC BUILDINGS"

Current situation

Vibration level measurements have been made by national public health laboratory on 09.04.2009 (see Annex No 9). Five measurement places have been chosen for the measurements of vibration caused by railway transport, one of them is teachers' room at Šilas High School (distance from the rail - 89 meters).

Table 46. Maximum allowable level/value of acceleration





Average geometric	Maximum al	lowed acceleration	n rate a _{vkr} , m/s ²	Maximum	allowable leve L _a , dB	l of acceleration
frequency of 1 / 3	Z direction	X and Y	according to	Z	X and Y	according to
octave bands, Hz		directions	screening of	direction	directions	screening of
			directions			directions
1	2	3	4	5	6	7
1,00	1,00*10	3,60*10	3,60*10	80	71	71
1,25	8,90*10	3,60*10	3,60*10	79	71	71
1,60	8,00*10	3,60*10	3,60*10	78	71	71
2,00	7,00*10	3,60*10	3,60*10	77	71	71
2,50	6,30*10	4,54*10	3,72*10	76	73	71
3,15	5,70*10	5,68*10	3,87*10	75	75	72
4,00	5,00*10	7,21*10	4,07*10	74	77	72
5,00	5,00*10	9,02*10	4,30*10	74	79	73
6,30	5,00*10	1,14*10	4,60*10	74	81	73
8,00	5,00*10	1,44*10	5,00*10	74	83	74
10,00	6,30*10	1,80*10	6,30*10	76	85	76
12,50	7,81*10	2,25*10	7,80*10	78	87	78
16,00	1,00*10	2,89*10	1,00*10	80	89	80
20,00	1,25*10	3,61*10	1,25*10	82	91	82
25,00	1,56*10	4,51*10	1,56*10	84	93	84
31,50	1,97*10	5,68*10	1,97*10	86	95	86
40,00	2,50*10	7,21*10	2,50*10	88	97	88
50,00	3,13*10	9,02*10	3,13*10	90	99	90
63,00	3,94*10	1,14*10	3,94*10	92	101	92
80,00	5,00*10	1,44*10	5,00*10	94	103	94
Corrected value and level	5,00*10	3,60*10	-	74	71	-

After the completion of measurements of vibration level in the teachers' room at Šilas school, the vibration did not exceed allowable standards, so the schools is not exposed to significant vibration. Similar measurements of vibration level have also been acquired in other points, except the living room in Pušų str. 21, Juodšiliai. At this point in the current situation, an extra-normal vibration is slightly felt in 31.5 Hz, 40 Hz, 50 Hz of octavic vibration acceleration frequencies dB. Annex No 9 provides the possibility to have a look at the vibration level measurements got and dislocation of places.

Train-induced vibration is a significant problem to the environment. Its solution / reduction methods in international law are not specifically identified, e.g. such as noise prevention measures. There is no simulation programmes that can predict its change and impact on the environment.

The project envisages the reduction of vibration through the implementation of measures, such as wheel geometry, rail track geometry (lining of curves at Paneriai), use of new technologies for the installation of bed, new installation of railway tracks on scoop, purchase of acoustic walls and new locomotives.

Additional vibration level measurements were carried out on September 21, which were performed by the same National Public Health Laboratory (see Annex No 9). Measurements were made by order of DB International, in order to assess the spread



of vibration more accurately. Spread of wider vibrations in octavic frequencies was required for the study.

Measurements were made from 1.0 Hz to 500Hz, although vibration is measured from 1.0 Hz to 80Hz under the Lithuanian hygiene standards. On the grounds of these expanded measurements, the spread of vibration will be evaluated and technological measures to reduce the spread of vibration will be chosen during the technical project.

Conclusion:

After the implementation of project and reinforcement of the entire bed, the situation should improve significantly.

3.10 Description of impact on land use and property

Current situation

The present rail line Vilnius bypass is located in Vilnius county, Vilnius region and the southern part of Vilnius city.

Vilnius county is one of the largest in Lithuania - 973,066 ha. Agricultural land and forests cover 42 per cent of the total county area. Roads, built-up area, water - 3 per cent, other land - 7 percent of total county land area (Table 12).

In Vilnius region, agricultural land covers nearly half of the total district area (46 percent) (Table 45).

			U					
territory	Measure	Agricultura I land	Forests	Roads	Built-up area	Water	Other land	Total area
Vilnius county	%	42	42	3	3	3	7	100
	ha of total area	411939,09	409066,25	22539,03	35404,31	30625,27	63492,25	973066,20
Vilnius district	%	46	40	2	3	2	7	100
	ha of total area	97874,87	84389,69	4868,77	6867,99	5140,80	13773,68	212915,80
Vilnius city	%	20	36	5	35	2	2	100
	ha of total area	8300,09	14261,38	1906,22	13939,54	616,48	1032,27	40055,98

Table 47. Structure of land use of region under consideration *.

* Data of National Land Service under the Ministry of Agriculture and the State Enterprise Centre of Registers, 1st January, 2008.

Possible impact

The railway line is surrounded by cultivated fields or meadows / pastures predominantly, where land sites are formed from small siters by the settlements (15m wide and 15m in length, for example, at Juodšiliai) to several tens of sites of hectares in size (about 180m wide and 950m long). The existing rail line is adjacent / runs through the greater forest at Juodšiliai (Juodšiliai forest), and through the forest of Paneriai (the forest of medium and low recreation potential).

At Paneriai memorial - the existing track connecting Vaidotas - Paneriai in direction of Lentvaris (track "L") is expected to be dismantled, and instead, a new double track will be built. This rail section (which is included in the general territory plan by 2015 of



Vilnius city municipality; the extract of general plan of Vilnius is enclosed in Annex No 10) runs through the Paneriai park array, which is the forest of state importance (see Annex No 10), although it is not formed as a separate land site.

Where a new double track at Paneriai is intended to be built, a planning document for territories (detailed plan) in this section is being prepared, it is also provided for seizure of land for public needs, to replace the main purpose of objective land use.

Bypass modernization works will be carried out within the existing LG trust-owned land sites, except for rearrangement of Paneriai unit, where the new target route crosses the state forest (see Annex No 11).

Measures for reduction of possible adverse impact

The land site taken for public needs shall be developed so that the required land site for the installation of new rail tracks would be fully ensured. It is necessary to ensure the economical and rational use of adjacent land use and access to them while forming the land site required for public needs (for laying of new track).

3.11 Description of impact on protected areas

Legal regulation

ORDER NO IX – 628 OF 4/12/2001 REGARDING TO THE REPLACEMENT OF LAW ON PROTECTED AREAS OF THE REPUBLIC OF LITHUANIA, VILNIUS;

LAW OF ENVIRNONMENTAL PROTECTION OF THE REPUBLIC OF LITHUANIA NO I-2223 OF 24/03/2005, VILNIUS;

REPLACEMENT OF LAW NO IX-240 ON THE FOREST LAW OF THE REPUBLIC OF LITHUANIA OF 10 APRIL 2001, VILNIUS;

REPLACEMENT OF LAW NO IX-1962 THE LAW ON TERRITORIAL PLANNING OF THE REPUBLIC OF LITHUANIA OF 09/28/2004, VILNIUS;

REPLACEMENT OF LAW NO IX-583 ON THE CONSTRUCTION LAW OF 8 NOVEMBER 2001, VILNIUS;

CONDITIONS FOR SPECIAL USE OF LAND AND FOREST APPROVED BY DECREE NO 343 OF THE GOVERNMENT OF LR ON 26 SEPTEMBER 2007, VILNIUS;

ORDER NO D1-518 OF 6 NOVEMBER 2006 BY THE MINISTER OF ENVIRONMENT OF LR "REGARDING TO THE LIST OF KEY LOCATIONS MATCHING THE SELECTION CRITERIA OF NATURAL HABITAT CONSERVATION AREAS INTENDED FOR THE APPROVAL BY THE EUROPEAN COMMISSION", VILNIUS;

DECREE NO 819 OF 25 AUGUST 2006 BY THE GOVERNMENT OF LR "REGARDING TO THE PRESENTATION OF DECREE NO 399 OF 8 APRIL 2004 BY THE GOVERNMENT OF LR "REGARDING TO THE APPROVAL OF LIST ON PROTECTED AREAS OR THEIR PARTS BY LR, INCLUDING TERRITORIES IMPORTANT FOR AVIFAUNA PROTECTION AND DETERMINATION OF TERRITORIAL BOUNDARIES IMPORTANT FOR AVIFAUNA PROTECTION", VILNIUS;

DECREE NO 380 OF 3 APRIL 2006 BY THE GOVERNMENT OF LR "REGARDING TO THE PRESENTATION OF PROVISIONS FOR APPROVAL ON TERRITORIES IMPORTANT FOR GENERAL HABITAT OR AVIFAUNA PROTECTION", VILNIUS.



ORDER NO D1-302 OF 15 JUNE 2005 BY THE MINISTER OF ENVIRONMENT OF LR "REGARDING TO THE LIST OF KEY LOCATIONS MATCHING THE SELECTION CRITERIA OF NATURAL HABITAT CONSERVATION AREAS INTENDED FOR THE APPROVAL BY THE EUROPEAN COMMISSION" OF, VILNIUS. MAP OF LITHUANIAN ECOLOGICAL NETWORK. LITHUANIAN FUND OF NATURE, CARTOGRAPHY SECTOR OF INSTITUTE OF GEOGRAPHY, 2001.

The present Vilnius bypass line does not cross any sites valuable conservationally. There are no the Natura 2000 sites around Vilnius bypass railway line. For protection of objects of biodiversity and conservation, protected areas are established by LR, which include two reserves and a regional park nearby the target line of modernization (see Annex No12).

 Table 48. Existing protected areas which are around Vilnius railway bypass line.

Section Municipality		Protected area Place		Purpose for establishment
	Vilnius city	Geomorphologic reserve of Vokė old valley slopes	railway line is far for 150m	To save Vokė fluvioglacial slope bar of old valley (its bar of more than 3 km long, 400-800 m wide and 25-35 m relative height);
Vilnius city	Vilnius city	Pavilnių regional park	railway line is far for 150m	To save erosive pocket and Vilnia valley slope landscape, its natural ecosystem;
	Vilnius city	Paneriai erosive hilly landscape reserve	railway line is far for 1670m	To save Néris erosive hilly area by the valley, rich in rare plants (dark- leaf helleborine, Frog orchid, golden garlic) production areas; cultural and historical objects (Vilnius-Kaunas railway tunnel).

Paneriai forest stretches along the section of Vaidotai - Paneriai, which contains established Vokė old valley landscape reserve, Paneriai tunnel having a status of cultural heritage monument and European importance.

Paneriai forest Current situation



Habitations of type 9010 Western taiga of European importance are predominated (Assessment of protected habitats in Vilnius city and preparation of protection regulations. Ecology Institute of Vilnius University. Vilnius, 2005).

Possible impact

For the new road construction, the site located at the southwest part of Paneriai and intended for forestry purposes shall be taken for public needs. During deforestation, they will be carried out following the basic rules on deforestation and other legal acts of the Republic of Lithuania. Interventions into the deep of forest Paneriai is unpredictable.





Paneriai tunnel

Current situation

4 species of mammals included in the List of extinct and endangered species of Lithuania live in the tunnel - bats: pond and Brandt's bats, brown long-eared bat, barbastelle. They are staying here during the wintering, from October to May.

<u>Possible impact.</u> The construction of new track on the section Vaidotai (Pušynas) – Paneriaiwill not affect wintering bats, because the works will be carried out at least 2 km away from the wintering places. Intended negligible deforestation of pine forest will not have any impact because the higher nurture of juvenile colonies of bats are located in buildings both in Vilnius and all over the country. However, under the possibility, old steep hollow trees should be left, or artificial bat summering-places should be installed in the nearby forests after having cut down those trees. The positive impact is expected after the dismantlement of old Paneriai-Pušynas track and having left open areas on the former railway site. This will create a suitable habitat for insects which the bats feed on.



Annex No13 contains the findings of the National Protected Areas Service that the implementation of target economic activities can not impact on the Natura 2000 site significantly.

3.12 Description of impact on natural frame

The bypass falls within the habitat of internal stabilization. The territory of bypass is a highly urbanized area, it is assigned to the concentration and the center habitats of agglomerate impact, where small abandoned fallow areas, residential sites, byhomestead sites prevail. The priority of transport interests of energy industries is assigned to the territory.

Animal migratory corridors extend along the streams, canals, ditches, where traces of small mammals can be found.



Illustration 27. Macerated ditches in the spring become spawning grounds for amphibians







Illustration 28. Siltation of culvert with soil



Illustration 29. Southern exposure slopes dominate almost throughout the bypass line



Illustration 30. Cave of slick lizard on the embankment slope

Measures for mitigation of impact

Biodiversity is threatened by the potential spread of invasive plants. These seeds can enter the local environment through the use of non-native soil during the construction. Foreign plants may come with loads during the construction. In order to avoid the effects, native ground (soil) and material for handling and mounting works of bed will be used. However, some of the materials, such as crushed granite, are going to be imported, so regular maintenance of bed by its mowing and removing vegetation will be



carried out during the operation of track line. Foreign plants will not be able to nurture seeds and spread to surrounding areas.

