

D4 HIGHWAY, IVANKA NORTH - ZÁHORSKÁ BYSTRICA

REPORT ON ACTIVITY ASSESSMENT UNDER ART. 31 OF THE ACT NO. 24/2006 COLL. ON ENVIRONMENTAL IMPACT ASSESSMENT AS AMENDED



NÁRODNÁ DIAĽNIČNÁ SPOLOČNOSŤ

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TABLE OF CONTENTS:

INTRODUCTION.....	5
A. BASIC DATA	6
A.I. Basic Information on Proponent	
A.II. Basic Data on Proposed Activity	7
A.II.1. Name.....	7
A.II.2. Purpose	7
A.II.3. User.....	7
A.II.4. Location	7
A.II.5. Overview of Location of the Proposed Activity	8
A.II.6. Reasons for Locating at the Relevant Location	8
A.II.7. Dates of Commencement and Completion of the Construction and Operation of the Proposed Works	9
A.II.8. Brief Description of Technical and Technological Solution	10
A.II.9. Alternatives of the Proposed Activity.....	21
A.II.10. Total Costs	22
A.II.11. Affected Municipality.....	22
A.II.12. Affected Self-Administrative Region	22
A.II.13. Affected Authorities	22
A.II.14. Authorising Authority.....	23
A.II.15. Relevant Ministry	23
A.II.16. Statement on Cross-Border Impacts of the Proposed Activity	23
B. DATA ON DIRECT IMPACTS OF THE PROPOSED WORKS ON THE ENVIRONMENT INCLUDING HEALTH.....	24
B.I. Input Requirements.....	24
B.I.1. Soil	24
B.I.2. Water	26
B.I.3. Raw Materials	27
B.I.4. Energy Sources.....	28
B.I.5. Requirements for Transport and Other Infrastructure	28
B.I.6. Labour Requirements	29
B.II. Output Data.....	30
B.II.1. Air	30
B.II.2. Waste Waters	33
B.II.3. Wastes	37
B.II.4. Noise and Vibrations.....	42
B.II.5. Radiation and Other Physical Fields	43
B.II.6. Smells and Other Outputs	44
B.II.7. Additional Data.....	44
C.COMPREHENSIVE CHARACTERISTICS AND ASSESSMENT OF IMPACTS ON ENVIRONMENT INCLUDING HEALTH.....	49
C.I. Demarcation of the Affected Area	49
C.II. Characteristics of the Current State of the Environment in the Affected Area.....	49
C.II.1. Geomorphology	49
C.II.2. Geology.....	50
C.II.3. Soil	56
C.II.4. Climate.....	59
C.II.5. Air	60
C.II.6. Hydrology	62
C.II.7. Fauna and flora	73
C.II.8. Land	78

C.II.9. Protected Areas under Special Regulations and Their Protection Zones	86
C.II.10. Territorial System of Ecological Stability.....	90
C.II.11. Population	92
C.II.12. Cultural and Historical Monuments and Sights	109
C.II.13. Archaeological Sites	112
C.II.14. Palaeontological Sites and Significant Geological Sites.....	117
C.II.15. Characteristics of Existing Sources of Environmental Pollution and Their Environmental Impact	117
C.II.16. Comprehensive Assessment of Current Environmental Issues.....	119
C.II.17. Overall Environmental Quality	120
C.II.18. Anticipated Area Development Assessment if the Proposed Activity Is Not Implemented.....	121
C.II.19. Compliance of the Proposed Activity with Applicable Land Use Documentation.	122
C.III. Assessment of the Expected Impacts of the Proposed Activity on the Environment, Including Health and Their Estimated Relevance.....	125
C.III.1. Impacts on Population	125
C.III.2. Impacts on Surrounding Rock, Mineral Deposits, Geodynamic Phenomena and Geomorphological Conditions.....	133
C.III.3. Impacts on Climate	135
C.III.4. Impacts on Air	137
C.III.5. Impacts on Water.....	142
C.III.6. Impacts on Soil	147
C.III.7. Impacts on Flora, Fauna and their Habitats	149
C.III.8. Impacts on Land	162
C.III.9. Impacts on Protected Areas and Their Protection Zones.....	164
C.III.10. Impacts on Territorial System of Ecological Stability.....	165
C.III.11. Impacts on Urban Complex and Land Use.....	168
C.III.12. Impacts on Cultural and Historical Monuments	170
C.III.13. Impacts on Archaeological Sites	171
C.III.14. Impacts on Palaeontological Sites and Significant Geological Sites.....	172
C.III.15. Impacts on Cultural Values of an Immaterial Nature	173
C.III.16. Other Impacts	174
C.III.17. Spatial Synthesis of the Effects of Activities in the Area	181
C.III.18. Comprehensive Assessment of the Expected Impacts in Terms of Their Significance and Their Comparison with the Valid Legislation	182
C.III.19. Operational Risks and Their Possible Impact on the Area	185
C.IV. Measures Designed to Prevent, Eliminate, Minimize and Offset the Impacts of Proposed Activity on the Environment and Health.....	186
C.IV.1. Land Planning Measures	186
C.IV.2. Technical Measures	186
C.IV.3. Technological Measures.....	191
C.IV.4. Organizational and Operational Measures.....	191
C.IV.5. Other Measures.....	193
C.IV.6. Statement to Technical and Economic Feasibility of Measures	193
C.V. Comparison of the Alternatives of the Proposed Activity and Proposal of the Optimal Alternative	
C.V.1. Creating a Set of Criteria and Determining Their Relevance for the Selection of Optimal Alternative	194
C.V.2. Selection of the Optimal Alternative or Ranking the Appropriateness of Considered Options	194
C.V.3. Justification of Proposal of Optimal Alternative	199
C.VI. Proposed Monitoring and Post-Project Analysis.....	200

C.VI.1. Proposed Monitoring From Start of Construction, During Construction, During Operation and After the Operation of the Proposed Activity	200
C.VI.2. Proposed Monitoring of Compliance with Specified Conditions	202
C.VII. Methods Used in the Impact Assessment Process of the Proposed Activities on the Environment and Methods and Sources of Obtaining Data on the Present Status of the Environment in the Territory Where the Proposed Activity Is to Be Constructed.....	203
C.VIII. Shortcomings and Uncertainties in Knowledge Encountered in the Processing of the Assessment Report.....	203
C.IX. Annexes to the Assessment Report.....	204
C.X. General Final Summary	205
C.XI. List of Researchers and Organizations Participating in Processing of the Assessment Report	212
C.XII. List of Supplementary Analytical Reports and Studies Available from the Proponent Used as Basis for Preparing the Assessment Report	213
C.XIII. Date and Confirmation of Correctness and Completeness of the Data by Signature (Stamp) of the Authorized Representative of the Assessment Report Author and of the Proponent	

TEXT ANNEXES:

(Printouts included in counterparts 1-6, otherwise only on the included CD)

Text Annex no. 1:	Traffic engineer documentation
Text Annex no. 2:	Noise study
Text Annex no. 3:	Dispersion study
Text Annex no. 4:	Impacts of the proposed activity on NATURA 2000 sites
Text Annex no. 5:	Impact on favourable status of habitats

GRAPHICAL ANNEXES:

(Printouts of Graphical Annexes 1 to 4.2 are included in all counterparts; Printouts of Graphical Annexes 5 to 9 are included in counterparts 1-6, otherwise on the attached CD)

Graphical Annex no. 1:	General situation of wider relations in M 1:120 000
Graphical Annex no. 2.1:	General situation 2a, 2b (1:30 000)
Graphical Annex no. 2.2:	General situation 7a, 7b (1:30 000)
Graphical Annex no. 2.3:	General situation 7c and SPL (1:30 000/1:50 000)
Graphical Annex no. 3:	Situation of the current status of environment - environmental characteristics (1:25 000)
Graphical Annex no. 4.1:	Situation of foreseen impacts on environment 2a, 2b, 7a, 7b, 7c (1:10 000)
Graphical Annex no. 4.2:	Situation of foreseen impacts on environment SPL (1:20 000)
Graphical Annex no. 5:	Geological map of the area (1:55 000)
Graphical Annex no. 6:	Consent with Land Use Documentation (1:90 000)
Graphical Annex no. 7:	Longitudinal profiles (1:20 000/1:2 000)
Graphical Annex no. 8:	Photographic documentation

Graphical Annex no. 9: Visualization**INTRODUCTION**

The presented Report on Activity Assessment under Article 31 of the Act no. 24/2006 Coll. on Environmental Impact Assessment as amended (EIA Report) is prepared for the intention "D4 Highway, Ivanka North - Záhorská Bystrica".

This is the 2nd section of the new D4 highway in the section from the Ivanka North interchange (D1 highway) - Záhorská Bystrica (road no. I/2). The D4 highway corresponds to the "New Project of Highway and Expressway Construction", approved by a resolution of the Government of the Slovak Republic no. 162 of year 2001 (updated by a resolution of the Government no. 882/2008) that defines the highway network as defined by the D1, D2, D3, and D4 highways and an expressway network formed by R1, R2, R3, R4, R5, R6, R7, and R8, and possible future lines in a distant outlook; this counts with D4 in the section from state border Austria/Slovak Republic - Bratislava - interchange with D2 Jarovce - interchange Rovinka - interchange with D1 Ivanka pri Dunaji North - interchange with road II/502 - interchange with road I/2 - interchange with D2 Stupava South - state border Austria/Slovak Republic.

The D4 highway also forms a part of the program of preparing and construction of highways and expressways for years 2007 - 2010 that was approved by a resolution of the Government of the Slovak Republic no. 1084/2007.

In 2008, HBH Projekt spol. s r.o. prepared an EIA Intention for this 2nd section of the D4 highway; this discussed 3 active alternatives (*Alternative 2, 3 and 7*). Active alternatives 2 and 3 resulted from the technical study prepared in May 2007; alternative 7 resulted from the extension of the technical study dated August 2007.

The conclusions of the EIA Intention recommended alternatives 2 and 7 for assessment within the EIA Report. After the publishing of the EIA Intention and its commenting, the Ministry of Environment has published, on 18 July 2008, the Scope of Assessment, that required the EIA Report, without limitation, to assess the modifications of alternatives 2 and 7 as well as a completely new alternative Senec - Pezinok - Lozorno (SPL).

The new SPL alternative, together with the modifications of alternatives 2 and 7 (alternatives 2a, 2b, 7a, 7b, and 7c) were processed in the Feasibility Study that discussed a number of other technical requirements from the Scope of Assessment not only for section II of the D4 highway but also for all prepared sections of the D4 highway. This is because all of them are being prepared and assessed at the same time.

The feasibility study, together with other expert documentation, formed a basis for the preparing of the submitted EIA Report.

The EIA Report was prepared by HBH Projekt spol. s r.o., organizational unit Slovakia, Banská Bystrica, by the specialists from the Ecological Unit and the Roads and Highways Unit.

A. BASIC DATA

A.I. BASIC INFORMATION ON PROPONENT

1. Business name (name): Národná diaľničná spoločnosť, a.s.

2. Identification number: 35 919 001

3. Seat: Mlynské Nivy 45, 821 09 Bratislava

4. Name, surname, address, phone number and other contact data of the proponent's authorised representative:

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5. Name, surname, address, phone number and other contact data of the contact person, who can provide the relevant information about the proposed activities and place of consultations:

Procurer:

Národná diaľničná spoločnosť, a.s.

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A.II. BASIC DATA ON PROPOSED ACTIVITY

1. Name

D4 Highway, Ivanka North - Záhorská Bystrica

2. Purpose

The construction of the D4 highway that integrally includes the 2nd section that we assess (in six alternatives) around Bratislava, the capital city of Slovakia, will significantly help with the solving of the problem of the transit transport and the problem of insufficient capacity of the road network of the capital city. Benefits will be mostly in the deviation of the transit transportation heading for the Czech Republic, Austria, and Hungary. It will also significantly help with the transport servicing of the affected area and relieve the surrounding municipalities from transit transportation that should be primarily covered by the highway network.

3. User

Národná diaľničná spoločnosť, a.s.
Mlynské nivy 45
821 09 Bratislava

4. Location

Region: Bratislava

District: Bratislava III, Bratislava IV, Malacky, Senec, Pezinok

Municipality: Lozorno, Pezinok, Viničné, Slovenský Grob, Chorvátsky Grob, Bernolákovo, Stupava, Bratislava - Záhorská Bystrica, Marianka, Borinka, Bratislava - Rača, Bratislava - Vajnory, Svätý Jur, Ivanka pri Dunaji

Cadastral area:

SPL alternative:

Lozorno, Neštich, Svätý Jur, Grinava, Pezinok, Viničné, Slovenský Grob, Chorvátsky Grob, Bernolákovo

Alternatives 2a, 2a, 7a, 7b, 7c:

Mást I, Záhorská Bystrica I, Bystrická hora, Mást II, Marianka, Borinka, Rača, Vajnory, Svätý Jur, Ivanka pri Dunaji

5. Overview of Location of the Proposed Activity



6. Reasons for Locating at the Relevant Location

The road network of our capital city of Bratislava is characteristic by a high growth of traffic load by automobiles; this is due to the location, size, and development of the city. Several causes of this critical situation in transportation exist. The first cause is that Bratislava is crossed by three multi-modal transport corridors as well as the Danube - a ship transportation corridor; these generate transit transportation.

Corridor IV: Berlin - Dresden - Prague - Bratislava - Vienna - Budapest - Sofia - Istanbul

- *in the territory of the Slovak Republic:* CZ/SK state border, Kúty crossing point, districts Skalica - Malacky - Bratislava - SK/H state border, Rusovce crossing point (Bratislava district)

Corridor V: Venice - Koper - Trieste - Ljubljana - Budapest - Uzhgorod - Lviv

- supplementary route V.a: Bratislava - Žilina - Košice - Uzhgorod

- *in the territory of the Slovak Republic:* interchange with D2, I/2, I/61 Bratislava - Trnava - Trenčín - Považská Bystrica - Žilina - Ružomberok - Lip. Mikuláš - Poprad - Prešov - Košice - Michalovce - Sobrance - SK/U state border, Vyšné Nemecké border crossing point (Sobrance district)

Corridor VI: Gdansk - Grudziadz - Warsaw - Katowice - Žilina

- *in the territory of the Slovak Republic:* PL/SR state border, Skalité border crossing point (Čadca district) - interchange with I/11, I/18 Žilina

Bratislava as a capital city is a strong source and destination for automobile transportation. High load at the entries to the city is also caused by the large attraction zone of the so-called "Big Bratislava" from which residents travel to Bratislava to work, study, and for other activities. The trend of moving of urban population to the countryside multiplies this effect even further.

The traffic density is also influenced by the barrier effect of the Small Carpathian Mountains, reaching from the north-west practically all the way to the Danube River and dividing the city.

Due to the above reasons, the territory of the city faces frequent capacity problems on 1st and 2nd class roads, the traffic peak times are prolonged, and these problems are shifted also to local roads as entering 1st and 2nd class roads from these is problematic. To avoid problems at the entry to Bratislava, numerous drivers seek substitute routes using local roads, burdening the local communication networks of adjacent towns and municipalities with transit traffic. Traffic problems also occur on the D1 highway, especially on the entry to Bratislava from the Trnava direction, where transit traffic is mixed with local source and destination traffic from the eastern part of the city to the west and vice versa. This causes an extraordinary traffic load especially before the Prístavný Bridge, on the Prístavný Bridge itself, and on the following roads crossing the Petržalka district.

