THE ROAD INFRASTRUCTURE AGENCY

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REPORT
on the
Impact Assessment of Investment Proposal for

IMPROVING THE ROAD BED OF LOT 3.2 OF STRUMA MOTORWAY

On the subject-matter and the objectives for protection of protected zones BG0000366 'Kresna-Ilindentsi', for the protection of natural habitats and wild fauna and flora and BG0002003 'Kresna' for the protection of wild birds

PART ONE

Sofia
July 2017

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List of abbreviations

Abbreviation	Significance
MOEW	Ministry of Environment and Water
MH	Ministry of Health
MRDPW	Ministry of Regional Development and Public Works
RIEW	Regional Inspectorate of Environment and Water
EEA	Executive Agency for the Environment
NCSIP	The National Company 'Strategic Infrastructure Projects',
API	“Road Infrastructure” Agency
EEC	European Economic Community
The EU	The European Union
EC	The European Commission
NSI	The National Statistical Institute
BSPB	Bulgarian Society for the Protection of Birds
BD	Basin Directorate
NGO	Non-governmental organization
EPA	Environmental Protection Act
BDA	Biodiversity Act
WA	The Water Act
PTA	The Protected Territories Act
WMA	The Waste Management Act
EIA	Environmental Impact Assessment (EIA)
REIA	Environmental Impact Assessment Report
CA	Compatibility Assessment
IRAR	Impact Rate Assessment Report
SG	State Gazette
DCM	Decree of the Council of Ministers
SG	State Gazette
BSS (BDS)	The Bulgarian State Standard
ETEC	Expert Technical and Economic Council
TC	Technical Council
TP	Technical project
DPDP	Detailed (property) development plan
PRC	Plan for regulation and construction
M (MW)	Motorway/Highway
MV	Motor vehicle
RV	Road vehicle
AgR	An agricultural road
RW	Railway / Rail
BCP	Border Checkpoint
CAW	Construction and assembly works
RDS	Road design standards
IP	Investment proposal
RBMP	River Basin Management Plans
HMS	Hydrometric station
UWB	Underground water body
NEMS	National Environmental Monitoring System
SPZ	Sanitary protection zone
SF	State Forestry

FMP	Forest management project
NtP	National Park
NP	Nature Park
RB	Red Book of Bulgaria
PZ	Protected zone
PA	Protected area
FNCS	Favourable Nature Conservation Status
NL	Natural Landmark
LV	Limit values
ICE	Internal combustion engines
TSD	Total suspended dust
FDP	Fine dust particles
VOCs	Volatile Organic Compounds
PAH / PAHs	Polycyclic aromatic hydrocarbons
AARPHH	The average annual rate of protection for human health

Introduction

The Impact Rate Assessment Report (IAR) of the investment proposal of 'Improving the route of Lot 3.2 of Struma Motorway was prepared on the basis of Art. 31, Para. 1 and Para. 4 of the Law on Biological Diversity (BDA, SG, No. 77/2002, as latest amended by SG No. 58 / 26 July 2016) and according to Art. 2, Para. 1, Subparagraph 1 and Art. 39, Para. 5 of the Ordinance on the conditions and procedure for assessment of the compatibility of plans, programs, projects and investment proposals with subject-matter and protection objectives of protected zones (*Ordinance on Compliance Assessment,* accepted by Decree of the Council of Ministers No. 201 / 31 August 2007, SG. 73 / 11 September 2007, as latest amended SG No. 94 / 30 November 2012).

The Contracting Authority has submitted before the MOEW a notification of the investment proposal, submitted under Art. 4, Para. 1 of the Ordinance on the conditions and procedure for environmental impact assessment (*Ordinance on EIA* , accepted by Decree of the Council of Ministers No. 59/2003, SG, No. 25/2003, as latest amended State Gazette, No. 12 / 12 February 2016) and Art. 10 of the Ordinance on Compliance Assessment, and the competent authority has issued a letter of ref. No. EIA-85 / 13 May 2015 of the MOEW. (Appendix No.1)

The road route of Lot 3.2 of the Struma Motorway passes through two protected zones under NATURA 2000 as follows:

- BG0002003 'Kresna' for the conservation of wild birds, announced by Order No RD -748 of 24 October 2008 (SG, issue 97/2008) by the Minister of Environment and Waters;
- BG0000366 'Kresna-Ilindentsi' for the Conservation of Natural Habitats and Wild Fauna and Flora, as included in the List of Protected Areas, accepted by the Council of Ministers, by Decision No. 122 / 2 March 2007 (State Gazette, No. 21/2007), amended and supplemented by Decree of the Council of Ministers No. 811/2010 (State Gazette, No. 96/2010).

In its majority, Lot 3.2 passes through the Kresna Gorge – an area that is exceptionally sensitive in environmental respect. The conditions are further aggravated by the complex physical and geographic features: Landslides and earth collapses, a fault zone with a complex geological structure and high seismic risk in respect of tectonics.