In order to maintain suitable breeding sites for sand lizards (*Lacerta agilis, Directive on Habitats, Annex IV*), organic material will be used the reinforcement of bed slopes. The networks made on the basis of such materials decompose over several years without causing barriers to flush the holes. Building of blind chutes shall be avoided during the construction of collection channels for rain water sewages at the stations. Such chutes become traps for sunk animals, where they usually die. Instead, all chutes will be passable.

The impact on the area will not be significant, because the construction of second track will be built on the existing rail line. After the application of existing culverts for the passage of small mammals, the fragmentation of the area and the resulting isolation of small mammals would decrease.

3.13 Description of impact on natural resources

During the performance of modernization project of Vilnius railway bypass, the direct impact on both shifting and non-shifting natural resources is unpredictable. The main potential minor impact is the use of bulk materials during the construction of the second line. By using modern technologies in construction of railway, existing metal and soil will be properly treated and used for the second time (after processing). Granite rubble, gravel and sand will be used for the construction of second line. The amount of these materials required for the construction of railway line will not be environmentally significant. Said bulk materials may be both local and brought ones. Local soil will be solely used for planting of greenery of bed (where necessary), to avoid invasive plants.

Measures for reduction of impact

In order to reduce the potential negative impact on natural resources at the maximum, bulk materials available on the bed of existing railway tracks should be used, i.e., they should be properly cleaned, processed, if mixed with the newly brought ones, if necessary, that they would meet all the technical parameters. If new local resources are used, it is necessary to ensure their best use rationally, as well as to use the existing quarries at the maximum, without starting the operation of the new ones.

Conclusion

Having applied any possible measures for the reduction of impact, the modernization of Vilnius railway bypass shall not have any significant impact on natural resources.

3.14 Description of impact on cultural heritage

Legal regulation

LAW OF 28/9/2004ON IMMOVABLE CULTURAL HERITAGE PROTECTION NO IX-2452, Vilnius

Current situation

In the pending area of Vilnius city there is one immovable cultural value (Map on values is given in Annex No.14)





• Massacre place and graves (unique code 1792 in the register of Cultural Heritage) in Vilnius city.

Construction of new railway section at Paneriai (which is included in the general territorial plan of Vilnius city municipality by 2015.) will be held near the Cultural Heritage object – at the boundaries of "Massacre place and graves" as it is impossible to adjust the boundaries of values of cultural heritage. "Survey report on archaeological studies" was done in November 2008. The studies (10% of about 100 m2) were carried out by archaeologist Ilona Vaškevičiūtė. Places of mass massacre were not found within the site of cultural heritage during dig and studies, only single bones, which are not of human origin, according to the archaeologist. Regardless the findings of the report, it was not allowed to adjust the boundaries of "Massacre place and graves". Therefore, the choice of Alternative II was made, which is less technically suitable for AB "Lithuanian Railways", and the construction of new track line next to the boundary of Cultural Heritage is intended (see Illustration 27).



Illustration 31. Target new sections nearby cultural heritage object

3.15 Waste

ORDER NO 217 OF 14 JULY 1999 REGARDING TO THE RULES FOR WASTE MANAGEMENT OF THE REPUBLIC OF LITHUANIA BY THE MINISTRY OF ENVIRONMENT.



ORDER NO IX-1004 OF 01/07/2002REGARDING THE REPLACEMENT OF ORDER REGADING TO THE WASTE MANAGEMENT OF THE REPUBLIC OF LITHUANIA.

The waste formed during the construction works shall be managed in accordance with the Rules for waste management (Order No 217 of 14 July1999by Minister of Environment of LR, Official Gazette, 12/06/2008, No 67-2541).

The amounts of waste and means for management will be presented in the Environmental part of technical project in detail. It is estimated, that the following waste / raw materials will form: contaminated soil and rubble, wooden and concrete sleepers.

According to the data of feasibility study on "Modernization of Corridor IX loop B (Kena - Vilnius - Kaišiadorys) and D loop (Kaišiadorys - Kaunas-Kybartai)" carried out by German company DE-CONSULT in February 2007, most part of dismantled upper track construction materials (rails, other metal products, reinforced concrete sleepers and part of wooden sleepers) will be used for building of secondary tracks or recycled. Tentatively, only about 30 percent of this waste will be handed over to the waste handlers.

The demand for rubble metal is about 138,671 m3 for the entire reconstructed railway section. Excavation/removal of old rubble metal is going to be about 55,820 m3. no more than 500 m3 of old rubble metal is going to be recovered, and after the cleaning of most part, it can be used for the tracks of lower grade.

The waste generated during the operation of railway track is the sludge inside surface water sewage treatment plants accumulated from the track.

The following waste / raw materials will form during the <u>construction works</u> of Vilnius railway bypass reconstruction: contaminated rubble (metal), wooden and concrete sleepers.

The waste generated <u>during the operation</u> of railway track is the sludge inside surface water sewage treatment plants accumulated from the track.

The waste accumulated during the construction work and the operation of railway will be handled in accordance with the Rules for Waste Management (Order No 722 by the Minister of Environment of LR of 30 December 2003)

It is expected that a large part of 70% of materials of dismantled upper track construction (rails, other metal products) will be used for <u>the building of secondary</u> tracks or recycled. Tentatively, about 30% of this waste will be handed over to the waste handlers. Wooden and reinforced concrete sleepers (100%) will be replaced with new concrete sleepers due to the deformation and wear and tear.

The demand for rubble metal is about $\underline{138,671 \text{ m}^3}$ for reconstruction of entire railway section.

Excavation / removal of old rubble metal will make about $55,820 \text{ m}^3$. It is expected to be recovered 500 m^3 of old rubble metal. This is metal contaminated with petrolic products (0,21 km) in Kyviškiai and Nemėžis stations (10,60 km) where locomotives often stop. It is expected to excavate contaminated metal within section of 30 m, in the depth of 1m and 15m in width in Kyviskiai railway station, and to dig out the contaminated metal within section of 10 m, in the depth of 1m (metal) and 10 m in width





in Nemėžis railway station (EIA, Annex 1, Tables 7, 8). Concentration of petrolic products, during the analysis of metal on the site, is indicated in the table.

Mileage, km	Sample No	mg N (metal)	IP /kg)	dry	soil
0,21	nr.2	5050			
10,60	nr.7	7840			
LAND 9–20	02*		500)0	

Concentration of petrolic products found in metal at the 0.21 and 10.6 kilometers of Vilnius railway bypass (samples No 2 and No 7), exceed the standard up to 1.6 times more than it is limitted by LAND 9-2002. Under LAND 9-2002, railway tracks within the beds are subject to dead area (category E), so the MPL must not exceed 5 g NP / kg of dry soil (5000 mg NP / kg of dry soil).

For example, contaminated ballast will be taken to Vilnius branch of Public Institution "Grunto valymo technologijos" ("Soil treatment technologies") (the site in Maišiagala or Medžiukai village), which is experienced in the treatment of soil contaminated by AB "Lithuanian Railways" during the reconstruction works of Kaunas railway tunnel. The soil contaminated by petrolic products will pass biological treatment (by microorganisms) on the site. Cleaned metal will not be reused, since it may not meet regulatory requirements after the treatment.

Uncontaminated metal and excavated soil will be used as a raw material for embankment construction in Rudamina.

Amounts of waste

After the reconstruction works of Vilnius railway bypass and after the installation of a new railway, additional waste during the railway operation is unpredictable. Sludge generated in rain water sewage maholes (3 m³ per year, per manhole) will be removed once a year.

Types, amounts and management of waste which may generate tentatively, are indicated in Table 49.





Table 49 Waste. Waste management.

Technologi cal process	i Waste s							Waste storage on site		Scheduled waste
ou. p. 00000	Name	Amour Meas ure unt.	nt Amount per year	Aggregate form (solid, liquid, paste)	Code according to waste list	Statistical classificati on code	Hazardous ness	Storage conditio ns	Maximu m amount	alternatives
1	2	3	4	5	6	7	8	9	10	11
Railway dismantleme nt works	Wooden sleepers (100 per cent waste)	unt	5742	solid	200137 or 191206	-	Hazardous	No storage	-	Placed at the waste manager's with a hazardous waste license disposal by means of tender (E.g. UAB "Žalvaris"), and recovered, Manager of Kaunas region Antanas Kiguolis 8620 82809)
Railway dismantleme nt works	Wooden sleepers (100 per cent waste)	unt	53401	solid	170904	12.13	Non- hazardous	No storage	-	Placed at the waste manager's disposal by means of tender (e.g. "Bionovus")
Railway dismantleme nt works	Metal from rails	t	21	solid	170405	06.11	Non- hazardous	No storage	-	Placed at metal debris procurement company's disposal (e.g. "Žalvaris")
Railway dismantleme nt works	Rails	t	4143	solid	170405	06.11	Non- hazardous	No storage	-	Placed at metal debris procurement company's disposal
Excavation works	Contamin ated metal	m3	500	solid	170507	12.61	H 14	No storage	-	Removal of contaminated metal byloading onto dump trucks and recovery (UAB "Grunto valymo technologijos"), deputy director Kriščiūnas,





Technologi cal process	Waste Waste site					Waste sto site	rage on	Scheduled waste management		
	Name	Amou Meas ure unt.	nt Amount per year	Aggregate form (solid, liquid, paste)	Code according to waste list	Statistical classificati on code	Hazardous ness	Storage conditio ns	Maximu m amount	alternatives
										8(5) 2 685301
Wastewater treatment plant maintenance Rainwater drainage	Rain sewage sludge	m3	48	liquid	170506	12.12	Non- hazardous	Cleaned once per year	48	Placed at the waste manager's disposal by means of tender (e.g. "Žalvaris",Manager of Kaunas region Antanas Kiguolis 8 620 82809)



4

PREVISION OF REMISSIVE MEASURES FOR ENVIRONMENTAL IMPACT

VILNIUS CONSULT

4.1 Analysis of instruments provided for prevention, reduction or remedy of significant adverse impact on the environment

Table 50. Means for reduction of negative environmental impact

Impacts	Suggested means
Waste	 treatment / disposal of contaminated rubble and soil on the sites of modernization; removal of contaminated wooden sleepers.
Noise	 installation of acoustic noise reduction wall next to the residential buildings (walls will be installed in sections of railway bypass: 6.200 to 7.400 km 10.400 to 11.700 km 12.700 to 13.500 km and 21.500 to 23.100 km). The length of all the acoustic walls planned to install is ~ 4.900 km; installation of new windows for individual homes by repeat of separation of current authentic wooden windows (places will be reviewed and local windows with acoustic characteristics will be selected in the technical project). This project intends the replacement of windows by increase acoustic windows for 62 houses; possible installation of protective embankment adjacent to Rudamina village (about 800 m). Embankment is 4m in height, sole width is 20m, top width is 12m.
Cultural heritage	 Alternative II was selected, target track section to be built near the boundary of cultural heritage. Such impact on cultural heritage is not intended.
	 surface water collection and abstraction. Sewage abstraction for 11.911 km is indended on the left of railway side of Kyviškės - Paneriai, while on the right – for 15.025 km
Sawaga	 installation of drainage ditches or modernization of existing ones;
Sewage	 surface waste-water treatment plant installation by Nemėžio (10 +508 km) Nemėžio (12 +470 km), stream);
	 installation of oil traps is planned nearby protection zone II-III of water- places of Aukštieji Paneriai and at the planned new railway construction site (from 1.490 to 3.281 km);
	• It is suggested to install sewage system, as it is shown in illustration 5, consisting of a geotextile filter with a drainage tube (diameter 160 mm or 200mm). Through the application of such a surface water sewer system in the range of every 50 m, water collection manholes shall be installed.
	reinforcement of embankment slopes on all streams
Air pollutants	 LR has purchased 39 Siemens locomotives so far, and in the future, it plans to acquire another 10. After the implementation of project, 50% of the new Siemens locomotives will run along rail bypass, other 50% of diesel locomotives will include new American engines.
	 properly prepare (isolate) storage sites for fertile layer, construction material and waste. After construction, it is necessary to rehabilitate temporary sites - to replant destroyed green plantations (grass, bushes);
Soil	 to collect used machinery lubricants to prevent contamination of surface water and soil. To provide means in case of emergency oil spill form mechanisms. During the construction, oil absorbent material (sawdust, sand), special oil collection containers are to be kept; do not leave open land areas without grass which abrade during some





	 time; After the performance of works where fertile soil layer removal is intended, it is urgently necessary to stabilize the region (strengthen it). For stabilization, removed fertile soil should be used for seeding of fast
	growing vegetation.
Biodiversity	 use of local soil (soil) and materials during management and reinforcement works of bed;
	 regular bed maintenance (mowing);
	 use of organic materials for reinforcement of bed slopes; installation of open (particula) sources ducts
	 Installation of open (pervious) sewage ducts.

