

Development of the
electric public transport in
Szeged

Non-technical summary

Report

March, 2008

Development of the electric
public transport in Szeged
Summary of the
Environmental Impacts
Report

March, 2008

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List of Abbreviations

EM	Ministry of Health (Egészségügyi Minisztérium)
FVM	Ministry of Agriculture and Rural Development (Földművelésügyi és Vidékfejlesztési Minisztérium)
KHVM	Ministry of Transport, Communication and Water (Közlekedési, Hírközlési és Vízügyi Minisztérium)
KöM	Ministry of Environment (Környezetvédelmi Minisztérium)
KvVM	Ministry of Environment and Water (Környezetvédelmi és Vízügyi Minisztérium)
IPPC	Integrated Pollution Prevention and Control
EIA	environmental impact assessment
ER	environmental report (of the environmental impact assessment)
LTI-ENW	Lower Tisza Inspectorate for Environment, Nature and Water (Alsó-Tisza-vidéki Környezetvédelmi, Természetvédelmi és Vízügyi Felügyelőség)
NTS	Non Technical Summary
CO	Carbon monoxide
dB(A)	A-weighted sound level
EIA	environmental impact assessment
ER	environmental report (of the environmental impact assessment)
NO _x	Nitrogen oxides
PM ₁₀	Particulate matter (airborne dust)
pSCIs	proposed Sites of Community Interest
SAC	Special Areas of Conservation
SCI	Sites of Community Importance
SPA	Special Protection Areas for birds
SO ₂	Sulphur dioxide

1 EXECUTIVE SUMMARY

Introduction, aim of the project

The purpose of the project titled “Szeged Electric Public Transport Development” is to improve the service standards of urban public transport, stop the deterioration of community transport.

The primary aim of this study is to describe and evaluate the impacts of the project on the environment. The study serves as a background document of the Grant Application to the Cohesion Fund. This analysis has been prepared on the basis of the documentation of preliminary reports, environmental report, as well as the environmental chapters of the building permit documentations.

The project aims to develop electric community transport in Szeged by renewing and extending some of the tram and bus lines, establishing new trolley bus lines, improving the infrastructural background.

The project contains the following elements:

- Development of tram line 1
- Development of the new tram line 2
- Development of tram line 3
- Development of tram line 4
- Development of the tram depot in Pulcz Street
- Development of the trolley bus depot in Csáky Street
- Extension of trolley bus line 8
- Construction of trolley bus line 10
- Preference to community transport
- Energy supply
- Construction of B + R bicycle storage racks
- Passenger information, ITS

Permitting procedures

In the case of activities having significant or expectedly significant impacts on the environment, environment impact assessments are to be performed. The list of activities that are subject to the obligation to perform such environmental impact assessment and those expected to have significant impacts on the environment is provided in Appendix 1 and 3 of Government Decree 314/2005 on „Environmental Impact Assessments and IPPC Procedure” respectively.

None of the planned activities falls within the scope defined in Appendix 1 to Government Decree 314/2005, the construction of the new tram line 2, the de-

velopment of the tram depot and the development of the trolley bus depot belong to Appendix 3.

On the basis of the preliminary report for the construction of the new tram line 2, the competent environmental authority has evaluated the expected environmental impacts as significant, and thus required the performance of an environmental impact assessment. According to the authority, the development of the tram depot and the trolley bus depot does not trigger significant environmental impacts, and therefore has not ruled for the performance of environmental impact assessment.

For the implementation of tram line 2, the environmental report has been prepared in 2007. The environmental permit is expected to be issued in the first half of 2008.

For activities that do not fall within the scope of Government Decree 314/2005, the environmental criteria are to be enforced in the course of the building permit procedures. During the building permit procedures, the environmental authority will act as expert authority.

Baseline conditions

The air quality of Szeged is significantly influenced by traffic. The structure of the town is based on a network of circular and radial roads, the communication network is strongly overloaded. 80–85% of the vehicles are passenger cars. Limit value exceedance is mainly generated by nitrogen oxides and airborne dust.

The noise level of Szeged is primarily determined by noise originating from traffic. Along the most important main roads of Szeged, noise levels exceed the limit values considerably.

The project elements will be implemented in densely populated urban environments. In the direct surroundings of the planning area, no nature conservation areas of local significance or Natura 2000 areas can be found.

Expected environmental impacts in operations

While environmental impacts in the construction phase will only be temporary, those in the operation phase will be present over the total lifetimes of the facilities. When evaluating the environmental impacts of the planned activities, it is to be considered that all the project elements will be implemented in the inner area of Szeged, in urban, built-in environments.

Construction of the new tram line 2: The environmental impacts of the planned activities have been assessed in course of an environmental impact assessment. The environmental report has made the following findings: the impacts of the activities on the soil, surface waters and groundwater cannot be deemed as significant. In view to air quality, the construction of the tram line will slightly improve the conditions in the impact area. According to the noise calculations performed in the course of the impact assessment, noise level will be unchanged or slightly better in comparison to the current conditions.

Tram line developments: The reconstruction of the tram lines is not subject to preliminary assessment (or environmental impact assessment). The environmental impacts of the planned activities are described in the building permit documentations. In general, it can be stated that after the reconstruction works the environmental impacts of operations will remain unchanged, or swing slightly to the positive side.

Development of the tram and trolley bus depots: The planned development of the tram and trolley bus site is subject to the obligation to perform preliminary assessments. The environmental impacts of these activities are presented in the preliminary report approved by the environmental authority. According to the decision of the environmental authority, the developments do not cause significant environmental impacts. Neither of the developments involves the occupation of any additional area.

Development of trolley bus lines: It is also true for the development of trolley bus lines that environmental impact is expected to occur in the course of construction. In operations, no negative environmental impacts will emerge.

Construction related impacts

Such environmental impacts will occur in a limited scope of time and space. In the course of the construction works, environmental impacts can be generated by the movement of machines, transportation traffic, loading procedures, demolition activities. Yet, the environmental impacts will considerably depend on the frequency of transportation runs, the haulage routes, the types of the machines, vehicles used, etc. The duration of construction will not exceed 6 months for none of the project elements, and naturally within this period the individual construction processes will be even shorter.

Construction works will typically bring about increased levels of noise, as well as air pollution. In view to noise protection, within the construction area primarily demolition procedures and the movement of transportation vehicles can have an impact. In the areas affected by the transportation routes, noise arising from the increased traffic may cause problems. In view to air pollution, it is primarily the movement of transportation vehicles can trigger air pollution in the construction area and the roads affected by the transportation, while from other work processes – demolition, spreading of materials – primarily dust pollution can originate.

The extent of these impacts may be substantially mitigated with the application of the following measures: The transportation of materials should take place with the avoidance of rush hours and night construction works. To avoid dust pollution, the transportation vehicles should be covered to prevent airborne dust. With the use of street washers, dust pollution within the construction area can be reduced. Road surfaces connected with the construction area should be kept clean. Any mud or dust settled should be cleared.

2 PRELIMINARIES

2.1 Objective of the Assignment

One of the main priorities of New Hungary Development Plan¹ is the development of community transport. With the country's accession to the European Union in 2004, Hungary has gained access to the development grants furnished from the Structural Funds and Cohesion Funds.

The purpose of the project titled "Szeged Electric Public Transport Development" is to improve the service standards of urban public transport, stop the deterioration of community transport.

This summary report provides an overview on the results of the environmental impact assessment, building permit design documentations and other studies completed within the framework of the project. The study serves as a background document of the Grant Application to the Cohesion Fund.

2.2 Scope of the Work and Reviewed Documents

The most important permits, decisions and other documents related to environment are summarised in the following table. For the purpose of the summary of environmental impacts, the following documents have been used.

Table 1: Reviewed documents

No.	Documents
<i>I</i>	<i>Studies</i>
1	Preliminary report. Extension of tram line 1. July 2006. Cowi Mo. Kft.
2	Preliminary report. Development of the tram depot in Pulcz Street. June 2006. Cowi Mo. Kft.
3	Preliminary report. Development of the trolley bus depot in Csáky Street. June 2006. Cowi Mo. Kft.
4	Environmental Report (EIA). Construction of the new tram line 2. March 2007. UNITEF Zrt.

¹ Government regulation 1103/2006. (X. 30.) on the New Hungary Development Plan

No.	Documents
<i>I</i>	<i>Studies</i>
5	Summary of the Environmental Report (NTS). Construction of the new tram line 2. March 2007. UNITEF Zrt.
6	Gardening chapter of the building permit document. Construction of the new tram line 2. March 2007. UNITEF Zrt.
7	Environmental chapter of the building permit document. Reconstruction of tram line 1 and the overhead cable. March 2007. UNITEF Zrt.
8	Environmental chapter of the building permit document. Reconstruction of tram line 3 and the overhead cable. March 2007. UNITEF Zrt.
9	Environmental permitting plan of the reconstruction of tram line 3 and the connected overhead power lines. March 2007. UNITEF Zrt.
10	Environmental chapter of the building permit document. Development of the tram depot in Pulcz Street. March 2007. TEBODIN EC Kft.
11	Environmental chapter of the building permit document. development of trolley bus depot in Csáky Street. March 2007. TEBODIN EC Kft.
12	Environmental chapter of the building permit document of the overhead cables of trolley bus line 10. February 2007. TEBODIN EC Kft.
13	Environmental chapter of the building permit document of the overhead cables of trolley bus line 8. February 2007. TEBODIN EC Kft.
<i>II.</i>	<i>Permits, decisions</i>
1	Decision on the preliminary study. Extension of tram line 1. LTI-ENW 34.000-1-16/2006.
2	Decision on the preliminary study. Development of the tram depot in Pulcz Street. LTI-ENW 44.092-1-12/2007.
3	Decision on the preliminary study. Development of the trolley bus depot in Csáky Street. LTI-ENW 44.818-1-13/2008.

2.3 The Need for the Project – Objectives

The aim of the project is the development of the electric public transport in Szeged by renewing, enlarging certain tram and trolley bus line sections, establishing new trolley bus lines, developing infrastructural background.

The project is in line with the Transport Development Concept of Szeged². Main goals of the policy are:

- Promote transport modes with less environmental impacts and prevent the urban environment, decrease environmental impacts, noise and pollution.
- Increase the attractiveness of the local public transport by providing better service level and accessibility of the service and promoting public transport against passenger cars.

² Kgy határozat 126/2007. (III. 29.)

- Reduce road traffic at the most sensitive urban area by traffic management, parking control, legislative and mobility management measures.
- Complete missing road network elements and improve road traffic conditions on the main arterials of the city to enable diversion of the transit traffic from the town centre and sensitive area, while introduce traffic calming and zone control in the residential area.

Accordingly to these main aims the development of electrical public transport is also a part of the development programs. This helps to improve the service level for the already served area and replace the bus public transport by zero-emission trolley service in other areas. According to the long term vision of the downtown a low (zero) emission zone will be created that is protected against normal propulsion vehicles, the most envisaged modes are walking and cycling while transport services are provided by only low emission vehicles within the protected area low (zero) emission zone.

Policy measures for road traffic reduction will accompany by countermeasures in public transport including improvement of level of service, reliability, accessibility and information provision to keep existing modal shift and patronage level or increase Public Transport share.

This will require the improvement of the existing PT supply, renew and rehabilitate the infrastructure and rolling stock to change passengers' general perception on the PT system. The focus is on the electric driven PT, the high capacity trams and the trolleys.

The potential developments were determined by a preliminary feasibility study. The study identified groups of potential measures and investments to tram lines, trolley bus lines, new vehicles and its infrastructures and developments that can make the public transportation more attractive. These are the follows:

- Service improvement measures
- PT efficiency measures
- Service accessibility

3 LEGAL AND PLANNING FRAMEWORK

3.1 Relevant Environmental Legislation

3.1.1 Overview

Act LIII of 1995 on the General Rules for Environmental Protection sets out the scope for environmental protection, the administrative and economic bases for protection, the roles and responsibilities of national and local government and the procedures for permitting and public participation. The Act also sets out the general requirements for the EIA procedure, the general rules of obtaining environmental permit and the procedures for public hearing of EIAs. Specific rules for conducting an EIA and obtaining an environmental permit are presented in Chapter 3.2 below.

During carrying out the EIA, specific rules have been considered on nature conservation, waste management, air quality, water and soil quality, protection against noise and vibration and the built environment. The following subchapters provide a summary of the Hungarian legislation related to soil and groundwater quality, surface water quality, nature conservation, noise and air quality.

3.1.2 Soil Quality

According to Act LV of 1994 on Arable Land protection of the arable land is a common task of the state and the land user or of the investor and the operator. In case of various (e.g. industrial, traffic infrastructural, etc.) investments in the planning and construction phase, the investor, whilst in the operational phase the operator, shall ensure that the upper productive layer of the soil is saved.

Government Decree 219/2004 (VII.21.) on the Protection of Groundwater lists those activities which can have impact on the quality (and quantity) of groundwater. In terms of groundwater sensitivity, the territory of Hungary is classified into three categories, i.e. *highly sensitive*, *sensitive* and *less sensitive* categories. Rules on the activities are determined in the decree according to this sensitivity classification.

The relevant Hungarian legislation also sets out a limit system for both soil and groundwater quality, which helps to evaluate the state of soil and groundwater, the extent of the environmental impacts and the required measures.