The decision to develop a tunnel for Lot 3.2 of Struma Motorway (EIA Decision No. 1-1 / 2008 of MOEW) is based on very limited environmental information, including that of the proposed Natura 2000 potential protected zones in 2007, as well as the absence of sufficiently detailed technical data on the project and the absence of geological research. At that time only the environmental consequences of the operation of the tunnel were taken into account, without taking into account those from its excavation, as well as the maintenance of the complex engineering equipment. Also, sub-projects, such as reconstruction and relocation of infrastructure of other departments, landfill sites, temporary landfills for earth masses and construction waste, construction sites at the entrance and exit of the tunnel, including the construction technology itself, the final defined road junctions, the control center, etc., were not subject to EIA and Compatibility Assessment procedures during that time.

The EIA Decision 1-1 / 2008 also includes numerous recommendations for improving the route in the next stages of study and design. One of the conditions, stipulated for the design phase - Subpara. 3.2 of the Decision requires - alongside with the development of the tunnel Option - to find ways to improve it and to achieve the best possible - environmentally-friendly, technically feasible and economically feasible Option.

During this period, the project has evolved, driven entirely by environmental considerations, and the design processes have been conducted along with the environmental assessment or the so-called 'Limiting environmental factors' defined by Jaspers in the framework of the Environment Strategy for Lot 3 of Struma Motorway - JASPERS in 2012.

The following activities have been carried out in the development of the project:

- Preliminary evaluations of the expected impacts on the habitat types and species types, with a particular focus on priority ones;
- Corrective measures, identified and taken to minimize impact on priority habitat types and associated species, protected in Natura 2000 protected zones - BG0000366 'Kresna-Ilindentsi' and Birds Protection Zone BG0002003 'Kresna';
- Consultations and meetings with representatives of the scientific community as well as various NGOs, including a joint site visit.

In this assessment (as well as in the EIA report), the following 5 Options, proposed by the Contracting Authority have been considered and evaluated by virtue:

- Long tunnel option (Double-Tube), conceptual design, 2015 - taking into account the EIA decision No 1-1 / 2008 of MOEW;
- Option G20 - Blue, Pre-investment (Feasibility) Study in 2014, for the road to pass through the Kresna Gorge;
- Option G20 - Red, Conceptual Design, 2015 - for the road to pass through

The Kresna Gorge:

- Eastern Option G10.50, Pre-investment (Feasibility) Study, 2016 - left road lane (in the direction Kulata-Sofia) on a new terrain, outside the gorge and the right road lane (in the direction Sofia-Kulata) along the existing road E79 in the gorge and eastern bypass of the town of Kresna on a new terrain;
- Eastern Option G20, Pre-investment (Feasibility) Study, 2016 - left and right road lane, outside the Kresna Gorge.

The two eastern options for crossing the route outside the Kresna Gorge - G10.50 and G20 were surveyed in 2016 by the Road Infrastructure Agency, taking into account:

- Decision No. 1-1 / 2008 of MOEW on EIA;
- Recommendation 98 (2002) of the Standing Committee of the Berne Convention;
- Written instructions, given by the competent environmental authority - outgoing Ref. No. EIA-85 / 13 May 2015 of MOEW;
- The results of the 'Observation, analysis and assessment of the mortality of animal species in the section E-79 (I-1), passing through the BG0000366 Kresna-Ilindentsi and BG0002003 Kresna Birds Protection Zone, for the period 2012-2016;
- Consultations on the updated EIA Scope and Terms of Reference/Assignment, within which it is proposed to consider an option, in which both roadways are taken outside of the Kresna Gorge;
- Recommendations made by DG of Environment with the EC during regular technical meetings.

By letter of ref. No. EIA-85 / 13 January 2017, the Minister of Environment and Water stated that the proposed assessment approach in the Scope and Terms of Reference of the EIA is in compliance with the requirements of Art. 95, Para. 2 and Para. 3 of the Environmental Protection *Act* (*EPA*) and comply with Art. 10, Para. 1 and Para. 3 of the Ordinance on the Conditions and Procedure for Environmental Impact Assessment (*EIA Ordinance*).

The impact rate is determined by the criteria of Art. 22 of the *Ordinance on Compatibility Assessment*, the scope, volume and content of the assessment being in compliance with the requirements of Art. 23, Para. 2 of the *Ordinance on the Compatibility Assessment* and the instructions, given by the MoEW, in letter of outgoing Ref. No. EIA-85 / 13 May 15

The impact assessment of the investment proposal for "Improvement of the road route of Lot 3.2 of the Struma Motorway" with respect to the affected protected zones has been carried out by a team or experts, in compliance with the requirements of Article 31, Paragraph 21 of the BDA and Article 9, Paragraph 1 of the Ordinance on Compatibility Assessment, with competences, relevant both to the subject of protection in the protected areas and to the specificity of the investment proposal and is presented in the form of a report, which presents an Appendix to the EIA report and forms an integral part of the report.