Thus, construction of the D4 highway around the capital city will substantially contribute to solving of the current traffic problems. The main benefit will be in the deviation of transiting traffic heading to Austria, Hungary, and the Czech Republic. However, it will also significantly contribute to the servicing of the affected area and relieve the surrounding municipalities from transiting traffic.

The location of the section of the D4 highway, Ivanka North - Záhorská Bystrica is based on the preparing of the zeroth tangential circuit around Bratislava. Since 2002 when the "Traffic and Urban Study of the Zeroth Circuit Around Bratislava" was prepared (Dopravoprojekt, a.s., February 2002), the corridor for the D4 highway has been stabilized and incorporated in the area plans of Bratislava, the capital city, and of the municipalities of Marianka and Stupava. The process of environmental impact assessment under the Act no. 24/2006 Coll. as amended requires a review and equal assessment of a new corridor located more to the north from the proposed alternatives, routed between Senec - Pezinok - Lozorno. 5 modified alternatives in the route of the already stabilized D4 corridor will be assessed, together with one alternative proposed more to the north, in the Senec - Pezinok - Lozorno corridor.

The Act no. 8/2009 Coll. on Road Traffic and on modification and amendment of other acts as amended, modifying and amending the Act no. 135/1961 Coll. on Road Communications (Road Act) as amended, included the D4 highway on the list of highways and expressways according to the Annex no. 2 to the Act. The D4 highway is defined there as follows: "D4 Austria/Slovak Republic state border - Bratislava - D2 Jarovce interchange - Rovinka interchange - D1 Ivanka pri Dunaji north interchange - interchange with road II/502 - interchange with road I/2 - D2 Stupava south interchange - Slovak Republic/Austria state border".

7. Dates of Commencement and Completion of the Construction and Operation of the Proposed Works

Start of construction: 2014
End of construction: 2018

8. Brief Description of Technical and Technological Solution

The assessed intention originally started in the dual-level interchange of the D1 highway with D4 Ivanka north. As the position of the relocation of the I/64 road that is being prepared changed, it is necessary to provide a solution for the crossing of D1 and D4 also by means when D4 will pass over D1.

This solution has been projected by Geoconsult spol. s r. o. in 2010 and upon request of the investor (NDS), an alternative solution of this interchange has been included in the Assessment Report for the section Jarovce - Ivanka north (see below). Both alternatives of the crossing of D1 and D4 are designed so that the altitude of the D4 highway remains stable from **km 0.575** to the west. At this point, all alternatives 2 and 7 of the D4 highway will thus start and this solution will provide for alternative routing of D4 in both directions from km 0.575 - from this kilometre, D4 can be routed east to pass under D1 or over D1 as well as to the west on the surface, or led to the Vajnory tunnel (see below).

To the maximum extent possible, all alternatives are designed according to the requirements specified in the Evaluation Scope (elevated and subgrade highway in the section around the Vajnory municipal district and from the western portal to the Záhorská Bystrica dual-level interchange); if this requirement is not met locally, this is due to the connection to the adjacent section III that is already being constructed in half-profile, or it is due to the requirements for drainage of water from the highway.

Alternative solution of the "Ivanka North" interchange of the D4 highway with the D1 highway

In the interchange with the D1 highway, the D4 highway is designed, according to the feasibility study for D4, under the current elevated body of the D1 highway, partially sinking the D4 highway under the terrain in order to adhere to the standardized clearance. For this solution, it is necessary to build the D4 highway in a sealed trough long approximately 600 m due to the high level of subsurface water. This solution was connected to the crossing of D4 with the relocation of the I/61 road that was planned to pass over D4.

Due to the unfavourable hydrogeological conditions in this section of the highway (need to build the sealed trough due to the high level of subsurface water and other potential anti-flooding measures) and due to the change of the planned relocation of the I/61 road that is now planned at the terrain level (under the planned D4), the proponent, NDS a.s., has ordered, during the preparing of the Assessment Report, an alternative solution of the location of the D4 highway in the section of the Ivanka North dual-level interchange. The alternative solution of the D4 highway consists of a modification of the elevation of the D4 highway, relocating it above the D1 highway (so that D4 passes continually above the I/61 road and the D1 highway). This requires a change of the elevation from km 21.250 to km 22.801 of the Jarovce - Ivanka North section and from km 0.000 to km 0.575 of the section Ivanka North - Záhorská Bystrica (in alternatives 2a, 2b, 7a, 7b, and 7c). The proposed change of the elevation is in line with STN 73 6101 for the proposed category D33.5/120. The highway will be led by a bridge over the D1 highway, avoiding the need to build a sealed trough under the

level of subsurface water that would require demanding construction technologies and disturb the regime and quality of subsurface waters during the construction period. This solution also permits to keep the D1 highway operational during the construction of the D4 highway, although with limitations. In case of construction of the D4 highway under the D1 highway, the D1 highway would have to be closed completely.

The second section thus de facto starts as late as from km 0.575 and the shape of individual alternatives of crossing of D1 and D4 in the section from 0.000 to 0.575 is as follows.

In case of the original alternative (D4 under D1), the body of the D4 highway is 1.5 meters below the terrain level. From the interchange to west, the highway moves from a slight cut onto a fill in approx. km 0.400.

In the case of the modified alternative of the Ivanka North dual-level interchange (D4 above D1), the D4 highway is approximately 15 meters above the current terrain level. From the interchange, the route follows on a decreasing elevation to km 0.575 from which it continues at the original elevation of the alternative. In both modifications, in km 0.490, the D4 highway passes over the Strúha stream by a bridge with a length of approximately 50 metres.

Alternative 2a

Alternative with elevated highway in the section around the Vajnory municipal district and between Marianka and Záhorská Bystrica municipal district, corresponding to the requirement from the Evaluation Scope.

The alternative 2a begins in km 0.575 where the elevations of both alternatives of the Ivanka North interchange meet on an approximately 6 metres high elevation. The route of the highway continues on the elevation (above surface) to the west in parallel to the Šúrsky channel in a distance of approximately 300 m from the north-western border of the built-up area of the Bratislava - Vajnory municipal district.

In km 1.263, the dual-level interchange Čierna voda is located; the D4 highway is crossing the III/5021 road (D4 over III/5021) by a bridge with a length of approx. 45 metres on a 8 metres tall elevation.

The highway continues in parallel to the Šúr channel on a decreasing elevation further to the eastern slopes of the Small Carpathian Mountains. In km 2.524, the highway crosses over the Račiansky stream by a bridge with a length of approximately 20 metres. In km 3.250, the highway is practically on the surface level and changes into an elevation tall 5 metres before the Rača dual-level interchange.

In the Rača dual-level interchange (km 4.142), the highway crosses the railway track no. 120 Bratislava – Žilina together with the road no. II/502 (D4 above the railway track and the road II/502) – see Graphical Annex 2.1.

In the section between the Ivanka north flyover interchange and the Čierna voda FOI, one-way, two-lane collectors (parallel roads) of category C 9.5/80 are designed on both sides of the D4 highway; local roads will connect to these. In the section between the Čierna voda FOI and the Rača FOI, a unidirectional collector is designed only on the southern side of the D4 highway, making it possible to connect the adjacent territory located westwards from the Vajnory municipal district (CEPIT area).

After the Rača FOI, the route of the highway continues to south-west across vineyards and on a slight filling to an elevation of 3 m, then in a slight cut and then again on a filling up to 5 m all the way to the eastern portal of the Karpaty tunnel. Four bridges over local roads and valleys, with lengths of 120, 90, 50, and 50 metres, are located in the section between the Rača FOI and the portal of the tunnel.

In km 6.213, the Karpaty tunnel starts in its eastern portal, leading the highway through the Lesser Carpathian Mountains (Malé Karpaty). The total length of the tunnel is 8.062 km; the

western portal is located on the border of the Malé Karpaty CHKO in km 14.275 of the D4 highway. The tunnel has a single ventilating shaft, approximately in km 10.050 of the D4 highway. The access road to the surface part of the ventilation shaft is led from the Bratislava - Rača municipal district on a forest road around the Pieskový brook under the Biely križ hill, and then on the Štefánik's line approximately 2 km to south-west, and then westwards by an unpaved forest road to the exhaust itself.

After the tunnel, the route from the western portal is in a cut up to 22 m deep (minimizing the noise load on the territory) that is approx. 1.100 km long. Then, it continues alternately on fillings with a maximum height of 6 m and in slight cuts on the foothills of the Marianske vinohrady district to the north from the municipality of Marianka. In km 15.843, the highway crosses a relocation of a field road by a bridge that is 30 m long.

The end of variant 2s is in the interchange of the D4 highway with road I/2 at the Záhorská Bystrica FOI (D4 over I/2). In the interchange, the highway passes over road I/2 by a two-array bridge that is 60 m long.

The total length of this variant is 16.840 km.

Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Ivanka - north, km 0.000 of the D4 highway, designed as four-leaf interchange of D1 (6 lanes with parallel communications, the so-called collectors, on both sides) and the D4 (4 lanes with parallel communications on both sides);
- FOI Čierna voda, km 1.263 of the D4 highway, designed as deltoid interchange with two rotary junctions on road III/5021 that are on the terrain together with the road; the rotary junctions are connected to the collectors and thereby to the D4 highway,
- FOI Rača, designed as a complex two-level shaped interchange in km 4.142 of the D4 highway,
- FOI Záhorská Bystrica, km 16.649 of the D4 highway, a deltoid interchange located on a small elevation between Stupava and Záhorská Bystrica in km 16.649 of the D4 highway
- Relocation of a field road in km 3.366 (to above the D4 highway), category P 6/40, total length 430 m
- Adjustment of road II/502 in the FOI Rača; this is an extension of the current four-lane road with separated directions by joining and turning lanes of the interchange. The length of the modifications is 1900 m
- Relocation of field road (in FOI Rača), category P 6/40, the length of the relocation is estimated to 1200 m
- Relocation of a field road (in km 14.500 of the D4 highway on the right), category P 6/40, total length 707 m
- Relocation of a field road (to a bridge over the D4 highway in km 15.247), category P 6/40, 270 m long
- Relocation of a field road (under the D4 highway in km 15.843), category P 6/40, 270 m long
- Fencing in the total length of 15 694 m
- The construction of a road for pedestrians and cyclists (km 16.559 of the D4 highway) in FOI Záhorská Bystrica with a width of 5 m and length of 253 m
- Construction yards in the territories of FOI Čierna voda, FOI Rača, and FOI Záhorská Bystrica, as well as at both portals of the Karpaty tunnel

- 12 bridges are located in the section between the bridge over the D4 highway on the collector in FOI Ivanka - north and the bridge on the D4 highway in FOI Záhorská Bystrica
- The Karpaty tunnel is formed by two tunnel tubes, the total length is 8 062 m, of which 7 992 m is a bored tunnel and 70 m is excavated tunnel (20 m at the eastern portal and 50 m at the western portal)

Variant 2b

Variant with partially buried highway in the section around the Vajnory municipal district and between Marianka and Záhorská Bystrica municipal district, corresponding to the requirement from the Evaluation Scope.

Variant 2b begins in km 0.575 where the elevations of both variants of the Ivanka North interchange meet on an approximately 6 metres high elevation. The route of the highway briefly continues westwards on a filling in parallel to the Šúrsky channel. In the section around the structures in the BA - Vajnory municipal district (in a distance of approx. 300 m from its north-eastern border), the elevation of the highway drops below the terrain in km 0.900 and stays there until km 1.600. This will be a buried (sub-level) section of the highway identified as the Vajnory tunnel.

In km 1.263, the Čierna voda FOI is located; the D4 highway is crossing the III/5021 road (D4 under III/5021) that passes above the highway by a bridge with a length of approx. 90 metres while the highway stays in the tunnel.

Behind the tunnel, the highway continues in parallel to the Šúrsky channel on a filling of up to 5 m further to the eastern slopes of the Lesser Carpathian Mountains. In km 2.524, the highway crosses over the Račiansky stream by a bridge with a length of approximately 20 metres. In km 3.250, the highway is practically on the surface level and changes into a 5 metres tall filling before the Rača FOI.

In the Rača FOI (km 4.142), the highway crosses the railway track no. 120 Bratislava – Žilina together with the road no. II/502 (D4 above the railway track and the road II/502) – see Graphical Annex no. 2.1.

In the section between the Ivanka north flyover interchange and the Čierna voda FOI, one-way, two-lane collectors (parallel roads) of category C 9.5/80 are designed on both sides of the D4 highway; local roads will connect to these. In the section between the Čierna voda FOI and the Rača FOI, a unidirectional collector is designed only on the southern side of the D4 highway, making it possible to connect the adjacent territory located westwards from the Vajnory municipal district (CEPIT area).

After the Rača FOI, the route of the highway continues to south-west across vineyards and on a slight filling to an elevation of 3 m, then in a slight cut and then again on a filling up to 5 m all the way to the eastern portal of the Karpaty tunnel. Four bridges over local roads and valleys, with lengths of 120, 90, 50, and 50 metres, are located in the section between the Rača FOI and the portal of the tunnel.

In km 6.213, the Karpaty tunnel starts in its eastern portal, leading the highway through the Lesser Carpathian Mountains (Malé Karpaty). Compared to variant 2a, the tunnel is artificially prolonged (requirement of the Ministry of Environment specified in the Assessment Scope) to a length of 9.055 km until the western end of the urbanized area of the municipality of Marianka. The tunnel has a single ventilating shaft, approximately in km 10.050 of the D4 highway. The access road to the surface part of the ventilation shaft is led from the Bratislava - Rača municipal district on a forest road around the Pieskový brook under the Biely kríž hill, and then on the Štefánik's line approximately 2 km to south-west, and then westwards by an unpaved forest road to the exhaust itself.

After leaving the body of the Lesser Carpathians (km 15.268), the highway is led in a deep cut that is covered, artificially prolonging the Karpaty tunnel in the proximity of the municipality of Marianka. Behind the tunnel, the route continues on a filling with a maximum height of 9 m on the foothills of the Marianske vinohrady district to the north from the municipality of Marianka. This part of this section is on a filling due to the need to drain the highway and to connect to the already partially constructed FOI Záhorská Bystrica. In km 15.843, the highway crosses a relocation of a field road by a bridge that is 30 m long.

The end of the section is in the interchange of the D4 highway with road I/2 at the Záhorská Bystrica FOI (D4 over I/2). In the interchange, the highway passes over road I/2 by a two-array bridge that is 60 m long.

The total length of this variant is 16.840 km.

Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Ivanka - north, km 0.000 of the D4 highway, designed as four-leaf interchange of D1 (6 lanes with parallel communications, the so-called collectors, on both sides) and the D4 (4 lanes with parallel communications on both sides);
- FOI Čierna voda, km 1.263 of the D4 highway, designed as deltoid interchange with two rotary junctions on road III/5021 that are on the terrain together and connected by a bridge above the D4 (in tunnel); the rotary junctions are connected to the collectors and thereby to the D4 highway,
- FOI Rača, designed as a complex two-level shaped interchange in km 4.142 of the D4 highway,
- FOI Záhorská Bystrica, a deltoid interchange located on a small elevation on the road between Stupava and Záhorská Bystrica in km 16.649 of the D4 highway
- Relocation of road III/5021 (to above the D4 in km 1.262), category C 7.5/50, length 305 m; the adjustment also includes two small rotary junctions
- Bypass on the road III/5021 (temporary bypass at 1.262 km), category C 7.5/50, of the length of 550 m.
- Relocation of a field road (above the D4 highway in km 3.366), category P 6/40, 430 m long
- Adjustment of road II/502 in the FOI Rača; this is an extension of the current four-lane road with separated directions by joining and turning lanes of the interchange. The length of the modifications is 1.900 km
- Relocation of field road (in FOI Rača), category P 6/40, the length of the relocation is estimated to 1.200 km
- Relocation of a field road (in km 14.500 of the D4 highway on the right), category P 6/40, total length 707 m
- Relocation of a field road (to above the western portal of the Karpaty tunnel in km 15.247 of the D4 highway), category P 6/40, 270 m long
- Relocation of a field road (under the D4 highway in km 15.843), category P 6/40, 270 m long
- Fencing in the total length of 14 594 m
- The construction of a road for pedestrians and cyclists (km 16.559 of the D4 highway) in FOI Záhorská Bystrica with a width of 5 m and length of 253 m
- Construction yards in the territories of FOI Čierna voda, FOI Rača, and FOI Záhorská Bystrica, as well as at both portals of the Karpaty tunnel

- 11 bridges are located in the section between the bridge over the D4 highway on the collector in FOI Ivanka - north and the bridge on the D4 highway in FOI Záhorská Bystrica
- The technical solution also includes once insulating basin at the Vajnory tunnel
- The Vajnory tunnel, formed by two partially separated tunnel tubes (from km 0.900 to km 1.600, constructed as a covered tunnel)
- The Karpaty tunnel, formed by two tunnel tubes, the total length is 9 055 m, of which 8 042 m is a bored tunnel and 1,013 m is excavated tunnel (20 m at the eastern portal and 993 m at the western portal)

Alternative 7a

Variant with elevated routing of the highway in the section around the Vajnory municipal district and between Marianka and Záhorská Bystrica municipal district, corresponding to the requirement from the Evaluation Scope. Compared to variants 2a and 2b, the Karpaty tunnel is longer and taking of vineyards is substantially smaller.

Variant 7a begins in km 0.575 where the elevations of both variants of the Ivanka North interchange meet on an approximately 6 metres high elevation. The route of the highway continues on a filling (above the surface) westwards in parallel to the Šúrsky channel in a distance of approx. 300 m from the north-eastern border of urbanized area of the BA - Vajnory municipal district.

In km 1.263, the dual-level interchange Čierna voda is located; the D4 highway is crossing the III/5021 road (D4 over III/5021) by a bridge with a length of approx. 45 metres on a 8 metres tall elevation.

The highway continues in parallel to the Šúr channel on a decreasing elevation further to the eastern slopes of the Small Carpathian Mountains. In km 2.524, the highway crosses over the Račiansky stream by a bridge with a length of approximately 20 metres. In km 3.250, the highway is narrowly above the surface level and continues on an elevation tall 8 metres before the Rača FOI.

In the section between the Ivanka north flyover interchange and the Čierna voda FOI, one-way, two-lane collectors (parallel roads) of category C 9.5/80 are designed on both sides of the D4 highway; local roads will connect to these. In the section between the Čierna voda FOI and the Rača FOI, a unidirectional collector is designed only on the southern side of the D4 highway, making it possible to connect the adjacent territory located westwards from the Vajnory municipal district (CEPIT area).

The middle of the Rača FOI is shifted, compared to variants 2a, 2b, more to the north, together with the elevation of the D4 highway that crosses the railway track no. 120 Bratislava - Žilina together with road II/502 (D4 above railway track and road II/502) - see graphical annex no. 2.2. In km 3.765 before the junction, it crosses a single array bridge with a length of 20 m above a relocation of a field road. After a short, approximately 250 m long filling up to 11 m tall, a two-array bridge above a feeder of an interchange continues, and then two more bridges of an interchange (six- and five-array bridge). The elevation is getting to the terrain level after the interchange and transfers into a cut in a section some 300 m long.

The eastern portal of the Karpaty tunnel is located in km 4.700. The total length of the tunnel for this variant is 9 950 m. The western portal is located behind the forest border, to the north from the municipality of Marianka, in km 14.650. The tunnel has a single ventilating shaft, approximately in km 10.050 of the D4 highway. The access road to the surface part of the ventilation shaft is led from the Bratislava - Rača municipal district on a forest road around the Pieskový brook under the Biely kríž hill, and then westwards by an unpaved forest road for approximately 2 km to the exhaust itself.

After the tunnel, the route from the western portal is in a cut that is 11 m deep (minimizing the noise load on the territory). Then, until the Záhorská Bystrica FOI, the elevation of the highway is slightly above the terrain (elevated routing); the maximum height of the filling in this section is 6 m. In km 15.775, the highway uses a 30 m long bridge to fly over a relocation of a field road. Variant 7a ends in the Záhorská Bystrica FOI (D4 over I/2) by a two-array bridge that is 60 m long.

The total length of this variant is 16.772 km.

Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Ivanka - north, km 0.000 of the D4 highway, designed as four-leaf interchange of D1 (6 lanes with parallel communications, the so-called collectors, on both sides) and the D4 (4 lanes with parallel communications on both sides);
- FOI Čierna voda, km 1.263 of the D4 highway, designed as deltoid interchange with two rotary junctions on road III/5021 that are on the terrain together with the road; the rotary junctions are connected to the collectors and thereby to the D4 highway,
- FOI Rača, designed as a complex two-level shaped interchange in km 4.142 of the D4 highway,
- FOI Záhorská Bystrica, a deltoid interchange located on a small elevation on the road between Stupava and Záhorská Bystrica in km 16.581 of the D4 highway
- Relocation of a field road (under the D4 highway in km 3.765), category P 6/40, 680 m long
- Adjustment of road II/502 in the FOI Rača; this is an extension of the current four-lane road with separated directions by joining and turning lanes of the interchange. The length of the modifications is 1,998 m
- Relocation of field road (in FOI Rača), category P 6/40, the length of the relocation is estimated to 1200 m
- Relocation of a field road (in km 14.500 of the D4 highway on the right), category P 6/40, total length 707 m
- Relocation of a field road (over the D4 highway in km 15.179), category P 6/40, 270 m long
- Relocation of a field road (under the D4 highway in km 15.775), category P 6/40, 270 m long
- Fencing in the total length of 12 844 m
- The construction of a road for pedestrians and cyclists (km 16.559 of the D4 highway) in FOI Záhorská Bystrica with a width of 5 m and length of 253 m
- Construction yards in the territories of FOI Čierna voda, FOI Rača, and FOI Záhorská Bystrica, as well as at both portals of the Karpaty tunnel
- 12 bridges are located in the section between the bridge over the D4 highway on the collector in FOI Ivanka - north and the bridge on the D4 highway in FOI Záhorská Bystrica
- The Karpaty tunnel, formed by two tunnel tubes, the total length is 9 950 m, of which 9 850 m is a bored tunnel and 100 m is excavated tunnel (50 m at the eastern portal and 50 m at the western portal)

Variant 7b

Alternative with partially buried highway in the section around the Vajnory municipal district and between Marianka and Záhorská Bystrica municipal district, corresponding to the requirement from the Evaluation Scope. Compared to variants 2a and 2b, the Karpaty tunnel is longer and taking of vineyards is substantially smaller.

Variant 7b begins in km 0.575 where the elevations of both variants of the Ivanka North interchange meet on an approximately 6 metres high elevation. The route of the highway briefly continues westwards on a filling in parallel to the Šúrsky channel. In the section around the structures in the BA - Vajnory municipal district (in a distance of approx. 300 m from its north-eastern border), the elevation of the highway drops below the terrain in km 0.900 and stays there until km 1.600. This will be a buried (sub-level) section of the highway identified as the Vajnory tunnel.

In km 1.263, the Čierna voda FOI is located; the D4 highway is crossing the III/5021 road (D4 under III/5021) that passes above the highway by a bridge with a length of approx. 90 metres while the highway stays in the tunnel.

Behind the tunnel, the highway continues in parallel to the Šúrsky channel on a filling of up to 5 m further to the eastern slopes of the Lesser Carpathian Mountains.

In km 2.524, the highway crosses over the Račiansky stream by a bridge with a length of approximately 20 metres. In km 3.250, the highway is narrowly above the surface level and continues on an elevation tall 8 metres before the Rača FOI.

In the section between the Ivanka north flyover interchange and the Čierna voda FOI, one-way, two-lane collectors (parallel roads) of category C 9.5/80 are designed on both sides of the D4 highway; local roads will connect to these. In the section between the Čierna voda FOI and the Rača FOI, a unidirectional collector is designed only on the southern side of the D4 highway, making it possible to connect the adjacent territory located westwards from the Vajnory municipal district (CEPIT area).

The middle of the Rača FOI is shifted, compared to variants 2a, 2b, more to the north, together with the elevation of the D4 highway that crosses the railway track no. 120 Bratislava - Žilina together with road II/502 (D4 above railway track and road II/502) - see graphical annex no. 2.2. In km 3.765 before the junction, it crosses a single array bridge with a length of 20 m above a relocation of a field road. After a short, approximately 250 m long filling up to 11 m tall, a two-array bridge above a feeder of an interchange continues, and then two more bridges of an interchange (six- and five-array bridge). The elevation is getting to the terrain level after the interchange and transfers into a cut in a section some 300 m long.

The eastern portal of the Karpaty tunnel is located in km 4.700; the depth of the cut before the tunnel is 15 m. The total length of the tunnel for this variant is 10 500 m. The western portal is located at the western border of the urbanized area of the municipality of Marianka, in km 15.200. The tunnel has a single ventilating shaft, approximately in km 10.050 of the D4 highway. The access road to the surface part of the ventilation shaft is led from the Bratislava - Rača municipal district on a forest road around the Pieskový brook under the Biely križ hill, and then westwards by an unpaved forest road for approximately 2 km to the exhaust itself.

After leaving the body of the Lesser Carpathians, the highway is led in a cut (buried routing) that is covered, artificially prolonging the Karpaty tunnel in the section between Marianka and the Záhorská Bystrica FOI. Behind the tunnel, the D4 highway continues in a cut (below surface) approximately until km 15.700. All the way to the Záhorská Bystrica FOI, the D4 highway is then slightly elevated above the terrain, with the maximum height of the filling in this section being 6 m. The routing of this part of the section on a filling is caused by the need of draining of the D4 highway and in order to provide for a continuous connection to the already partially completed Záhorská Bystrica FOI. In km 15.775, the highway uses a 30 m long bridge to fly over a relocation of a field road. Variant 7b ends in the Záhorská Bystrica FOI (D4 over I/2) by a two-array bridge that is 60 m long.

The total length of this variant is 16.772 km.Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Ivanka - north, km 0.000 of the D4 highway, designed as four-leaf interchange of D1 (6 lanes with parallel communications, the so-called collectors, on both sides) and the D4 (4 lanes with parallel communications on both sides);
- FOI Čierna voda, km 1.263 of the D4 highway, designed as deltoid interchange with two rotary junctions on road III/5021 that are on the terrain together and connected by a bridge above the D4 (in tunnel); the rotary junctions are connected to the collectors and thereby to the D4 highway,
- FOI Rača, designed as a complex two-level shaped interchange in km 4.142 of the D4 highway,
- FOI Záhorská Bystrica, a deltoid interchange located on a small elevation on the road between Stupava and Záhorská Bystrica in km 16.581 of the D4 highway
- Relocation of road III/5021 (to above the D4 in km 1.262), category C 7.5/50, length of relocation 305 m; the adjustment also includes two small rotary junctions
- Bypass on the road III/5021 (temporary bypass at 1.262 km), category C 7.5/50, of the length of 550 m.
- Relocation of a field road (under the D4 highway in km 3.765), category P 6/40, 680 m long
- Adjustment of road II/502 in the FOI Rača; this is an extension of the current four-lane road with separated directions by joining and turning lanes of the interchange. The length of the modifications is 1,998 m
- Relocation of field road (in FOI Rača), category P 6/40, the length of the relocation is estimated to 1200 m
- Relocation of a field road (in km 14.500 of the D4 highway on the right), category P 6/40, total length 707 m
- Relocation of a field road (to above the western portal of the Karpaty tunnel in km 15.179 of the D4 highway), category P 6/40, 270 m long
- Relocation of a field road (under the D4 highway in km 15.775), category P 6/40, 270 m long
- Fencing in the total length of 11 744 m
- The construction of a road for pedestrians and cyclists (km 16.559 of the D4 highway) in FOI Záhorská Bystrica with a width of 5 m and length of 253 m
- Construction yards in the territories of FOI Čierna voda, FOI Rača, and FOI Záhorská Bystrica, as well as at both portals of the Karpaty tunnel
- 11 bridges are located in the section between the bridge over the D4 highway on the collector in FOI Ivanka - north and the bridge on the D4 highway in FOI Záhorská Bystrica
- The technical solution also includes once insulating basin at the Vajnory tunnel
- The Vajnory tunnel, formed by two partially separated tunnel tubes (from km 0.900 to km 1.600 the tunnel is covered)
- The Karpaty tunnel, formed by two tunnel tubes, the total length is 10 500 m, of which 9 900 m is a bored tunnel and 600 m is excavated tunnel (50 m at the eastern portal and 550 m at the western portal)

Variant 7c

Variant with elevated routing of the highway in the section around the Vajnory municipal district and buried routing in the section between Marianka and Záhorská Bystrica municipal district, corresponding to the requirement from the Evaluation Scope. In comparison to variants 2a and 2b, it has a longer Karpaty tunnel and a substantially smaller taking of vineyards, and compared to variants 7a and 7b, it has a different shape of the Rača FOI.

Variant 7c begins in km 0.575 where the elevations of both variants of the Ivanka North interchange meet on an approximately 6 metres high elevation. The route of the highway continues on a filling westwards in parallel to the Šúrsky channel in a distance of approx. 300 m from the north-eastern border of urbanized area of the BA - Vajnory municipal district.

In km 1.263, the dual-level interchange Čierna voda is located; the D4 highway is crossing the III/5021 road (D4 over III/5021) by a bridge with a length of approx. 45 metres on a 8 metres tall elevation.

The highway continues in parallel to the Šúr channel on a decreasing elevation further to the eastern slopes of the Small Carpathian Mountains. In km 2.524, the highway crosses over the Račiansky stream by a bridge with a length of approximately 20 metres. In km 3.250, the highway is practically on the surface level and changes into an elevation tall 8 metres before the Rača FOI.

In the section between the Ivanka north flyover interchange and the Čierna voda FOI, one-way, two-lane collectors (parallel roads) of category C 9.5/80 are designed on both sides of the D4 highway; local roads will connect to these. In the section between the Čierna voda FOI and the Rača FOI, a unidirectional collector is designed only on the southern side of the D4 highway, making it possible to connect the adjacent territory located westwards from the Vajnory municipal district (CEPIT area).