Joint Ministerial Decree (KöM-EüM-FVM-KHVM) 10/2000 (VI.2.) sets out the limit system and numeric values both for soil and groundwater quality.

3.1.3 Surface Water Quality

Government Decree 220/2004 (VII.21.) sets out rules on the emission of various water polluting substances, especially dangerous substances and also on activities with wastewater discharge. The decree defines the general rules on the protection of surface water, the general obligations of wastewater emitters and the system of discharge limits. There are two kinds of discharge limits for surface water in the Hungarian legislation: technological limits (for given technologies) and territorial limits (for different categories of water quality protection zones). Territorial limit is to be applied in those cases when there is no technological discharge limits for the given technology or pollutant.

Ministerial Decree (KvVM) 28/2004 (XII.25.) includes all the discharge limits, both technological and territorial (i.e. Zone 1: Lake Balaton and its catchment area, Zone 2: Other protected areas, Zone 3: Periodic watercourses and Zone 4: Generally protected areas) and prescribes the rules of their application. According to the territorial categories of the Decree, the design area belongs to Zone 4. protection zone.

3.1.4 Groundwater Quality

The categories of sensitivity for groundwater are identical to those of soil, presented under point 3.1.2.

Joint Ministerial Decree (KöM-EüM-FVM-KHVM) 10/2000 (VI.2.) sets out the system and numeric values of quality limits both for soil and groundwater.

3.1.5 Nature Conservation

Nature Protected Areas

Act LIII of 1996 on Nature Conservation sets out the rights and obligations of the state, users of environment and other organizations regarding to nature conservation. In the Hungarian legislation four categories of nature protected areas (i.e. national parks, landscape protection areas, nature conservation areas, natural monument) are differentiated according to extent of the protection, the purpose and the national and international importance.

Natura 2000 Sites

Natura 2000 is a European ecological network of protected areas designated by the EU Member States based on the Habitats (92/43/EEC) and Birds (79/409/EEC) Directives. According to Article 3 of the Habitats Directive Natura 2000 is a coherent European ecological network of Special Areas of Conservation (SAC) and Special Protection Areas for birds (SPA), which forms the two types of protected areas.

Government Decree 275/2004. (X.8.) sets out the Hungarian regulations on Natura 2000 network and lists 55 SPAs and 467 SCIs. The annexes of this legislation include the species and types of habitats having European level significance, determined in the directives mentioned above. The decree also determines those activities, which need permit or approval from the inspectorate for environment, nature and water acting as expert authority on Natura 2000 sites (e.g. breaking in sward, use of agricultural land for other purposes).

3.1.6 Waste

Act of 1995 on General Rules of Nature Protection and Act LIII of 2000 on Waste prescribes how to practice waste generating, handling treatment and disposal activities in harmony with sustainable development. Major aspects that should be followed are waste prevention, reduction of quantity and hazard of the waste, maximizing the reuse and recycling rate of waste, that cannot be avoided and treatment with minimum load on the environment of all the remaining waste.

General rules on domestic waste is discussed in Act LIII of 2000 on Waste, registration and reporting requirements are detailed in Government Decree 164/2003. (X. 18.).

Hazardous wastes, defined in the Ministerial Decree (KöM) 16/2001 (VII. 18.) on the Lists of Wastes, generated during operation should be collected, removed and disposed in accordance with the provisions of Government Decree 98/2001 (VI. 15.).

3.1.7 Noise

General rules on protection against noise and vibration are set out in the recently adopted Government Decree 284/2007. (X. 29.). According to this decree the corresponding limit values for noise and vibration are to be complied with during the planning, construction and operation of new facilities and expansion/widening of existing facilities being source of noise and vibration (in the time of the environmental and building permit procedure the general rules on protection against noise and vibration were set in Government Decree 12/1983 (V.12.)). These limit values for outdoor traffic noise set out in Ministerial Decree 8/2002. (III.22.) KöM-EüM are summarized in Table 2 (the limit values has not been changed by the new government decree). Various limit values are set depending on the location of the areas to be protected against noise, those limit values typically relevant in case of the Project are highlighted in bold in the table.

Table 2: Noise limit values for traffic noise

Area protected against noise	Limit values for traffic noise (dB)							
	Residential or resort areas with no traffic		Along minor or "access only" roads		Along normal roads, minor railways or minor airports		Along motorways, expressways, trunk roads, bus stations, major railways or major airports	
	Day	Night	Day	Night	Day	Night	Day	Night
Hospitals, recreational areas, resorts, designated nature reserves	45	35	50	40	55	45	60*	50*
Residential areas (small towns)	50	40	55	45	60	50	65*	55*
Residential areas (large towns)	55	45	60	50	65	55	65*	55*
Industrial areas	60	50	65	55	65*	55*	65*	55*
<u>Notes:</u>								
Day-time: from 6 to 22. Night time: from 22 to 6.								
In justified cases limit values marked with * can be relaxed by 5 dB (exceptionally by 10 dB) by the public hygiene authority, taking into consideration the viewpoint of the environmental authority.								

The limit values presented above are to be complied with at 2 meter distance from the façade of residential houses, apartments, hotels, hospitals and schools. The Hungarian legislation also sets standards for indoor noise levels, which depend on the actual use of a given room. However, assuming a sound level difference of approximately 25 dB (outdoor versus indoor), the indoor noise standards (40/30 dB in residential buildings and 35/30 in hospitals) are achievable with normal windows, where traffic noise is within the outdoor standards.

3.1.8 Air Quality

Government Decree 21/2001 (II.14.) sets out the prescriptions regarding to line-sources of air pollution. Decree (KöM-EüM-FVM) 14/2001 (V.9.) includes the list of air pollutants and the related quality limits for air. Air pollutants are categorized into four classes according to their scale of danger ranging from Class I: extremely dangerous to Class IV: slightly dangerous. Relevant hourly, daily and yearly quality limits are summarized in table below.

Table 3: Air quality limits

Pollutant	Class	Unit	Hourly	Daily	Yearly
Sulphur-dioxide (SO ₂)	III	µg/m ³	250	125	50
Nitrogen-oxides (NO _x)	II	µg/m ³	200	150	70
Carbon-monoxide (CO)	II	µg/m ³	10000	5000	3000

Pollutant	Class	Unit	Hourly	Daily	Yearly
Particulate matter (airborne dust, PM ₁₀)	III	µg/m ³	-	50	40
Settling dust (non-toxic)	IV	g/m ² *30 days	-	16	-
		t/km ² *year	-	-	120

3.2 Environmental and Building Permit Procedures

3.2.1 Rules on Environmental Permitting

Sections 67-71 of the Act LIII of 1995 on the General Rules for Environmental Protection set out the requirements of the environmental impact assessment. The Act also sets out the content of the environmental permit and the procedures for public hearing.

The provisions of conducting an environmental impact assessment and obtaining an environmental permit are set by Government Decree 314/2005 on Environmental Impact Assessments and IPPC Procedure, which is in force since 1 January 2006. The Government Decree harmonizes the procedures for environmental permits and IPPC permits, with a view to streamlining the environmental permit granting process for new investment projects.

In case of projects listed in Annex 1-3 to the Government Decree compilation of a preliminary assessment is mandatory. The preliminary assessment provides an opportunity for environment users and the environmental authority to hold consultations early in the permit granting process. The preliminary assessment is initiated by the environment user by submitting preliminary report, which are then made public.

The preliminary assessment phase is ended with a resolution – issued by the environmental authority – defining what specific procedure is applicable to the planned project, accordingly distinction is made between the following (if the project is not refused in the early phase):

- environmental impact assessment,
- IPPC (Integrated Pollution Prevention and Control) procedure (in some cases combined or linked to environmental impact assessment),
- other procedure (e.g., building permit procedure, water permit procedure).

Annex 1 to the Government Decree lists projects subject to a mandatory EIA. In case of project listed in Annex 2 an IPPC procedure is to be conducted, while in case of project listed in Annex 3 an EIA procedure is required only if the impacts are expected to be significant.

The environmental report (of the impact assessment) is submitted to the environmental authority for review and approval. A summary environmental report also has to be prepared for the general public. The environmental authority asks the opinions of the relevant regulatory authorities and the local municipalities. A public hearing is held. The environmental authority collates all the responses and prepares a Decision on the application for the Environmental Permit. The permit may be rejected or accepted. The Decision includes a summary of the project, responses from the authorities, the public hearing, the reasons for the Decision, and if favourable, any environmental conditions that have to be incorporated into the scheme design.

The Government Decree 314/2005 is in compliance with EU Directives 85/337/EEC as amended by Directive 97/11/EC.

3.2.2 Building Permit Procedure

Following the EIA (if it was mandatory), further environmental studies are undertaken for the building permit procedure. This includes a review of all the environmental requirements provided in the ER and the conditions to the environmental permit, and may involve re-evaluation of impacts and mitigation. The building permit document including engineering and environmental designs is submitted to the relevant authority. The building permit document is also reviewed by the environmental authority acting as expert authorities in the building permit procedure. Environmental conditions and requirements set by the environmental authority are included in the building permit issued by the relevant authority.

3.2.3 Appeal Procedures

There is an appeal procedure whereby objectors can appeal against the decisions of the environmental authorities on the Environmental Permit. The first appeal is reviewed by the National Inspectorate for Environment, Nature and Water, who issues a Decision of the I Degree to accept, modify or reject the original Decision. This Decision can be appealed and the objection is heard in Court.

3.3 Current Status

3.3.1 Environmental Permits & Public Consultation

The following table summarizes the project elements according to the definitions of the Annex I & III. to the Government decree 314/2005. (see 3.2.1 for general rules on environmental permitting).

Table 4: Project elements according to the definitions of Government decree 314/2005.

	Elements of the project	listed in Annex I to the 314/2005. Gov. Decree	listed in Annex III to the 314/2005. Gov. Decree
1	Development of tram line 1	–	–
2	Development of the new tram line 2	–	+
3	Development of tram line 3	–	–
4	Development of tram line 4	–	–
5	Development of the tram depot in Pulcz Street	–	+
6	Development of the trolley bus depot in Csáky Street	–	+
7	Extension of trolley bus line 8	–	–
8	Construction of trolley bus line 10	–	–
9	Preference to community transport	–	–
10	Energy supply	–	–
11	Construction of B + R bicycle storage racks	–	–
12	Passenger information, ITS	–	–

None of the planned activities falls within the scope defined in Appendix 1 to Government Decree 314/2005, construction of the new tram line 2, development of the tram depot and development of the trolley bus depot belong to Appendix 3.

The other planned activities do not fall within the scope of Government Decree 314/2005, in these cases the environmental criteria are to be enforced in the course of the building permit procedures. During the building permit procedures, the environmental authority will act as expert authority. For the last four project elements specified in the table above, due to their nature, direct environmental impacts cannot be interpreted, therefore this Summary does not cover these project elements.

Preliminary assessment

Preliminary assessment for the construction of the tram line 2 was carried out by COWI Hungary Ltd in June, 2006. The preliminary report was submitted to the Lower Tisza Inspectorate for Environmental, Nature and Water (LTI-ENW or the inspectorate). The preliminary report was approved by the inspectorate and conduction of an environmental impact assessment was order (as the environmental impacts are expected to be significant) (decision no.: 34.000-1-16/2006.).

	<p>In case of tram depot reconstruction and trolley bus depot development, the preliminary assessments were carried out. The preliminary reports for both projects were approved by the environmental authority. In view to these developments, the activities do not cause significant environmental impacts, therefore conduction of environmental impact assessments were not ordered (decision no.: 44.092-1-12/2007. & 44.818-1-13/2008.). The authority has informed the public on the commencement and closing of the preliminary assessment.</p>
<p>Environmental impact assessment</p>	<p>In connection with the implementation of tram line 2, the procedure for the environmental impact assessment has been launched. The environmental report and the summary for public consultation have been prepared. The environmental permit is expected to be issued in the first part of 2008.</p>
<p>Public consultation</p>	<p>Pursuant to the provisions of Government Decree 314/2005, the procedure involved public consultation. The public hearing was held on 21 November 2007.</p>

3.3.2 Building Permits

The application for the building permit has been examined by the environmental authority acting as expert authority in the procedure. The conditions and requirements prescribed by the environmental authority have been included in the building permit issued by the competent authority.

The current status of the building permits is presented in Table 5 herein.

3.3.3 Summary of the environmental and building permit procedure

Next table summarises the current status of environmental and building permit procedure.

Table 5: Current status of environmental and building permit procedure

No	Project element	Preliminary assessment	Decision on preliminary assessment	Environmental impact assessment	Approval of environmental permit	Building permit document	Approval of building permit
1	Development of the tram line 1	N/A	N/A	N/A	N/A	May 2007	expected in the first part of 2008
2	Development of the new tram line 2	July 2006	November 2006	March 2007	expected in February 2008	May 2007	expected in the first part of 2008
3	Development of the tram line 3	N/A	N/A	N/A	N/A	May 2007	expected in the first part of 2008
4	Development of the tram line 4	N/A	N/A	N/A	N/A	May 2007	expected in the first part of 2008
5	Development of the tram depot in Pulcz Street	June 2007	October 2007	N/A	N/A	March 2007	January 2008
6	Development of the trolley bus depot in Csáky Street	June 2007	January 2008	N/A	N/A	March 2007	December 2007
7	Extension of trolley bus line 8	N/A	N/A	N/A	N/A	May 2007	expected not later than June 2008
8	Construction of trolley bus line 10	N/A	N/A	N/A	N/A	May 2007	expected not later than June 2008

4 MAIN ELEMENTS OF THE PROJECT

This Chapter summarises the main elements of the project for the purposes of the present environmental summary. Detailed project description is presented in document titled “Szeged Electric Public Transport Development. Feasibility study and Cost Benefit Analysis”.