The team of experts, who prepared the EIA Report comprised the following experts:

Master of sciences, Biologist Krassimir Borisov Donchev - zoologist. Natural habitats

Signature (illegible)

Doctor of Biological Sciences, Margarita Trifonova Voicheva - The vegetable kingdom
Signature (illegible)

Associate Professor, Doctor of Sciences, Lachezar Zlatev Pehlivanov - Hydrobiologist, Ichthyologist
Signature (illegible)

Assistant Professor, Doctor of Sciences, Nevena Trifonova Ivanova - Ecologist. Ornithologist
Signature (illegible)

Master of Sciences, Biologist, Vesselin Mintrev Valchanov - Biologist, Zoologist
Signature (illegible)

Engineer Tsvetko Marinov Tsvetkov, Road Engineering
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1. Annotation of the investment proposal

Five Trans-European corridors pass through the Republic of Bulgaria - IV, VII, VIII, IX and X of the Trans-European Transport Network, which aims to improve the economic and social cohesion of European countries.

"Struma" Motorway is a part of the North-South Trans-European Motorway (TEN) and a part of the Fourth Trans-European Transport Corridor.

As a main arterial road, it is of great importance to the integration of the National Transport Infrastructure into the European Transport System. It offers the shortest route, connecting the navigable route of the Danube River and the Aegean Sea and has an important role for connecting Romania, Bulgaria and Greece, and more generally – the Baltic, Black and Aegean Seas.

This route is the busiest one, running through Bulgaria in the North-South direction. The route is part of Priority Project 7 of the EU for development of the Trans-European Transport Network, including the motorway axis Igumenitsa/Patra-Athens-Sofia-Budapest.

The Lot 3 route is located in an environmentally sensitive area. The greatest section of the length of Lot 3 is located along the Struma River valley and within the strip, including the existing road E79 and the 'Sofia-Kulata' railway line.

The main prerequisite for the construction of "Struma" Motorway has also resulted from the need to update and bring the road infrastructure in conformity with the European regulations with regard to the respective classes of roads. As a result of the new route construction, the number of road traffic accidents is expected to decrease. Last but not least, a long-standing problem will be solved, related to the risky passage through Kresna gorge – a road section with a very high degree of road accidents/casualties.

The Struma Motorway is a 150 kilometre-long route, located in the South-Western part of the country between the Daskalovo road junction (next to the town of Pernik) and the border between Bulgaria and Greece at the village of Kulata.

Struma Motorway is divided into four lots: Lot 1, from Dolna Dikanya to Dupnitsa; Lot 2, from Dupnitsa to Blagoevgrad; Lot 3, from Blagoevgrad to Sandanski and Lot 4, from Sandanski to the border crossing point near Kulata.

Lot 1, Lot 2 and Lot 4 have been completed and commissioned. Lot 3.1 and Lot 3.3 are being built.

The part, yet to be constructed from the "Struma" Motorway, Lot 3 'Blagoevgrad-Sandanski", starts from km 359+000 (end of Lot 2 – south of the Barakovo village and East of the Struma river) to km 420+624 (in the beginning of Lot 4, at approximately 500 m from the village of Novo Delchevo), with total length of about 61.624 km.

Lot 3 is further divided into the following sections, as shown on the map below.

- Lot 3.1 – from Blagoevgrad to the village of Krupnik - from km 359+000 (coinciding with km 359+482 of Struma Motorway, Lot 2, to km 376+000);
- Lot 3.2 from Krupnik to Kresna - subject of this EIA (from km 373 + 300 to km 397 + 000). This section crosses the terrain, whereas part of the design solutions fall within the Kresna Gorge.

Note: In order to find the most appropriate and feasible solution for Lot 3.2, from an environmental and technical point of view, the following options have been developed: Eastern Option G10.50 and Eastern Option G20, which lead to the impact upon a section of approximately three kilometres at the end of Struma Motorway, Lot 3.1 (from km 373 + 300 to km 376 + 000).

- Lot 3.3 from Kresna to Sandanski - from km 397 + 000 to km 420 + 624 (coinciding with km 423 + 800 of Struma Motorway, Lot 4).