Requirements for contractors:

During the implementation of technical and technological measures provided for in the railway modernization project, the rules on safety and health for employees will be followed, construction machinery and other equipment of taut technical state will be used. The avoidance of air, soil, surface water or groundwater pollution will be followed during the construction works. All waste generated will be handled as follows:

sorted by types on the site of formation;

 hazardous and non-hazardous shall be kept at the places of destination and / or in containers;

• containers with hazardous waste shall be marked with labels for hazardous waste;

• non-hazardous waste shall be arranged at least once a year or sent to waste handlers;

hazardous shall be sent to waste handlers at least once every three months;

• all the formed, arranged or sent waste shall be recorded in "The initial accounting register of waste" under the requirements of "Rules for waste management";

• during the transfer of hazardous waste, bill of lading for hazardous waste must be completed under the requirements of "Rules for waste management".

During the construction / renovation works, the contractor shall be obliged to take the following measures in order to reduce the potential impact on the environment:

To carry out most part of works on the territory of AB "Lithuanian Railways";

• To prepare the environmental action plan (EAP). EAP should be prepared aggreable to the finding on the EIA selection or the environmental part of technical project, and shall include the recommended management, reduction of impact and monitoring related to the direct activities of contractor. EAP should be prepared so as to cover all work-related activities and all the sites and temporary or permanent structures (work sites, storage sites, storage sites for excavated ground and waste, storage sites for construction material, used tracks, etc.) which will be available till the end of works and which are within the liability limits of the contractor; and the contractor shall be responsible for implementation of these matters. The contractor shall get more comprehensive requirements;

• In case of residential adjacency, noisy works should be organized during the day (at 8 am -4 pm)

To inform the owners of adjacent residences about the intended works;

• In cases where the works are carried out near existing trees, the protective measures shall be used (e.g. reinforcement fences);

- To build temporary roads and detours, where appropriate;
- To clean drainage systems after the completion of construction works;
- Overall management and restoration of construction site.





The greatest mischief is still frequent accidents. They are declining. In comparison with the road transport accidents, it can be said that they are nearly avoided in the rail transport. But the rail has another problem. Here, one accident can have serious consequences. In 2000, during the accident occurred in Vaidotai, 120 tons of diesel fuel spilled over from the tanks. The consequences of the accident are being eliminated until now. This work was carried out by UAB "Biocentras". It cleaned the soil by biological means. About 20 cars of contaminated soil was transported to the base of "Biocentras" in V. Graičiūnas street, and then cleaned there. It is characteristic for diesel fuel to penetrate into the soil rapidly. UAB "Grota" assisted during its pumping from deeper layers (3-4 m) by means of vacuum. Other water protection measures have been used, too.

There are trains designed for extinction of for especially big fires. The railwaymen can always come with their enginery to the accident site, although the accidents mostly occur in the places where they are not expected. This can happen in marshy areas, in the middle of forest or dense woodland. The place of accident can be reached from both one and other side.railway track can be restored, if it damaged, in front of you. There is a powerful technique which may "step off" itself from the embankment at any point.

Adjustment of national legislation with the regulations and directives of European Union is an important step in the development of transport infrastructure, maintenance of vehicles, control management of fuel quality, process of transport of dangerous freight and environment-friendly economic conditions in the transport sector.

Recently, there is a strong focus on road safety issues in all countries. This is the matter of interest for public, government institutions and international organizations. Therefore, the European Commission, the Conference of Ministers of European Transport, and each state individually make every effort to improve traffic safety.

Historical-geographical situation of Lithuania formed a natural movement of freight traffic within our country during several centuries. In 1990, after the restoration of Lithuanian independence, the phase of new quality of transit freight movement and application of the whole transport system to service these flows was entered. The improvement economically, increase of people's incomes, mobile demand is growing pro rata, too. One of the areas that could adversely affect the environment, human health and safety is the transport of dangerous goods.

During the integration of Lithuanian railways into the transport system of Europe, safe traffic becomes underlying stage, which is an integral part of membership of our country in the EU. The Lithuania policies on traffic safety, reduction of environmental adverse impact on transport fields are formed by the Ministry of Transport and Communications.

Lots of components have impact on traffic safety: traffic participants, vehicles, roads and environment. Their contribution to road safety is directly dependent on the economy, funding, people and culture of living of the country.

Considering the increasing volume of dangerous freight over and over, and in order to ensure the safety of this type of freight transport, AB "Lithuanian Railways" follows the agreements and rules regulating the transport of dangerous freight.

Means for reduction of environmental impact in emergencies

Unsafe transport of chemicals, hazardous waste, petrolic products is a major cause for soil and groundwater pollution endangering the environment and human health. Serious threat to road safety is worn fleet thrust of rolling-stock. To avoid such contamination, deployment of the best technical means available, and the use of economic instruments is





intended in the future. But here, not only outdated technology is to be blamed. Most serious violation of traffic safety for locomotive driver is to go when the stop signal is lit; it is difficult to predict after-effect. Some accidents are due to depot repairers and maintenance employees. It is not a secret that the freight rates are determined by high technical characteristics of tracks and their maintenance, modern fleet of thrust rolling-stock, up-to-date management systems and staff qualification. It should be noted that especially a lot of money has been allocated to track economy, lots of repairs have been carried out in recent years. This affected the decline in the number of accidents, and gives hope that the track economy will not block progress of the Lithuanian railways.

In recent years, the departments of company have avoided more significant emergency pollution, but two carriages transporting cars and the tank carrying bitumen derailed from the track on passage 23 of Palemonas on 20 September 2005. About 50 kg of bitumen spilled over from the overturned tank on the building of track through the breather. Bitumen contaminated rubble has been dozed and taken to the waste disposal center of UAB "Žalvaris". For the present, environmental damage was avoided.

During the lifetime of AB "Lithuanian Railways" and during previous years in the departments, there were some railway accidents which caused the contamination of environment. All the events have been recorded by environmental authorities. Table 51 presents the review of accidents and the ecological consequences during 1991-2008.

-			,	
No	Station, mid- station	Year	A brief description of situation (name and quantity of pollutants, spillage causes)	Cleaning, emission quantity of remaining in the environment, studies, groundwater monitoring
1.	Vaidotai	1991-03-13	Leak of 40 t fuel oil	Collected 38 t*
2.	Vaidotai	1992-08-24	From the damaged tanker leak of 29.397 tons of petrol into the environment	No data
3.	Paneriai	1992-03-05	Leak of 0.5 tons of wagon axle oil from the filling column	No data
4.	Vaidotai	1992-09-20	From the damaged tanker leak of 27,1 tons of fuel oil, polluted area of 75x12-20 m	Collected 22 t*
5.	Paneriai	1993-07-22	During the crash while shunting on 21 track station leak of 34.9 tons of diesel fuel, contaminated area of 840 sq. m.	Collected 7 tons of diesel fuel and 12 tons of water-diesel fuel mixture
6.	Vaidotai	1994-03-27	Due to poorly regulated retarders, after the crash and rolling away of tank, the leak of 13.8 tons of fuel oi,l contaminated area of 250 m ²	Collected 50 m ³ of polluted soil
7.	Vaidotai	2000-02-24	At signals M 2-M 6 (Juodšiliai), after rolling away of four tanks, 201.2 tons fell into the environment, spread near the bed in the area of 2-18x182 m (1803 m) along the bed, accumulated in declension, some absorbed into the soil	Pumped from the surface, collected with snow and soil. Pumped and dispersed inside soil andon surface, in total - 119 t. Detailed studies carried out, performance of groundwater monitoring, which showed that the remaining contamination is in a stable condition and does not pose a significant risk to the environment
8	Vaidotai	2002-10-24	Due to failure of brakes during shunting at signal Mg-10, tank was ruptured, leak of t 58.71 diesel fuel on 39 424 m and 88 m 38 track sections	Overspread 234 kg of organic sorbent, removed track, contaminated soil scooped in and removed for cleaning (1560 m3)

Table 51. Summary of emergency situations





				ENGINEERING CONSOL
9	Palemon as	2005-09-20	From Palemonas passage on 23 road, adjacent to point 217, turned over tanker spilled 50 kg of bitumen	Bitumen and contaminated rubble collected and given for decontamination
10	Vaidotai (LT-1 Vaidotai worksho p)	2007-03-07	Oil spills were observed in fire ponds. Studies showed that 184 tonnes fell into soil	Cleaning works have been carried out until now, and 134 tons of petrolic products were collected.
11	Paneriai station	2008-03-18	After tank turned over, due to the track condition, leak of 39.588 tons of petrol, which was absorbed into the soil	Ecogeological studies were made, bailout plan is prepared, cleaning works are carried out currently

According to the available data, the following largest spills of petrolic products occured: 1100 t spilled on the track of Pauostis in 1988, next year 1170 tons of fuel oil in Juknaičiai. About 1,012 tons of various oil products (fuel oil, diesel and gasoline) were spilled over at Rykantai-Vievis span near Rykantai in 1992, after the derailment and overturn of 18 tanks. In 2000, big and painful accident occurred at the approach of Vaidotai station near Juodšiliai. As a result, one man was killed, and 201 tons of diesel fuel was spilled over from derailed tanks.

Total number of recorded accidents, i.e. 92 percent of events associated with the spill of petrolic products, the remaining 8 percent - with access of other substances into the environment.

Most accidents occurred in 1991-1992, i.e. during the first year of restoration of independence. Their reasons are varied, but most important is the human factor. In recent years, substantial investment in the modernization of rail infrastructure led to a significant reduction in the number of accidents.

According to the data available, the company has paid over 1 million litas since 1993 for emergency pollution of environment (with petrolic products). In case of disasters, accidents, incidents and breaks, where appropriate, an operational group is made by order of the railway manager to eliminate the effects. If there is information available that the dangerous freight caught the fire, shattered, spilled over or their condition was unstable in derailed or broken carriages, containers or other packages during the accident, and there is a threat to people and the environment – it is necessary to notify the services: the driver reports to station operator on the accident, station operator reports on the accident to the chief of station, train dispatcher, local government, police, prosecution, territorial units of Central Public Health and Ministry of Environment; and then takes measures in accordance with the accident card references which are invoked for the elimination of accident. During the investigation, all the circumstances of the accident, causes, consequences and guilty persons are to be clarified. In accordance with the investigation material, professionals of company take care of preparation of technical, preventive, safety improvement measures, which have to be fulfilled in specified time, and organization of permanent trainings for emergency (auxiliary trains).

The works of AB "Lithuanian Railways" environmental department are focused on the prevention of accidents with ecological consequences, analysis of events and liquidation of their results.

In general, dangerous freight is known as materials and articles characterized by hazardous properties that can harm human health, the environment or property. Such freight, incorrectly transported or stored may cause human or animal diseases, poisoning,





burns, as well as cause an explosion, fire or damages of other cargo, vehicles, buildings and equipment, contamination of environment and water. For proper transport of dangerous freight, all involved members of transport are responsible - the sender, the carrier (the driver) and the recipient. The vehicle transporting dangerous freight has to be properly marked, equipped with fire-technical means.

Transport of dangerous freight is one of the most complicated and most safety-intensive transport sectors. During the accidents or traffic events dangerous freight may access the environment and cause reciprocal effects. The main part of transport of dangerous freight falls to the railway transport (about 60% of the total cargo volume) as the freight is transported in large quantities. Railways are advantaged than other types of vehicles, because it can serve all shippers. This does not mean that the railway can transport any product to anywhere, because all the addressees are not accessible by rail. But it is clear that it is possible to transport a wide variety of goods in large quantities by type of transport. Both dry and liquid dangerous freights, including goods requiring temperature control are transported by the railway. The largest part of the freight makes transport of petrolic and its products: fuel, lubricants, oils, chemicals and mineral fertilizers, and others.

Rising freight scale, with a major part - 41% of petroleum and its products, increase environmental pollution risks by petrolic products, which poses a threat to human health, damnifies the carriers and the environment. Environmental control system of the company pays a special attention to these factors.

One of the major parts of the freight of petroleum and petroleum products - about 22% (see Table 52) was / is transported along this rail track in 2007, miscellaneous chemical products made only 0% of all freight (data from "Load flow analysis and prognosis of feasibility study for development of Vilnius, Paneriai , Kaunas (Palemonas) and Šeštokai stations", 2008). Most part of the freight make ferrous metals and mineral products which are not dangerous.

After the implementation of the project and traffic safety measures, the reduction in road accidents is planned.

In the event of an accident during the transport of hazardous materials, fire rescue services, police, prosecutors, public health center, a territorial unit of the Ministry of Environment and the Municipality must be called in.