4.1 Developing of tram line 1 and construction of line 2

Tram line 1

Line 1 serves the highest passenger traffic in the town. The project aims at upgrade commercial speed of the line by good track quality, track segregation, better energy supply and improved traffic signal control.

The existing structure of the line on most of the length has no sleepers, the rails lay on broken basalt bed. Only some short sections have been reconstructed during the recent years. The project comprises the reconstruction of the total length of the track using modern, stabile superstructure with wider, thus standard rail axle distance.

On most of the length concrete plate or longitudinal concrete sleeper superstructure will be deployed with rail isolating elements, providing low noise and vibration.

Tram line 2

New tram line (line 2) will be constructed on the Rókusi boulevard between the Kossuth Lajos avenue and Csongrádi avenue. Branching out from the route of line 1 at the Rókusi boulevard junction the line will provide direct link between the residential area with block of flats and the town centre.

Based on the local public transport passenger surveys the possible new branch of tram line 1 (numbered as Tram line 2) along Rókusi ringroad could have significant passenger load. Location of the planned development is presented in Figure 1 (in Appendices).

4.2 Developing of tram line 3

The tram line 3 and 3F crosses the town from the north-eastern residential area to the west part that is in transition with mixed – industrial and residential and service – land use. The length of tram line 3 is 6,1 km, the length of tram line 3F is 8,1 km. From the eastern end the tram line runs on a common track with

line 4 to the Dugonics square. Line 3 branches out at the Dugonics square as a single track, and runs on the Kálvária boulevard with middle alignment to the Kálvária square, then crosses the road and runs on the side up to the Fonógyári street, a major collector road of an old industrial area.

The technical part of the feasibility study contains several independent developing measures which have been reviewed. Modernisation of the tram line 3 from the Dugonics square up to the Hospital II. includes replacement of the existing sub and superstructure and the extension of the turnout at the Kálvária place by the construction of a 700 m second track between Veresács street and the II. Hospital, thus eliminate the bottleneck for frequency increase and reduce waiting time. Location of the planned development is presented in Figure 2 (in Appendices).

4.3 Developing of tram line 4

Tram line No 4 is situated on József Attila avenue passing through the north-eastern block of flat area, and the downtown to the western part of Szeged. In the downtown the alignment is lying at the Tisza Lajos ringroad up to Dugonics square and going to south-west on the Petőfi Sándor avenue.

Although there were minor developments (e.g. new termini loop at Tarján, reconstructed section on the Tisza Lajos boulevard) and newer rolling stock is running on the line, the commercial speed on the segregated track is low (around 15 kph) and not in line with the passengers expectations. Track conditions are especially deteriorated on the József Attila avenue, the common section with tram line 3.

The project comprises the reconstruction of the 4,1 track km of double track on that route with open superstructure with concrete sleepers. Location of the planned development is presented in Figure 3 (in Appendices).

4.4 Pulz utca tram depot development

The tramcars are maintained in the original, old depot. The project aims to provide appropriate place and infrastructure for the maintenance of the newly purchased vehicles, ensuring sustainability in this aspect.

The existing depot layout contains only one storage hall with very narrow, 3.0 m track distance. The hall needs renewal as such as the training repair hall and the painting hall. The original depot hall will be renewed and extended; a new maintenance hall will be constructed. The buildings will contain wash equipment for the tramcars, a wheel lathe, central and side-pits for the inspection, stages for the maintenance of the current collector. The inner track network will be renewed, extended and reorganized, thus the vehicles will be able to drive around the depot according to the technological order. The depot place will be provided with hazardous waste storage place, too. Location of the planned development is presented in Figure 1 (in Appendices).

4.5 Csáky utca trolley bus depot development

The development of the trolley network, commission of new infrastructure elements and assets results in increased maintenance demand. The trolley depot hall and also the trolleybus washing hall will have to be expanded accordingly.

4.6 Extension of line 8

The project comprises the extension of the trolley bus line 8 from the Kálvin place to the Clinics along the Tisza Lajos boulevard. Trolleybuses will use the common public transport lane from the Anna fountain. Overhead cables may be installed on the columns that were built in 2004. Location of the planned development is presented in Figure 4 (in Appendices).

4.7 Build up line 10

The proposed trolley bus line 10 will replace the bus lines 10, 35 and 35Y, and decrease the environmental impacts at Szilléri avenue. It will join trolley bus line 8 at the Csongrádi avenue. From this point to the Clinics the trolley bus service will run on the Tisza Lajos boulevard.

4,4 km of new overhead wire will be constructed. Development of trolley bus line 8 and 10 will cover the purchase of 10 new low floor articulated buses with low noise and good acceleration. Location of the planned development is presented in Figure 4 (in Appendices).

4.8 Public transport priority

Belváros bridge is one of the bottlenecks of the road network of Szeged. In the meantime many bus and trolley routes cross Tisza river on the bridge. In peak hours there are long queues on Belvárosi bridge from direction Újszeged. The feasibility study³ has proposed priority measure for public transport vehicles coming from Újszeged. The priority scheme consists of implementation of bus lanes approaching the bridge head in Újszeged in 800 m. Signal traffic control will be installed at three junctions with traffic and queue detection and responsive control strategy. The PT priority and exclusive use of bus lanes will be controlled by video cameras. The bus stops will also be relocated providing better access to the served area.

4.9 Energy supply

The reconstruction will involve the construction of two new distribution centres, a new transformer and a converter, and the installation of 8 small converter stations. The tramway and trolleybus network will be served by new current

³ “Szeged Electric Public Transport Development. Feasibility study and Cost Benefit Analysis”

cables led underground. This will ensure the safe and capacitive supply of the expanding network, reducing the current loss on the long distances.

4.10 B+R

Bike storages will be constructed at 8 sites of the PT network with at least 40 bikes capacity each. The storages will be video-controlled. The aim is to facilitate the use of the public transport from the outskirts by reaching the dense network by bike.

4.11 Passenger information system, ITS

The development will be completed by a GPS-based vehicle monitoring, which allows improving the service quality by on-time arrivals, failure handling and passenger information system on the vehicles, at nearly all stops, by mobile phones or internet. The feasibility study elaborated a proposal for the on board and stationary real time information system including the functional architecture of the system, technical requirement and other specifications based on the existing system components. The system shall also collect relevant information from the vehicles and transmit them to the dispatcher centre that enables real time vehicle location and management of the trolley and tram fleet.

5 CURRENT STATUS OF THE ENVIRONMENT

5.1 Climate, air quality

Climate

The typical climate of area of the proposed alignment is warm and dry. The precipitation is somewhat higher than the driest areas (less than 500 mm) in the Great Plain. The annual total number of sunny hours is 2,150. The coldest month is January (-1.5°C) and the warmest one is July with a monthly mean temperature of 22.1°C. The total annual precipitation is 530 mm, which is relatively low in comparison with the national average. The number of days with precipitation is 87 during the year with 6 to 8 days for winter months and 5 to 6 days per month during the end of the summer and the beginning of autumn. The prevailing wind direction is northern (NNW) throughout almost the whole year with differences only in spring, in March and April (N, NW). The annual average wind speed is 3.0 m/sec with the smallest values in September, and the largest in March.

Air quality

According to the Ministerial Decree (KvVM) 4/2002. (Oct 07) on the determination of air quality zones and agglomerations, air quality of Szeged can be characterized by data presented in the following table.

Table 6: Air quality of Szeged

Pollutant	SO ₂	NO ₂	CO	PM ₁₀	benzene
Concentration (µg/m ³)	< 50	40-60	2500 – 3500	> 40	2,5 - 3,5

Air quality of the entire area can be characterized as follows [1][2][4]:

Sulphur dioxide (SO₂): Baseline level of the sulphur dioxide is well below the limit values, increasing tendency can not be observed.

Nitrogen dioxide (NO₂): No increasing tendency has been experienced in recent years, the pollution level is considered to be constant. Daily levels are exceeded rarely, and thus can be detected just on a few occasions. However, hourly levels are frequently exceeded. The number of such occasions varied between 18 and 166 in the individual years from 1998 to 2004.

Causes of air pollution

Nitrogen oxides (NO_x): No increasing tendency has been experienced in recent years, the pollution level is considered to be constant. Daily levels are typically not exceeded, yet the hourly levels are quite frequently surpassed. The number of such occasions varied between 192 and 314 in the individual years from 1998 to 2004. With respect to the annual average figures can be considered as appropriate, but the fact that hourly limit values are exceeded frequently may cause problems.

Carbon monoxide (CO): No increasing tendency can be ascertained. The annual, daily and hourly levels of carbon monoxide do not pose any problem to the air quality of Szeged.

Airborne dust (PM₁₀): In the period from 1998 and 2004, a slight increase was measured, annual average fell within the range of 40-50 µg/m³. Limit values may be exceeded with increasing frequency.

Ozone (O₃): No increasing tendency has been experienced in recent years. Ozone can only cause air quality concerns under special weather conditions and pollution circumstances.

With respect to the protection of air quality, a significant role can be attributed to green surfaces. In a considerable proportion of the outer areas of Szeged, agricultural activities are pursued, which has an unfavourable impact on air quality. The airborne dust from the agricultural land considerably increases the dust content of the air of Szeged.

The industrial structure of the town can be regarded as rather positive in view to air quality. Szeged has no major heavy-industry establishments

Air quality is significantly influenced by traffic. The structure of the town is based on a network of circular and radial roads, the traffic network is strongly overloaded. 80–85% of the vehicles participating in the traffic belong to passenger cars. The emission levels of the vehicles are improving, yet a counter-effect is exercised by the increase of the number of vehicles.

5.2 Noise & vibration

In Szeged, noise load are determined by the noise originating from the traffic. Along the most busy main roads of Szeged, noise level exceeds the noise limit values. In Nagykörút [Large Boulevard], the noise level remains above the noise limit values both night and day. Moreover, in certain narrow cross-sections measured level exceeds the limit values by max. 13 dB(A).

5.3 Soils

Around Szeged, the geological surface formation in the right banks of River Tisza is the Würm loess layer constituting the level formed in the Pleistocene era. It is predominantly infusion loess. The loess layer has a typical thickness of 3–4 m with quite a varied composition and increasing sandiness toward the up-

per layers. The loess layer from the Pleistocene Era is invariably formed from clayey silt with cyclic formation, and holds fine sandy inclusions here and there.

The surface of the 3–4 m loess layer in the area of Szeged is frequently of strongly humic loam. The parts of Szeged within the embankment were filled up after the Great Flood of 1879. The thickness of this embankment is the largest along public roads and avenues. In the sections within Large Boulevard, the thickness of the embankment reaches 3.0–3.4 m.

The project area do not feature the original soil conditions any longer. Most of the planning area has been filled up and paved.

5.4 Quality of groundwater and surface waters

The depth of the groundwater ranges from 2 to 4 m. Its quantity is not significant. In terms of chemical properties, it contains calcium–magnesium hydrogen-carbonate, yet at several locations sodium contents can as well be detected. Near the settlements, the sulphate content tends to exceed even 300 mg/l.

According to the Ministerial Decree (KvVM) 27/2004 on the Classification of Settlements Concerning Subsurface Sensitivity, the subsurface sensitivity categorization of Szeged is sensitive.

5.5 Habitats, Flora and Fauna

The project elements will be implemented in densely populated urban environments. In the direct vicinity of the planning area, no nature protected area can be found. In the neighbourhood of Szeged, however, Maros Flood Plain (national park) belonging to the Körös-Maros National Park is located. The nearest part of Pusztaszer Landscape Protection Area lies approximately 2 km from the city center of Szeged.

The project elements do not affect Natura 2000 sites designated by the Government Decree 275/2004 (Natura 2000). In the outer area of Szeged, farther from the planning area there lies the Szegedi ürgés gye (area code: HUKN20012) and the Maros (area code: HUKM20008), as well as the Lower Tisza Valley (area ID: HUKN10007) special conservation areas.

The protected natural values of local significance in Szeged are specified in Municipality Decree 56/2001.

5.6 People and Communities

Szeged urban structure is a centralised layout. Road network of the town, designed centuries ago, corresponds to the urban structure and consists of three orbital with many radial roads leading to the town centre.

The administrative, cultural and commercial districts with 3-5 floor buildings in the middle of the town are enclosed by the inner ring-road, called Tisza Lajos. This ring is the end point of the radial roads.

Land use of the belt around this area vary by segments, the clear function of the university campus and a commercial area is mixed with administrative, service and residential area up to the mid ring-road.

Major residential areas with low density detached housing are located in the outskirts of the city and in the agglomeration settlements. High density block of flat estates are spread on the northern segment of the outer belt of the town. Old industrial areas on the northern and western part of the town are losing their importance, number of jobs and work trips have been significantly dropped.

Population of Szeged, 162 800 inhabitants, has been steady for the last five years. However, there is a clear internal migration from the downtown and the large block of flats housing area to the suburbs. The population of the high density housing area with block of flats is also changing, students are moving in to the many abandoned flats to let.