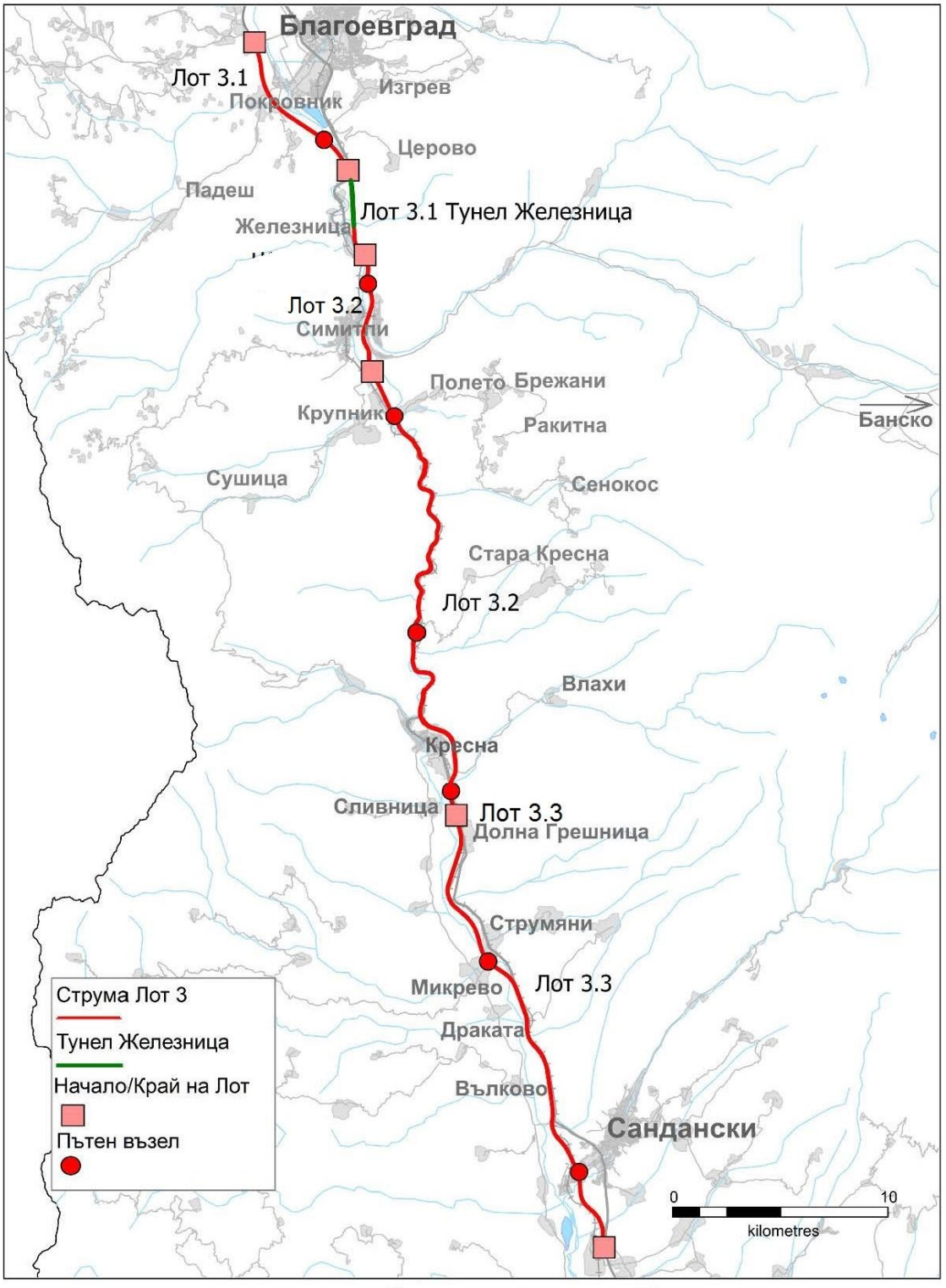

Figure No.1-1

The design options, discussed in the Impact Rate Assessment Report (IAR) 5 for 'Improving the road route of Lot 3.2 of Struma Motorway have been subjected to assessment of their merits with respect to the impact rate in the on-going EIA procedure. These are: Option G20 – Blue; Option G20 – Red; Eastern Option G10.50; the Long Tunnel Option and the Eastern Option G20.

The description of the design options and the degree of information detail in the Report corresponds to the level of research and design

of the various option solutions within the project of Improving the road route of Lot 3.2 of the Struma Motorway.

OPTION G20 - BLUE, Feasibility Study Stage, 2014

The project route starts South of 'Krupnik' road junction, at km 376 + 000. In Kresna Gorge, one of the lanes, in its main part, follows the existing road E79 and the other lane runs on a new terrain with tunnels and facilities in the western massif of the gorge. Upon the exit from the Kresna gorge, it will pass East of the town of Kresna and end at road junction 'Kresna'.