<u>Emergency spills environmentally</u>, sensitive sites are the sections of railway crossing the hydrological objects. Vilnius railway bypass crosses these rivers and streams: 1.1 km - Kyvė, 3.9 km - Šaternikis, 7.5 km - Murlė, 10.5 km - Nemėža, 12.5 km - Nemėža, 19.3 km – Becardis stream (an affluent of Vokė). Water treatment plant would be a good protection for stoppage of petrolic products. In case of accident, trackside ditches must be fenced, thus avoiding contamination of rivers and the increased spread of pollutants.

Vilnius railway bypass crosses the following settlements: Grigaičiai, Juodšiliai and Nemėžis. The target modernization of railway bypass will only improve the current situation (reinforcement of bed, alarm installation, installation of traffic management measures, etc.) and will reduce the risk of accidents. Therefore, the threat of accidents on this section of railway track is unpredictable.

Table 52. Total freight handling work at station Paneriai in 2007, according to the nomenclature of the load

Type of freight	Loading thousand t.	%	Unloading thousand .t.	%	Loading + unloading thousand t.
Animal origin products	18,774	9%	7,772	0%	26,546
Mineral products	14,899	7%	906,293	58%	921,192
Oil and petrolic products	33	0%	346,465	22%	346,498




Food industry products	11,920	5%	4,407	0%	16,327
Solid mineral fuel	2,136	1%	24,335	2%	26,471
Miscellaneous chemical					
products	9,862	4%	2,742	0%	12,604
Wood, cork	6,236	3%	46,262	3%	52,498
Articles of stone, plaster,					
cement, glass	11,744	5%	30,718	2%	42,462
Ferrous metals	53,418	24%	133,764	9%	187,182
Vehicles, equipment	54,111	25%	5,162	0%	59,273
Other	36,789	17%	57,870	4%	94,659
	219,92				
IN TOTAL:	2	100%	1565,790	100%	1785,712

For reduction of contamination with petrolic products and cleaning for soil of railway and areas, environmentally safe (of biological origin) materials (e.g. "Hydro Break") should be used.

The rules of safety and emergency situations, or liquidation of after-effect when hazardous freight is carried via the railway provide administration and heads of structural units, emergency and fire train crews and emergency teams of AB "Lithuanian Railways" with remedial and rescue as well as and safety measures for elimination of after-effect of disasters, accidents, incidents and emergency situations during the carriage of dangerous freight. The procedure for elimination of emergency situations resulting from the carriage of dangerous freight by railways:

1. The carriage of dangerous freight is allowed to the crews who heard necessary instruction, are aware of requirements with those set of rules, individual protective measures ("CΠИ - 20" (Russian) or similar) first-aid kit or portable radio station.

In the event of an emergency at the span, the train cab driver shall immediately notify via the train radio or other possible means of communication, arising from such circumstances, the train dispatcher and the operators of the closest spans limiting it under the procedures. Cab-driver and the assistant have the right to open the package of freight documents.

The driver describes the nature of the emergency in his report: provides details about the injured, names of load, numbers of accident cards (freight UN number, if applicable), amount of dangerous freight in emergency zone, and on the electrified sections - evidence of the need to turn off the contact line voltage.

After having transmitted the report on an emergency situation, the crew of locomotive shall take the measures provided for in the accident card on the dangerous freight.

2. After receiving notification from the driver on an emergency situation or in case of emergency situation at the station, the operator shall inform the chief of station, train dispatcher, local government, police, prosecution, Public Health Centre and Environment, territorial units of Ministry of Environment about the accident, and then take measures in accordance with the accident card references.

3. The staff of other structural departments of the railway may be used for urgent rescue and recovery works, providing them with individual protective equipment and instructing them on safety issues how to work with dangerous freight theretofore.

4. After the reception of notification about an emergency situation, the traffic dispatcher shall promptly notify the traffic management services on duty who manage the trains to the place of accident. In case of necessity, ESB shall send the emergency and the fire train to the site.

5. As soon as LGB has received the notification about an emergency situation, transfers this information in accordance with the scheme of Urgent notification about an emergency situation on railway (see Illustration 28).

6. In case of emergency situations threatening to the people and the environment, the head of operational group formed by AB "Lithuanian Railways" shall carry out the following set of measures together with specialists, local authorities, representatives of Fire and Rescue Department, Public Health Centre and the Ministry of Environment, police, business, professionals of sender (receiver) who will take part in the restoration works:

a) to perform the sanitary and chemical reconnaissance of local and emergency areas at risk of contamination, to determine the boundaries of hazardous area, to fence the area and to allocate the security;





- b) if necessary, to evacuate the area population immediately (evacuation area is bounded by taking into account the load characteristics and the amount, terrain features and weather conditions)
- c) after the assessment of fire situation;
- d) to find the people who were affected by the poisonous (toxic) and mordant materials, biohazardous products and provide them with medical assistance;
- e) to make an emergency eradication plan, which sets out the following operational procedures: 1)to provide short characteristic of emergency focus;
- 2)to identify fire and explosion risks to participants of works and residents, the fire spread risk;
- 3)to determine necessary forces and means for liquidation of accident after-effect and the procedure of their use;
- 4) to give tasks to the departments and specialized developers;
- 5)to introduce permanent control of environmental pollution by chemical substances;
- 6)to determine the recovery and rescue sequence;
- 7)to organize the registration of participants who will work during the liquidation of emergy situation;
- 8)to choose the neutralization and decontamination methods under the accident rate card references;
- 9)to control the area, environmental objects, equipment, transportation and special clothing to be neutralised (decontamination, disinfection);
- 10) to ensure medical service;
- 11) to take necessary safety measures;
- 12) to organize management of work procedures and to determine the procedures for submission of notifications.

The railway performs localized fire-fighting, continuous traffic updates, cleaning of obstacles, rollingstock raising, demounting of wagons. Blocking of emergency zones, decompression of control points, organization of communication between departments involved in emergency eradication works, neutralization of toxic materials, pumping of liquids, contaminated soil collection and disposal, filling with earth of spills and fencing by mounds, organization of elimination of complicated fires (burning of toxic substances or the formation of toxic combustion products), the area pollution and utilization of hazardous freight residue is carried out by the state of specialized emergency services.

7. Supervisor of the liquidation of after-effect of accident is responsible for the work safety. The heads of departments invoked for railway and other works are responsible for the performance of measures determined by the supervisor by their subordinates.

It is forbidden for rail crash forces to begin restoration works in the emergency area with dangerous loads until the arrived emergency services and rescue professionals do not remove the threat to human life and health, do not instruct the staff and allow to start works.

If the properties of substances are not available, the supervisor may find out about that applying to the shipper (receiver), specialized research organizations, the operational management service of Fire and Rescue Department, to require the specialist of sender (receiver) to arrive at the location of the accident.

8. Vans with dangerous freight that can cause a fire or injury, must be carefully driven away to a safe place at the distance indicated in the accident card, but no closer than 200 meters from the industrial and residential buildings, other vans with dangerous freight or to the tracks specifically intended for such purposes and indicated in the station register.

9. The maintenance of vans loaded with dangerous freight and the repair of coupled are carried out in accordance with the procedures of AB "Lithuanian Railways".

10. In case of determination that the impact of wagons with dangerous loads exceed the speed, but they do nor derail from the track, it is necessary to perform the following measures: to perform technical and commercial inspection of wagoons in compliance with safety requirements, the accident card and the rules of reference.

If the dangerous freight does not start spilling, crumbling or igniting within 2 hours after the impact, the wagon can be carried further.

If it will be observed that the freight is spilling, crumbling or caught the fire during this period, it is necessary to act as specified in the accident card of these Rules.

11. After the arrival at the emergency location, officials of Public Health Centre and Ministry of Environment shall immediately begin monitoring the execution of the work safety instructions and recommendations and control the efficiency of the area, vehicles and machinery decontamination.

12. A continuous on-call medical staff should be organized throughout the rescue and rehabilitation works, and set out an evacuation point, if necessary.

13. The spill of dangerous freight or discharge from the damaged tanks or containers on the





ground, into water, etc. is prohibited, and may be allowed only in exceptional cases under the permission of competent authorities and with approval of local authorities.

14. The supervisor of restoration and rescue works decides to restore the traffic of trains and shunting works on the territory which has been contaminated due to the accident, upon the receipt of respective finding from the Public Health Centre and the Ministry of Environment.

15. After having carried out decontamination (degassing) works, the staff of Public Health Centre and the Ministry of Environment shall carry out the laboratory control of efficiency of such works. If an emergency situation with the dangerous freight occurred during the winter, the laboratory control of efficiency of decontamination works shall be repeated during the warm season, and if necessary, the works for decontamination should be repeated.

16. Emergency situations with dangerous freight or liquidation works of after-effect shall be final, when the pollution is eliminated, and this is confirmed by chemical sanitary finding, the traffic safety is ensured, and when the commission makes the act on liquidation of an accident or emergency situation.

17. Individual protective measures used to eliminate the consequences of the accident must be verified whether they are suitable for further use.

MEASURES FOR LOCALIZATION, NEUTRALIZATION AND DECONTAMINATION OF POLLUTION OF DANGEROUS FREIGHT:

1. Localization works of contamination (infections) are performed under references in accident cards in accordance with the fire and personal safety requirements and include:

- re-suction of hazardous freight residues from damaged container into a suitable one;

- re-suction of spilled liquids from the lower area of accident sites;

- deflation of water poisoned by hazardous substances from the points of accumulation;

- pouring over the remnants of spilled liquid with rubble capable of absorbing dangerous fluid;

- collection of screes and removal of poisoned surface layer and itss pouring over with clean soil;

- digging in of spill sites with embankments, construction of dams, excavation of pits, scoops, collectors, pond – settlers for collection of dangerous spilled freight;

- excavation of setting ditches, oclussive cross ditches on the slopes, troughs, runs and drain sewer pipe system for dangerous substances;

- installation of drainage for contaminated area.

- installation of hydraulic equipment along the flow for the protection from dangerous substances when snow is melting or it is raining;

- installation of water barrier to protect the site from intense evaporation of toxic gases;

- installation of fire barrier;

-loosening of contaminated soil;

- construction of river or water storage dams for detention of contaminated sludge.

2. Methods for neutralization (degassing) of hazardous materials on railway tracks and within the dangerous zone:

- use of water or washing solutions;

use of neutralizing solutions;

- pouring over of individual sources of the infected foci with neutralizing material powder;

- incineration of hazardous material in separate foci of dangerous zone, where there is a threat to poison groundwater and surface waters;

- treatment of soil with cultivator (plow) or other technology, before having the earth sprinkled with chemicals inducing the decomposition of petroleum products and lubricants under natural conditions;

- removal of contaminated soil.

3.<u>Neutralizing substances used for neutralization of hazardous materials on the rail tracks and</u> within the area are specified in the table on accident rate of freight.

The estimated rate of neutralizing substances:

dry substances – 0,5-1 kg/m²;

- aquatic solutions – 1-2 l/m^2 .

The estimated time of effect of neutralizing substances - 0.5 to 2 hours.

It is advisable to cut the contaminated soil or compressed snow for 7-8 cm and covered with powdery snow - 20cm.

Loosened place is poured over with 10 cm thick soil.

4. The rolling-stock may be loaded with contaminated dangerous substances and transported further only after their neutralization (degazavus). Degassing of rolling-stock is carried out mainly at the accident site. For spray of neutralizing solution, it is advised to use pumping equipment of fire and emergency trains. Neutralization of hazardous substances (degassing) present on the trains or



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individual surfaces of vans is carried out without unloading the freight. In some cases, the order to unload the freight may be given by the supervisor only. The progress of neutralization (degassing) works have to be monitored periodically.

5. Neutralization (degassing) methods for dangerous substances present on the surface of rollingstock:

- mopping is periodically changed by cloth or tow;

- sweeping or scraping of all rolling-stocks and parts, which can be touched by people, with scrapers;

- blasting of contaminated surfaces by fresh steam;

- removal of toxic dust with vacuum pumps or vacuum equipment tips;

- washing with cold, hot water or compressed steam;

- washing with washable tools and grinding with pumps together, or by using the equipment PDP-4V, IC-4. The washing fluid pressure must be not less than 0.2 MPa.

Consumption of water - 3-5 l/m2

Consumption of washing, neutralizing solutions – 1,5-2 l/m2

Solution must be kept for 15 minutes on the surface being neutralized.

Difficult access points may be further processed manually.

6. It is necessary to take into account the fact that the neutralizing substances are dangerous during storage, preparation for works (solution preparation) and working with them. Therefore AB "Lithuanian Railways" shall make the local instruction on the use of neutralizing substances in advance, to determine the locations where the dangerous freight and contaminated soil may be removed with local authority and to control how employees carry out the requirements of this instruction in conjunction with the Public Health Centre and the Ministry of Environment.