6 IMPACT ASSESSMENT

This Chapter presents the expected environmental impacts of the individual project elements. For better understanding, environmental impacts of all the project elements are discussed by the individual environmental elements and hazards, rather than presenting the impacts of each project element, individually.

For the description of the environmental impacts of the new tram line 2 the environmental report (of the EIA) has been used, while in case of other project elements environmental chapters of the building permit documents have been used. In order to avoid repetitions, project elements having nearly the same environmental impacts is described jointly.

Chapter 6.1–6.7 describe the environmental impacts likely to occur in the operational phase, whereas Chapter 6.8 presents the environmental impacts accompanying construction works. Mitigation measures are detailed with which the unfavourable impacts can be reduced. Chapter 6.9 presents the indirect impacts of the project.

Due to their nature, direct environmental impacts cannot be linked to the last four project elements detailed in Table 4 (Enhancing community transportation; Energy supply; B + R; Passenger information system, ITS), and therefore this Chapter does not focus on these project elements.

While environmental impacts in the construction phase will only be temporary, those in the operation phase (maintenance and servicing) will be present over the total lifetimes of the facilities. When evaluating the environmental impacts of the planned activities, it is to be considered that all the project elements will be implemented in the inner area of Szeged, in urban, built-in environments.

In the case of new tram line 2 three scenarios have been assessed by the EIA (only for air quality and noise predictions), i.e. baseline, future (2018) with and future without scenarios assessed. Other project elements have been assessed for baseline and after construction scenarios in the building permit documents.

6.1 Air Quality

6.1.1 Development of the new tram line 2

The operation of the tram line has no direct impact on air quality, as the tram line has no air emission. Indirect impacts will be the consequence of the re-arrangement of road traffic. Therefore, pollution load is to be estimated for three scenarios: at present, in the future with the development established and in the future without the development. The direct impact area corresponds to the area where the pollution load from the traffic changes (increases or decreases) at least by 25%.

The impact areas of the presented scenarios have been assessed on the basis of traffic surveys. By comparing the future with and without scenarios the relevant changes could be identified. The calculations based on assuming a traffic intervention, in which tram line 2 will run in the same (or nearly the same) route as buses No. 2, 83 and 83A, which will be terminated.

Based on calculations made during environmental impact assessment, limit value exceedance may occur at junctions of narrow cross-sections. Farther from this point, immission levels are expected to be under the limit values.

In the future without scenario, due to the improved emission of the vehicle fleet a considerable decrease in pollution can be expected, and as a result immission levels over the limit values will cease to occur.

In future with scenario, air quality will improve in the impact area even in comparison with the baseline scenario. The measure of improvement varies, but can be identified in all the examined cross-sections. The degree of changes amount to 10% of the limit values at the building facades of only certain parts of Kossuth L. Ave. and Rókusi Blvd. See Table 8, 9 & 10 in the Appendices for relevant calculations.

6.1.2 Development of tram line 1, line 3 & line 4

Based on the measurement results (presented in the environmental chapter of the building permit documents) of the present status, the studied air pollutants generally do not exceed the limit values.

The reconstruction of the tram tracks will not affect operations. Tram traffic cause no air pollution, and by replacing other means of transport polluting the air, it has a positive impact on the environment.

When comparing the emission values without and after the construction, it can be claimed that no significant differences can be expected. See Table 11, 12 & 13 in the Appendices for relevant calculations.

6.1.3 Development of the tram depot, and the trolley bus depot

Currently, at the tram depot, there is one air emission point source being subject to reporting obligations, in connection with the two 290 kW gas boilers supplying heat energy and service hot water. Within the framework of the planned developments, the hot-water supply and heating system of the site will also be reconstructed. The modernization does not affect the current vehicle traffic of the site. In the course of the developments, some new parking places will also be established. The emission of air pollutants by the movement of vehicles is not expected to be significant.

The planned development of the trolley bus depot affects only the building of the trolley bus washer. Within the framework of the planned reconstruction, the existing heating system will be reconstructed. The heat demand of the building will be smaller, and therefore one of the existing gas-fired boilers will be removed. At the same time, a new, 212 kW gas-fired heating unit will be installed in the washer with a chimney height of 8.5 m. Pursuant to Government Decree 21/2001, the new, equipment is deemed as an air emission point source being subject to reporting obligations.

When comparing the emission values without and after the reconstructions, it can be claimed that no significant differences can be expected.

6.1.4 Extension of trolley bus line 8 and construction of trolley bus line 10

The operation of trolley bus lines in itself has no direct impact on air quality. Tram traffic cause no air pollution, and by replacing other means of transport polluting the air, it has a positive impact on the environment.

6.2 Noise

6.2.1 Development of tram line 2

Under the provisions of Ministerial Decree 8/2002 the noise limit (immission) values shall consider the joint impacts of all the traffic elements, thus the emissions of the planned tram line can not be assessed separately from the road traffic.

In the course of the EIA both measurements and calculations have been carried out in order to assess the present noise load of the project area.

The noise level measurements have been carried out – in compliance with the decision of the LTI-ENW⁴ – at five locations. According the results of the measurements and calculations noise levels are above the limit values. Based on the measurements, it can be stated that noise originates from road traffic ex-

⁴ Decision on the preliminary study. Extension of tram line 1. LTI-ENW 34.000-1-16/2006

ceeds the noise of the tram traffic by 10 dB(A). Due this fact, future noise levels will be primarily determined by the road traffic rather than tram traffic.

In the course of the EIA, traffic surveys has been prepared in order to assess the impact area in the future (2018) with and without scenarios. By comparing the baseline and the future with scenario it can be stated that in certain cross-sections increased noise levels are expected, whereas in other locations noise levels will decrease. Assessment of the future without scenario is also important, as long-term impacts may be triggered by changes that are independent from the project. Calculations shows that noise levels of the future with scenario will not differ in comparison with the future without scenarios. See Table 14 in the Appendices for relevant calculations.

6.2.2 Development of tram line 1, line 3 & line 4

In order to assess the impacts of the development on noise levels calculations have been carried out in the course of the building permit procedure. As in case of tram line 2, the emissions of the tram lines can not be assessed separately from the road traffic. According the results of the calculations noise levels are above the limit values in most of the project area. It is to be noted that current noise levels are mainly determined by road traffic, as the noise originates from tram traffic is much lower than noise levels of road traffic.

Apart from certain sections of the tram lines, the lines runs along densely populated urban area where typically narrow cross-sections are presented. As a result of the developments the number of tram vehicles will not increase, however some of the vehicles will be changed by new ones and the tram track will be fully reconstructed.

Based on the calculations presented in the environmental chapter of the building permit documents it can be stated that noise levels are above the limit values along narrow cross-sections even in the baseline scenario. It is also apparent that the reconstruction would not deteriorate the current situation. Most, though to minor extents, decrease in noise levels can be expected. See Table 15, 16 & 17 in the Appendices for relevant calculations.

6.2.3 Development of the tram depot and the trolley bus depot

In the direct surroundings of the sites, there are no buildings to be protected against noise. The depots are located in industrial area. Within a 200-meter range from the boundaries of the sites, no residential properties can be found.

According to the information presented in the environmental chapter of the building permit documents noise emission of the site is in line with the corresponding limit values set by the Ministerial Decree 8/2002.

In the case of the new facilities, it is the operation of the newly installed exhaust equipment, fans and air-treatment units that would generated further noise

emission. Based on the building permit documents it can be stated, that significant changes in noise levels are not expected.

6.2.4 Extension of trolley bus line 8, construction of trolley bus line 10

The proposed developments have no significant impacts on noise levels.

6.3 Soil quality, water quality

6.3.1 Development of the new tram line 2

In sections where track is located in the middle of the road, the road is to be widened, whereas in the case of the track is located on the outer side of the road, sidewalks and/or green areas are to be used. With respect to the soil, the cross-section used by the tracks (approx. 7 m) can be defined as the direct impact area. Operation will have no significant impacts on the soil. Oil contamination may occur during the operation, but its probability can be reduced to the minimum with proper maintenance.

Materials used for maintenance are environmentally friendly, bio-degradable, and therefore do not have any risk to the soil or groundwater. The fill-up of the green track is in direct connection with the soils, and therefore any infiltrating - potentially contaminated - water may bring about risks, yet it is mostly materials originating from road traffic.

An artificial lake (Lake VÉR) is situated in the vicinity of the tram tracks. The tram line will not have significant impacts on the ecosystem and water quality of the lake. The superstructure – partly due to the cutting of trees – will slightly modify the draining conditions, but the quality of the pond located in the urban environment will not be perceptible modified.

6.3.2 Development of tram line 1, line 3 & line 4

The reconstruction works will not in fact involve the use of new surfaces. Main purpose of the projects is to reconstruct existing tram lines, thus groundwater flow is unlikely to be affected. Surface runoffs will be drained off in closed system and will be finally discharged into the sewerage (sewage is treated in local wastewater treatment plant), it will affect neither the soil, nor groundwater.

In the course of the operation of the trams, no significant impacts on the soil or groundwater are expected, because contaminations originating from the trams are substantially smaller than those from the public roads.

In course of emergencies contaminations will be drained off in closed system, therefore contamination of soil or groundwater is not expected. In case of soil contamination occurs the environmental authority has to be informed.

Maintenance tasks are performed by the Public Transport Company of Szeged. The oiling and greasing of the vehicles are carried out in the depots. The tracks and superstructures are greased with bio-degradable materials. In the surroundings of the tracks, environmentally safe herbicides are used three times a year.

6.3.3 Development of the tram depot and the trolley bus depot

Neither of the developments involves the occupation of any additional area. Under normal circumstances the operation of the sites are not likely to cause significant impacts on the quality of the soil, surface waters and the groundwater. The waste management system of the sites ensures that the wastes produced will not cause adverse impacts on the subsurface quality.

With respect to the soil, groundwater and surface waters the collection and drainage of wastewater and rainwater of site represent potential sources of contamination. With proper operation and maintenance of water treatment facilities (oil and silt traps) to be installed will ensure that the soil and the groundwater will not be affected adversely by the potentially contaminated wastewater or rainwater.

The operation of the oil and silt traps is to be controlled annually, and regular maintenance should be ensured. Wastewater generated at the site will be pre-treated, and then discharged to the public sewer network.

In case of soil contamination occurs the environmental authority has to be informed.

6.3.4 Extension of trolley bus line 8 and construction of trolley bus line 10

The operation of the trolley bus lines affects insignificant impacts on soils, groundwater, as well as surface waters.

6.4 Wastes

6.4.1 Development of the new tram line 2

In the course of the operation of the new tram line, wastes are primarily generated during the maintenance of the tracks and vehicles. Such wastes potentially include lubricants, municipal solid wastes, green wastes, etc. Some of the wastes generated in operations occur in the depot. For the collection of the wastes produced in the depot, adequate infrastructure is available. For the passengers using the tram line, the collection of municipal solid wastes is to be ensured at the stops, with the use of appropriate waste-collection facilities.

6.4.2 Development of tram line 1, line 3 & line 4

In the course of the operation of the reconstructed tram line, the wastes described for tram line 2 are expected to occur, and as here the projects do not involve the establishment of new activities, but the renewal of existing operations, only such quantities of wastes are to be taken into account that are also produced at the present.

6.4.3 Development of the tram depot and the trolley bus depot

The wastes produced at the tram depot and the trolley bus depot are registered, and transferred to properly licensed contractors. Municipal solid wastes are collected in 4 m³ closed containers. For the introduction of selective waste collection, two selective waste-collection islands have been installed at the tram depot.

In case of tram depot, at the present, hazardous wastes produced in the site are stored in a destined area, which is not fully compliant with the relevant requirements, and therefore in the course of the reconstruction a new hazardous waste collection area will be developed in the tram depot. Annually, approx. 8 tons of hazardous and 50 tons of non-hazardous wastes are produced in the tram depot.

In case of trolley bus depot, hazardous wastes are stored in a destined waste collection area, which is in compliance with the regulations

Reconstructions will not have significant impact on the quantities and quality of the wastes produced in sites.

6.4.4 Extension of trolley bus line 8 and construction of trolley bus line 10

In the course of the operation of the trolley bus lines, wastes are primarily generated during the maintenance works. Such wastes potentially include lubricants, municipal solid wastes, etc. Most of the wastes generated in operations occur in the depot. For the passengers using the trolley bus lines, the collection of municipal solid wastes is to be ensured at the stops, with the use of appropriate waste-collection facilities.

6.5 Habitats, flora and fauna

6.5.1 Development of the new tram line 2

The development of the tram line does not affect any nature protected areas, and the development area is not part of any Natura 2000 sites.

Along the Rókusi Boulevard trees of 5–10 years of age can be found. Depending on the width of the area, rows of trees are planted in one, two or three rows.

In the vicinity of the intersection of Rókusi Boulevard and Makkosházi Blvd., an artificial lake and a small planted forest.

The construction of the tram tracks will reduce the green area to some extent, thus trees will be cut. According to the gardening chapter of building permit document, 104 of the 557 trees of the planning area will be cut. Building rules of Szeged⁵ defines requirements on tree replacements. In line with the rules the cut trees will be replaced by planting 291 trees.

The most important impact of the tram is the disturbance of animal species, but it is to be highlighted that in the very busy urban environment only such animals can survive that have already adapted to the circumstances.