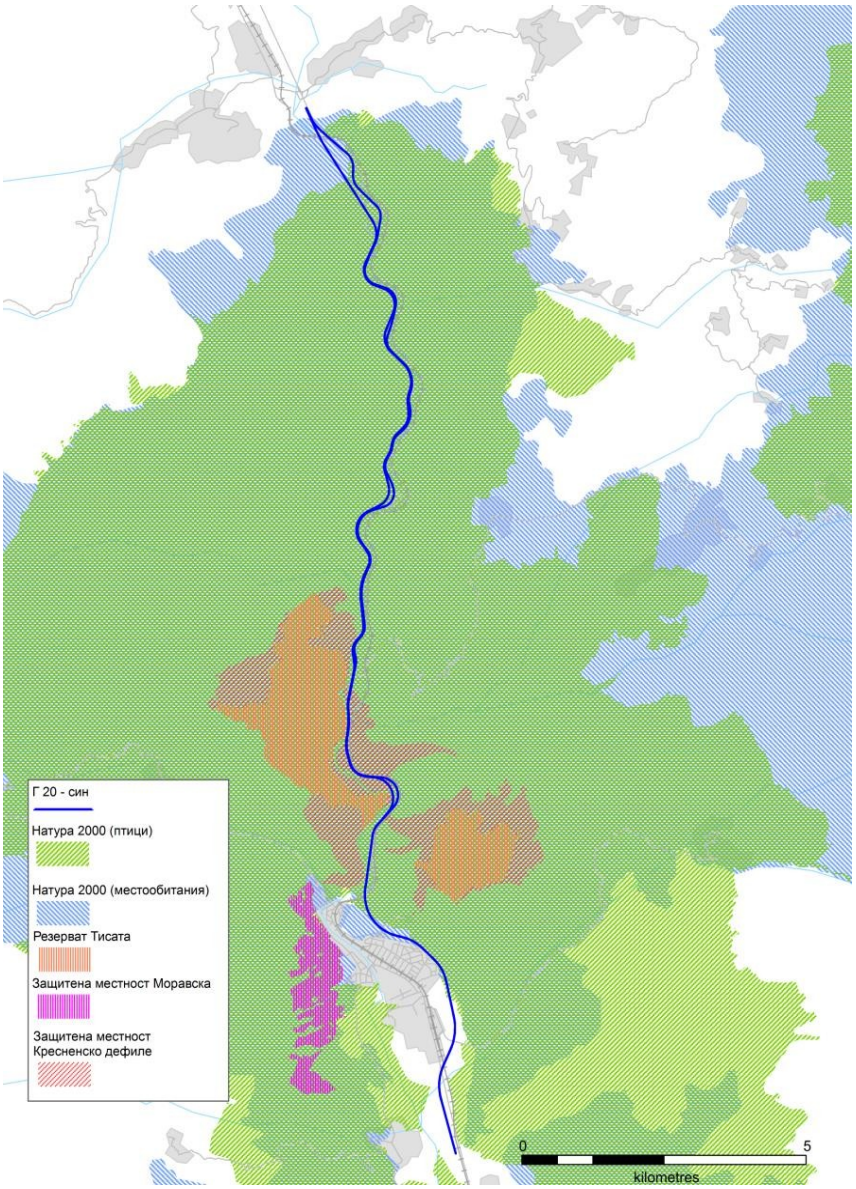

Figure No. 1-2. Layout Plan of Option G20 - Blue

We have enclosed the layout plan of the project route, **Option G20 – blue**, on a topographic map, in scale of 1:25 000 – Annex No. 2 and 2a, in .*shp format.

The lengths of the left and right roadway differ, due to the fact that their routes have different parameters and curves, and respectively – different lengths.

Under the 2014 project, the start of this option is at km 376 + 000.

In the section from km 378 + 600 to km 393 + 100, the two road lanes are developed

independently of each other, taking them apart and approaching the situational and level respect. Where possible, the existing road is followed and used and in other sections - tunnels and viaducts are projected. In some cases, the Struma river and its slopes are provided with retaining walls.

Left roadway:

The beginning of the section under consideration is at km 376 + 000 after the existing road junction 'Krupnik', where the Kresna gorge begins. The route of the left lane in its main part follows the existing road, using the existing bridge over the Struma river and the railroad from km 379+051 up to km 379+271 and along the existing road E79 up to km 379+900. In the section from km 379 + 900 to 380 + 800, the new route leaves the existing road E79, with two bridges and two tunnels passing on a new route. From km 380 + 700 to km 382 + 500, the existing road and existing bridges and tunnel are used. From 382 + 565 to km 382 + 735, the project provides for a new tunnel. From km 382 + 800 to km 384 + 700, the existing road is used, from km 384 + 740 to km 384 + 810 - a new tunnel from km 384 + 810 to km 388 + 360, again the route follows the existing road. From km 388 + 360 to km 388 + 480, a new tunnel is projected and then the existing road to km 393 + 100 is used again.

The road track ends at km 399+832 ≡ km 397+600 of Lot 3.3.

Right roadway:

It develops to the right of the existing road and is entirely on a new terrain, as it follows in situational respect the left roadway, and in separate sections, it goes away from it. In elevation respect, it is often on a second, higher level than the left one, in a trench or in a tunnel. At km 393 + 100, the two roadways are again parallel to each other and develop alongside to the end of the section, distanced only in the case of a tunnel solution.