7. Neutralization works are carried out in shifts when being at accident focus without interruption, and with individual protective equipment for a maximum of 40 minutes, and shift work time shall not exceed 4 hours.

8. Environmental damage, during the liquidation of after-effect of emergency situation with dangerous freight is determined by the methodology approved by the competent national authorities.

After the changes in procedures of conveyance of the staff about traffic accidents and emergency situations, and after AB "Lithuanian Railways" has installed an automated voice message transmission system on the traffic accidents, the Order No. I-740 of 10 November 2008 "Regarding to the approval of describtion of procedures for the action in the event of accidents on public railway infrastructure of employees whose work relates to traffic, and initial information about these events" :

1. Employees whose work is connected with railway traffic, and who noticed the railway accident or received a message on the accident from any person shall immediately inform the station operator (hereinafter - GSB) and the train dispatcher (hereinafter - ESD) of Traffic Management Authority.

2. Train locomotive crew, when an accident occurs at the span, must:

2.1. take measures to stop the train safely;

2.2. Immediately, also by means of radio tolls notify the other locomotive crews located at the span, ESD and span restricting GSB: Attention, attention! Listen everyone! I, the dirver of the train No. ____ notify that at the span on km pk on the track (specify the nature of the accident - for example derailed carriages, there is no gauge of even (odd) track, fire broke out, train brakes failed, I felt impact, etc.), be careful, look forward to ESD guidelines. Notice is repeated until a reply is got that the message is received.

Particular actions of railway workers are provided by the Railway Traffic Rules and the regulation foraction of employees whose work relates to rail traffic, during accidents and other exceptional cases (S/96, 1998);

2.3. if there are any injured people or the fire broke out, to notify the span restricting GSB or ESD for they would call the ambulance and fire rescue service.

2.4. if possible, provide the injured with first aid;

2.5. to undo the package with accompanying freight documents and check whether the train vans are not loaded with dangerous freight and persons accompanying them, if they are present - quickly notify ESD and span restricting GSB;

2.6. in case of fire, if possible, distribute the train vans, if they contain dangerous freight - to wait for orders of special services;

2.7. if the train locomotive is driven by more than one driver, to send the assistant driver to determine what is the state of derailed rolling-stock, conditions of location and the track profile, to fix the remaining vans on the track with the hand brake and train wheel brakes;





2.8. to identify the nature of damage to the track and contact system, how many and what railway rolling-stock derailed, were damaged, what freight carried according to documents spilled and crumbled, to check whether the adjacent track gauge is not damaged;

2.9. specified data on the accident and what measures are taken shall be delivered to the CAD and the span restricting GSB by radio, telephone or other means.

3. 2.5 If the train locomotive is operated by one driver, the latter is obliged to fulfil the requirements under sub-paragraphs 2.1, 2.2, 2.3, 2.4, and 2.5 and, depending on the nature of the accident location, other requirements of sub-paragraph 2, too.

4. In the event of accident, locomotive crew or shunting leader of the train station and the manager of any railway infrastructure or railway companies on approache tracks shall present the details about the accident (incident location, type, number of vans damaged, their numbers, circumstances, etc..) to the GSB immediately.

5. Having received the notice on the accident or have seen it himself, GSB must:

5.1. suspend the trains ready to exit the station along intended route (switch exit signals into entrance signals, if the train has already passed the traffic lights - to order the driver to stop the train, etc..);

5.2. make a record on that in the Traffic register (E-2 or Form E-3) and notify:

5.2.1. chief of station, GSB, ESD of adjacent railway stations about all available information about the accident, give the appropriate commands to the locomotive drivers who are at the railway station or railway stations of restrictive spans;

5.2.2. electromechanic and track master about the location, nature of traffic accident and the damaged objects;

5.3. if there are any injured people, to call the local ambulance and provide it with information about the location of the accident, the number of injured persons, if it is known - about the nature of injuries.

5.4. if the fire broke out at the place of accident – to call the local fire and rescue service and provide them with information about the location of accident, hazardous substances present in the fire focus, and the fire-scale.

6. When the railway station is controlled by traffic control center, the actions referred to in paragraphs 4.1, 4.2.1, 4.2.2, 4.3 and 4.4 are carried out by the ESD. Agter the reception of the notification, ESD must make a record in the register of Traffic dispatcher (E-6 form) immediately, to call the GSB on duty to the railway station immediately and report to the station chief on the accident. Upon receipt of the ESD report, GSB on duty must arrive to the train station immediately.

7. Passenger train cab driver transfers to received information about the traffic accident to the passenger train chief, drivers of diesel or electric trains shall inform about the accident and the measures needed to be performed to train conductors, as well as inform the passengers over the loudspeaker on the train drive problems.

8. The chief or their deputies of railway stations and restrictive spans, where the accident occurred, after receiving their GSB, and the chief (operator on duty) of traffic control center, after receiving the ESD report about the accident, must:

8.1. to arrive at the station immediately;

8.2. if they have information that the dangerous freight caught fire, crumbled, spilled in the derailed or defective vans, containers or other packages, or there is a threat to humans, animals or the environment because of their status, to inform the local special services (in accordance with the scheme);

8.3. together with the employee of public railway infrastructure automation and communications department serving as a senior electromechanic (but not inferior), to draw up an act which would indicate the readings, buttons, handles and other elements of the situation at the time of the accident on the signaling control panel, also check the seals on the list of indicated sealed equipment (such an act to be drawn up at other span restricting station. If the accident occurred at the railway station, such act to be drawn up at the railway station);

8.4. to arrive at the accident site for specification of more details about this accident, to take the freight documents from the driver, to check the names of dangerous freight, accident card numbers with the accompanying documents indicated and to transmit such data to the ESD and GSB immediately via available means;

8.5. if there is no any dangerous freight on derailed or damaged vans:

8.5.1. to take steps to remove the damage of even a single track gauge;

8.5.2. ESD instruction to organize the works for dragging of vans which can be pulled off, to ensure proper security of transport documents;

8.5.3. visually determine what are the consequences of an accident, how many vans or axles derailed, how many vans, tracks have been damaged, and other, and to report on ESD from the accident site. To draw the scheme of accident site, rolling-stock and layout of other items important for the investigation.





9. Having received the notice on the accident from the train crews, GSB, track inspector, or other railway employees and people on the outside, ESD must:

9.1. immediately report on all available information about the accident to the operator on duty of the Traffic and control center division (hereinafter - ESB), and on the electrified sections – to the power dispatcher, locomotive drivers of trains at the railway station or span. If the adjacent railway stations are operated from the control center, to inform the railway station operators on duty;

9.2. to record the received notification into the Traffic dispatcher's register immediately (E-6 form); 9.3. to interrupt the traffic of trains on the track, where a traffic accident took place;

9.4. to inform the railway stations about the changes in the schedule of passenger trains;

9.5. to require information about the state of derailed vans, dangerous freight (if such available - to find out the names), numbers provided by the United Nations (UN), accident card numbers from the GSB (Station Chief), and report to the operator on duty of ESB and Traffic control centre of LG (hereinafter - LGB);

9.6. if there is no information on the train and the freight documents within 20 minutes (if they are lost, burned, etc..), this data shall be requested from the intial railway station or the station, where the vans were coupled. According to the train sheet, to check whether there are any vans containing dangerous freight on the train and where they are on the train exactly. After receiving the information, to hand it to span restricting GSB and ESB railway stations immediately;

9.7. having received the information that technical assistance for the stopped operated by one driver can not be provided by GSB, to organize the necessary assistance.

10. ESB shall make a record in the register of Traffic events on received information and the consequences and forward it to the LGB.

ESB shall forward the information available to the operator on duty of LG branch of "Vilnius Railway Infrastructure" by phone and fax, indicates the order number, accident location, date and time, the part of list Nno. 2, whereby the transmission of the voice message shall be made, the position of employee who gave the message, a brief description of the accident. Employees whose work is related to the events mentioned in the notification received, after the reception of the notification and confirmed that it has been received, must immediately go to the accident site.

11. When the accident occurs on the sections of Radviliskis-Kretinga (Pagégiai) - Kalipéda, Radviliškis - Obeliai - Radviliškis - Bugeniai or Radviliškis - Joniškis, the functions of ESB stated in paragraphs 7.1, 7.5, 7.6, 7.7, and 8 are carried out by LGB.

12. LGB coordinates the information about the accident with the chieves of public railway infrastructure manager, and submits the consequences to the addressees referred to in list No1 in accordance with the scheme on urgent notification about the traffic accident on the railways (Annex 1).

13. The lists No. 1, 2 are approved by the Chief Inspector of public railway infrastructure.

14. The manager of public railway infrastructure, if the accident is considered as an accident or disaster, shall inform the managers of the Ministry of Transport and Communications, State Rail Authority, Ministry of the Interior, Ministry of Health, Ministry of Environment, departments of State security and Fire Protection and Rescue, other concerned ministries and institutions.

15. It is not necessary to notify the specialized on the event if there is no dangerous freight on the site, or because of the state of present vans, containers and other packaging, the dangerous freight does not endanger the liquidation of accident after-effect, except in cases of deaths or injured people.

16. It is prohibited to transfer the information on the accident circumstances and causes of assumptions during the procedure of transference.

17. The notification on the event unrelated to the traffic of trains or occurrence of emergency situation is subject to the Order No [-538 of 2 September 2008 by the General Director of LG "Relating to theapproval of procedures during the notification about the emergency situations and procedures of their investigation" within a structural subdivision.

This description of the procedures shall be introduced to the relevant staff, and they shall be monitored in compliance with the requirements of Schedule of Pprocedure Description. To ensure that the operator on-duty of the branch of "Vilnius railway infrastructure" would transfer the notification about the accident via automatic voice communication system to the staff referred to in the list No 2, which was received from LG operator on duty or the regional dispatcher of Dispatcher Department.





INIIS

Illustration 32. Scene of express notification on the accident in a public railway infrastructure

After the implementation of the project and measures for safe traffic, the accident rate on this section is expected to be reduced.

In the event that the accident occurs during the transport of hazardous substances, Fire and Rescue Service shall be called in, and the access to the track is good for it (protection zone within cities is 20 meters on the both sides of outside track axes, while in rural areas - 45 meters on both sides of outside track axles is under the supervision of AB "Lithuanian Railways").

The most sensitive sites for emergency spills environmentally are the railway tracks situated nearby the water pools. Water treatment plant would be a good protection for stopping of petrolic products. It is necessary to fence the trackside ditches in case of an accident, thus avoiding contamination of rivers and the increased spread of contaminants.

During the modernization and execution of reconstruction works, the contractor shall prepare the plan on the liquidation of accident which must include the sequence of warnings in the event of spills, release, fire or accident when the environment, workers or the public may be damaged. Also, main measures for the liquidation of accidents shall be provided, which are used for the control of spills and clean-up works, avoidance of contamination of water pools, etc. Materials and equipment required for the work in cases of potential accidents and spills shall be brought to the site, and they shall be kept close to the places where they might be needed. Such plans shall be included in the Environmental Management Plan (APV).

Most of the freight is formed by petroleum and its products, which increase the environmental risk of pollution with petrolic products, and this endangers human health and environmental damage. The modernization of this project shall ensure the existence of safe, fast and environmentally friendly rail transport in the future, and all direct and additional engineering, traffic safety, signaling, traffic management and environmental measures applied during the modernization shall be applied in order to reduce the risk of accidents.





Investment in the renovation of railway infrastructure reduces the number of accidents significantly, increases safety of traffic and safe transportation of hazardous substances. Any threat of extreme situations and adverse impact on the environment for the settlements located nearbt the railway line is unpredictable.



5

COMPARISON OF VERSIONS

The following table provides a comparison of the effects in points. And the comparison of O version with the project.

 Table 53. Assessment of impacts in points.