6.5.2 Development of tram line 1, line 3 & 4

The planned developments do not affect any nature protected area, and the planning area is not part of any Natura 2000 sites.

In course of the planned reconstructions, habitat loss or habitat fragmentation is not expected. During the reconstruction works green areas will be reduced to some extent, however the impacts of this are not expected to be significant. Damage caused to green surfaces should be avoided, the cutting of trees is to be limited to the minimum.

According to the environmental chapters of the building permit documents each developments will induce tree cuttings:

Tram line 1: 17 trees are expected to be cut, will be replaced by 115 trees.

Tram line 3: 28 trees are expected to be cut, will be replaced by 128 trees.

Tram line 4: 12 trees are expected to be cut, will be replaced by 72 trees.

6.5.3 Development of the tram depot and the trolley bus depot

The planned developments do not affect any nature protected area, and the planning area is not part of any Natura 2000 sites.

The planned developments do not cause any negative impact on the flora and fauna.

6.5.4 Extension of trolley bus line 8 and construction of trolley bus line 10

The planned developments do not affect any nature protected area, and the planning area is not part of any Natura 2000 sites.

⁵ Provisions on building rules of Szeged 59/2003. (XII. 5.) Kgy.

According to the environmental chapters of the building permit documents cutting of trees is not expected. The planned developments do not cause any negative impact on the flora and fauna.

6.6 Cultural heritage

6.6.1 Development of the new tram line 2

The tram line will be established in a densely populated urban area (high population characteristics). The planned development does not affect any registered archaeological site. No monuments can be found in the surroundings of the proposed tram line.

6.6.2 Development of tram line 1, line 3 & 4

Developments do not affect any registered archaeological site. Tram line 1 crosses the district within Tisza Lajos Boulevard, which has high monumental significance. In the surroundings of the tram line, there are 27 monuments. In the surroundings of the tram line 3, there are 6 monuments, while along the tram line 4 3 monuments can be found.

6.6.3 Development of the tram depot and the trolley bus depot

The sites are situated in an industrial zone. The planning area does not affect any registered archaeological site or monument.

6.6.4 Extension of trolley bus line 8 and construction of trolley bus line 10

The proposed developments do not affect any monument.

6.7 People and Communities

6.7.1 Development of the new tram line 2

At the present, tram line 1 is used by a daily volume of 10–12,000 passengers in both directions, therefore the line is fairly busy. In the course of the target group survey, the respondents have shown positive attitudes towards the construction of the tram line, as well as the development of electric public transport.

With the use of the new tram line, Rókusi Boulevard would be directly accessible from the city center, independently from the traffic on public roads. An important environmental impact is that electric public transport offers environmentally friendly ways of transport, and therefore the development does not only have environmental and health effects in the present time, but also on the long run.

6.7.2 Tram line reconstructions, developments

The proposed developments do not influence the general health conditions of the population, yet the reconstructed lines will offer more comfortable traveling.

According to the noise calculations presented in the building permit documents, it can be stated that along narrow cross-sections noise levels are above the limit values presently. On the other hand, noise levels to be achieved with the reconstruction will not deteriorate the current levels. Mostly, rather slight, yet clearly perceivable decrease in noise levels can be expected.

With the developments, the tram lines will provide safer and more comfortable means of transport; therefore, the change swings to the positive side.

6.7.3 Development of the tram depot and the trolley bus site

These developments will not have any influence on the society.

6.7.4 Extension of trolley bus line 8 and construction of trolley bus line 10

In general, it can be claimed that electric public transport offers environmentally friendly ways of transport, and therefore the development does not only have environmental and health effects in the present time, but also on the long run.

6.8 Construction related impacts, required mitigation measures

While environmental impacts in the operational phase will be present over the total lifetimes of the facilities, impacts in the construction phase will only be temporary. Present description of the construction related impacts are based on the environmental report (EIA of the new tram line 2) and environmental chapter of the building permit documents.

Project elements can be divided into two groups concerning construction related impacts, the tram line and trolley bus line constructions/reconstructions and the depot reconstructions. Depot reconstructions will be carried out in an industrial area, while tram line and trolley bus line constructions/reconstructions will be executed in very busy urban environment.

The duration of construction will not exceed 6 months for none of the project elements, and naturally within this period the individual construction processes will be even shorter. Construction related impacts largely depend on the type of equipment and machinery of the contractor, as well as the applied technology, schedule, etc.

Construction related environmental are presented below together with the measures to be taken to mitigate these impacts.

Air quality	<p>Major activities generating air pollution in the construction period include material transport, earthwork and operation of machines used for construction work. Special efforts are to be made to keep air pollution at a tolerable level:</p> <ul style="list-style-type: none"> • The movement of materials should take place with the avoidance of rush hours and night construction works, • To avoid dust pollution, the transportation vehicles should be covered to prevent airborne dust. • With the use of street washers, dust pollution within the construction area can be reduced. • Road surfaces connected with the construction area should be kept clean. Any mud or dust settled should be cleared.
Noise	<p>Noise load derive from the construction works, transport and loading vehicles. In general, building materials would be transported along existing public roads. In addition, noise levels are not expected to increase significantly if the transportation activities are properly organised, i.e., transport and construction activities would be limited to day-time periods and appropriate haulage routes are selected. In order to reduce the noise loads from the construction operations, the following arrangements are proposed:</p> <ul style="list-style-type: none"> • applying low-noise machines and equipment, • blocking noise propagation, • proper designation of haulage routes, • selecting low-noise construction technologies and processes. <p>If during the construction works any public complaint is received in connection with the noise, it is to be properly handled and monitoring measurements are to be carried out.</p>
Soil quality, water quality	<p>The construction area should be kept clean during the works. The soil and groundwater should be prevented from being contaminated. Soil pollution may be caused by fuel storage and storage of wastes generated during the construction. Special attention should be paid for the storage of hazardous waste.</p> <p>In the surroundings of surface waters, lakes, no hazardous materials, wastes may be stored even temporarily.</p>
Wastes	<p>In the course of the construction works, due attention should be paid to the collection and continuous removal of wastes generated. Hazardous wastes should be collected, stored and transported in line with the relevant legislation in force. The area should be kept clean during the construction works. The soil and groundwater, as well as surface waters should be prevented from any contamination.</p>
Habitats, flora and fauna	<p>In the course of the construction works green surfaces should not be damaged, whereas the number of trees to be cut is to be limited to the minimum (see Chapter 6.5).</p>
Cultural heritage	<p>During the construction works, access to facilities, residential buildings are to be ensured even with the use of alternative routes, or the proper scheduling of</p>

the construction works. Due attention should be paid during the designation of haulage routes in order to avoid residential areas and monuments.

People and Communities

During the construction works, such negative impacts are expected to occur that will exist only temporarily. In the construction period, such organization procedures should be applied that cause the least possible disturbance.

6.9 Indirect impacts of the project elements

By implementing the project a traffic intervention is assumed, in which certain bus lines (2, 83, 83/A) will be terminated. As an indirect impact of the project, along this bus lines air quality and noise levels are expected to improve, however immission values cannot be determined in advance.

Emissions of the buses can be calculated with respect to specific emission values. The emissions of buses can be estimated in the light of the annual mileage and the specific emission data. According to the calculations, annual mileage of buses to be replaced by electric means of transport is nearly 900,000 vehicle kilometers. The emission values of the bus lines to be terminated are shown in the table hereunder.

Table 7: Annual emission values of bus lines

	total (kg/year)
Carbon monoxide	13 767
Nitrogen dioxide	5 587
Airborne dust (PM10)	1 886
Sulphur dioxide	136
Carbon dioxide	992 307
Total	1 013 683

With respect to the above table, it can be stated that the total volume of the reduction of the emitted pollutants (as related to the examined pollutants) is approximately 1,000 t annually. It is to be noted that the volume of the above described reduction is considered negligible comparing with the total volume of pollutants emitted in Szeged.