The middle of the Rača FOI is shifted, compared to variants 2a, 2b, more to the north, together with the elevation of the D4 highway that crosses the railway track no. 120 Bratislava - Žilina together with road II/502 (D4 above railway track and road II/502) - see graphical annex no. 2.3. The shape of the Rača FOI in variant 7c is different from variant 7a and 7b, even though directional routing is the same. All interchange ramps are located westwards from the II/502 road. With this type of interchange, the D4 crosses only a single five-array bridge above the railway track and route II/502.

Already before the interchange, in km 3.765 the D4 highway passes over a relocation of a field road by a bridge that is 20 m long.

After the interchange, the highway is on a filling of up to 9 m, gradually transferring into a cut up to the eastern portal of the Karpaty tunnel in km 4.700 with the depth of the cut being approximately 15 m.

The total length of the tunnel in this variant (identical to variant 7b) is 10 500 m. The western portal is located behind the western border of the urbanized area of the municipality of Marianka, in km 15.200 of D4. The tunnel has a single ventilating shaft, approximately in km 10.050 of the D4 highway. The access road to the surface part of the ventilation shaft is led from the Bratislava - Rača municipal district on a forest road around the Pieskový brook under the Biely kríž hill, and then westwards by an unpaved forest road for approximately 2 km to the exhaust itself.

After leaving the body of the Lesser Carpathians, the highway is led in a cut (buried routing) that is covered, artificially prolonging the Karpaty tunnel in the section between Marianka and the Záhorská Bystrica FOI. Behind the tunnel, the D4 highway continues in a cut (below surface) approximately until km 15.700. All the way to the Záhorská Bystrica FOI, the D4 highway is then slightly elevated above the terrain, with the maximum height of the filling in this section being 6 m. The routing of this part of the section on a filling is caused by the need of draining of the D4 highway and in order to provide for a continuous connection to the

already partially completed Záhorská Bystrica FOI. In km 15.775, the highway uses a 30 m long bridge to fly over a relocation of a field road. Variant 7c ends in the Záhorská Bystrica FOI (D4 over I/2) by a two-array bridge that is 60 m long.

The total length of this variant is 16.772 km.

Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Ivanka - north, km 0.000 of the D4 highway, designed as four-leaf interchange of D1 (6 lanes with parallel communications, the so-called collectors, on both sides) and the D4 (4 lanes with parallel communications on both sides);
- FOI Čierna voda, km 1.263 of the D4 highway, designed as deltoid interchange with two rotary junctions on road III/5021 that are on the terrain together with the road; the rotary junctions are connected to the collectors and thereby to the D4 highway,
- FOI Rača, designed as a complex two-level shaped interchange in km 4.142 of the D4 highway,
- FOI Záhorská Bystrica, a deltoid interchange located on a small elevation on the road between Stupava and Záhorská Bystrica in km 16.581 of the D4 highway,
- Relocation of a field road (under the D4 highway in km 3.765), category P 6/40, total length of relocation is approximately 680 m
- Adjustment of road II/502 in the FOI Rača; this is an extension of the current four-lane road with separated directions by joining and turning lanes of the interchange. The length of the modifications is 1,477 m
- Relocation of field road (in FOI Rača), category P 6/40, the length of the relocation is estimated to 1200 m
- Relocation of a field road (in km 14.500 of the D4 highway on the right), category P 6/40, total length 707 m
- Relocation of a field road (to above the western portal of the Karpaty tunnel in km 15.179 of the D4 highway), category P 6/40, 270 m long
- Relocation of a field road (under the D4 highway in km 15.775), category P 6/40, 270 m long
- Fencing in the total length of 11 744 m
- The construction of a road for pedestrians and cyclists (km 16.559 of the D4 highway) in FOI Záhorská Bystrica with a width of 5 m and length of 253 m
- Construction yards in the territories of FOI Čierna voda, FOI Rača, and FOI Záhorská Bystrica, as well as at both portals of the Karpaty tunnel
- 12 bridges are located in the section between the bridge over the D4 highway on the collector in FOI Ivanka - north and the bridge on the D4 highway in FOI Záhorská Bystrica
- The Karpaty tunnel, formed by two tunnel tubes, the total length is 10 500 m, of which 9 900 m is a bored tunnel and 600 m is excavated tunnel (50 m at the eastern portal and 550 m at the western portal).

Variant "Senec – Pezinok – Lozorno" (SPL)

This is a completely newly proposed variant on the basis of a requirement of the Ministry of Environment of the SR in the Assessment Scope for the intention.

In this variant, the route of the D4 highway begins in the Chorvátsky Grob FOI (D4 above D1), approximately in the middle between the existing Senec FOI and the planned Triblavina

FOI on the D1 highway. It continues westwards to Pezinok on a shallow filling with height not exceeding 5 m, or in a cut up to 2 m deep.

In km 2.615, the highway is crossed by a bridge with a relocation of field road, 59 m long.

In km 5.450, the highway passes under a relocation of road III/5023 under a bridge that is 59 m long.

In the section between the municipalities of Slovenský Grob and Viničné, it becomes aligned with the planned relocation of road II/502 to which it is connected in the Pezinok FOI. In the area of the interchange, it crosses the Vininčiansky brook twice and the Mahulianka channel once, on bridges with lengths of approx. 20 m.

In km 8.233, it crosses the Stará Blatná channel by a single-array bridge. From km 8.500, the elevation of the highway climbs up to a filling 12 m high; in km 9.732 it passes over a relocation of road II/502 by a two-array bridge 12 m above the terrain surface.

The route of the D4 highway continues on the same filling westwards, crossing, in km 10.321, the railway track no. 120 Bratislava - Žilina and the current routing of road II/502 by a ten-field bridge 310 m long. After the bridge, the highway continues on a filling up to 6 m high.

Before the eastern portal of the Karpaty tunnel located in km 10.700, the highway enters a 9 m deep cut. The total length of the Karpaty tunnel in this variant is 12.400 km. The tunnel has two ventilating shafts. Shaft 1 is located in km 14.313 of the SPL variant. Access to the exhaust is provided by a paved forest road from the municipality of Svätý Jur (approx. 2.500 km westwards from the edge of urbanized area). Shaft 2 is located in km 19.094 of the SPL variant, with access also possible by a paved forest road linking the municipalities of Lozorno, Borinka, and adjacent areas of weekend huts.

In km 23.450 in the section between the western portal of the Karpaty tunnel (in km 23.100) and the eastern portal of the Katušiná tunnel (in km 23.600), the D4 highway crosses a valley with a small water flow by a 45 m long bridge.

The total length of the Katušiná tunnel is 1.850 km. Its western portal is located in km 25.450. From the western portal of the Katušiná tunnel, the route of D4 continues just above the current terrain (filling with a maximum height of 5 m) directly to the existing Lozorno flyover interchange (D4 above D2) after which this variant ends.

In km 27.068, the highway passes under a bridge on a relocation of road II/501 in a new routing.

The total length of this variant is 28.065 km.

Summary of scope of structure:

- The width structure of the highway is proposed in category D 26.5/120; in tunnels, 2T 8.0/80.
- FOI Chorvátsky Grob, tubular interchange in km 0.000 of the D4 highway, the highway also includes an adjustment of the D1 highway,
- FOI Pezinok, tubular interchange with a feeder to a relocation of road II/502 in km 6,853 of the D4 highway
- FOI Lozorno, four-leaf interchange in km 27.691 of the D4 highway, the structure will include a modification of the existing D2 highway in the location of interchange feeders,
- Relocation of road III/5023 (above the highway in km 5.450), category C 7.5/60, length of relocation approx. 737 m
- Relocation of road III/5022 (above the highway in km 8.513), category C 7.5/60, length of relocation approx. 425 m
- Relocation of road III/501 (above the highway in km 27.068), category C 9.5/70, length of relocation approx. 993 m

- Relocation of road I/2 (to the left of the D4 highway in km 27.700); in km 2.015, this road crosses road III/0237 by a rotary junction, category C 9.5/70, length of relocation approx. 2771 m
- Relocation of road III/0237 (continuation of variant D4 in km 28.065), the width changes from D 26.5 to C 9.5/80 until the rotary junction with road I/2 and continues in category C 7.5/60, total length of the relocation is estimated to 1072 m
- Feeder from relocation of II/502 in Pezinok FOI (to the right from the D4 highway in km 6.853), category C 11.5/80, total feeder length 1545 m
- Relocation of a field road (over the D4 highway in km 2.615), category P 4/30, approximately 425 m long
- Circumvention on road III/5023 (in km 5.400 of the D4 highway), category C 7.5/50, approximately 800 m long
- Circumvention on road III/5022 (in km 8.400 of the D4 highway), category C 7.5/30, approximately 500 m long
- Circumvention on road II/501 (in km 27.000 of the D4 highway), category C 7.5/50, approximately 1,000 m long
- Fencing in the total length of 26 500 m
- Access road to D4 construction site from road III/5022, length of adjustment approx. 530 m
- Access road to D4 construction site from road III/5023, length of adjustment approx. 2300 m
- Access road to D4 construction site from road II/501, length of adjustment approx. 1,200 m
- The Karpaty tunnel, formed by two tunnel tubes, total length 12 400 m, of which 12 300 m bored tunnel and 100 m excavated tunnel (at the eastern portal, the northern tube 60 m and southern tube 40 m, and at the western portal, northern tube shall be excavated for 40 m and southern tunnel tube for 60 m)
- The Katušiná tunnel, formed by two tunnel tubes, the total length is 1 850 m, of which 1 700 m is a bored tunnel and 150 m is excavated tunnel (100 m at the eastern portal and 50 m at the western portal)

9. Variants of the proposed activity (brief overview)

In the Impact Assessment Report (EIA Report), the following variants will be assessed:

Variant 2a.

From the interchange with the D1 until the eastern portal of the Karpaty tunnel, the D4 highway is led mostly above the terrain (**elevated routing**). From the western portal of the Karpaty tunnel, also **elevated routing** of the highway until the crossing of the D4 with road I/2 (Záhorská Bystrica FOI).

Variant 2b.

The eastern part of the D4 highway from the interchange with the D1 to the eastern portal of the Karpaty tunnel is on a filling, however, the required section of the D4 highway around the Vajnory municipal district in the location of crossing road III/5021, Čierna voda FOI, is led in a tunnel (**buried routing**; from km 0.900 to km 1.600). After rising from the body of the Lesser Carpathians, on the west, the D4 highway is in a deep cut that is covered (extended

tunnel at the Marianka municipality; **buried routing**). Then, the D4 highway continues on a slight filling up to the interchange of the D4 with route I/2:

Variant 7a.

From the interchange with the D1 highway, the D4 highway is led above the terrain (**elevated routing**) up to the eastern portal of the Karpaty tunnel. From the western portal of the Karpaty tunnel, also **elevated routing** of the highway until the crossing of the D4 with road I/2 (Záhorská Bystrica FOI).

Variant 7b.

The eastern part of the D4 highway from the interchange with the D1 to the eastern portal of the Karpaty tunnel is on a filling, however, the required section of the D4 highway around the Vajnory municipal district in the location of crossing road III/5021, Čierna voda FOI, is led in a tunnel (**buried routing**; from km 0.900 to km 1.600). From the western portal of the Karpaty tunnel on the edge of urbanized area of the municipality of Marianka (extended tunnel up to km 15.200), the D4 highway is led in a cut for another approx. 380 m (**buried routing**) and then continues on a slight filling to the interchange of the D4 highway with road I/2.

Variant 7c.

From the interchange with the D1 until the eastern portal of the Karpaty tunnel, the D4 highway is led above the terrain (**elevated routing**). From the western portal of the Karpaty tunnel on the edge of urbanized area of the municipality of Marianka (extended tunnel up to km 15.200), the D4 highway is led in a cut for another approx. 380 m (**buried routing**) and then continues on a slight filling to the interchange of the D4 highway with road I/2.

Variant "Senec – Pezinok – Lozorno"

From the interchange with the D1 until the eastern portal of the Karpaty tunnel, the D4 highway is led almost on the terrain level. Before the eastern portal, the D4 highway crosses road II/502 and a railway track by a bridge. From km 23.100 to 23.500, the highway crosses, on a bridge, a valley between the portals of the Karpaty tunnel and the Katušiná tunnel. After the western portal of the Katušiná tunnel, the highway continues on terrain until the existing interchange of the D2 highway with road I/2.

10. Total Costs (informative)

Variant 2a - EUR 851 444 126 (excl. VAT)

Variant 2b - EUR 952 709 422 (excl. VAT)

Variant 7a - EUR 1 004 361 894 (excl. VAT)

Variant 7b - EUR 1 076 909 590 (excl. VAT)

Variant 7c - EUR 1 000 498 635 (excl. VAT)

Variant „Senec – Pezinok – Lozorno“ – EUR 1 248 576 345 (excl. VAT)

11. Affected Municipality

Lozorno, Pezinok, Viničné, Slovenský Grob, Chorvátsky Grob, Bernolákovo, Stupava, Bratislava - Záhorská Bystrica, Marianka, Bratislava - Rača, Bratislava - Vajnory, Svätý Jur, Ivanka pri Dunaji

12. Affected Self-Administrative Region

Bratislava Region

13. Affected Authorities

Ministry of Transport, Construction and Regional Development of the Slovak Republic
Ministry of Environment of the Slovak Republic
Ministry of Agriculture and Rural Development of the Slovak Republic
Ministry of Economy of the Slovak Republic
Regional Environmental Authority in Bratislava
Regional Land Authority in Bratislava
Regional Forest Authority in Bratislava
Regional Authority for Road Transport and Roads in Bratislava
Regional Monuments Board in Bratislava
Regional Directorate of Firefighting and Rescue Units in Bratislava
District Environmental Authority in Bratislava
District Environmental Authority in Malacky
District Environmental Authority in Pezinok
District Environmental Authority in Senec
District Forest Authority in Bratislava
District Forest Authority in Malacky
District Land Authority in Bratislava
District Land Authority in Malacky
District Land Authority in Pezinok
District Land Authority in Senec
District Authority for Road Transport and Roads in Bratislava
District Authority for Road Transport and Roads in Malacky
District Authority for Road Transport and Roads in Pezinok
District Authority for Road Transport and Roads in Senec
District Mining Authority in Bratislava
District Administration Authority in Bratislava, Department of Civil Protection and Crisis Management
Regional Public Health Authority in Bratislava
Railway Transport Regulatory Authority in Bratislava

14. Authorising Authority

For the zoning decision - the Regional Construction Authority in Bratislava will appoint the relevant construction authority for the issue of the zoning decision after agreement with the affected municipalities

For the construction permit – Ministry of Transport, Construction, and Regional Development of the Slovak Republic

15. Relevant Ministry

Ministry of Transport, Construction and Regional Development of the Slovak Republic

16. Statement on Cross-Border Impacts of the Proposed Activity

Due to the location, scope, and nature of the assessed activity, i.e. of the construction and subsequent operation of the D4 highway, Ivanka north - Záhorská Bystrica, no impacts on environment that would cross state borders are expected.

B. DATA ON DIRECT IMPACTS OF PROPOSED ACTIVITY ON ENVIRONMENT INCLUDING HEALTH

B.I. INPUT REQUIREMENTS

B.I.1. SOIL

Total soil taken in ha, of that, built-up area (ha, agricultural land, forest land, bonity), of that temporary and permanent taking.

The assessed intention in all assessed variants will mostly cross agricultural land, marginally touching land dedicated to the functions of forests.