The end of the section is at about 2.5 km before the town of Kresna, leaving the existing road on the left bank of the Struma river at km 394+050 to km 394+150, crossing the river with a bridge, and from km 394+360 to km 394+565 - passes again above the Struma river, the existing road I-1 and the Sofia-Kulata railway line. From km 394 + 565 to km 394 + 700 a new tunnel is projected, after that the route crosses the Vlahinska river and the road route runs from the north-east and East of the town of 7.12.2.

At km 398 + 200 it passes over the Railway Line 'Sofia - Kulata' and at km 398 + 310 - above Road I-1.

The road track ends at km 399+832 ≡ km 397+600 of Lot 3.3.

Cross section

Section from km 378+600 to km 399+000.

The G20 dimension is accepted for speeds of 80 km / h:

- Traffic lanes 2 x (2x3.50) m;
- Guiding strips 2 x 0.50 m;
- Banked earth 2 x 1.50 m;
- Middle separating strip 1 x 2.00 m.

Total: 20 m

Section from km 399+000 to km 399+789 { 397+600.

The area dimensions become A29, as the dimensions in the other sections of the 'Struma' motor motorway.

- 2x2 traffic lanes -2x (2x 3.75) = 15.00 m
- 2x2 asphalt guide strips -2x (2x 0.75) = 3.00 m
- 2x2 strips for emergency stops -2x2.50 = 5.00 m
- 2x1 banked earth base - 2x1.25 = 2.50 m
- middle dividing strip - 1x3.50 = 3.50 m

Total = 29.00 m

Pavement

The pavement structure has been designed for 'very heavy' traffic category and for elastic modulus - En = 370 mPa, maintaining the homogeneity of the pavement in the previous sections of the Struma Motorway:

- Split mastic (SMA)0/11S with polymer additives 4 cm;
- Asphalt mix for the base course (binder) 0/22 8 cm;
- Asphalt mixture for the basic layer Ao 18 cm;
- Crushed stone with selected granulometry (0-63mm) 20 cm;
- Crushed stone (0 – 63 mm 20 cm;
- Area A – materials of group A-1 50 cm.

Road junctions

• road junction “Krupnik” at km 377+700, after the end of Lot 3.1 – km 376+000;
• road junction 'Oshtava' - at km 389 + 700
• road junction “Kresna” – at km 398+882.

Sites for long-lasting and short-term recreation

- Sites for long-time recreation from km 376 + 500 to km 376 + 900
- Short-term recreation areas at km 397 + 500 to 397 + 700

There are no deep excavations (with height of the slope/acclivity/ over 8-10 m) and high embankments (over 2 m) according to Ordinance No. 1 of May 26, 2000, on Road Design.

The implementation of Option G20 - Blue is related to the construction and the reconstruction of the following sites:

Viaducts new - 3,075 м′, existing - 554 м′
New tunnels - 7,345 m', existing - 410 m
Walls - supporting, new - 3,710 m'

Large facilities

Retaining and retaining walls

No.	From km to km		Explanatory Text	Side of the road (Left/	Length (m)
1	383 + 000	383 + 200	new, left roadway	Left	200
2	383 + 420	383 + 600	new, left roadway	Left	180
3	384 + 900	385 + 100	new, left roadway	Left	200
4	385 + 200	385 + 300	new, right roadway	Left	100
5	385 + 350	385 + 400	new, left roadway	Left	50
6	385 + 420	385 + 520	new, right roadway	Left	100
7	385 + 520	385 + 570	new, right roadway	Left	50
8	385 + 570	385 + 620	new, right roadway	Left	50
9	385 + 850	385 + 950	new, left roadway	Left	100
10	386 + 620	386 + 720	new, right roadway	Left	100
11	386 + 720	386 + 770	new, right roadway	Left	50
12	387 + 250	387 + 350	new, left roadway	Left	100
13	387 + 300	387 + 720	new, right roadway	Left	420

No.	From km to km		Explanatory Text	Side of the road (Left/	Length (m)
14	387 + 350	387 + 500	new, left roadway	Left	150
15	387 + 720	387 + 900	new, right roadway	Left	180
16	387 + 900	387 + 990	new, right roadway	Left	90
17	385 + 490	385 + 610	new, left roadway	Right	120
18	388 + 850	388 + 950	new, left roadway	Left	100
19	388 + 950	389 + 100	new, left roadway	Left	150
20	389 + 040	389 + 120	new, right roadway	Left	80
21	389 + 290	389 + 330	new, left roadway	Right	40
22	390 + 340	390 + 390	new, right roadway	Right	50
23	390 + 390	390 + 480	new, right roadway	Right	90
24	390 + 480	390 + 530	new, right roadway	Right	50
25	390 + 530	390 + 640	new, right roadway	Right	110
26	390 + 640	390 + 850	new, right roadway	Right	210
27	391 + 470	391 + 550	new, right roadway	Right	80
28	392 + 900	392 + 950	new, left roadway	Left	50
29	395 + 555	395 + 565	new, left and right	Right	10
30	395 + 565	395 + 630	new, left and right	Right	65
31	395 + 630	395 + 670	new, left and right	Right	40
32	395 + 670	395 + 820	new, left and right	Right	150
33	395 + 885	395 + 925	new, left and right	Right	40
34	395 + 975	396 + 050	new, left and right	Right	75
35	396 + 665	396 + 685	new, left and right	Environ	20
36	396 + 725	396 + 785	new, left and right	Environ	60