			O version			
	Project		(current situation)			
Impacts	Suggested measures		Points			
A HUMAN AND SOCIAL ENVIRONMENT						
Land use, private ownership, separation						
Land expropriation for the construction of railway (by Paneriai)		-1	0			
Barrier to residents	Arrangement of passages	It is expected to arrange underground pedestrian passages in Grigaičiai and Juodšiliai. +1	Effect of railway as a barrier increases through the increase of traffic intensity			
	Impact on	human boalth	-			
	impact on	numan nealth				
The number of people living in a high-noise zone	Acoustic walls	After the construction of acoustic walls, noise level in permitted residential area will provide normative values ~ 0 households +3	Increased noise level in residential premises includes 78 households in total 0			
Sleep disturbances because of the noise	Windows with increased acoustic insulation	After installation of windows with increase acoustic properties, the noise level of the premises at night will not be exceeded +2	Increased noise level in residential premises includes 78 households in total 0			
Regional pollution: change of pollution emission in comparison with the current situation		0	0			
Global pollution: CO2 increase of emission	After the introduction of new locomotives (fuel costs reduced due to new engines) and rectification of rail geometry	+1	0			
Psychological stress due to the taking of land, appearance of visual and physical barrier		-1	0			
	Lar	iscape				
Impact on Natura 2000 and protected areas	-	0	0			
Human and social						
environment -						
Impact points in total		+5	-1			





			O version					
	Project		(current situation)					
Impacts	Suggested measures	Points	Points					
PHYSICAL AND LIVE NATURE								
Surface water								
Increase / decrease of river pollution by railway track sewage	Cleaning equipment, installation of drainage, installation of sewage effluent ditches / reconstruction	After the construction of sewage treatment plants and installation / reconstruction of sewage effluent ditches, pollution is unpredictable +1	Installation/reconstruction of sewage ditches is necessary 0					
	Biod	liversity	1					
Barrier to animals	Culverts, passages	Decrease of impact	Culverts have to be reconstructed/cleaned					
Physical and live nature – impact points in total		+2	-1					
Environmental impact - impact points in total		+7	-2					

Negative impact

Positive impact

- -3 significant impact
- -2 on the average significant
- -1 weak impact
- 0 no changes

- +3 significant impact
- +2 on the average significant
- +1 weak impact

Conclusion

After the implementation of the project, a general positive impact compared to the O version is predicted.



6 CONTROL OF ASSESSMENT SOLUTIONS ON ENVIRONMENTAL IMPACT

Control of solutions of Environmental Impact Assessment (EIA) (angl.EIA follow up) consists of the following solutions [37]:

- Monitoring or also known as assessment audit of environmental impact this is a recurrent target data validation, comparison with standards or forecasts;
- Assessment this is verification of assessment solutions of environmental impact under the monitoring data;
- Management the decision making and intended action plans;
- Collaboration conveyance of customer and the public in specific cases.

Control of solutions of environmental impact assessment is intended in cases where:

- The effects need to be clarified;
- It is desirable to deepen the scientific and technical knowledge
- Control is regulated by legislation;
- There are sensitive areas;
- There is a doubt concerning the effectiveness of the measures proposed.

In this project, the motivation for control of solutions of environmental impact assessment should include:

- Adjustment of impact;
- Adjustment of effectiveness of means.

The assessment law on environmental impact of target economic activity states that the report provides environmental monitoring framework. However, further performance of monitoring, at least of infrastructure objects, is not legally regulated.

A preliminary monitoring plan is presented in the following table:

Motivation of control for AEI solution	Kontrolės objektas Object of control	Period for accomplishment of monitoring		
Revise of impact	Assessment of noise level near buildings ***	During construction, after construction		
	Research of river water quality	During construction, after construction		
Revise of effectiveness of	Acoustic walls**	After construction		
means	Culverts for animals*	After construction		

*** - control is really necessary

- ** control is necessary
- * control can be performed

The monitoring programme is proposed to be established for 5-year period after the implementation of the project. Further control stages of assessment of environmental impact are:

- Assessment the evaluation of monitoring data (impact and effectiveness of measures) in accordance with the applicable standards in Lithuania and prognostic assessments of environmental impact.
- Management prevision of further actions, namely additional environmental and technical measures (if necessary).

The control of solutions for the assessment of environmental impact should be organized by the project customr, i.e. AB "Lithuanian Railways".



PUBLIC INFORMATION-CONSULTING PROGRAMME

Conveyance at the stage of programme preparation

The EIA organiser of documents has announced about the target railway modernization project, the prepared programme by EIA and where, when and till when it is possible to have a look at it in the newspaper "Vilniaus diena" ("Vilnius Day") (Annex 15):

About the assessment programme on the environmental impact of target construction of the second track sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai

AB "Lithuanian Railways" (Mindaugas str. 12/14, LT-2600 Vilnius, phone: 8 5 2693300, fax: 8 5 2,692,028) plan to modernize Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai sections. The target second track section under the modernization falss within territories of Vilnius county - Vilnius city and region municipalities.

According to replacement law on the assessment of target business activities of environmental impact of the Republic of Lithuania (2005-06-21 NoX-258), this object is subject to environmental impact assessment in accordance with a pre-agreed environmental impact assessment programme. Environmental impact assessment is carried out by UAB "Vilnius Consult" (Vokiečių str. 12-3, Vilnius, phone: 8 5 2395066, fax: 8 5 2395067). The following assessment subjects shall analyse the prepared assessment programme on an environmental impact and assessment report on environmental impact and will present their findings: Vilnius County Governor's administration, the Municipality of Vilnius District, Municipality of Vilnius City, Vilnius Public Health Centre, Vilnius territorial unit of Cultural Heritage Department, Fire and Rescue Service of Vilnius city, Fire and Rescue Service of Vilnius District. The decision, whether the modernization of second track is permissible at the chosen location, will be made by Environmental Protection Department of Vilnius Region.

The programme on environmental impact assessment of the contruction of second track on the sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai is available from February 13 until March 3 at UAB "Vilnius Consult" (Vokiečių str. 12-3, Vilnius).

Motivated proposals concerning the programme environmental impact assessment for modernization of track on the sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai may be delivered to UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius, phone: 8 5 2693300, fax: 8 5 2,692,028th Additionally, the copies of proposals may be submitted to the environmental impact assessment bodies and the responsible authority. Fax: 8 5 2692028, e-mail: audrius@vilniusconsult.lt.

Motivated proposals for assessment programme on environmental impact has not been received. The approved assessment programme on environmental impact see in Annex No16.

The project on the second track construction on the sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai was presented at elderates of Pagiriai, Juodšiliai and Šatrininkai (see minutes in the documents attached).

Conveyance at the stage of report preparation

The EIA organiser of documents has announced about the target railway modernization project, the prepared report by EIA and where, when and till when it is possible to have a look at it in the newspaper "Vilniaus diena" ("Vilnius Day") (Annex 16):





About the prepared assessment report on the environmental impact of the second track sections Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai

Customer of target economic activity – AB "Lithuanian Railways", Mindaugas str. 12/14, LT-2600 Vilnius, phone: 8 5 2693300, fax: 8 5 2692028.

EAI organisator of documents on target economic activities – UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius, phone: 8 5 2 3 9 5 0 6 6.

Name of target economic activity – Technical assistance (design) for the second sections of track construction Kyviškės-Valčiūnai and Vaidotai (Pušynas)-Paneriai.

Site of target economic activity – target second track section under modernization falls within the territories of Vilnius county – Vilnius city and district municipalities.

EAI subjects –EAI documents shall be analysed and the findings shall be presented by: Vilnius County Governor's administration, the Municipality of Vilnius District, Municipality of Vilnius City, Vilnius Public Health Centre, Vilnius territorial unit of Cultural Heritage Department, Fire and Rescue Service of Vilnius city, Fire and Rescue Service of Vilnius District. The decision, whether the modernization of second track is permissible at the chosen location, will be made by Environmental Protection Department of Vilnius Region.

To take a closer look at the EAI report – at UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius, phone: 8 5 2395066, during workdays and working hours.

Public introduction of EAI report to society – will take place in sessional hall of municipality of Vilnius district on 11th June, at 5 pm.

Motivated proposals on EAI issues may be delivered - in writing to UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius or by e-mail: audrius@vilniusconsult.lt.

The public was informed and took part in the process of assessment on environmental impact of Vilnius railway bypass modernization in accordance with the Order No D1-370 approved by Ministrer of Environment of LR on 15 July 2005 "The description of procedure on public awareness and participation in the planning of economic activities during the environmental assessment process" (Official Gazette, 2005, No 93-3472, 2008, No 143-5740). According to the above mentioned description, the public was informed about the initial ("Vilniaus Diena", 29/11/2008, page 25.) and the final conclusion concerning the selection ("Vilniaus Diena", 31/12/2008, page 20.) whether it is obligatory to assess the environmental impact of target economic activity, on the program prepared by the EIA ("Vilniaus Diena", 13/02/2009, page 13), it has also been informed ("Vilniaus Diena", 27/05/2009, page 13, on the notice boards of Vilnius district municipality, elderships of Juodšiliai, Rudamina, Nemėžis) and participated (session hall of municipality of Vilnius district, 11/06/2009) during the public introduction of EIA report on the target economic activity.

Considering the importance and the scope of Vilnius railway bypass modernization project and in order to inform the public in detail, organisators of environmental impact assessment report, additionally, the representations of project solutions were organized to the representatives of Vilnius District Municipality and elders together with the Project manager and AB "Lithuanian Railways", where the project was presented in detail and feedback and suggestions were heard.

As it was mentioned, presentation in public was held in session hall of Vilnius district on 11 June 2009. The EIA organisers, Project Manager, representatives of AB "Lithuanian Railways", the employees of Vilnius District Municipality and elderships, representatives of local communities and local residents took part in that presentation. Target economic activity and its possible adverse effects and possible mitigation measures were presented during the public presentation. All the attendance was informed that they still have 10 working days to present their motivated suggestions and requests. After the presentation of project, a discussion followed, the questions of concern of the attendance were answered.





During the term of 10 working days provided for by the Order Nr. D1-370 approved by the Minister of Environment of LR on 15 July 2005 " The description of procedure on public awareness and participation in the planning of economic activities during the environmental assessment process" (Official Gazette, 2005, No 93-3472, 2008, No 143-5740), both AB "Lithuanian Railways" and the EIA organiser UAB "Vilnius Consul" received 18 motivated proposals. Some of them were personal, and others - on behalf of the community. The most common complaints were on the railway noise and vibration. All the motivated suggestions were answered in writing, as it is provided by legislation, and sent by registered mail to the people who presented their suggestions or representatives of communities. All the responses prepared by EIA to the motivated suggestions were agreed in writing with responsible staff of AB "Lithuanian Railways".

Annex No 16 includes:

1. Copies of advertisements in media, 2 pages;

2. Copies of notices at elderships and administration of Vilnius district municipality, 1 page;

- 3. Copy of the minutes of public discussion, 3 pages;
- 4. Copy of list of participants in public discussion, 3 pages;
- 5. Copies of received motivated proposals, 25 pages;

6. Copies of prepared and sent answers (with attachments) to motivated proposals, 119 pages;

7. Copies of approval by AB "Lithuanian Railways" on prepared and sent answers (with attachments) to motivated suggestions, 3 pages.

Conveyance about the decision-making

The customer shall inform the public in accordance with the laws after the reception of the decision on the EIA report from responsible authority.



8

FINDINGS OF WORKING GROUP



- 1. Development of Lithuanian economy and integration into the European Union these are the determinant factors in positive dynamics of traffic and intensity. If the traffic increases, the environmental impact also grows in proportion;
- 2. Implementation of the project is necessary because of growing traffic, increasing impact on the environment and humans, deteriorative traffic safety conditions;
- 3. Environmentally, we value the project as a local, having no significant impact on the global and regional environmental changes. Significant negative impact on the health of people living at the railway is unpredictable;
- 4. After the implementation of the project and proposed mitigation measures for a possible negative impact, it will be significantly reduced by the currently existing and daily inevitably felt impact on the natural environment and humans in Vilnius city / district;
- 5. The installation of modern railway infrastructure which meets all the environmental, safety and infrastructural requirements of EU in Lithuania will ensure environmentally friendly, cost-effective and safe railway operation in the future.



9

LIST OF REFERENCES

1. Law No VIII-1636 on assessment of target economic activity on environmental impact. (Official Gazette, 2005, No X-258).

2. Order No D1-665 by the Minister of Environment "Regarding to the approval of methodical guidelines for the selection of target economic activity" of 30 December 2005-12 (Official Gazette, 2006, No 4-129).

3. Order No D1-636 by the Minister of Environment "Regarding to the approval of provisions for preparation of assessment programme and report on environmental impact" of 23 December 2005. (Official Gazette, 2006, No 6-225).

4. Order No D1-370 by the Minister of Environment "Regarding to the approval of description process of public conveyance and participation in the assessment procedure of target economic activity on environmental impact" of 15 July 2005 (Official Gazette, 2005, No 93-3472).

5. Law No . VIII-787 on the waste management. (Official Gazette, 1998, No 61-1726).

6. Order No 722 by the Minister of Environment "Regarding to the replacement of Order No 217 by the Minister of Environment of 14 July 1999 "On the Rules for waste management" of 30 December 2003 (Official Gazette 2004, No 68-2381).

7. Law No VIII-1641 on chemical materials and preparations (Official Gazette, 2000, No 36-987).

8. Order No 64 by the Director of Fire and Rescue Department under the Ministry of Internal Affairs of LR " Regarding to the approval of general fire safety regulations and recognition of some orders spent by the director of Fire and Rescue Department under the Ministry of Internal Affairs" of 18 February 2005 (Official Gazette, 2005, No 26-852).

9. Order No V-520 by the Minister of Health of LR "Regarding to the approval of Lithuanian Hygiene Standard HN 33-1:2003 "Acoustic Noise. Permitted levels in residential and working environment. General requirements for measuring procedures" of 2003-09-03. " (Official Gazette, 2003, No 87-3957).