The entry documentation for the calculation of the use of agricultural land was the data from the Research Institute of Pedology and Soil Protection, published on its internet portal. The layers of forests with classification of functions were taken from the Landscape Atlas of the Slovak Republic.

The following table lists total soil taken by individual assessed variants. The calculated values of use by individual variants include the main route of the highway outside tunnel sections, areas of FOI, and areas of parallel collectors.

These soil taking values were calculated as maximum values; it is probable that as the technical solution and project documentation become more clear, the quantity of soil taken will be reduced.

Table B.I.1: Preliminary Estimate of Total Soil Taken in ha

Variant	Agricultural land	Forest land	Other	Total
2a	87.73	1.37	1.40	90.5
2b	77.40	0.00	1.40	78.80
7a	78.61	1.67	1.40	81.68
7b	69.89	1.56	1.40	72.85
7c	61.76	0.00	1.20	62.95

SPL	87.65	3.28	0.00	90.93
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USE OF AGRICULTURAL LAND (PPF)

To be able to assess the land taken by individual assessed variants, structure of agricultural land by classified soil-ecology units (BPEJ) was used, with subsequent classification by quality.

Under the Act no. 220/2004 Coll. on Protection and Use of Agricultural Land as amended, all agricultural land is divided according to BPEJ to 9 soil quality groups. Those with the best quality belong to group 1, those with the lowest quality in group 9. The first four groups are protected under Article 12 of the Act on Protection of Agricultural Land and can be used temporarily or permanently for non-agricultural purposes only in unavoidable cases if no alternative solution is available. Quality groups 5 to 7 are soils with medium quality that are not specially protected. Low quality soils belong to quality groups 8 and 9.

For agricultural production, protected soils belonging to quality groups 1 to 4 are the most valuable. A preliminary estimate of soil taking by these quality groups is specified in the following table.

Table B.I.2. : Preliminary Estimate of Taking of Protected Agricultural Land

Variant	Total agricultural land taken (ha)	Taking in quality groups 1 to 4	
		ha	%
2a	87.73	31.45	35.85
2b	77.40	26.56	34.32
7a	78.61	31.47	40.03
7b	69.89	25.96	37.14
7c	61.76	27.40	44.37
SPL	86.22	58.30	67.62

FOREST LAND (LPF)

The assessed variants also include land designated to fulfil forest functions. Under the Act no. 326/2005 Coll. on Forests as amended, three categories of forests exist in Slovakia, i.e. production forests, protective forests, and special purpose forests. Each forest fulfils several production and non-production functions, with classification based on its prevailing function. The function of the forest is not dependent solely on subjective requirements of humans; they are also significantly limited by site conditions of individual forest stands. This is why forest classification is closely related to *site classification* and the classification of a forest as production or protective forest is clearly based on the prevailing *typological* entity in the forest. However, this is not true for special purpose forests. This is mostly implied by the social and/or group interest that is expressed by an act pronouncing forests to be special purpose forests according to the relevant letter of the subcategory.

A preliminary estimate of taking of forest land in individual variants is described by the following table.

Table B.I.3. : Preliminary Estimate of Taking of Forest Land

Variant	Forest land taken (ha)	Total forest land taken
	Forests	

	production	protective	special purpose	
2a	0.00	0.00	1.37	1.37
2b	0.00	0.00	0.00	0.00
7a	0.00	0.00	1.67	1.67
7b	0.00	0.00	1.56	1.56
7c	0.00	0.00	0.00	0.00
SPL	3.28	0.00	0.00	3.28

B.I.2. WATER

Total, maximum, and average taking of water (m³/h, m³/year), divided to drinking, utility, source of water (public pipeline, surface source, other), location of offtake facility, total consumption of water (m³/h, m³/year).

The proposed traffic structure does not create a significant load on environment by water offtake. During the periods of construction and operation, water will be necessary for drinking and sanitary purposes, water for construction technologies and machinery, during operation, water for road maintenance, maintenance of tunnels and machinery, water for fire purposes.

Drinking water and water for sanitary purposes, its need expressed by the minimum quantity of water unavoidably necessary to provide for the basic needs of humans without negative impact on their health and hygiene in the SR is about 70 - 80 litres per person and day.

Under the Regulation no. 648/2006 Coll. as amended, specifically its Annex no. 1, it is necessary to consider the consumption of drinking water of 5 l/person/shift and for indirect needs (washing and showering), 120 l/person/shift. The maximum hourly need of water per person will be set as 50% of the indirect consumption, i.e. 60 l/h. The annual sum of need of water (240 working days) is 30 m³ per employee.

Thus, for 50 employees on site, the estimated need of water is 6.25 m³/day, the maximum hourly need is 3 m³/h and the annual need for 50 employees is 1500 m³/year (exact numbers of employees will be known only during the construction).

The above values show that even with a tenfold number of employees (500), the daily and annual consumption of drinking water from the viewpoint of capacity in the affected territory will be insignificant. In addition, offtake will be temporary and unbalanced during the year.

Water for construction technologies and machinery will be used to produce concrete mixtures, build tunnels, shower the construction site, and maintenance of machinery (700 l per single washing). Water from a public pipeline, nearby water flows (Šúrsky channel, Račí brook, etc.) and water collected during tunnel boring will be used. The quantity of water consumed in the construction of the non-tunnel sections is estimated to several hundred m³ per year. When boring the tunnel, water consumption will be influenced by the method of boring; the water used will be from nearby water flows and recycled water from the accumulation tank. As a whole, the consumption of water for the above purposes is estimated to several tenths of litre per second. From the viewpoint of water quantity and availability in the territory, this quantity is of little significance from the capacity aspect.

Water for maintenance of roads, tunnels, and machinery necessary to maintain roads and tunnels, verdures, and machinery. Once again, the sources will be local pipelines and adjacent water flows. The consumption of water for maintenance of roads, tunnels, and surrounding verdures will be irregular (as necessary) and is estimated to several tanks a year. Up to a thousand of m³ per year will be used for maintenance of machinery. In total, the quantity will be insignificant in the territory.

Fire water for the tunnels will be provided according to TP MDPT 04/2006. For the Karpaty tunnel (in all variants), the set thermal output of a potential fire is determined as 50 MW, resulting in a need of at least 20 l/s and a permanent water reserve with a volume of 150 m³. For the Kатуšíná tunnel, the thermal output of a potential fire is set to 30 MW, resulting in a need of at least 16.7 l/s and a permanent water reserve of 120 m³. The feeding of permanent water tanks that must be available by water is expected using drainage water from the rock environment. For each variant, these tanks will be located at the western portal of the Karpaty tunnel. For the SPL variant, the tank will serve both tunnels.

B.I.3. RAW MATERIAL

Type, consumption (daily, annual), procurement method (own source, transportation)

During construction, requirements for construction raw materials corresponding to the nature of the structure will arise:

- filling materials of the ground body
- gravel and sand for building individual road layers
- crushed stone for concrete structures and asphalt mixtures
- material for road surfaces - oil asphalts, modifying additives, special road cement
- steel for concrete reinforcement and security facilities such as safety barriers and fences
- sewage pipelines, drainage pipelines, concrete blocks
- fuels, oils, and lubricants for construction and transport technology

The source of soil and stone necessary for the construction of roads and other structures will be mostly the material from excavations and tunnel bores. If necessary, stone can also be brought from local mines (Devín mine, etc.); however, the stone from the bore areas of the tunnel tubes must be used preferentially.

The following table evaluating the balance of earth works implies that apart from variant 2a that will have a slight lack of filling material, all variants have surpluses of excavation materials that can also be used for other construction purposes in a wider territory of the structure and/or to re-cultivate the surrounding waste landfills or old mines (mine at Marianka).

Table B.I.4. : Balance of Earth Works in the D4 Highway Section Ivanka North - Záhorská Bystrica

Variant	Fillings (m ³)	Excavations from the road (m ³)	Excavations from the tunnel (m ³)	Balance (m ³)
2a	2,125,885.3	361,967.2	1,752,000.0	-11,918.1
2b	1,803,082.4	202,538.1	2,081,000.0	480,455.7
7a	1,594,740.9	426,340.2	2,162,000.0	993,599.3
7b	1,292,508.4	220,426.4	2,397,000.0	1.324.918
7c	1,472,830.5	341,362.8	2,322,000.0	1,190,532.3
SPL	1,858,648.6	44,633.4	3,065,000.0	1,250,984.8

During operation, it is necessary to consider the consumption of fuels, oils, and lubricants by maintenance mechanisms. For a four-lane road, the estimated consumption is approx. 3 tons per machine per year. The quantity of material necessary for repairs and maintenance (concrete, barriers, colours, etc.) depend on the extent thereof.

The consumption of materials must also include winter maintenance spreading material, i.e. chemical spreading material (sodium chloride, calcium chloride, magnesium chloride) in a quantity of approx. 1.2 kg/m² at 60 – 70 intervention days in a year. If inert material is used, its consumption in flat sections at the same number of intervention days will be around 10.5 kg/m² per year.

B.I.4. ENERGY SOURCES

Type, consumption (day, night)

ELECTRIC POWER

During construction, the consumption of power will be covered by an aerial LV line connected to the current VHV distribution network with transformers added in the offtake location. The foreseen input power of the site technology of a bridge is 50 kW; the facilities at the main construction yard may require an input power of up to 200 kW.

During the construction of tunnels, it is expected that technical centres will be built on both portals with connections to both high and low voltage, distribution boxes, transformers, and backup sources.

The exact consumption of electric power will be known when the contractor and the machinery and technologies are selected.

During operation, the requirements on consumption of electric power will be derived from the operation of tunnels (communication facilities, video surveillance, traffic signs and signals, electric fire alarm, metering devices, tunnel illumination, tunnel ventilation, central control system), their estimated input power is:

The Karpaty tunnel, for variants 2a, 2b, 7a, 7b, and 7c, necessary input power of 8 - 10 MW,

The Vajnory tunnel, for variants 2b, 7b, input power will be known at a later product documentation stage; electric power will only be necessary here for illumination at night

The Karpaty tunnel for SPL variant, necessary input power of 10 - 15 MW

The Katušiná tunnel for SPL variant, necessary input power of 1.5 - 2 MW

Tunnels must be connected to the electric grid from two independent sources with backup diesel generators.

To provide for the sewage of the D4 highway in the Ivanka north - Záhorská Bystrica section, with regard to the flat terrain, it is necessary to pump rain waters to individual recipients in variants 2a, 2b, 7a, 7b, and 7c. The estimated input power of pumping stations for individual variants is as follows:

Variants 2a, 7a, 7c, estimated input power 41.2 kW for 7 pumping stations

Variants 2b, 7b, estimated input power 128.4 kW for 6 pumping stations

GAS

It is not expected to use natural gas during the construction of the D4 highway in the Ivanka north - Záhorská Bystrica section. Shall it be necessary to connect construction yards to the gas distribution network for the purposes of heating in facilities, the daily consumption is estimated to approx. 100 m³.

B.I.5. REQUIREMENTS FOR TRANSPORT AND OTHER INFRASTRUCTURE

During the construction of the D4 highway in the Ivanka north - Záhorská Bystrica section, it will be necessary to provide for the access of construction machinery to the construction sites, especially to locations of construction of large units of bridges, interchanges, and tunnels. Construction yards are proposed in the locations of flyover interchanges and tunnel portals. It is assumed that all public communications with direct access to the site will be used as access road to the site, and the future suppliers of construction works will undertake to travel around the D4 highway route on surfaces permanently taken by the structure.

To access the eastern portal of the Karpaty tunnel (variants 2a, 2b, 7a, 7b, 7c), a relocation of field road in vineyards in FOI Rača, connected to an existing field road in vineyards heading to the location of the tunnel portal will be used. To access the western portal of the Karpaty

tunnel, a relocation of field road approximately in km 14.500 of the D4 and the route of the D4.

For the SPL variant, it is also considered that three temporary single-purpose roads can be built. The access from road III/5022 continuing on a field road to the D4 highway for 530 m, access road from road III/5023 continuing on a field road to the D4 highway for 2300 m, and access from the road II/502 in the urbanized area of the municipality of Lozorno, continuing on a field road for 1200 m.

In relation to manipulation with soil and rocks from excavations and cuts and with transport of construction material to the site, no significant load of surrounding communications by site traffic is expected as the space of the future D4 highway will be used for site traffic to a maximum. However, it is necessary to count on certain limitations during construction on these roads and on temporary changes of organization of traffic.

During operation, the requirements for transport infrastructure in relation to the maintenance of the highway will be negligible.

B.I.6. LABOUR REQUIREMENTS

During construction, the labour requirements will peak. This relates mostly to construction workers and craftsmen, as well as labour force with higher qualification, especially for the construction of tunnels. It is impossible to estimate the exact requirements for labour and its qualification on the basis of available documentation of the project intention. The share and quantity of workers in individual professions will depend on technical equipment of the contractor, period of construction, and complexity of individual structures.

During operation, labour requirements will relate to the maintenance of the road, its technical facilities, and its surroundings (mowing and cutting of verdures, repairs of road surface, winter spreading, cleaning, etc.).

B.II. OUTPUT DATA

B.II.1. AIR

Main sources of air pollution (stationary, mobile), qualitative and quantitative characteristics of emissions, method of trapping of emissions, method of measurement of emissions, time effects of sources (permanent, regular, random)

Period of construction

During the construction period, the proposed structure may act as a specific area source of pollution of the lowest level of atmosphere (dust, exhaust gases of heavy construction machinery) in the proximity of construction yards and in locations with higher concentrations of construction works (e.g. around bridges).

Period of operation

The construction of the D4 highway in the assessed section Ivanka north - Záhorská Bystrica will bring a new line source of air pollution into the territory, but in the end, traffic will be redistributed between the current transport network and the new transport corridor of the D4 highway, thereby also redistributing the production of emissions of transportation among the current traffic network and the new traffic corridor (reduction of production of emissions on current roads and their transfer to the D4 highway). Naturally, aerosols with various compositions will also be formed from the chemicals used for winter maintenance of roads and, in small quantities, also from substances immediately related to automobile operation.

With regard to the technical development of automobile industry, the currently valid and expected legal regulation of conditions of operation of vehicles, it can be expected that in near future, the production of exhalates from traffic per unit of output transported will be reduced.

The law of the EU tries to minimize the unfavourable exhalates from traffic using EURO standards for engines of road vehicles. Since 2014, Euro 6 standards will apply to passenger cars and vans (categories M1 and N1) and Euro VI for heavy utility vehicles (categories M2, M3, N2, and N3). The emission reduction technologies, such as particle filter, catalytic converters, and the SCR technology - injection of a water solution of carbamide into engines - AdBlue are available but still expensive.

DISTRIBUTION OF EMISSIONS OVER TIME

To evaluate the air pollution at any section of a highway, it is very important to differentiate the period of construction of the section from the period of operation thereon; these impacts differ in quality and quantity.

Period of construction

During the period of construction of the assessed section of the D4 highway, near surroundings of the construction will be polluted by emissions of exhaust gases from construction machinery and heavy trucks. In the construction phase, the decisive source of emissions into air is in ground works, forming a substantial part of the volume of all construction works during the construction of the highway.

It is not possible to model this impact mathematically as no emission factors exist for sources of secondary dust. Emissions of this kind are significantly influenced by climate conditions. Similarly, it is impossible to model the concentrations of other polluting substances from site traffic as at present, its intensity and transport routes are unknown.