Viaducts

No.	From km to km		Explanatory Text	Side Left/ Right	Length (m)
1	379 + 040	379 + 180	new	Right	140
2	379 + 051	379 + 261	Existing, milling, new	Left	210
3	380 + 400	380 + 445	new	Left	45
4	380 + 620	380 + 720	new	Left	100
5	381 + 020	381 + 130	Existing, milling, new	Left	110
6	381 + 220	381 + 320	Existing, milling, new	Left	100
7	389 + 920	390 + 140	new	Right	220
8	390 + 210	390 + 344	existing, milling, new	Left	134
9	392 + 195	392 + 585	new	Right	390

No.	From km to km		Explanatory Text	Side Left/ Right	Length (m)
10	392 + 650	392 + 900	New	Left	220
11	394 + 050	394 + 150	New	Left/right	100
12	394 + 340	394 + 530	New	Left/right	190
13	394 + 750	394 + 970	New	Left/right	220
14	395 + 160	395 + 320	New	Left/right	160
15	395 + 965	395 + 975	New	Left/right	10
16	396 + 115	396 + 250	New	Left/right	135
17	398 + 200	398 + 350	New	Left/right	150

Overpasses, underpasses, interpasses

No.	km	Explanatory text	Side of the road	Length (m)
1	379 + 482	the same drilling interpass with L = 4 m, milling,	Left	4
2	396 + 555	New drill with L = 6 m,	Left/right	6
3	396 + 860	New drill with L = 6 m,	Left/right	6
4	km 397+383 Km 397 + 403	New inclined underpass with L = 20 m,	Left/right	20
5	Km 397 + 914 Km 397 + 926	New inclined underpass with L = 12 m,	Left/right	12
6	Km 398 + 830	New underpass with L = 24 m,	Left/right	24
7	Km 389 + 950	New inclined overpass with L = 36 m,	Left/right	36

Tunnels

No.	From km to km		Explanatory Text	Side of the road	Length (m)
1	379 + 180	380 + 350	New	Right	1170
2	379 + 930	380 + 340	New	Left	410
3	380 + 455	380 + 455	New	Left	125
4	380 + 520	380 + 800	New	Right	280
5	381 + 130	381 + 200	existing	Left	70
6	380 + 950	381 + 020	New	Right	70
7	382 + 035	382 + 095	New	Right	60
8	382 + 565	382 + 735	New	Left	170
9	382 + 300	382 + 580	New	Right	280
10	382 + 740	383 + 220	New	Right	480
11	384 + 150	384 + 690	New	Right	540
12	384 + 740	384 + 810	New	Left	70
13	385 + 300	385 + 420	New	Right	120
14	385 + 890	386 + 570	New	Right	680
15	386 + 370	386 + 710	existing	Left	340
16	386 + 955	387 + 155	New	Right	200
17	387 + 995	388 + 195	New	Right	200
18	388 + 360	388 + 480	New	Left	120

No.	From km to km		Explanatory Text	Side of the road	Length (m)
19	388 + 220	388 + 310	New	Right	90
20	388 + 910	389 + 040	New	Right	130
21	394 + 565	394 + 700	New, double-sided	Left	135
22	394 + 750	395 + 000	New	Left	220
23	395 + 420	395 + 510	New, double-sided	Left	90
24	396 + 665	396 + 785	New	Left	120
25	396 + 685	396 + 725	New	Right	40

Tunnelling will be carried out, based on the classic drill-and-blast method, with reinforced concrete facing. For shorter tunnels, ventilation and fire extinguishing equipment is not required, but only a lighting installation.

Bridges

No.	At km	Explanatory Text	Side of the road	Length (m)
1	386 + 030	existing	Left	8
2	388 + 493	New	Left	6
3	397 + 043	New	Left	6
4	398 + 560	New	Left	20
5	399 + 135	New	Right	10
6	399 + 610	New	Right	10

Option G20 - Blue, crossing the Simitly and Kresna municipalities – region of Blagoevgrad.