10. Order No 342 by the Minister of Environment of LR "Regarding to the reduction and control of industrial noise" of 27 June 2002 (Official Gazette, 2002, No 70-2941).

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VILNIUS CONSULT Engineering consulting

10 ACCOMPANYING DOCUMENTS, ANNEXES





Ministry of Environment of the Republic of Lithuania Vilnius region environmental department

2010-03-26 No.VR-1.7-509 to 2010-02-26 No.G7/VC/100226/114

UAB "Vilnius Consult" 2010-0 AB "Lietuvos geležinkeliai" to 2010-02 Vilnius county governor's administration Vilnius district municipality administration Vilnius city municipality administration Vilnius district fire and rescue board Vilnius public health centre Department of cultural heritage under the Ministry of culture, Vilnius territorial division

DECISION CONCERNING THE POSSIBILITIES OF THE CONSTRUCTION OF SECOND RAILWAY TRACK IN VILNIUS RAILWAY BYPASS ON SECTIONS KYVISKĖS- VALCIŪNAI IR VAIDOTAI (PUSYNAS)- PANERIAI

1. The Customer of planned economical activity

AB "Lithuanian Railways", Mindaugo str. 12/14, LT 03603 Vilnius, tel. 8-5-2693300, fax. 8-5-2692028.

2. Drawer of the documents for environmental impact assessment

UAB "Vilnius Consult", Vokieciu str. 12-3, LT-01130 Vilnius, tel.:(85) 239 5066

3. Name of planned economical activity

Construction of second railway track in Vilnius railway bypass on sections Kyviskes-Valciunai and Vaidotai (Pusynas) – Paneriai

4. Place of planned economical activity

Vilnius city and Vilnius district municipalities, Vilnius County.

5. Description of planned economical activity

Implementation of the planned economical activity is prospective in a territory of Vilnius city municipality and Vilnius district municipality. It is planned to modernize a 25,616 km length route strip of Vilnius railway bypass, by building a second track, which common width with existing track will be 7,460m.Works will be implemented in a railway land territory, by widening existing track formation or building a new one for the construction of second track. It is planned to demount existing junction track Vaidotai- Paneriai beside the Paneriai memorial towards Lentvaris and to build new track roads (1,540km) through the Paneriai forest as it is planned in Vilnius city General Plan to the years 2015. Territory planning document (Detail Plan) will be prepared for this route, also it is prospective to take a land for the society needs and change the main objective land usage purpose. Common length of track modernization is approximately 27,156km. These passenger train stations are in a track of Vilnius railway bypass that is being modernized: Kyviskes, Valciunai, Vaidotai, Pusynas, Paneriai and also these cargo train stations: Kyviskes, Nemezis, Valciunai, Vaidotai, Pusynas and Paneriai. Vilnius railway bypass crosses rivers and streams: Kyve, Saternikis, Murle, Nemeza. After implementation of second railway track there will be a possibility to direct cargo train traffic away from Vilnius centre.

Reconstruction and modernization project of Vilnius railway bypass includes these main works:

- Construction of second track in routes Kyviskes- Valciunai and Vaidotai (Pusynas)- Paneriai;
- Removal of weak spots of railway track formation;
- Restoration/ renovation of existing track formation for objective speed to 80 km/h and to 25t axle workload;





- Earthworks, restoration/ renovation of drainage system;
- Adjustment of signaling, telecommunications and power supply systems due the changed tracks layout. Adjustment of surface contact network system in Paneriai according to the modified rail tracks layout.
- Changing of switches, increase of deflection speed in Paneriai and Kyviskes stations including geometric modifications of rail track.
- Realignment of line routes in places where at the moment existing curve geometry does not meets the requirements of line speed 80km/h;
- Increase of horizontal and vertical railway curves.

6. Description of measures that are planned for the avoidance of the negative impact for the environment, and decrease, compensate or liquidate its consequences.

6.1 It is planned to install cleaning equipment for surface water sewage and design water collection trenches up to the cleaning equipment beside Nemeza river which is crossed by a railway line in two places. Installation of catcher of oil products is planed beside II and III security zone of Aukstieji Paneriai watering place and beside place of planned construction of a new railway track.

6.2 Acoustic walls (planned tentative length ~4,9km) will be built near the groups of houses for the minimization of noise and in separate houses it is planned to change windows into the windows with higher acoustic isolation. Beside Rudamina village it is possible to build an embankment (approximately 800m).

6.3 During the planned economical activity it is prospective to extend and clean culverts that are in bypass route.

6.4 All waste that will emerge during the period of all construction and maintenance will be placed on waste handling company's disposal.

7. Submitted conclusions of environmental impact assessment subjects:

7.1 Vilnius public health centre approves the report of the environmental impact assessment and possibility of planned economical activity with a letter 2009-12-31 No. (12-30)-12.30-10.

7.2 Vilnius district fire and rescue board approves the report of the environmental impact assessment and possibility of planned economical activity with a letter 2009-12-11 No.3-8-2420(1.10.-4)

7.3 Department of cultural heritage under the Ministry of culture, Vilnius territorial division submitted a conclusion with a letter 2009-11-10 No.(1.40.V)-2V-957: planned economical activity is possible considering the security of cultural objects, we approve the report of environmental impact assessment for planned economical activity. We recommend to indicate in a project on changing the windows into the windows with higher acoustic isolation (according to the Annex No.8) that new windows would have the same frame form as authentic wooden ones.

7.4 Vilnius county governor's administration approves the report of the environmental impact assessment and does not contradicts to the possibility of planned economical activity with a letter 2009-11-30 No. (80)-1.2-2925-(3.31)

7.5 Vilnius city municipality administration approved the report of the environmental impact assessment and possibility of planned economical activity with a letter 2009-11-16 No. A178-28(2.3.1.3-AD13)

7.6 Vilnius district municipality administration approved the report of the environmental impact assessment and possibility of planned economical activity with a letter 2010-02-11 No. A33-835-(4.15)

8. Informing and involvement of public

Discussion with the society was organized because of environmental impact assessment report for project "Construction of second railway track in Vilnius railway bypass on sections Kyviskes- Valciunai and Vaidotai (Pusynas) – Paneriai ". An announcement which invites representatives of the society to come into the dicussion about the environmental impact assessment report for project "Construction of second railway track on sections Kyviskes- Valciunai and Vaidotai (Pusynas) – Paneriai of second railway track on sections Kyviskes- Valciunai and Vaidotai (Pusynas) – Paneriai of Vilnius railway bypass" was plastered in a newspaper "Vilniaus diena" on 2009-05-27. Announcements were also published on notice boards in Pagiriai, Juodsiliai,





Rudamina, Nemezis and Satrininkai elderships and Vilnius district municipality. Public introduction with the environmental impact assessment report occurred on 2009-06-11 in a councilchamber of Vilnius district municipality. Additionally presentations about project solutions were organized for representatives of Vilnius district municipality and for the monitors of elderships. After public introduction with the report, Customer of planned economical activity and drawers of EIA report received 18 motivated offers from the society. Generally people were complaining about noise and vibration that appears from the railway. It was answered in written form to all motivated offers.

After receiving the report for the decision, Vilnius regional environmental protection department (hereinafter RAAD) announced to the society about analyzing EIA report for project "Construction of second railway track on sections Kyviskes- Valciunai and Vaidotai (Pusynas) – Paneriai of Vilnius railway bypass" on 2010-01-06 in Websites of Ministry of Environment and Vilnius regional environmental protection department. They indicated the date until when society had right to apply (in written form) to the responsible institution and EIA subjects and to submit information about possible breaches concerning determination, describing and evaluation of possible impact for the environment occurred by a planned economical activity or during the implementation of EIA procedures. Any remarks, offers and claims from the society were not received during the whole process of environmental impact assessment.

9. International consultancy

International procedures of environmental impact assessment are not applied for planned economical activity.

10. Main motives that were referred during the acceptance of decision

10.1 Importance of the impact of planned economical activity implementation was identified for exsiting and potential "Natura2000" territories. Nearest protected territory "Natura 2000" is in a 2 km distance away from planned economical activity. State service for protected areas under the Ministry of Environment submitted a letter 2008-12-11 No. V3-10.7-2874 with conclusion that implementation of planned economical activity can not have a meaningful impact for "Natura 2000" territory and in this regard it is not obligatory to prepare environmental impact assessment for planned economical activity.

10.2 After the modernization of railway more modern trains will be maintained, train speed will increase, and standing time will be shorten and hereby air pollution will decrease. Building of railway infrastructure that meets EU environmental requirements and also traffic security and infrastructure requirements will ensure that Lithuania's railway transport maintenance in a future will be environmental friendly, economically beneficial and safe.

10.3 It is planned to build new or reconstruct sanded trenches in a trackside, for cleaning the surface sewage form railway track formation. Near the sensitive nature objects, water collected from trackside trenches will be cleaned.

10.4 Measures for minimization of train exhausted noise in a habitat area are planned – acoustic walls, embankment and windows with higher acoustic isolation.

11. Decision

AB "Lietuvos gelezinkeliai" planned economical activity - Construction of second railway track on sections Kyviskes- Valciunai and Vaidotai (Pusynas) – Paneriai of Vilnius railway bypass– according to submitted environmental impact report is allowable.

Director

Rolandas Masilevicius

Jurate Keburyte, tel. (8 5) 210 2492, email: j.keburyte@vrd.am.lt





ADMINISTRATION OF VILNIUS REGION MUNICIPALITY

2009-12-07 No. A33-4980-(4.15) to 2009-11-04 No. G7/VC/091103/54

UAB "Vilnius Consult" Vokiečių str. 12-3 Vilnius

Considering environmental impact assessment report of planned economical activity

After analyzing your submitted environmental impact assessment report of construction of Vilnius railway bypass sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track because of planned economical activity, we approve it.

Also we inform that all traffic safety and control measures for warranting safe crossing for cars and pedestrians through the double line railway should be planned in preparation of second railway track project.

Director of administration

Liucina Kotlovska

Gražina Jarmalkovič, tel. 273 4691





DEPARTMENT OF CULTURAL HERITAGE UNDER THE MINISTRY OF CULTURE VILNIUS TERRITORIAL DIVISION

2009-11-10 No.(1.40.V)-2V-957 to 2009-11-04 No. G7/VC/091103/54

UAB "Vilnius Consult" Vokiečių g. 12-3 01130 Vilnius

Concerning the report of environmental impact assessment

After we analyzed your submitted environmental impact assessment report and appendixes of construction of Vilnius Bypass railway sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track, we drew a conclusion:

- Planned economical activity is possible considering the protection of culture values;
- We approve the environmental impact assessment report of planned economical activity;
- We recommend to point out in project arrangement acts of window changing into windows of greater acoustic parameters, that by changing windows, existing authentic wooden window frame form would remain the same.

Head of Vilnius territorial division

Rimantas Bitinas

Rasa Trapikienė, 272 4069, e-mail r.trapikiene@heritage.lt





VILNIUS CITY MUNICIPAL GOVERNMENT ADMINISTRATION ENVIRONMENT PROTECTION DIVISION

UAB "Vilnius Consult" Vokiečių g. 12-3 LT-01130 Vilnius

Due the report of environmental impact assessment

Republic of Lithuania Law of environmental impact assessment of planned economic activity (Žin., 1996, No.82-1965; 2005, No.84-3105) (further EIA law) regulates duties and authorities for drawers of environmental impact assessment report and for other subjects that are participating in a process of environmental impact assessment.

One of the Subjects – Vilnius city municipal government administration, according to 6 chapter of EIA law, analyzes and verifies if questions, which are in the competence of administration, are planned in the programme and are properly analyzed in a report and gives their conclusions to Organizer (Customer) of planned economical activity or his liable drawer of EIA documents along with conclusions of the report and possibilities of planned economical activity, which are ment for managing authority - the Ministry of Environment of the Republic of Lithuania

Ministry of Environment as a managing authority, referred to 10 chapter of EIA law after analyzing the report, conclusions given by EIA subjects concerning the report and possibility of planned economical activity and sound evaluation of public suggestions, decides if planned economical activity according to its structure and environmental impact is allowed in a selected area

Environment Protection Division of Vilnius City Municipal Government Administration, according to EIA law, has analyzed the report of environmental impact assessment and approves to the environmental impact assessment report of "Technical assistance for construction of railway sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track" project and possibility of planned economical activity. Executor of planned economical activity must consider motivated public suggestions about environmental impact assessment of planned economical activity and possible environmental impact in physical, social and economical aspects.