These impacts will be of a local scope, territorially limited to the area of the structure and bound in time to the period of construction; as already stated, an important role will be played by current meteorological conditions.

This is why any effort to quantify these emissions or their distribution to the surrounding space would lead, on the level, solely to speculation. A solution of the task, at least approximate, requires the knowledge of a detailed time plan of organization of construction and construction technology of the project (quantities and types of construction machinery employed, their collaboration in time, definition of transport routes of excavation materials, etc.).

The project of construction organization is, as a standard, prepared in the necessary detail only in the documentation for construction permit. At the relevant level of knowledge of outputs of the data, it is thus necessary to be satisfied with an estimate of significance of the total negative impact of the produced emissions on the pollution of air at the time of construction of the highway. When assessing this significance, the following work theses can be applied:

- Mutual ratio of the period of construction to the subsequent period of standard operation is very low, as well as the mutual ratio of the quantity of emissions from exhaust gases that it very small to negligible. This implies that to assess the impact of the construction of the highway on air pollution by emissions of exhaust gases, the decisive will always be the period of operation of the highway.
- Emissions of dust that can be expected, on the other hand, to be much higher during the construction period than in the following period of operation can be reduced by technological and organizational measures (sprinkling of transported soils, pressure washing of paved parts of roads, etc.).

These theses also imply two general requirements on the contractor of the structure:

- Maximum shortening of the period of construction of the D4 highway in the assessed section
- Strict adherence to technological procedures and conditions of construction set by the EIA report and subsequently in the conditions of the relevant construction permit.

Period of operation

The source of emissions into free air in the proximity of the road is mostly the operation of motor vehicles; the surface of the road, as any other paved surface, is only a secondary source of dust.

TYPE AND QUANTITY OF EMISSIONS INTO AIR

During operation, the D4 highway will be a line source of air pollution. Under the Act no. 137/2010 Coll. on Air, automobile transport is classified as mobile sources.

The calculation of emissions of pollutants is based on the development of traffic intensity and emission factors of motor vehicles in the foreseen period, inclinations of the road, and development of specific emission factors set separately for passenger cars (OA) and for trucks (NA). Specific emission factors of pollutants for which calculation was made are shown in the following table.

Table B.I.1: Emission Factors of Motor Vehicles in Year 2030

Speed [km/h]	CO [g/km]		NO _x [g/km]		PM [g/km]		C _x H _y [g/km]	
	OA	NA	OA	NA	OA	NA	OA	NA
50	1.3	3.9	0.3	6.8	0.13	0.24	0.7	1.1
80	0.8	1.6	0.4	6.3	0.10	0.21	0.4	0.8
100	0.8	1.1	0.5	5.3	0.13	0.15	0.4	0.6

Characteristics of the Karpaty Tunnel as Source of Air Pollution

The Karpaty tunnel has the following lengths in individual variants:

- variant 2a: 8.062 km
- variant 2b: 9.055 km
- variant 7a: 9.950 km
- variant 7b and 7c: 10.500 km
- variant SPL: 12.400 km.

The tunnel will be ventilated by a forced ventilation system. Exhausts will be located both on portals and in ventilating shafts. In variants 2a, 2b, 7a, 7b, and 7c, it is expected to have a single ventilation shaft; in the SPL variant, two ventilation shafts are proposed.

The method of ventilation of the tunnel in individual variants is as follows:

2a - the section from the beginning of the tunnel in km 6.213 to km 8.137 will be ventilated by the portal exhaust, the section between km 8.137 and 12.168 will be ventilated by the middle exhaust located approx. in km 10.060, and the section between km 12.168 and the end of the tunnel in km 14.275 will be ventilated by the other portal exhaust.

2b - the section from the beginning of the tunnel in km 6.213 to km 8.137 will be ventilated by the portal exhaust, the section between km 8.137 and 12.675 will be ventilated by the middle exhaust located approx. in km 10.060, and the section between km 12.675 and the end of the tunnel in km 15.268 will be ventilated by the other portal exhaust.

7a - the section from the beginning of the tunnel in km 4.700 to km 7.640 will be ventilated by the portal exhaust, the section between km 7.640 and 12.615 will be ventilated by the middle exhaust located approx. in km 10.580, and the section between km 12.615 and the end of the tunnel in km 14.650 will be ventilated by the other portal exhaust.

7b - the section from the beginning of the tunnel in km 4.700 to km 7.640 will be ventilated by the portal exhaust, the section between km 7.640 and 12.890 will be ventilated by the middle exhaust located approx. in km 10.580, and the section between km 12.890 and the end of the tunnel in km 15.200 will be ventilated by the other portal exhaust. The tunnel in variants 7b and 7c is identical, including ventilation sections.

SPL - 2 portal and 2 central exhausts are designed in the tunnel. The section from the beginning of the tunnel in km 10.700 to km 12.507 will be ventilated by the portal exhaust, the section between km 12.507 and 16.705 will be ventilated by a central exhaust located in km 14.313, the section between km 16.705 and 21.099 will be ventilated by the second central exhaust located in km 19.094, and the section between km 21.099 and the end of the tunnel in km 23.100 will be ventilated by the other portal exhaust.

Basing on the dividing of the tunnels to ventilation segments, the quantities of pollutants released by individual exhausts depending on traffic intensity and emission factors of motor vehicles. The results are shown in the following table.

Table no. B.II.2: Weight flows of pollutants released by the exhausts from tunnel ventilation

Variant	Exhaust	Weight flow in kg/day			
		NO _x	CO	PM ₁₀	C _x H _y
2a	Eastern portal	58.8	41.0	6.5	20.9
	Ventilating shaft	123.3	85.9	13.5	43.7
	Western portal	64.4	44.9	7.1	22.9
2b	Eastern portal	58.8	41.0	6.5	20.9
	Ventilating shaft	138.8	96.7	15.2	49.2
	Western portal	79.3	55.3	8.7	28.1
7a	Eastern portal	89.9	62.7	9.9	31.9
	Ventilating shaft	152.1	106.1	16.7	54.0
	Western portal	62.2	43.4	6.8	22.1
7b, 7c	Eastern portal	89.9	62.7	9.9	31.9
	Ventilating shaft	160.5	111.9	17.6	56.9
	Western portal	70.6	49.2	7.7	25.1
SPL	Eastern portal	24.8	20.7	3.3	10.5
	Ventilating shaft 1	57.6	48.2	7.7	24.4
	Ventilating shaft 2	60.3	50.5	8.0	25.5
	Western portal	27.5	23.0	3.7	11.6

Note: The values in the table are used to calculate absorbed emission contributions of individual pollutants for which limits are set (see chapter C.III.4).

The dispersion of emissions will be provided by portal and central exhaust structures with the following parameters.

Portal exhausts are designed as chimney bodies with a rectangular cross-section of 2 x 4 m, an area of 8 m² and height of 8 m. The structure includes an inlet opening for clean air (fig. 1). The proposed speed of flow of waste air is 16 m/s.

Exhausts in ends of central ventilation shafts will be built with the following parameters. These will be circular bodies with a diameter of 8 m, with half of the area used for inlet of clean air and half for exhausting of waste air (fig. 2). The area of the exhaust opening is around 18 m². The proposed height of the structure is 15 m and the speed of flowing of waste air is 16 m/s.

B.II.2. WASTE WATERS

Total quantity, type, and qualitative parameters of released waste waters (in m³/year), release location (recipient, public sewage, waste water treatment plant), source of waste waters, method of treatment.

Waste waters will be formed during the entire period of construction of the highway and naturally, during its operation. The following types of waste waters will be produced:

- Rain waste waters
- Sanitary waste waters
- Technological and operating waste waters
- Waste waters in non-urbanized areas (caused by storm rainfall)

During construction, waste waters are generated mostly in the social facilities of the site (sanitary waste water) and when constructing the tunnel (technological waste water). The quantity of sanitary waste water will depend on the organization of construction and number of persons working on the site. The daily production of sanitary waste waters per person is estimated to approximately 125 litres. When converted to 50 persons, this means a daily production of sanitary waste waters of 6.25 m³/day, or 1 500 m³ per year. The production of technological waste water will be kept down to minimum; it is expected to clean and re-use it during tunnel boring.

During operation, mostly rain waste waters will be produced, flowing from the surfaces of roads, as well as waste waters from tunnels (tunnel cleaning and maintenance).

The following formula was used to calculate the total quantity of drained rain waters from the intention assessed:

$$V_s = \check{s} \cdot L \cdot h_s \cdot k_s$$

V_s ... quantity of rain waters from a section of a road m³/rok
 \check{s} ... width of paved area of road
 L ... length of assessed section of road
 h_s ... average annual sum of rainfall (m/year)
 k_s ... runoff coefficient – 0.9

The average annual sum of rainfall increases with increasing altitude above seal level; at the 11811 Stupava meteorological station (altitude 179 m), it is 605.1 mm,

11812 Malý Javorník (altitude 586 m) is already 776.6 mm per year,

11813 Bratislava – Koliba (altitude 286 m) it is 681.9 mm,

11816 Bratislava – airport (altitude 131 m) has the lowest annual average of 564.4 mm per year. For the calculations, we have used the value from the Malý Javorník station (highest annual sum of rainfall among the four neighbouring meteorological stations).

Table B.II.3: Quantity of Drained Water from Individual Variants

Variant	rainfall volume in m ³ /year	of that, in the winter period of December to March. (approx 44%)
2a	173,932.966	76,530.505
2b	147,308.594	64,815.781
7a	143,172.617	62,995.951
7b	123,514.929	54,346.569
7c	134,523.234	59,190.223
SPL	310,837.500	136,768.500

The Decree of the Government no. 296/2005 Coll. as amended, defining the requirements for quality and qualitative goals of subsurface waters and limit values of pollution indicators of waste waters and special waters does not set the limit values of pollution indicators of released waste waters from the roads for automobile traffic. This is why in the proposal of sewage, the requirements of the procurer for quality of rain water removed from the surface of the road are respected. Removed rain waters will be pre-cleaned in oil traps (ORL) to a value of 0.1 mg/l NEL on the output. Oil traps are designed as concrete, with a sedimentation tank for trapping of solid substances in the entry.

The proposed rain sewage will be built alongside the entire section of the highway (apart from the tunnel); it is located in the middle lane, in the section between the Ivanka - north FOI and

Čierna voda FOI with two-lane collectors on both sides of the highway, the sewage will be located on both sides between the collectors and the highway.

Due to the flat terrain, it will be necessary to pump waste waters using pumping stations from the road to oil traps and from the oil traps to the recipient. The quantity of waters released into these flows will be limited; the water taken from the road will therefore first be directed into retention tanks and then to recipients by a regulated flow. Adjacent water flows are proposed to be used as recipients.

Variant 2a is divided to 15 sewaged sections (apart from the tunnel); 7 pumping stations will be located here, and the recipients will be the Strúha creek, Šúrsky channel, Račiansky creek, Podhájsky creek, Mariansky creek. Water from five sewaged sections will freely seep into lower layer after cleaning in an oil trap.

Table B.I.4. : Sewage sections and their termination for variant 2a

Sewage section (km)	Termination (recipient)
0.000 – 0.500	to the Jarovce - Ivanka North section of the D4 highway
0.500 – 1.200 (left)	via an oil trap and retention tank to the Strúha creek
0.500 – 1.200 (right)	via an oil trap and retention tank to the Šúrsky channel
1.200 – 1.500 (left)	via an oil trap and retention tank to the Strúha creek
1.200 – 1.500 (right)	via an oil trap and retention tank to the Šúrsky channel
1.500 – 2.500	via an oil trap and retention tank to the Račiansky creek
2.500 – 4.300	via an oil trap and retention tank to the Šúrsky channel
4.300 – 4.800	via an oil trap seepage into subsoil
4.800 – 5.400	via an oil trap seepage into subsoil
5.400 – 6.200	via an oil trap seepage into subsoil
14.200 – 14.600	via an oil trap seepage into subsoil
14.600 – 15.100	via an oil trap seepage into subsoil
15.100 – 15.600	via an oil trap and retention tank to the Podhájsky creek
15.600 – 16.600	via an oil trap and retention tank to the Mariansky creek
16.600 – 16.840	into the Záhorská Bystrica - Devínska Nová Ves section of the D4 highway

Variant 2b is divided to 10 sewaged sections (apart from the tunnel); 6 pumping stations will be necessary, and the recipients will be the Strúha creek, Šúrsky channel, Podhájsky creek, and Mariansky creek. Water from three sewaged sections will freely seep into lower layers after cleaning in an oil trap.

Table B.II.5: Sewage sections and their termination for variant 2b

Sewage section (km)	Termination (recipient)
0.000 – 0.600	to the Jarovce - Ivanka North section of the D4 highway
0.600 – 2.200 (left)	via an oil trap and retention tank to the Strúha creek
0.600 – 2.200 (right)	via an oil trap and retention tank to the Šúrsky channel
2.200 – 4.300	via an oil trap and retention tank to the Šúrsky channel
4.300 – 4.800	via an oil trap seepage into subsoil
4.800 – 5.400	via an oil trap seepage into subsoil
5.400 – 6.200	via an oil trap seepage into subsoil
15.250 – 15.600	via an oil trap and retention tank to the Podhájsky creek
15.600 – 16.600	via an oil trap and retention tank to the Mariansky creek
16.600 – 16.840	into the Záhorská Bystrica - Devínska Nová Ves section of the D4 highway

Variant 7a is divided to 12 sewaged sections (apart from the tunnel); 7 pumping stations will be located here, and the recipients will be the Strúha creek, Šúrsky channel, Račiansky creek, Podhájsky creek, and Mariansky creek. Water from two sewaged sections will be released for seepage after cleaning in an oil trap.

Table B.II.6: Sewage sections and their termination for variant 7a

Sewage section (km)	Termination (recipient)
0.000 – 0.500	to the Jarovce - Ivanka North section of the D4 highway
0.500 – 1.200 (left)	via an oil trap and retention tank to the Strúha creek
0.500 – 1.200 (right)	via an oil trap and retention tank to the Šúrsky channel
1.200 – 1.500 (left)	via an oil trap and retention tank to the Strúha creek
1.200 – 1.500 (right)	via an oil trap and retention tank to the Šúrsky channel
1.500 – 2.500	via an oil trap and retention tank to the Račiansky creek
2.500 – 4.400	via an oil trap and retention tank to the Šúrsky channel
4.400 – 4.700	via an oil trap seepage into subsoil
14.650 – 15.100	via an oil trap seepage into subsoil
15.100 – 15.600	via an oil trap and retention tank to the Podhájsky creek
15.600 – 16.500	via an oil trap and retention tank to the Mariansky creek
16.500 – 16.770	into the Záhorská Bystrica - Devínska Nová Ves section of the D4 highway

Variant 7b is divided to 8 sewaged sections (apart from the tunnel); 6 pumping stations will be necessary, and the recipients will be the Strúha creek, Šúrsky channel, Podhájsky creek, and Mariansky creek. Water from one sewaged section will freely seep into lower layers after cleaning in an oil trap.