7 REFERENCES

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8 APPENDICES

FIGURES

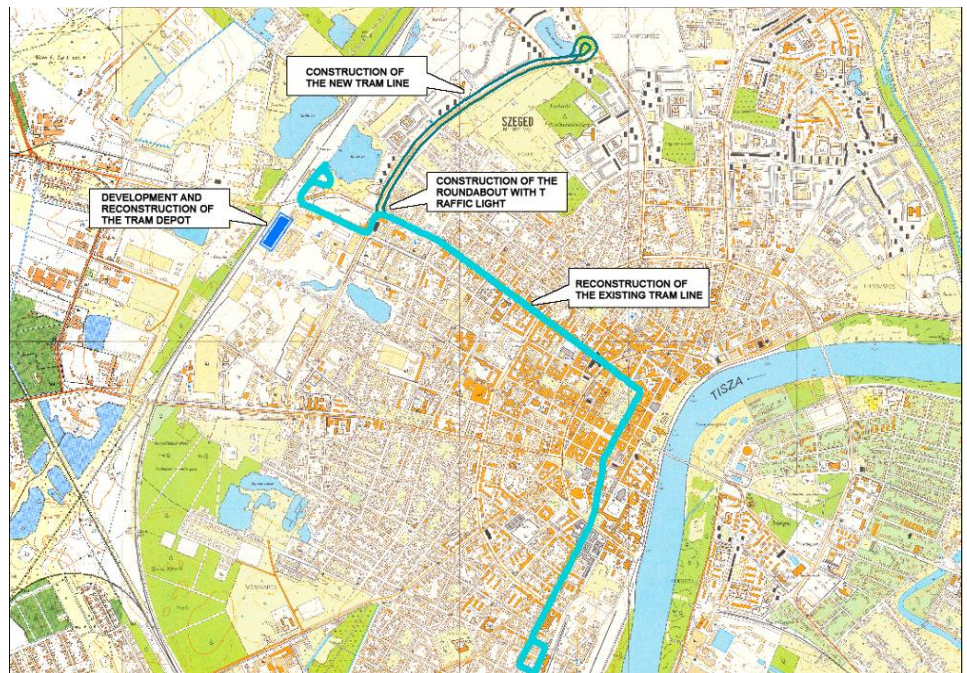


Figure 1. The existing tram line 1 and the proposed tram line 2

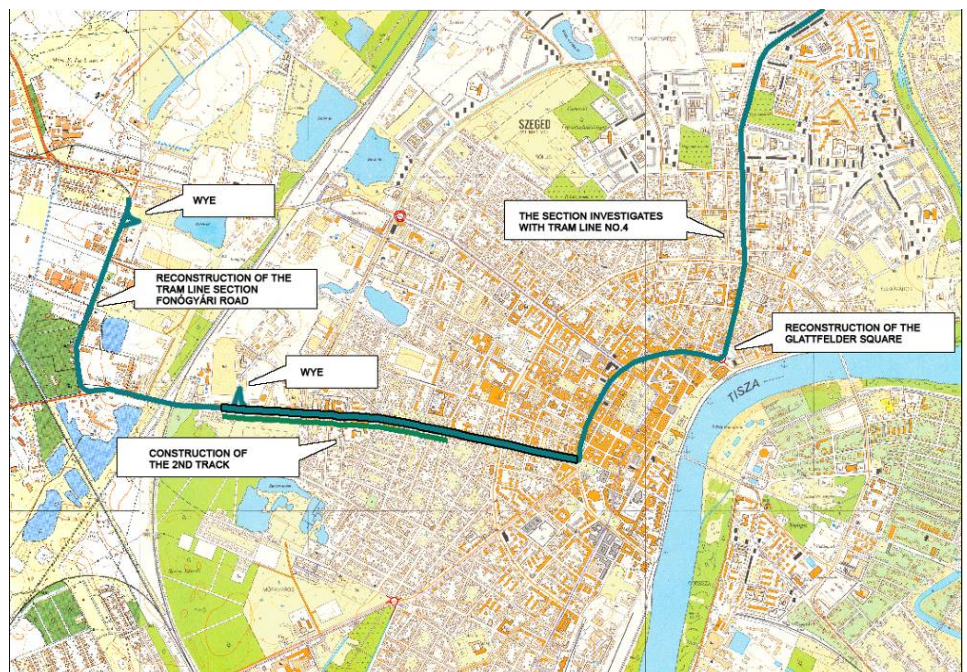


Figure 2. Planned development of tram No 3

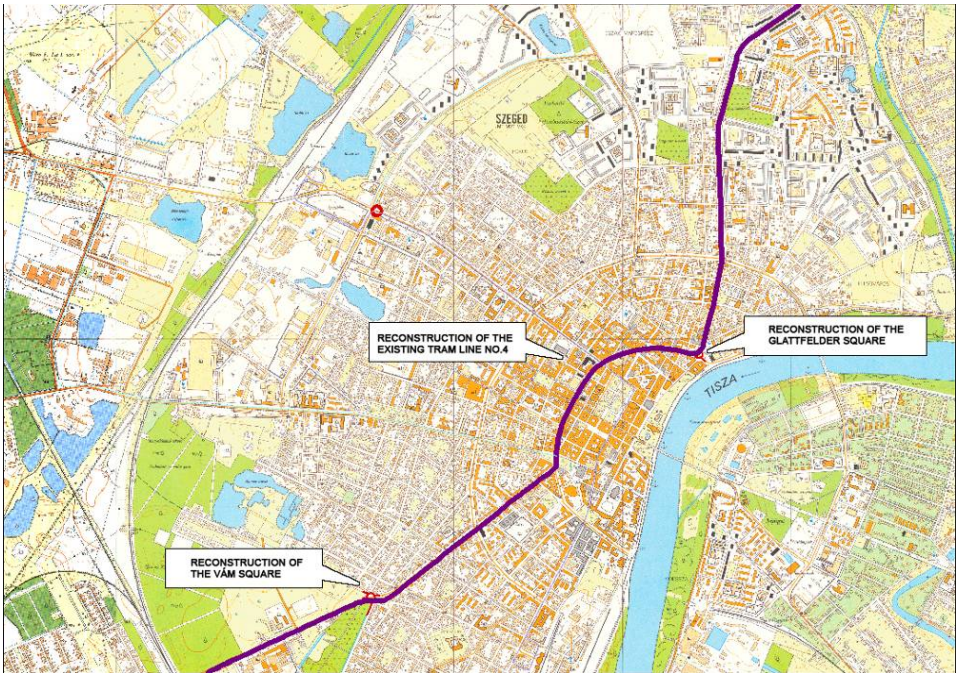


Figure 3. Planned development of tram No 4

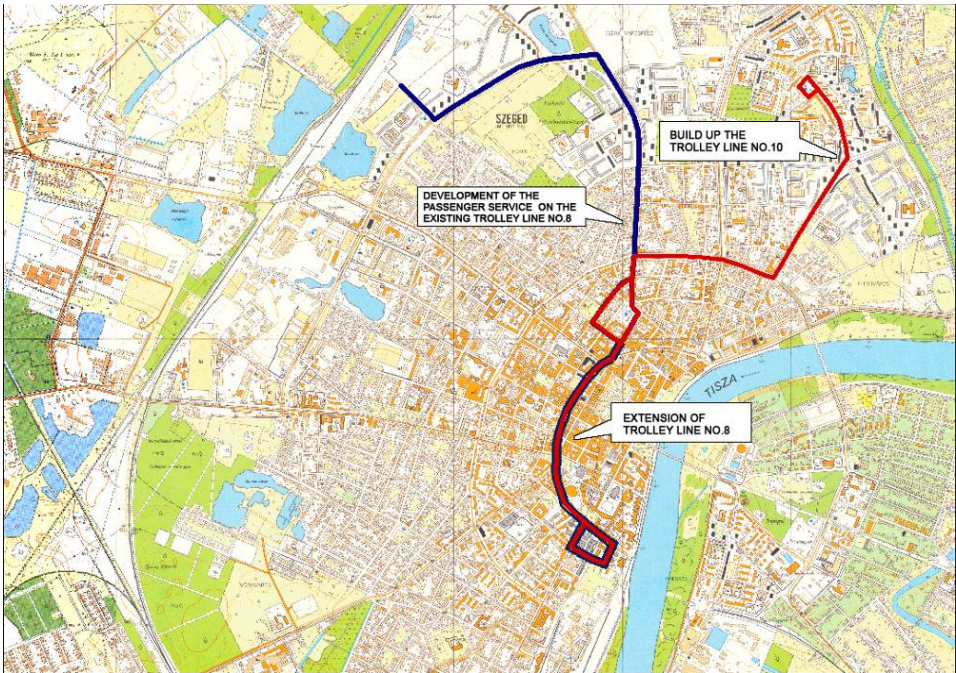


Figure 4. Planned developments to trolley bus line 8 and 10

CALCULATIONS

Air quality

Table 8: Tram line 2, baseline level, emission values

section	psc/h	hv/h	v (km/h)	CO	NOX	dust
				g/h/m		
Attila u.-01	184	125	47	2.81	0.74	0.07
Attila u.-02	8	99	49	1.06	0.47	0.05
Attila u.-03	8	99	49	1.06	0.47	0.05
Bécsi krt	935	79	35	10.75	1.16	0.10
Csongrádi sgt -D	1066	157	26	17.29	1.71	0.18
Csongrádi sgt -É	985	160	28	16.21	1.66	0.17
Damjanich u.	37	17	49	0.48	0.11	0.01
Föltámadás u.	411	1	48	3.49	0.35	0.02
Gogol u.	31	0	49	0.26	0.03	0.00
Kálvária sgt-K-01	1130	26	34	12.17	1.07	0.08
Kálvária sgt-K-01	1030	19	37	11.04	0.95	0.07
Kálvária sgt-Ny	1947	130	0	56.16	2.64	0.37
Kisteleki u.	739	138	36	9.39	1.29	0.12
Kiszáth K. u.-01	0	98	49	0.98	0.46	0.05
Kossuth L. sgt-01	2218	346	37	27.37	3.53	0.32
Kossuth L. sgt-02	1839	300	41	18.56	2.97	0.24
Kossuth L. sgt-03	1927	318	40	19.48	3.13	0.25
Kossuth L. sgt-04	1573	297	42	16.28	2.73	0.22
Kossuth L. sgt-05	1573	296	42	16.27	2.72	0.22
Kossuth L. sgt-06	1588	305	42	16.48	2.78	0.23
Kossuth L. sgt-07	2166	439	35	27.92	3.94	0.37
Kossuth L. sgt-08	2166	439	35	27.92	3.94	0.37
Kossuth L. sgt-09	2096	494	35	27.84	4.15	0.39
Kossuth L. sgt-10	2096	533	34	28.30	4.34	0.41
Kossuth L. sgt-11	1396	25	26	19.92	1.27	0.12
Kossuth L. sgt-11	2096	533	34	28.30	4.34	0.41
Körtöltés u.	305	35	48	2.93	0.42	0.03
Londoni krt-01	1838	492	37	25.10	3.93	0.38
Londoni krt-02	1838	509	37	25.31	4.01	0.39
Londoni krt-03	1864	214	42	17.91	2.58	0.20
Londoni krt-03	1864	238	41	18.15	2.70	0.21
Londoni krt-05	2143	236	40	20.49	2.92	0.22
Londoni krt-06	2143	225	40	20.38	2.87	0.21
Makkosházi krt	2398	327	36	29.04	3.59	0.32
Mérey u.	233	1	49	1.98	0.20	0.01
Mikszáth K. u. -02	0	98	49	0.98	0.46	0.05
Mikszáth K. u. -03	0	98	49	0.98	0.46	0.05
Moszkvai krt-01	1393	149	45	13.27	1.88	0.14
Moszkvai krt-02	1393	149	45	13.27	1.88	0.14
Moszkvai krt-03	1393	149	45	13.27	1.88	0.14
Moszkvai krt-04	1393	149	45	13.27	1.88	0.14
Moszkvai krt-05	1393	142	45	13.20	1.85	0.14
Párizsi krt-D	1694	508	38	23.78	3.89	0.38
Párizsi krt-K	2406	572	30	32.01	4.79	0.45

Petőfi S. u. K	449	30	46	4.10	0.52	0.04
Petőfi S. u. K-01	690	33	43	6.17	0.74	0.05
Petőfi S. u. Ny	879	85	36	10.23	1.15	0.10
Pozsonyi I. u.	849	14	41	7.32	0.78	0.05
Puskás u.	88	29	49	1.03	0.21	0.02
Rígó u.	612	49	43	5.67	0.75	0.05
Rókusi krt-01	2416	389	34	29.96	3.91	0.36
Rókusi krt-02	2421	381	34	29.92	3.87	0.35
Rókusi krt-03	2234	373	36	27.86	3.68	0.34
Rókusi krt-04	2234	373	36	27.86	3.68	0.34
Rókusi krt-05	2234	373	36	27.86	3.68	0.34
Rókusi krt-06	2234	371	36	27.83	3.67	0.34
Rókusi krt-07	2234	371	36	27.83	3.67	0.34
Rókusi krt-08	2349	326	36	28.51	3.55	0.32
Rókusi krt-09	2350	315	36	28.39	3.49	0.31
Rókusi krt-10	2570	402	32	31.73	4.10	0.37
Rókusi krt-11	2570	402	32	31.73	4.10	0.37
Somogyi u.	569	0	46	4.81	0.48	0.03
Szatymazi u.	119	10	49	1.11	0.15	0.01
Szt. Gellért u.	0	60	49	0.60	0.28	0.03
Szt. Gellért u.	0	60	49	0.60	0.28	0.03
Tábor u.	5	0	49	0.04	0.00	0.00
Tavaszi u.	149	19	49	1.45	0.22	0.02
Teréz u.	391	38	47	3.69	0.51	0.04
Tisza L. krt -01	663	46	43	6.07	0.78	0.05
Tisza L. krt -02	1353	79	23	20.13	1.52	0.15
Tisza L. krt -03	1203	95	26	18.28	1.49	0.15
Tisza L. krt -04	1296	94	23	19.56	1.56	0.16
Tisza L. krt -05	1455	110	16	2.28	1.97	0.24
Tisza L. krt -06	1474	100	16	2.07	1.92	0.24
Tisza L. krt -07	1474	78	18	1.61	1.78	0.22
Tisza L. krt -08	1400	56	23	20.45	1.44	0.14
Tópart u.	166	54	48	1.94	0.39	0.03
Török u. -01	106	0	49	0.90	0.09	0.01
Török u. -02	106	0	49	0.90	0.09	0.01
Török u. -02	89	27	49	1.02	0.20	0.02
Vásárhelyi P. u.	1656	190	0	49.72	2.83	0.39
Vértói u.	500	61	45	4.84	0.71	0.05

Table 9: Tram line 2, future with scenario (2018), emission values

section	psc/h	hv/h	v (km/h)	CO	NOX	dust
Attila u.-01	567	92	42	2.29	0.50	0.03
Attila u.-02	10	91	49	0.41	0.25	0.01
Attila u.-03	10	91	49	0.41	0.25	0.01
Bécsi krt	3203	74	0	31.41	2.58	0.22
Csongrádi sgt -D	1583	114	11	16.33	1.73	0.14
Csongrádi sgt -É	1702	81	9	17.12	1.61	0.13
Damjanich u.	46	12	49	0.20	0.05	0.00
Föltámadás u.	466	5	47	1.59	0.22	0.01
Gogol u.	187	1	49	0.63	0.09	0.00
Kálvária sgt-K-01	924	18	39	4.66	0.52	0.03
Kálvária sgt-K-01	418	17	47	1.47	0.23	0.01
Kálvária sgt-Ny	2033	96	0	20.44	1.92	0.16
Kisteleki u.	1047	201	23	8.64	1.43	0.10
Kiszáth K. u.-01	0	91	49	0.38	0.25	0.01
Kossuth L. sgt-01	2175	241	39	11.98	1.89	0.11
Kossuth L. sgt-02	2100	118	42	7.54	1.25	0.07
Kossuth L. sgt-03	2219	132	41	8.00	1.34	0.07
Kossuth L. sgt-04	1752	127	44	6.41	1.12	0.06
Kossuth L. sgt-05	1752	126	44	6.41	1.12	0.06
Kossuth L. sgt-06	1770	124	44	6.46	1.12	0.06
Kossuth L. sgt-07	2487	157	38	13.10	1.76	0.11
Kossuth L. sgt-08	2487	157	38	13.10	1.76	0.11
Kossuth L. sgt-09	2323	156	40	8.45	1.45	0.08
Kossuth L. sgt-10	2323	202	39	12.51	1.83	0.11
Kossuth L. sgt-11	2055	23	0	19.89	1.51	0.13
Kossuth L. sgt-11	2323	202	39	12.51	1.83	0.11
Körtöltés u.	378	37	47	1.42	0.27	0.01
Londoni krt-01	3562	329	24	27.07	3.40	0.24
Londoni krt-02	3562	353	23	27.23	3.50	0.25
Londoni krt-03	3406	115	31	17.43	2.08	0.13
Londoni krt-03	3446	115	31	17.63	2.09	0.14
Londoni krt-05	3591	170	28	26.23	2.76	0.20
Londoni krt-06	3591	170	28	26.23	2.76	0.20
Makkosházi krt	2667	247	35	14.44	2.15	0.13
Mérey u.	550	1	46	1.85	0.25	0.01
Mikszáth K. u. -02	0	91	49	0.38	0.25	0.01
Mikszáth K. u. -03	0	91	49	0.38	0.25	0.01
Moszkvai krt-01	3141	124	34	16.17	1.97	0.13
Moszkvai krt-02	3141	124	34	16.17	1.97	0.13
Moszkvai krt-03	3141	124	34	16.17	1.97	0.13
Moszkvai krt-04	3141	125	34	16.17	1.98	0.13
Moszkvai krt-05	3143	166	33	16.39	2.12	0.13
Párizsi krt-D	3122	327	29	23.98	3.14	0.22
Párizsi krt-K	4554	371	9	47.41	5.22	0.42
Petőfi S. u. K	992	12	38	4.97	0.53	0.04
Petőfi S. u K-01	598	32	44	2.14	0.35	0.02
Petőfi S. u. Ny	852	103	36	4.74	0.77	0.04
Pozsonyi I. u.	1058	35	35	5.41	0.64	0.04