Head of Division

Vita Braškienė

Rasa Pajarskienė, 211 2843, el.p. rasa.pajarskiene@vilnius.lt





VILNIUS COUNTY FIRE AND RESCUE BOARD

2009-11-17 No. 3-17-2240 (8.48-17) to 2009-11-04 No. G7/VC/091103/54

UAB "Vilnius Consult" director Daiva Vitkutė

Vokiečių g. 12-3 LT-01130 Vilnius

Concerning the report of environmental impact assessment

We inform that after analyzing your submitted environmental impact assessment report of construction of Vilnius Bypass railway sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track, we can not approve it. We ask to specify in the 5^{th} chapter what extreme situations were examined considering the rescue service and their available facilities and are they adequate for liquidation of possible accidents.

Director

Rimantas Steponavičius

Original document will not be sent

V. Brigevičius, tel. (85) 271 7542, e-mail v.brigevicius@vpgt.lt





VILNIUS COUNTY FIRE AND RESCUE BOARD

2009-12-11 No. 3-8-2420 (1.10.-4) to 2009-10-23 No. G7/VC/091208/83

UAB "Vilnius Consult" director Daiva Vitkutė

Vokiečių g. 12-3 LT-01130 Vilnius

Due the report of environmental impact assessment

We inform that we have explored your prepared environmental impact assessment report of Vilnius Bypass railway's second road's construction section Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai. We approve to environmental impact assessment report and planned economical activity.

Director

Rimantas Steponavičius

Roaldas Kepalas, tel. (85) 271 7532





VILNIUS COUNTY GOVERNOR'S ADMINSITRATION

2009-11-30 No. (80)-1.2-2925-(3.31) to 2009-11-04 Nr. G7/VC/091103/54

UAB "Vilnius Consult" Vokiečių g. 12-3 LT-01130 Vilnius

Concerning the report of environmental impact assessment

Vilnius county governor's administration, according to the Republic of Lithuania law of environmental impact assessment of planned economic activity (Žin. 2005. Nr. 84-3105), has analyzed environmental impact assessment report of AB "Lietuvos geležinkeliai" planned economical activity in construction of railway sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track and are now adjusting it. Furthermore the administration does not object the planned economical activity.

County governor

Jonas Vasiliauskas

Laima Petrauskienė, tel. (8-5) 231 25 83, e-mail.: laima_petrauskiene@vilnius.aps.lt





VILNIUS PUBLIC HEALTH CENTRE

2009-12-02 No. (12.32)-12.32-27

UAB "Vilnius Consult" Vokiečių g. 12-3, Vilnius

Concerning environmental impact assessment report of construction of Vilnius Railway Bypass sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track

Information about report's of environmental impact assessment to planned economical activity drawer: UAB "Vilnius Consult", Vokiečių str. 12-3, Vilnius, tel 8-5-239-50-66.

Organizator of planned economical activity: AB "Lietuvos geležinkeliai", Mindaugo str. 12/14, Vilnius

Name of planned economical activity: construction of Vilnius railway bypass sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track

Place of planned economical activity: Vilnius region territory.

Evaluation of environmental impact assessment report of planned economical activity:

It is planned to modernize route of Vilnius Railway Bypass. Construction of second road in sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai is projected. There are these stations of passenger trains in a route: Kyviškės, Valčiūnai, Vaidotai, Pušynas ir Paneriai; stations of cargo trains: Kyviškės, Nemėžis, Valčiūnai, Vaidotai, Pušynas and Paneriai. These modernization works are planned:

Reconstruction of station tracks in Kyviškės: Arrangement of layout of tracks near new switch's layout.

Two new tracks will be constructed in route Kyviškės- Nemėžis (0 km - 10,550 km) from 0 to 500m into direction to Valčiūnai by mounting new track formation.

Moving of existing single rail line from 500 to 1,030 is planned by moving it 1 m into south side and new second line will be constructed in nearby, which will not trespass the limits of railway land zone.

Route is on the same track from 1,030 km to 4,950km, and on the south side of existing track a new second line will be constructed, which will not trespass the limits of railway land zone. Considering the construction of second track, prolongation and adjustment of two road crossings of regional importance are planned on 1,250 km and 3,650 km.

Moving of existing track to south side from 4,950km to 6,750km is planned and construction of second road, , which will not trespass the limits of railway land zone, except a ~100m strip in 5930-6,050km where route marginally goes out from railway land zone.

Route is in the same track from 6,750km to 10,550km, and new second line will be constructed in south side of existing line, which will not trespass the limits of railway land zone. Considering of construction of second track, prolongation and adjustment of two road crossings of regional importance are planned on 8,948 km and 10,230 km.

Route is in the same track from 10,550km to 11,900km through the station of Nemežis, deviated track of north third station will be demounted and new second rail line will be constructed in south side of a track.

Moving of existing track to south in strip of Nemėžis- Valčiūnai (11,900km- 21,150km) from 11,900 km to 12,750 km is planned and new second line will constructed, which will not trespass the limits of railway land zone.

Route is in the same track from 12,750 km - 17,550 km, rail line that will be new constructed switches to north side, which will not trespass the limits of railway land zone.





Considering the construction of second track, prolongation and adjustment of road crossing of regional importance is planned on 13,515 km. New bridge construction instead of existing bridge is planned on 15,150km., because of bad technical conditions.

Moving of existing track to north from 17,550km to 17,850km is planned and line which will be new constructed again switches into south side and which will not trespass the limits of railway land zone.

Route is in the same track from 17,850 to 21,150km, and new second track will be constructed in south side from existing line and which will not trespass the limits of railway land zone. Considering of construction of second road, prolongation and adjustment of road crossings of regional importance (Vilnius-Lyda) is planned on 18,455 km.

Moving of existing track to south side in Valčiūnai station (21,150km -22,850km) from 21,150km to 21,850 km and new construction of second track is planned and which will not trespass the limits of railway land zone. Prospective crossing located in 21,586 km will be transferred and prolonged.

Route is in the same existing double rail line from 21,850km to 22,850km, by reconstructing lay of station lines switches, by scheduling installation of protective spurs and reconstruction of existing tracks.

New double rail line to the direction Vaidotai will be constructed which will not trespass the limits of railway land zone, in strip Valčiūnai-Vaidotai (22,850km - 25,000km) from 22,850 to 23,400 km.

Triple rail line to Vaidotai begins on 23,400 km, and leaves existing line in a right side and two new rail lines will be constructed in a nearby. New track formation will be built in whole strip of new constructed tracks.

Reconstruction of Vaidotai station tracks from 24,500 km to 25,000 km are planed.

Route from Vaidotai station is in the same existing double rail line until Pušynas station in strip Vaidotai (Pušynas)- Paneriai (0-9,016km) from 0km to 2,700 km. Reconstruction of tracks are planned.

New layout of tracks is planned from Pušynai station towards to Paneriai. Existing connective line Vaidotai- Paneriai towards to Lentvaris is planed to be disassembled and instead of it new double rail line which will integrate to main Vilnius- Kaunas line, will be constructed. Considering the layout of changed tracks connective line Pušynas- Paneriai will be moved of existing track. Considering of construction of new double rail line new construction of one bridge and one auto-overpass is planned.

It is planned that Vilnius Railway bypass route after realization of project solutions will warrant speed up to 80 km/h for cargo trains.

Health examination of environmental impact assessment for construction of railway sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai programme was made in Vilnius public health centre with protocols of health examination for design documents (2009-02-26 No. (12-29)-12.29-3 and 2009-04-23 No. (12-29)-12.29-4). It is planned to measure new sanitary zone in a repeatedly submitted programme, according to the order No. V-586 "Evaluation of sanitary security zones and regime regulations" that is verified by health security minister of Republic of Lithuania on 2004-08-19. It is determined in 20.4 item of this law that sanitary security zone of railways is 100m.

Calculations of environmental air pollution in EIA report was made by using ADMS Urban model and also exhaust of pollution amount because of locomotives. Air quality is valuated in years 2009 and 2015 considering to a new locomotives stock. After analyzing pollution concentrations distribution of railway transport (carbon black, nitrous oxides, sulphur dioxide, volatile organic compounds) in impact area and in environment air near the households, it is estimated that these concentrations will not exceed limit values. Means for minimizing air pollution is not planned in this project.

Physical pollution- noise level in habitable territory and means for minimizing noise level was estimated in EIA report. Modeling of noise level was made by using predicted noise





programme CadnaA and also calculations of noise dose were made in present and forward situations (2008 and 2015). There are 169 households and 406 people that are in a higher noise zone. It is planned that after realizing a project and after using compensatory means for noise minimizing, people who lives near the railway track will get smaller noise dose than it was until the realization of the project. There are still 59 detached households which after building noise fences are in higher noise level zone. Considering given information after building the noise fences and increasing of train traffic additionally 2 households will get the same noise dose, when noise level is 60-65 dBA, and in a noise zone 55-60dBA the same noise dose will affect 21 households lesser than in previous situation. After building acoustic walls in a villages noise level will decrease until allowable level in a night time (55dBA).

62 detached houses that are in a higher noise dispersion zones were identified and arrangement acts of "Windows change of into higher acoustic parameter windows" (6 appendix of the report) was prepared for each house, but any specifications of prospective windows were not submitted.

It is planed to minimize negative impact of noise to health and vibrations by applying these measures:

Change of old locomotives into new locomotives that satisfies standards of international union of railways (UIC); Grinding of rail stock (cars and diesel locomotives) axle wheels; Replacement of metal brake shoes with brake shoes made from composite materials, which are recommended by international union of railways (UIC) in freight cars; Usage of continuous welded rail in railway track construction; Grinding of rails; Preparation of modern track bed; Choosing a proper geometry of railway tracks, preparing the excavation for railway tracks, installation of noise absorbing barrier with high acoustic isolation (- 30 dBa), installation of noise absorbing barrier with low acoustic isolation (-6 - -9 dBa), with a possibility to install barrier on both sides of the railway track; Planting of noise-reducing flora in individual household territories (-5 dBa); Installation of windows with a higher acoustic isolation which have noise-stopping vents in individual households facing railway; Noise observation.

After executing an interview with residents in a territory of planned economical activity, it is ascertained that 80% of respondents are approving modernization of railway and project of second track construction by installing negative impact minimizing measures. 70% of respondents noted that planed economical activity will not have negative impact to their life quality and health.

Information, that EIA drawer after estimating that new windows with better acoustic parameters will be installed in houses located in a higher noise spread in a nighttime zone, (-30 dBA) and then noise will decrease until allowable level and noise will be decreased with planting homesteads in a habitable environment, is given in a report. Also drawer of the report measured that sanitary zone in a habitable environment matches with noise spread isolation line 60 dBA (if it will be planted, noise will decrease to 55dBA) that is 100m from axis of a railway (appendix 6). It is also said in a report that fixed 100 m sanitary zone satisfies the law "Considering affirmation of evaluation of sanitary security zones and regime regulations" on 2004-08-19 No.V-586 verified by health security minister of Republic of Lithuania, fixed 100 m sanitary security zones in railway, when environmental impact assessment is not executed. So it is not clear what sanitary security zone are appointed. Sanitary security zone lines are not shown in a graphic material of the report.

Also detail information about planned protective strips of plants near to the detached residential houses, structure of plant strips, length and width of strips and its minimizing parameters and its installation places is not given.

Increased and dangerous pollution of soil and surface water is not intended by pursuing planned economical activity, so impact to health is not analyzed in these aspects. Though information given in the report shows that railway line will cross Aukštieji Paneriai watering-place territory. Detailed information about sanitary security zones of this IIb subgroup water-place is not given and possible negative impact of planned economical activity for water quality is not evaluated.





Community was informed and participated in a process of environmental impact assessment of Vilnius railway bypass modernization, according to "Order declaration of notification to community and participation in a process of environmental impact assessment of planned economical activity" (Žin. 2005, No. 933472; 2008, No. 143-5740) verified by republic of Lithuania minister of Environment on 2005-07-15. Community was informed about the primary (2008-11-29 "Vilniaus diena") and final selection conclusion (2008-12-31 "Vilniaus diena") if it is ordered to evaluate environmental impact assessment of planned economical activity, about the EIA programme (2009-05-27 "Vilniaus diena"), also community was informed about prepared report (2009-05-27 "Vilniaus diena", municipalities of Vilnius region, notice boards in Pagiriai, Juodsiliai, Rudamina, Nemezis and Satrininkai districts.)

Public presentation of EIA report of planned economical activity was introduced on 2009-06-11 in conference hall of municipality of Vilnius region. People have said their opinion about acoustic walls, higher acoustic parameters windows, isolation of buildings and embankment in Rudamina.

It is planned to consider it in comment answers, though this information is not given about some part of comments in a EIA report. For example by evaluating possibility to construct protective embankment in Rudamina, efficiency of noise minimizing calculation for this kind of engineer building is not done, information about its possible parameters is also not given

The Conclusion: we do not approve environmental impact assessment report of construction of Vilnius Railway Bypass sections Kyviškės- Valčiūnai and Vaidotai (Pušynas) – Paneriai of the second track and possibility of planned economical activity.

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