Table B.II.7: Sewage sections and their termination for variant 7b

Sewage section (km)	Termination (recipient)
0.000 – 0.600	to the Jarovce - Ivanka North section of the D4 highway
0.600 – 2.200 (left)	via an oil trap and retention tank to the Strúha creek
0.600 – 2.200 (right)	via an oil trap and retention tank to the Šúrsky channel
2.200 – 4.400	via an oil trap and retention tank to the Šúrsky channel
4.400 – 4.700	via an oil trap seepage into subsoil
15.200 – 15.600	via an oil trap and retention tank to the Podhájsky creek
15.600 – 16.500	via an oil trap and retention tank to the Mariansky creek
16.500 – 16.770	into the Záhorská Bystrica - Devínska Nová Ves section of the D4 highway

Variant 7c is divided to 11 sewaged sections (apart from the tunnel); 7 pumping stations will be located here, and the recipients will be the Strúha creek, Šúrsky channel, Račiansky creek, Podhájsky creek, and Mariansky creek. Water from one sewaged section will freely seep into lower layers after cleaning in an oil trap.

Table B.II.8: Sewage sections and their termination for variant 7c

Sewage section (km)	Termination (recipient)
0.000 – 0.500	to the Jarovce - Ivanka North section of the D4 highway
0.500 – 1.200 (left)	via an oil trap and retention tank to the Strúha creek
0.500 – 1.200 (right)	via an oil trap and retention tank to the Šúrsky channel
1.200 – 1.500 (left)	via an oil trap and retention tank to the Strúha creek
1.200 – 1.500 (right)	via an oil trap and retention tank to the Šúrsky channel

1.500 – 2.500	via an oil trap and retention tank to the Račiansky creek
2.500 – 4.200	via an oil trap and retention tank to the Šúrsky channel
4.200 – 4.700	via an oil trap seepage into subsoil
15.200 – 15.600	via an oil trap and retention tank to the Podhájsky creek
15.600 – 16.500	via an oil trap and retention tank to the Mariansky creek
16.500 – 16.770	into the Záhorská Bystrica - Devínska Nová Ves section of the D4 highway

Variant SPL For this variant, no solution of sewage is proposed in the Feasibility Study; on the basis of available documentation and field research, we recommend use the Rakytov creek and the Matejkov channel as recipients nearby the Lozorno interchange, or direct a part of the sewage into the sewage of the D2 highway. In the space between the portals, use a nameless left-side inflow of Suchý creek as a recipient. The eastern section can be sewages into the Šúr, Viničniansky, Stará Blatiná channels, the Mlynský creek and the nameless channel at the Chorvátsky Grob FOI. Due to the capacities of these flows and the nature of the terrain, it will probably be necessary to build retention tanks.

B.II.3. WASTE

Total quantity (t/year), type and category of waste, location where created, method of waste treatment.

During the planned construction of the Ivanka north - Záhorská Bystrica section of the D4 highway, waste will be generated from the beginning of construction and during the entire period of operation as well. At the stage of processing the "EIA Report" for the assessed intention, it is impossible to define even approximate quantities of waste. Any estimates without a detailed measuring of the territory would be misleading.

Under the Regulation of the Ministry of Environment of the Slovak Republic no. 284/2001 Coll. defining the Waste Catalogue as amended, wastes of the following danger categories will be generated:

1. dangerous wastes identified by letter "N"
2. other wastes identified by letter "O"

The wastes are classified into groups, subgroups, and types in the catalogue of wastes.

During construction, waste will be generated during the preparing of the territory and during the construction activities itself. The highest quantities of waste will be generated by the operation of the construction site facilities of the main construction yard.

The following tables provide an overview of waste generated during construction.

Table B.II.9: Waste Generated on Main Construction Site

Waste type number	Name of waste	Category of waste
02 01 03	plant-tissue waste	O
02 01 07	waste from forestry	O
03 01 04	sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances	N
03 01 05	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	O
06 13 19	wastes not otherwise specified	
08 01 11	waste paint and varnish containing organic solvents or other dangerous substances	N
08 01 12	waste paint and varnish other than those mentioned in 08 01 11	O

08 04 09	waste adhesives and sealants containing organic solvents or other dangerous substances	N
08 04 10	waste adhesives and sealants other than those mentioned in 08 04 09	O
10 13 11	wastes from cement-based composite materials other than those mentioned in 10 13 09 and 10 13 10	O
10 13 14	waste concrete and concrete sludge	O
12 01 01	ferrous metal filings and turnings	O
12 01 02	ferrous metal dust and particles	O
12 01 03	non-ferrous metal filings and turnings	O
12 01 04	non-ferrous metal dust and particles	O
12 01 05	plastics shavings and turnings	O
12 01 13	welding wastes	O
13 05	oil/water separator contents	N
13 08 02	other emulsions	N
13 08 99	wastes not otherwise specified	
15 01 01	paper and cardboard packaging	O
15 01 02	plastic packaging	O
15 01 03	wooden packaging	O
15 01 04	metallic packaging	O
15 01 05	composite packaging	O
15 01 06	mixed packaging	O
15 01 07	glass packaging	O
15 01 09	textile packaging	O
15 01 10	packaging containing residues of or contaminated by dangerous substances	N
15 01 11	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers	N
15 02 02	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	N
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	O
16 02	wastes from electrical and electronic equipment	N/O
17 01 01	concrete	O
17 01 02	bricks	O
17 01 03	tiles and ceramics	O
17 01 06	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances	N
17 01 07	mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	O
17 02 01	wood	O
17 02 02	glass	O
17 02 03	plastic	O
17 02 04	glass, plastic and wood containing or contaminated with dangerous substances	N
17 03 02	bituminous mixtures containing other than those mentioned in 17 03 01	O
17 04 01	copper, bronze, brass	O
17 04 02	aluminium	O
17 04 03	lead	O
17 04 04	zinc	O
17 04 05	iron and steel	O
17 04 06	tin	O

17 04 07	mixed metals	O
17 04 09	metal waste contaminated with dangerous substances	N
17 04 10	cables containing oil, coal tar and other dangerous substances	N
17 04 11	cables other than those mentioned in 17 04 10	O
17 05 03	soil and stones containing dangerous substances	N
17 05 04	soil and stones other than those mentioned in 17 05 03	O
17 05 05	dredging spoil containing dangerous substances	N
17 05 06	dredging spoil other than those mentioned 17 05 05	O
17 05 07	track ballast containing dangerous substances	N
17 05 08	track ballast other than those mentioned in 17 05 07	O
17 06 01	insulation materials containing asbestos	N
17 06 03	other insulation materials consisting of or containing dangerous substances	N
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03	O
17 06 05	construction materials containing asbestos	N
17 08 01	gypsum-based construction materials contaminated with dangerous substances	N
17 08 02	gypsum-based construction materials other than those mentioned in 17 08 01	O
17 09 03	other construction and demolition wastes (including mixed wastes) containing dangerous substances	N
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	O
20 03 01	mixed municipal waste	O

At the construction site, waste will be generated during the following activities:

- demolitions of structures
- demolitions of current structures and roads
- removal of verdure
- relocations of utilities
- construction of bridges
- construction of tunnels
- laying individual road layers
- finalizing works
- potentially solving emergency situations (leakage of oil products, etc.)

Table B.II.10: Waste Generated in the Construction Yard Area

Waste Type Number	Name of waste	Category of waste
03 01 04	sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances	N
03 01 05	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	O
08 01 11	waste paint and varnish containing organic solvents or other dangerous substances	N
08 01 12	waste paint and varnish other than those mentioned in 08 01 11	O
12 01 01	ferrous metal filings and turnings	O
12 01 02	ferrous metal dust and particles	O
12 01 03	non-ferrous metal filings and turnings	O
12 01 04	non-ferrous metal dust and particles	O
12 01 05	plastics shavings and turnings	O
12 01 12	spent waxes and fats	N

12 01 13	welding wastes	O
13 01	waste hydraulic oils	N
13 02	waste engine, gear and lubricating oils	N
13 03	waste insulating and heat transmission oils	N
13 08 02	other emulsions	N
13 08 99	wastes not otherwise specified	
14 06 03	other solvents and solvent mixtures	N
14 06 05	sludges or solid wastes containing other solvents	N
15 01 01	paper and cardboard packaging	O
15 01 02	plastic packaging	O
15 01 03	wooden packaging	O
15 01 04	Metallic packaging	O
15 01 05	composite packaging	O
15 01 06	mixed packaging	O
15 01 07	glass packaging	O
15 01 09	textile packaging	O
15 01 10	packaging containing residues of or contaminated by dangerous substances	N
15 01 11	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers	N
15 02 02	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	N
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	O
16 01 03	end-of-life tyres	O
16 01 07	oil filters	N
16 02	wastes from electrical and electronic equipment	N/O
16 06	batteries and accumulators	N/O
20 01 01	paper and cardboard	O
20 01 02	glass	O
20 01 08	biodegradable kitchen and canteen waste	O
20 01 10	clothes	O
20 01 11	textiles	O
20 01 21	fluorescent tubes and other mercury-containing waste	N
20 01 38	wood other than that mentioned in 20 01 37	O
20 01 39	plastic	O
20 01 40	metals	O
20 02 01	biodegradable waste	O
20 03 01	mixed municipal waste	O
20 03 04	septic tank sludge	O

At construction yards, waste will be generated during the following activities:

- preparing of construction components
- painting of structures
- regular maintenance of construction mechanisms
- operation of construction facilities and sanitary facilities for employees
- storage of material

During operation, the main source of waste will be the maintenance and cleaning of the assessed section. These activities can be characterized in more detail as follows:

- road cleaning
- sewage and rain inlet cleaning
- minor modifications of the road and of highway embankments
- highway maintenance during winter
- cleaning of retention tanks
- cutting and maintenance of verdure in areas of FOI, the middle lane, and on shoulders

On the basis of these activities, types of waste can be specified as summarized in the following table:

Table B.II.11: Waste Generated During Operation of Highway

Waste Type Number	Name of waste	Category of waste
02 01 03	plant-tissue waste	O
13 05 02	sludges from oil/water separators	N
13 05 06	oil from oil/water separators	N
15 01 10	packaging containing residues of or contaminated by dangerous substances	N
15 02 02	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	N
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	O
20 02 01	biodegradable waste	O
20 03 03	street-cleaning residues	O
20 03 06	waste from sewage cleaning	O

Treatment of wastes, the method of use and/or disposal thereof will be governed by the Act no. 223/2001 Coll. on Waste and on modification and amendment of other acts as amended, and by the provisions of the Regulation no. 283/2001 Coll. executing certain provisions of the Act on Waste as amended.

According to the provisions of the Act on Waste, whoever performs construction, maintenance, reconstruction, or demolition of a road must use the construction waste from this activity and the waste from demolition as materials in construction, renovation, or maintenance of roads. The contractor of the structure will be responsible for waste treatment during the construction and fulfil all duties of an originator of waste.

From the dangerousness aspect, generated waste is divided to the category of "other" in which no dangerous characteristics occur and the category of "dangerous" with potential occurrence of any of the dangerous characteristics.

In the next level of project documentation, a waste treatment project for the period of construction will be made, basing on the material balance and reflecting local conditions and requirements.

B.II.4. NOISE AND VIBRATIONS

Source and Intensity

NOISE

Period of construction

In this period, the surroundings of the construction will be burdened by noise emissions of construction machinery and vehicles serving the site. After removal of a part of the mould, basic ground works will continue one by one according to the project documentation, related to founding bridges, building tunnel portals, fillings and cuts, relocations of utilities, etc. In this phase various earthmoving machinery and mechanisms such as excavators, bulldozers, flatteners, trucks, loaders, compactors, etc. will be used. These machines are specified below as they are the main sources of noise during construction. The below noise parameters were obtained from measurements at similar construction works (measured in a set distance of 7 m from the edge of the machine, the scope of noise levels is defined by the percentage of power of the machine used and by its load)

Tatra trucks	87 – 89 dB(A)	
Bulldozer		86 - 90 dB(A)
Compactors for soil and gravel		83 – 86 dB(A)
Surface flatteners		86 – 88 dB(A)
Excavator	83 – 87 dB(A)	
Soil loaders	86 – 89 dB(A)	

It is generally known that the noise around working earthmoving machinery reaches relatively high values. The noise has a significantly variable or even interrupted nature - it depends on the type of activity performed and on the immediately performed technology, such as excavation, filling of gravel, ploughing, compacting, loading, etc. Superposition of several noise sources, i.e. concurrent running of several machines at a single moment, is also possible. Noise from the basic earthmoving works of construction of premises is naturally temporary.

These impacts will be of a local scope, territorially limited to the area of the structure and bound in time to the period of construction; an important role will be played by the location of access roads to the construction site of the highway and of construction yards.

Another source of noise will be the operation of construction yards where supporting technologies such as a concrete plant or an asphalt mixing plant will be located. Apart from movements of trucks with raw materials and finished mixtures, dominant sources of noise will include the individual facilities of technological lines.

According to the Annex to the Regulation of the Ministry of Health of the Slovak Republic no. 549/2007 Coll., on working days from 7 a.m. until 9 p.m. and on Saturday from 8 a.m. until 1 p.m., when evaluating noise from construction activities in an exterior environment, the assessed value is set by adding a correction of $K = (-10)$ dB to the equivalent level A of sound (time average level of sound A = immediate level of sound found using weight filter A of a sound level meter, determined using a sound level meter or by calculation from the noise spectre and expressed in dB) in the said time intervals. In these time intervals, corrections according to Table 2 of the Annex to the Regulation are not applied.

Period of operation

All assessed variants of the D4 highway are **outside urbanized territories of all affected municipalities** and form a new line source of noise in the territory.

The construction of the D4 highway will result in a redistribution of traffic in the area between the already existing road network and the newly built D4 highway. The result will be a change of the noise load (a slight decrease thereof is expected) on the existing road network

and an increase of noise load from the newly built D4 highway. A significant reduction of noise load can be expected on roads passing the municipal districts of Vajnory and Záhorská Bystrica where the largest decrease of traffic is expected (text annex no. 2).

Protection of urbanized areas of the affected municipalities from the impact of the operation of the D4 highway is made, first of all, by the maximum possible distance of routes of individual assessed variants from the urbanized areas, and by covering of the highway and/or extension of the tunnel. In cases where it was impossible to apply such measures and the predicted noise levels approach limit values, noise barriers are proposed with proposals to be detailed on a later level of the project documentation. The preliminary scope of noise barriers was proposed within the assessment of noise load impacts of the assessed variants of the D4 highway (see Noise Study - Text Annex 2).

A specific situation from the viewpoint of noise load will occur in the area of the D1 highway in the proximity of the Vajnory municipal district. The southern and south-eastern part of this urbanized area is significantly attacked by the noise from the D1 highway and from the Bratislava - Komárno railway track. The situation will not improve after the construction of the D4 highway (by transferring a part of the traffic to this highway) as the estimated traffic intensity on D1 in this section in 2040 is estimated to 110 000 vehicles in 24 hours (triple the intensity on the D4). This is why it was necessary to solve the relevant traffic area of the D1 and D4 highways together (the modelled noise was both from D4 and D1). The protection of the southern and south-eastern part of the Vajnory municipal district is necessary both from the railway track and from the D1 highway that is elevated above the level of the railway track.

The noise load in the monitored period in the surroundings of the routes of individual variants for year 2040, day and night time, is specified in a separate Noise Study (Text Annex 2).

VIBRATIONS

Construction works are a major source of vibrations that may disrupt the factors of wellness and influence statics. Stronger vibration effects can be expected within metres or dozens of metres from the axis of the road.