Puskás u.	120	18	49	0.48	0.10	0.01
Rigó u.	732	51	41	2.67	0.46	0.03
Rókusi krt-01	2775	251	34	15.00	2.22	0.13
Rókusi krt-02	2779	276	33	15.14	2.31	0.13
Rókusi krt-03	2561	279	35	14.08	2.21	0.13
Rókusi krt-04	2561	279	35	14.08	2.21	0.13
Rókusi krt-05	2561	279	35	14.08	2.21	0.13
Rókusi krt-06	2561	279	35	14.08	2.21	0.13
Rókusi krt-07	2561	279	35	14.08	2.21	0.13
Rókusi krt-08	2671	290	34	14.68	2.30	0.13
Rókusi krt-09	2662	271	35	14.54	2.23	0.13
Rókusi krt-10	2880	337	31	15.95	2.56	0.15
Rókusi krt-11	2880	337	31	15.95	2.56	0.15
Somogyi u.	115	0	49	0.39	0.05	0.00
Szatymazi u.	150	19	49	0.58	0.12	0.01
Szt. Gellért u.	0	68	49	0.28	0.19	0.01
Szt Gellért u.	0	68	49	0.28	0.19	0.01
Tábor u.	12	0	49	0.04	0.01	0.00
Tavaszi u.	186	2	49	0.63	0.09	0.00
Teréz u.	514	18	46	1.80	0.28	0.02
Tisza L. krt -01	0	30	49	0.13	0.08	0.00
Tisza L. krt -02	598	63	43	2.27	0.44	0.02
Tisza L. krt -03	866	76	37	4.67	0.69	0.04
Tisza L. krt -04	384	76	46	1.61	0.38	0.02
Tisza L. krt -05	384	76	46	1.61	0.38	0.02
Tisza L. krt -06	0	76	49	0.32	0.21	0.01
Tisza L. krt -07	0	62	49	0.26	0.17	0.01
Tisza L. krt -08	0	47	49	0.20	0.13	0.01
Tópart u.	207	46	48	0.89	0.22	0.01
Török u. -01	228	0	49	0.77	0.10	0.01
Török u. -02	354	1	48	1.19	0.16	0.01
Török u. -02	228	0	49	0.77	0.10	0.01
Vásárhelyi P. u.	2084	190	0	21.91	2.51	0.20
Vértói u.	623	60	43	2.34	0.44	0.02

Table 10: Tram line 2, future without scenario (2018), emission values

section	psc/h	hv/h	v (km/h)	CO	NOX	dust
					g/h/m	
Attila u.-02	10	98	49	0.44	0.27	0.02
Attila u.-03	10	98	49	0.44	0.27	0.02
Bécsi krt	3214	74	0	31.51	2.59	0.22
Csongrádi sgt -D	1587	114	10	16.36	1.73	0.14
Csongrádi sgt -É	1706	111	6	17.47	1.79	0.15
Damjanich u.	47	12	49	0.21	0.05	0.00
Föltámadás u.	470	5	47	1.60	0.22	0.01
Gogol u.	188	1	49	0.64	0.09	0.00
Kálvária sgt-K-01	419	17	47	1.48	0.23	0.01
Kálvária sgt-K-01	927	18	39	4.68	0.52	0.03
Kálvária sgt-Ny	2039	96	0	20.50	1.93	0.16
Kisteleki u.	1051	201	23	8.67	1.44	0.10
Kiszáth K. u.-01	0	98	49	0.41	0.27	0.02
Kossuth L. sgt-01	2184	241	39	12.02	1.89	0.11
Kossuth L. sgt-02	2116	148	41	7.72	1.34	0.07
Kossuth L. sgt-03	2236	163	40	8.19	1.43	0.08
Kossuth L. sgt-04	1767	157	43	6.59	1.21	0.07
Kossuth L. sgt-05	1767	157	43	6.59	1.21	0.07
Kossuth L. sgt-06	1785	155	43	6.64	1.21	0.07
Kossuth L. sgt-07	2503	188	38	13.33	1.87	0.11
Kossuth L. sgt-08	2503	188	38	13.33	1.87	0.11
Kossuth L. sgt-09	2335	186	39	12.49	1.78	0.11
Kossuth L. sgt-10	2335	225	38	12.69	1.91	0.11
Kossuth L. sgt-11	2335	225	38	12.69	1.91	0.11
Kossuth L. sgt-11	2060	23	0	19.94	1.52	0.13
Körtöltés u.	383	37	47	1.44	0.27	0.01
Londoni krt-01	3571	344	23	27.23	3.47	0.25
Londoni krt-02	3571	361	23	27.35	3.54	0.25
Londoni krt-03	3414	115	31	17.47	2.08	0.13
Londoni krt-03	3455	115	31	17.68	2.10	0.14
Londoni krt-05	3602	170	28	26.31	2.77	0.20
Londoni krt-06	3602	170	28	26.31	2.77	0.20
Makkosházi krt	2678	247	35	14.50	2.16	0.13
Mérey u.	553	1	46	1.86	0.25	0.01
Mikszáth K. u. -02	0	98	49	0.41	0.27	0.02
Mikszáth K. u. -03	0	98	49	0.41	0.27	0.02
Moszkvai krt-01	3154	124	33	16.23	1.98	0.13
Moszkvai krt-02	3154	124	33	16.23	1.98	0.13
Moszkvai krt-03	3154	124	33	16.23	1.98	0.13
Moszkvai krt-04	3154	125	33	16.24	1.98	0.13
Moszkvai krt-05	3156	166	32	16.45	2.12	0.13
Párizsi krt-D	3129	360	28	24.25	3.28	0.23
Párizsi krt-K	4562	371	9	47.49	5.22	0.42
Petőfi S. u. K	993	12	38	4.97	0.53	0.04
Petőfi S. u K-01	598	32	44	2.14	0.35	0.02
Petőfi S. u. Ny	853	103	36	4.74	0.77	0.04
Pozsonyi I. u.	1061	35	35	5.43	0.64	0.04
Puskás u.	121	18	49	0.48	0.10	0.01

Rigó u.	736	51	41	2.68	0.46	0.03
Rókusi krt-01	2789	282	33	15.22	2.33	0.14
Rókusi krt-02	2794	307	33	15.37	2.42	0.14
Rókusi krt-03	2575	310	35	14.31	2.32	0.13
Rókusi krt-04	2575	310	35	14.31	2.32	0.13
Rókusi krt-05	2575	310	35	14.31	2.32	0.13
Rókusi krt-06	2575	310	35	14.31	2.32	0.13
Rókusi krt-07	2575	310	35	14.31	2.32	0.13
Rókusi krt-08	2695	321	33	14.95	2.42	0.14
Rókusi krt-09	2686	301	34	14.81	2.34	0.14
Rókusi krt-10	2901	367	30	16.21	2.67	0.15
Rókusi krt-11	2901	367	30	16.21	2.67	0.15
Somogyi u.	116	0	49	0.39	0.05	0.00
Szatymazi u.	150	19	49	0.58	0.12	0.01
Szt Gellért u.	0	60	49	0.25	0.16	0.01
Szt. Gellért u.	0	60	49	0.25	0.16	0.01
Tábor u.	12	0	49	0.04	0.01	0.00
Tavaszi u.	187	2	49	0.64	0.09	0.00
Teréz u.	516	18	46	1.81	0.28	0.02
Tisza L. krt -01	0	46	49	0.19	0.13	0.01
Tisza L. krt -02	598	78	42	2.33	0.48	0.03
Tisza L. krt -03	867	92	36	4.75	0.74	0.04
Tisza L. krt -04	385	92	45	1.68	0.42	0.02
Tisza L. krt -05	385	92	45	1.68	0.42	0.02
Tisza L. krt -06	0	92	49	0.39	0.25	0.01
Tisza L. krt -07	0	69	49	0.29	0.19	0.01
Tisza L. krt -08	0	47	49	0.20	0.13	0.01
Tópart u.	209	46	48	0.89	0.22	0.01
Török u. -01	228	0	49	0.77	0.10	0.01
Török u. -02	228	0	49	0.77	0.10	0.01
Török u. -02	355	1	48	1.20	0.16	0.01
Vásárhelyi P. u.	2086	190	0	21.93	2.51	0.20
Vértói u.	627	60	43	2.36	0.44	0.02

Table 11: Tram line 1, emission values (pollutants are given in g/h/m)

	Baseline						After construction					
	psc/h	hv/h	v	CO	NOx	dust	psc/h	hv/h	v	CO	NOx	dust
Aradi vértanúk tere	174	3	49	0.60	0.08	0.00	173	3	49	0.59	0.08	0.00
Bécsi krt.	1440	14	25	10.16	0.88	0.07	1440	14	25	10.16	0.88	0.07
Boldogasszony u.	200	9	49	0.71	0.11	0.01	200	9	49	0.71	0.11	0.01
Boldogasszony u.	61	4	49	0.22	0.04	0.00	61	4	49	0.22	0.04	0.00
Horváth M. u.	210	7	49	0.73	0.11	0.01	209	7	49	0.73	0.11	0.01
Indóház tér	0	5	49	0.02	0.01	0.00	0	5	49	0.02	0.01	0.00
Kossuth L. sgt.	1861	21	9	18.02	1.37	0.12	1858	21	9	17.99	1.37	0.12
Kossuth L. sgt-01	2184	241	39	12.02	1.89	0.11	2175	241	39	11.98	1.89	0.11
Kossuth L. sgt-07	2503	188	38	13.33	1.87	0.11	2487	157	38	13.10	1.76	0.11
Párizsi krt-D	3129	360	28	24.25	3.28	0.23	3122	327	29	23.98	3.14	0.22
Párizsi krt-K	4562	371	9	47.49	5.22	0.42	4554	371	9	47.41	5.22	0.42
Pozsonyi I. u.	1061	35	35	5.43	0.64	0.04	1058	35	35	5.41	0.64	0.04
Puskás u.	121	18	49	0.48	0.10	0.01	120	18	49	0.48	0.10	0.01
Rókusi krt-11	2901	367	30	16.21	2.67	0.15	2880	337	31	15.95	2.56	0.15
Széchenyi tér	0	153	48	0.64	0.42	0.02	0	153	48	0.64	0.42	0.02
Széchenyi tér	15	0	49	0.05	0.01	0.00	15	0	49	0.05	0.01	0.00
Takaréktár u.	13	14	49	0.10	0.04	0.00	13	14	49	0.10	0.04	0.00
Tavaszi u.	187	2	49	0.64	0.09	0.00	186	2	49	0.63	0.09	0.00
Teréz u.	516	18	46	1.81	0.28	0.02	514	18	46	1.80	0.28	0.02
Tisza L. krt.	76	47	49	0.45	0.16	0.01	76	47	49	0.45	0.16	0.01
Tisza L. krt.	62	51	49	0.42	0.17	0.01	62	51	49	0.42	0.17	0.01
Vásárhelyi P. u.	2086	190	0	21.93	2.51	0.20	2084	190	0	21.91	2.51	0.20
Vörösmarty u.	1753	3	15	16.80	1.19	0.10	1750	3	15	16.77	1.19	0.10

Table 12: Tram line 3, emission values (pollutants are given in g/h/m)

	Baseline						After construction					
	psc/h	hv/h	v	CO	NOx	dust	psc/h	hv/h	v	CO	NOx	dust
Kálvária sgt.	2102	221	0	22.40	2.70	0.22	2097	221	0	22.35	2.70	0.22
Mórávárosi ú.	821	200	30	5.07	1.08	0.06	818	200	30	5.06	1.08	0.06
Vásárhelyi P. u.	1709	159	0	18.00	2.07	0.17	1707	159	0	17.98	2.07	0.17
Kálvária sgt.	2243	128	0	22.78	2.25	0.19	2238	128	0	22.74	2.25	0.19
Csáktornyai u.	395	30	47	1.45	0.26	0.01	395	30	47	1.45	0.26	0.01
Kálvária sgt.	2598	122	0	26.12	2.46	0.20	2593	122	0	26.07	2.45	0.20
Káolna u.	28	3	49	0.11	0.02	0.00	28	3	49	0.11	0.02	0.00
Korda u.	21	0	49	0.07	0.01	0.00	21	0	49	0.07	0.01	0.00
Kálvária sgt.	2039	96	0	20.50	1.93	0.16	2033	96	0	20.44	1.92	0.16
Londoni krt-06	3602	170	28	26.31	2.77	0.20	3591	170	28	26.23	2.76	0.20
Kálvária sgt-K-01	927	18	39	4.68	0.52	0.03	924	18	39	4.66	0.52	0.03

Table 13: Tram line 4, emission values (pollutants are given in g/h/m)

	Baseline						After construction					
	nsc/h	hv/h	v	CO	NOx	dust	nsc/h	hv/h	v	CO	NOx	dust
Arany J. u.	232	17	49	0.85	0.1	0.01	232	17	49	0.85	0.1	0.01
Brüsszeli krt.	4583	233	0	46.2	4.4	0.37	4577	233	0	46.2	4.4	0.37
Budapesti krt.	1983	148	0	20.5	2.1	0.18	1979	148	0	20.4	2.1	0.18
Csorba u.	1226	69	28	9.03	0.9	0.07	1225	69	28	9.02	0.9	0.07
Dankó P. u.	1234	50	29	8.96	0.9	0.07	1231	50	29	8.94	0.9	0.07
Dózsa u.	15	44	49	0.23	0.1	0.01	15	44	49	0.23	0.1	0.01
József A. sgt.	2038	98	0	20.5	1.9	0.16	2032	98	0	20.4	1.9	0.16
József A. sgt.	1270	61	27	9.28	0.9	0.07	1267	61	27	9.26	0.9	0.07
József A. sgt.	1705	132	3	17.6	1.9	0.16	1701	132	4	17.6	1.9	0.16
József A. sgt.	2596	263	35	14.1	2.1	0.13	2595	263	35	14.1	2.1	0.13
József A. sgt.	1582	110	11	16.2	1.7	0.14	1580	110	11	16.2	1.7	0.14
József A. sgt.	1875	74	44	6.60	1.0	0.06	1871	74	44	6.59	1.0	0.06
József A. sgt.	1271	61	27	9.29	0.9	0.07	1267	61	27	9.26	0.9	0.07
József A. sgt.	495	51	45	1.88	0.3	0.02	494	51	45	1.87	0.3	0.02
Kálmáni L. u.	532	8	46	1.82	0.2	0.01	531	8	46	1.82	0.2	0.01
Kossuth L. krt.	1753	3	15	16.8	1.1	0.10	1750	3	15	16.7	1.1	0.10
Kossuth L. krt.	1893	7	9	18.1	1.3	0.11	1889	7	9	18.1	1.3	0.11
Madách u.	94	17	49	0.39	0.0	0.00	94	17	49	0.39	0.0	0.00
Makkosházi krt.	2208	176	0	22.9	2.5	0.20	2197	176	0	22.8	2.5	0.20
Római krt.	3334	222	0	34.2	3.5	0.29	3328	222	0	34.1	3.5	0.29
Szt Miklós u.	701	16	43	2.42	0.3	0.02	701	16	43	2.42	0.3	0.02
Teleki u.	47	0	49	0.16	0.0	0.00	47	0	49	0.16	0.0	0.00
Tisza L. krt.	28	92	49	0.48	0.2	0.02	28	92	49	0.48	0.2	0.02
Tisza L. krt.	76	47	49	0.45	0.1	0.01	76	47	49	0.45	0.1	0.01
Tisza L. krt.	521	40	45	1.92	0.3	0.02	520	40	45	1.91	0.3	0.02
Tisza L. krt.	171	65	48	0.85	0.2	0.01	171	65	48	0.85	0.2	0.01
Tisza L. krt.	13	47	49	0.24	0.1	0.01	13	47	49	0.24	0.1	0.01

Noise

Table 14: Tram line 2, noise levels

	Measured		Calculated		Future with scenario (2018)		Future without scenario (2018)	
	LAM [dB]		LAM [dB]		LAM [dB]		LAM [dB]	
	day	night	day	night	day	night	day	night
Óvoda, Rókusi krt. 37	68.4	64.2	70.6	62.4	69.6	61.5	70.7	62.7
Petresi u. 2. lakóép.	63.4	59.1	65.5	57.3	65.9	57.6	65.9	57.7
Rókusi krt. 78. lakóép.	65.8	61.5	67.7	59.5	68.4	60.1	68	59.9
Kukovetz N. u. 5. lakóép.	65.4	61.1	67.5	59.3	68.1	59.8	67.9	59.7
Rókusi krt. 23. lakóép.	64.1	59.8	66.2	58.0	66.4	58.1	66.3	58.1
Rókusi krt. 17. lakóép.	64.2	59.9	65.9	57.7	66.0	57.8	65.9	57.7
Vértói út 1. lakóép.	63.2	58.9	65.6	57.3	65.7	57.5	65.7	57.5

	day	night	day	night	day	night	day	night
ÁNF	21248	2142	24236	1823	26417	2064	27547	2073

Table 15: Tram line 1, noise levels (dBA)

	Baseline					After reconstruction				
	Q1	Q2	Q3	Noise day	Noise night	Q1	Q2	Q3	Noise day	Noise night
Aradi vértanúk tere	1740	21	16	60.9	53.0	1737	21	16	60.9	53.0
Bécsi krt.	14408	64	81	70.3	62.1	14402	64	81	70.3	62.1
Bocskai u.	316	0	0	53.5	43.9	316	0	0	53.5	43.9
Boldogasszony u.	611	23	25	56.2	46.9	611	23	25	56.2	46.9
Boldogasszony u.	2009	47	49	62.2	53.5	2006	47	49	62.2	53.5
Boldogasszony u.	611	23	25	56.2	46.9	611	23	25	56.2	46.9
Boldogasszony u.	385	0	1	54.3	43.9	385	0	1	54.3	43.9
Boldogasszony u.	385	0	0	54.3	43.9	385	0	0	54.3	43.9
Boldogasszony u.	385	0	1	54.3	43.9	385	0	1	54.3	43.9
Boldogasszony u.	611	23	25	56.2	46.9	611	23	25	56.2	46.9
Boldogasszony u.	385	0	0	54.3	43.9	385	0	0	54.3	43.9
Damjanich u.	471	54	73	58.4	46.9	468	54	73	58.4	46.9
Horváth M. u.	2104	42	30	61.9	53.5	2098	42	30	61.9	53.5
Kossuth L. krt	18931	43	31	71.3	63.3	18899	43	31	71.3	63.3
Kossuth L. krt	17536	22	15	71.0	63.0	17509	22	15	71.0	63.0
Kossuth L. sgt	18615	117	99	71.4	63.3	18583	117	99	71.4	63.2
Kossuth L sgt.	18615	117	99	71.4	63.3	18583	117	99	71.4	63.2
Kossuth L. sgt-01	21845	863	1556	72.7	64.4	21756	863	1556	72.7	64.4
Kossuth L. sgt-02	21160	656	832	71.9	63.4	21000	656	526	71.5	63.4
Kossuth L. sgt-03	22369	720	915	72.2	64.0	22198	720	609	71.8	63.6
Kossuth L. sgt-04	17677	714	865	71.3	63.2	17525	714	559	71.0	62.7
Kossuth L. sgt-05	17677	712	861	71.3	62.7	17525	712	555	71.0	62.7
Kossuth L. sgt-07	25030	857	1028	72.7	64.4	24877	857	722	72.4	64.0
Kossuth L. sgt-08	25030	857	1028	72.7	64.4	24877	857	722	72.4	64.0
Kossuth L. sgt-09	23359	853	1013	72.4	64.2	23232	853	707	72.2	63.8
Kossuth L. sgt-10	23359	1046	1206	72.7	64.4	23232	1046	976	72.5	64.3
Kossuth L. sgt-11	23359	1046	1206	72.7	64.4	23232	1046	976	72.5	64.3
Kossuth L. sgt-11	20601	123	111	71.9	63.7	20550	123	111	71.9	63.7
Párizsi krt-D	31296	1769	1840	74.2	66.1	31223	1769	1510	73.9	65.9
Párizsi krt-K	45622	1778	1936	75.4	67.3	45541	1778	1936	75.4	67.3
Pozsonyi I. u.	10613	157	193	69.3	60.8	10587	157	193	69.3	60.7
Puskás u.	1217	79	110	61.6	50.9	1207	79	110	61.5	50.9
Rókusi krt-11	29019	1371	2307	74.1	66.1	28805	1371	2001	73.9	65.8
Széchenyi tér	0	766	766	66.8	58.1	0	766	766	66.8	58.1
Széchenyi tér	155	0	0	49.9		155	0	0	49.9	
Szt Ferenc u.	1466	240	240	63.7	55.6	1463	240	240	63.7	55.6
Szt. Gellért u.	0	303	303	62.4	53.4	0	303	379	63.1	53.4
Takaréktár u.	133	73	67	55.5		133	73	67	55.5	
Tavaszi u.	1876	8	17	61.2	53.0	1864	8	17	61.2	53.0
Teréz u.	5162	60	122	66.2	57.5	5141	60	122	66.2	57.5
Tisza L. krt.	766	238	239	62.7	54.6	763	238	239	62.7	54.6
Tisza L. krt.	629	259	253	62.9	54.3	626	259	253	62.9	54.3
Török u.	2195	6	12	61.9	53.9	2177	6	12	61.8	53.9
Vásárhelyi P. u.	20865	726	1177	73.3	65.2	20843	726	1177	73.3	65.2
Vörösmarty u.	17536	22	15	71.0	63.0	17509	22	15	71.0	63.0

Table 16: Tram line 3, noise levels (dBA)

szakasz neve	Baseline				After reconstruction				
	Q2	Q3	Noise day	Noise night	Q1	Q2	Q3	Noise day	Noise night
Kálvária sgt.	799	1418	73.6	65.4	20971	799	1418	73.6	65.4
Mórvárosi ú.	702	1300	71.1	63.0	8184	702	1300	71.0	63.0
Vásárhelyi P. u.	625	969	72.5	64.3	17074	625	969	72.5	64.2
Kálvária sgt.	526	761	73.1	65.0	22383	526	761	73.1	65.0
Kálvária sgt.	526	761	73.1	65.0	22383	526	761	73.1	65.0
Csáktornyai u.	106	198	65.8	56.5	3953	106	198	65.8	56.5
Kálvária sgt.	507	716	73.5	65.5	25935	507	716	73.5	65.5
Kálvária sgt.	507	716	73.5	65.5	25935	507	716	73.5	65.5
Káolna u.	13	20	53.0	43.9	287	13	20	53.0	43.9
Kálvária sgt.	496	696	73.5	65.4	25653	496	696	73.5	65.4
Kálvária sgt.	497	698	73.5	65.5	25867	497	698	73.5	65.5
Kálvária sgt.	445	613	73.4	65.3	25867	445	613	73.4	65.3
Kálvária sgt.	433	528	72.5	64.4	20339	433	528	72.4	64.4
Kálvária sgt.	433	528	72.5	64.4	20339	433	528	72.4	64.4
Kálvária sgt.	433	528	72.5	64.4	20339	433	528	72.4	64.4
Kálvária sgt-Ny	433	528	72.5	64.4	20339	433	528	72.4	64.4
Londoni krt-06	814	890	73.8	65.7	35914	814	890	73.8	65.7
Kálvária sgt-K-01	91	96	68.5	60.2	9248	91	96	68.5	60.2
Kálvária sgt.	91	96	68.5	60.2	9248	91	96	68.5	60.2
Bólyai J. u.	5	10	65.6	57.5	5066	5	10	65.6	57.5
Kálvária sgt.	86	86	65.3	56.7	4182	86	86	65.3	56.7
Kálvária sgt-K-01	86	86	65.3	56.7	4182	86	86	65.3	56.7
Tisza L. krt -02	392	392	68.2	59.5	5989	392	240	67.7	59.5
Tisza L. krt -03	460	460	69.5	61.5	8667	460	308	69.2	61.0
Somogyi u.	0	0	59.1	50.9	1155	0	0	59.1	50.9

Table 17: Tram line 4, noise levels (dBA)

	Baseline				After reconstruction				
	Q2	Q3	Noise day	Noise night	Q1	Q2	Q3	Noise day	Noise night
Arany J. u.	94	83	63.2	53.9	2320	94	83	63.2	53.9
Brüsszeli krt.	1122	1214	76.0	68.0	45771	1122	1214	76.0	68.0
Budapesti krt.	655	829	72.7	64.6	19799	655	829	72.7	64.6
Csorba u.	259	440	70.4	62.4	12259	259	440	70.4	62.4
Dankó P. u.	249	255	70.1	62.1	12319	249	255	70.1	62.0
Dózsa u.	225	219	61.5	53.4	155	225	219	61.5	53.4
József A. sgt.	418	568	72.5	64.3	20325	418	568	72.5	64.3
József A. sgt.	298	315	70.4	62.2	12675	298	315	70.4	62.2
József A. sgt.	609	715	72.1	64.0	17014	609	715	72.1	64.0
József A. sgt.	469	494	71.5	63.5	15802	469	494	71.5	63.5
József A. sgt.	1010	1625	73.3	65.1	25951	1010	1625	73.3	65.1
József A. sgt.	917	1521	74.3	66.3	25739	917	1521	74.3	66.3
József A. sgt.	354	390	70.8	62.2	18714	354	390	70.8	62.2
József A. sgt.	259	253	67.0	58.8	4943	259	253	67.0	58.8
Kálmáni L. u	22	26	64.2	56.2	3703	22	26	64.2	56.2
Kálmáni L. u	34	50	66.0	57.7	5316	34	50	65.9	57.7
Kossuth L. krt	22	15	71.0	63.0	17509	22	15	71.0	63.0
Kossuth L. krt	43	31	71.3	63.3	18899	43	31	71.3	63.3
Madách u.	94	83	60.4	49.9	949	94	83	60.4	49.9
Makkosházi krt.	668	1098	73.4	65.4	21979	668	1098	73.3	65.4
Római krt.	1040	1181	74.9	66.8	33286	1040	1181	74.9	66.8
Szt Miklós u.	73	95	67.4	59.0	7013	73	95	67.3	59.0
Teleki u.	0	0	55.1	46.9	474	0	0	55.1	46.9
Tisza L. krt.	463	457	64.8	56.6	287	463	457	64.8	56.6
Tisza L. krt.	238	239	62.7	54.6	763	238	239	62.7	54.6
Tisza L. krt.	204	204	66.8	57.7	5207	204	204	66.8	57.7
Tisza L. krt.	259	253	62.9	54.3	626	259	253	62.9	54.3
Tisza L. krt.	238	238	62.4	54.3	607	238	238	62.4	54.3
Tisza L. krt.	332	321	65.0	55.9	1712	332	321	65.0	55.9
Tisza L. krt.	238	238	61.4	53.4	133	238	238	61.4	53.4