Period of construction

During the construction period, vibrations may be generated mostly by activities of heavy machinery and by applying special construction technologies (tunnel boring, pile boring). Also, vibrations may result from heavy trucks driving in residential areas.

Period of operation

The D4 highway is not expected to generate vibrations from traffic that could influence urbanized areas.

The impact on the stability of the embankments of the Šúrsky channel due to vibrations from traffic on the D4 highway must be verified in the phase of geologic and hydrogeologic research at a later stage of project documentation.

B.II.5. RADIATION AND OTHER PHYSICAL FIELDS

Thermal, magnetic, and other - source and intensity.

No production of any kind of radiation or creation of other physical fields is expected in relation to the planned construction and operation of the planned D4 highway in the section Ivanka north - Záhorská Bystrica.

B.II.6. SMELLS AND OTHER OUTPUTS

Source and Intensity.

Dispersion of smell of any nature in a quantity that would negatively influence the wellness of surrounding inhabited areas and users of the road is not expected. Smells will occur in locations of construction yards, concrete and asphalt mixing centres, and during laying of asphalt. No other outputs are expected.

B.II.6. ADDITIONAL DATA

Significant landscaping and interventions with landscape.

SIGNIFICANT LANDSCAPING.

Variant 2a - outside the tunnel, it is mostly on a slight filling, with the elevation increasing as necessary in premises of flyover interchanges (up to a maximum height of approx. cca 8 m). Most landscaping works are expected in the location of the Rača FOI and in the locations of both portals of the Karpaty tunnel where the tunnel will be built by excavation (20 m at the eastern portal and 50 m at the western portal).

Variant 2b - similarly to variant 2a, outside the tunnel, it is mostly on a slight filling with the elevation not exceeding 8 m in locations of flyover interchanges. Landscaping work of a significant nature will be necessary, apart from the Rača FOI, for the building of the Vajnory tunnel that will be buried under the surface. The eastern portal of the Karpaty tunnel will require landscaping similar to variant 2a. The western portal of the Karpaty tunnel is shifted behind the urbanized area of the municipality of Marianka. The 993 m long western part of the tunnel will be constructed by excavation, construction in the pit, and subsequent covering. Therefore, this section will require the most demanding landscaping work.

Variant 7a - outside the tunnel it is mostly on a slight filling that increases in flyover interchanges; the maximum, approx. 12 m, is reached in the Rača FOI. Significant landscaping works are also formed by the construction of both portals of the Karpaty tunnel where the tunnel will be built by excavation (50 m at the eastern portal and 50 m at the western portal).

Variant 7b - most landscaping in this variant will be required by the construction of the Vajnory tunnel and the Rača FOI, similarly to variant 2b. Significant landscaping will be necessary at the western portal of the Karpaty tunnel, with the 550 m long terminal section constructed by excavation and subsequent coverage by soil and vegetation (buried routing). From the viewpoint of impact on the landscape, the construction of the eastern portal of the Karpaty tunnel will be significant equally to variant 7a.

Variant 7c will be mostly led on a slight filling outside the tunnel; in locations of flyover interchanges the filling is higher (maximum height 12 m in the Rača FOI). Significant landscaping will be formed by the construction of the eastern portal of the Karpaty tunnel and the construction of the western portal together with a 550 m long part of tunnel constructed as excavated tunnel.

Variant SPL is led on a slight filling or in a shallow cut outside the tunnel. The only tall filling, approx. 14 m, will be necessary to fly over the railway track no. 120 and the road no. II/502 to the south of Pezinok. Apart from this filling, substantial landscaping will be required for the construction of all portals of Karpaty and Katušiná tunnels.

DEMOLITIONS

Variants 2a and 2b will require the demolition of the structure of a former police guarding tower at road II/502 that is located in the area of the future Rača FOI; also, the demolition of

the OMV fuel station at the road II/502 to the north from the junction with Rybníčná street is recommended, as well as the demolition of several garden huts and lodges before the eastern portal of the Karpaty tunnel (estimated number up to 25); also, behind its western portal demolition of garden huts and lodges will be necessary (estimated number up to 10).

Demolition or moving will be necessary in the case of a Mary-dedicated chapel from 1608 approx. in km 15.250 in both variants.

Also, it will be necessary to relocate the cross on a field road in km 15.800 of the D4 highway as well as the cross at the old orchard in km 16.450 of the D4 highway. Both crosses stand in the route of the planned D4 highway.

Variants 7a, 7b, and 7c will require the demolition of the structure of former police guard tower at road II/502 that is located in the premises of the future Rača FOI, of a concrete dung-pit located in the location of the eastern portal of the Karpaty tunnel in km 4.700 of the D4 highway, as well as of a few garden huts at the western portal of the Karpaty tunnel (estimated number up to 5).

Demolition or moving will be necessary in the case of a Mary-dedicated chapel from 1608 approx. in km 15.150 in all three variants.

It will be necessary to relocate the cross on a field road in km 15.800 of the D4 highway as well as the cross at the old orchard in km 16.450 of the D4 highway. Both crosses stand in the route of the planned D4 highway.

Variant SPL will require the demolition of five garden huts between the Šúrsky channel and the railway track in km 10.200; if this variant is constructed, also a demolition of a production hall at the Lozorno interchange or re-routing of a relocation of road I/2 would be necessary.

STORING THE EXCAVATED MATERIAL FROM THE TUNNEL

According to the Feasibility Study and balances of earth works for individual variants, surpluses of excavated land and rock from the tunnel (except for variant 2a where the balance is almost zero) between 480 000 and 1 250 000 m³.

After considering the possibilities of storing the surpluses of excavated materials for individual variants, the possibilities of disposal of this surplus material are as follows:

- Transport of surplus material to the gravel yard nearby the municipality of Vysoká pri Morave,
- Establishing a temporary dumping site for excess material that can be used for future traffic structure in the nearby area,
- Direct sale of surplus excavated material from the tunnel and of excavated soils for construction and/or other uses,
- Use of surpluses to cover the extended Karpaty tunnel to the north of the municipality of Marianka.

CUTTING AND RESERVES OF VERDURE

Estimate of cutting of verdure on forest land

According to interventions of individual variants in the registered forest areas and nature of forests, the estimated reserves of wood in the affected locations are as follows.

Variant 2a - will affect the forest to the north of the municipality of Marianka. The affected forest has a majority of hornbeam, beech, and oak, currently forming a wood reserve of approx. 505 m³.

Variant 2b - does not affect any registered forest land.

Variant 7a - affects a registered forest to the north of the municipality of Marianka, specifically, a recently planted monoculture forest of beech where it is not yet possible to

determine the reserves of wood. Also, it affects a forest in the territory of the Rača FOI, specifically a young alder forest that can not be evaluated from the viewpoint of reserves of wood either.

Variant 7b - affects a forest in the territory of the Rača FOI, specifically a young alder forest that can not be evaluated from the viewpoint of reserves of wood yet.

Variant 7c - includes no interventions with registered forest land.

Variant SPL - will affect registered forest land in the section between the portals; this is a mixed forest both in terms of age and species. Broad-leaved species such as beech, hornbeam, oak, and others prevail massively. The reserves of wood on the affected area that will need to be cut are estimated to approximately 900 m³.

The relocation of road I/2 to the south of the Lozorno interchange will affect a pine forest with acacia as invading species. The volume of wood that will need to be cut is approximately 100 m³.

Estimate of cutting of verdures on land outside forests

Cuts of verdure will occur on land where the proposed D4 highway in all variants 2a, 2b, 7a, 7b, 7c, and SPL crosses non-forest verdure.

Variants 2a and 2b will, in the territory, influence areas with spot and line non-forest verdure mostly in the territory of vineyards where the verdure forms natural line barrier between individual vineyards; also non-forest verdures between fields will be affected. In total, approximately 4300 trees and 33 000 m² of bushes will be cut; the social value of the removed verdure in the territory of variants 2a and 2b was calculated to EUR 1 750 000 (rounded to tens of thousands).

In the territory of **variants 7a, 7b, and 7c**, non-forest verdure will also partially be cut in the territory of vineyards as the D4 highway touches the line verdures of a creek; also, cutting of adjacent verdure next to roads, verdure separating individual sections of arable land, and line verdure around the Šúrsky channel will be cut. In total approximately 4 000 trees and 20 500 m² of bushes will be cut, with a total social value of EUR 1 470 000 (rounded to tens of thousands).

In **variant SPL**, removal of non-forest verdure will be done in the territory of local vineyards; subsequently, line verdure growing on the borders of individual sections of arable land and adjacent line verdure of creeks in the territory around Slovenský Grob and Chorvátsky Grob will be removed. Also, verdure in the territory of local vineyards at the D1 highway will be removed. In total, approximately 500 trees and 14 200 m² of bushes will be cut, with a total social value of EUR 370 000 (rounded to tens of thousands).

Table B.II.12: Overview table of representation of individual verdure types in the territory of the structure for each variant separately

Name of verdure (Latin)	Name of verdure (Slovak)	Origin ¹	Growth characteristics ²	Relative achievable age ³	2a, 2b	7a, 7b, 7c	SPL
<i>Acer campestre</i> L.	Field maple	1	SL	2.1		*	
<i>Acer campestre</i> L.	Field maple	1	K,S	2.1	*	*	*

¹ 1 – original local species, 2 – verified introduced species, 3 – partially verified introduced species, 4 – potentially introduced species (currently rare).

² S – tree, K – bush, K, S – bush or tree, L – liana, SL – broad-leaved tree, SI – coniferous tree.

³ 1 – long-aged verdure - 1.1 significantly high age (over 500 years), 1.2 high age (200 – 500 years); 2 – medium-aged verdure - 2.1 medium age (100 – 200 years); 3 – short-aged verdure - 3.1 low age (50 – 100 years), 3.2 very low age (up to 50 years of age).

<i>Acer platanoides</i> L.	Norway maple	1	SL	1.2	*	*	*
<i>Acer pseudoplatanus</i> L.	Sycamore	1	SL	1.2	*	*	*
<i>Alnus glutinosa</i> (L.)	Alder	1	SL	2.1	*	*	
<i>Armeniaca vulgaris</i> L.	Apricot	2	SL	3.2	*		*
<i>Betula pendula</i> Roth	Silver birch	1	SL	3.1	*		
Name of verdure (Latin)	Name of verdure (Slovak)	Origin ⁴	Growth characteristics ⁵	Relative achievable age ⁶	2a, 2b	7a, 7b, 7c	SPL
<i>Carpinus betulus</i> L.	Common hornbeam	1	SL	2.1	*	*	
<i>Cerasus avium</i> (L.)	Wild cherry	1	SL	3.1	*	*	*
<i>Clematis vitalba</i> L.	Old man's beard	1	L	3.2	*		
<i>Colutea arborescens</i> L.	Bladder-senna	1	K,S	3.1	*	*	
<i>Crataegus monogyna</i> Jacq.	Hawthorn	1	K,S	3.1	*	*	*
<i>Euonymus europaeus</i> L.	Common spindle	1	K	3.1	*	*	*
<i>Fagus sylvatica</i> L.	Red beech	1	SL	1.2	*	*	
<i>Fraxinus excelsior</i> L.	European ash	1	SL	2.1		*	
<i>Juglans regia</i> L.	Persian walnut	2	SL	2.1	*	*	*
<i>Larix decidua</i>	European larch	1	SI	1.2		*	
<i>Malus domestica</i> Borkh.	Apple tree	1	SL	3.1	*	*	*
<i>Negundo aceroides</i> Moench	Box elder	2	SL	3.1			*
<i>Pinus sylvestris</i> L.	Scotch pine	1	SI	2.1	*	*	*
<i>Populus alba</i> L.	White poplar	1	SL	2.1	*	*	*
<i>Populus nigra</i> L.	Lombardy poplar	1	SL	2.1			*
<i>Populus tremula</i> L.	Common aspen	1	SL	3.1	*		
<i>Populus canadensis</i> Moench	Canadian poplar	1	SL	3.1	*	*	*
<i>Populus canescens</i> (Ait.) Sm	Grey poplar	1	SL	3.1	*	*	*
<i>Prunus cerasifera</i>	Cherry plum	2	SL	3.1	*	*	*

⁴ 1 – original local species, 2 – verified introduced species, 3 – partially verified introduced species, 4 – potentially introduced species (currently rare).

⁵ S – tree, K – bush, K, S – bush or tree, L – liana, SL – broad-leaved tree, SI – coniferous tree.

⁶ 1 – long-aged verdure - 1.1 significantly high age (over 500 years), 1.2 high age (200 – 500 years); 2 – medium-aged verdure - 2.1 medium age (100 – 200 years); 3 – short-aged verdure - 3.1 low age (50 – 100 years), 3.2 very low age (up to 50 years of age).

Ehrh.							
<i>Prunus domestica</i> L.	Plum	1	SL	3.2	*		*
<i>Prunus spinosa</i> L.	Blackthorn	1	K,S	3.2	*	*	*
<i>Pyrus communis</i> L.	European pear	2	SL	3.1			*
<i>Quercus robur</i> L.	Oak	1	SL	1.1	*	*	*
<i>Robinia pseudacacia</i> L.	Black locust	2	SL	2.1	*	*	*
<i>Rosa canina</i> L.	Dog-rose	1	K	3.2	*	*	*
<i>Rubus caesius</i> L.	European dewberry	1	K,L	3.2	*	*	
<i>Rubus fruticosus</i> agg.	Blackberry	2	K	3.2	*		*
<i>Rubus idaeus</i> L.	Red raspberry	1	K	3.2	*		*
Name of verdure (Latin)	Name of verdure (Slovak)	Origin ⁷	Growth characteristics ⁸	Relative achievable age ⁹	2a, 2b	7a, 7b, 7c	SPL
<i>Salix alba</i> L.	White willow	1	SL	3.1	*	*	*
<i>Salix cinerea</i> L.	Grey willow	1	K,S	3.2	*	*	
<i>Salix fragilis</i> L.	Crack willow	1	K,S	3.1	*	*	*
<i>Salix sp.</i>	Willow sp.	1	SL	3.1	*	*	*
<i>Sambucus nigra</i> L.	Blood-twig dogwood	1	K	3.1	*	*	*
<i>Sorbus aucuparia</i> L.	Mountain-ash	1	SL	3.1	*		
<i>Swida sanguinea</i> L.	Common dogwood	1	K	3.1	*	*	*
<i>Syringa vulgaris</i> L.	Common lilac	2	K	3.2	*		*
<i>Tilia cordata</i> Mill.	Small-leaved lime	1	SL	1.1	*		
<i>Ulmus laevis</i> Pallas	European white elm	1	SL	1.2	*	*	
<i>Viburnum opulus</i>	Guelder-rose	1	K	3.1		*	

⁷ 1 – original local species, 2 – verified introduced species, 3 – partially verified introduced species, 4 – potentially introduced species (currently rare).

⁸ S – tree, K – bush, K, S – bush or tree, L – liana, SL – broad-leaved tree, SI – coniferous tree.

⁹ 1 – long-aged verdure - 1.1 significantly high age (over 500 years), 1.2 high age (200 – 500 years); 2 – medium-aged verdure - 2.1 medium age (100 – 200 years); 3 – short-aged verdure - 3.1 low age (50 – 100 years), 3.2 very low age (up to 50 years of age).

Disclaimer

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