RECONSTRUCTION OF FACILITIES OF OTHER AUTHORITIES

In the course of the project, reconstructions will be required of the power electricity lines Networks, water supply pipelines, gas pipelines, irrigation ducts, fibre optical cables, etc. The reconstructions shall be:

- Reconstructions of HV networks - 110 kV networks. They shall be implemented in the segment between km 378 + 500 and km 379 + 500. This will include the installation of 9 new pillars.
- Reconstruction of networks LV and Medium voltage. - 20 kV. The reconstructions will take place all the way along the road at 22 places. It will include dismantling of pillars and removal of shafts, comprised in the road track and construction of new shafts - 7 pcs. and steel-armoured pillars - 13 pcs.
- Reconstructions of communication cables and facilities. The optical cables shall be impacted. The reconstructions take place all the way along the route. They will comprise laying of tubes for optical cables with diameter of 40 mm – 13 pieces, made of PVC pipes, with diameter of 110 mm in concrete casing of diameter 110 mm - 16 pieces and shafts - 37 pieces.
- Reconstruction of gas pipelines. The existing gas pipelines intersect in three places, the reconstruction includes the construction of a protected concrete casing.
- Reconstructions of water pipelines. They will comprise the replacement of the affected parts of the pipes, where they intersect with the road route. It shall be implemented in sections from km 378 + 000 to km 378 + 500 and from km 397 + 500 to km 399 + 400. These will include the replacement of the potable water pipeline, made of asbestos-cement pipes, diameter 125 mm; of the potable water supply lines of diameter 80 mm, made of asbestos-cement, of diameter 32 (mm), of diameter 120 (mm), of diameter 150 (mm); potable water supply line - of diameter 250 (mm), made of asbestos-cement;
- Reconstructions of irrigation systems. It will include relocation of open irrigation channels

and irrigation pipelines outside the track range. It will be implemented
in the sections from km 376 + 200 to km 378 + 500 and from km 394 + 000 to km 399 + 400. It will include reconstructions of drainage channels from 'Krupnik' draining field in 2 sections, the Main Irrigation Channel - 'Left, 'Pirin' RailWay Station' - in 5 sections, the Deviation of the Main Irrigation Channel - 'Left, 'Pirin' Railway Station' - in 5 sections. The reconstruction of the pipelines falls within the scope of the road route, where it is necessary to replace parts of them, which remain under the road bed. It will include the main pipeline, made of PVC, 250 mm - 2 pcs. of pipe-intersections; Internal irrigation line Œ160mm, made of steel, internal irrigation line of diameter 120 mm, made of polyester and diameter 140 mm, made of polyester.

Summary on the expected impact on components and factors of the environment (atmospheric air; surface waters; ground waters; bowels of the earth; waste; noise) and human health from the Environmental Impact Assessment (EIA):

Ambient air

The carbon dioxide equivalent amount of greenhouse Gases in Option G20 - blue during construction shall be 1,450 tons of equivalent CO_2 per year. The estimated volume of blasting works for the tunnels shall be about 350 tons of blasting/detonating powder and in the gorge - approximately 400 tons of blasting/detonating powder.

During the operation of the highway, the significance of impact for Option G20 - Blue of Lot 3.2 of the Struma Motorway shall be significant. The impact shall have high significance in part 0. Common beginning from Simitly – Cherniche of Lot 3.1/Lot 3.2 of the Struma Motorway – Option G20 – blue. During the operation of the motorway, the impact rate shall be very high in residential areas (mid-sensitivity receptors) in the vicinity of Road E79 in the 'Dalgata' residential area, town of Simitly. The impact shall have moderate significance in Part I - Krupnik - Stara Kresna in Lot 3.2 of the Struma Motorway - Option G20 - Blue. During the operation, the rate of impact for the agricultural buildings and single residential buildings shall be medium (low-sensitivity receptors). Low impact significance will be observed in sub-section III of part II Stara Kresna – Kresna of Lot 3.2 of the Struma Motorway - Option G20 – blue. High significance of impact will be observed in subsection IV of part II, Stara Kresna – Kresna of Lot 3.2 of Struma Motorway – Option G20 – blue. During the operation of the highway, the impact rate shall be very high in the vicinity of residential areas (high sensitivity receptors) of the town of Kresna.

The carbon dioxide equivalent amount of greenhouse gas emissions for Option G20 - Blue in the operation of the motorway shall be 24,230 tonnes of equivalent CO_2 per year.

Surface waters

This option makes the most of the existing route. New
road is to be built only at the bypassing of the town of Kresna. In fact, the construction shall be implemented as much as possible within the road, to the right of the existing road track. The impact on surface water bodies will be limited mostly to three water bodies, two of the Struma river and the Vlahinska river, which are already under the influence of the existing road and this Option will bring relief to the impact, due to the improvement in traffic conditions - mostly limiting the risk of accidents.

Bridges and viaducts of significant height are to be constructed and this will ensure less demanding foundation requirements for these facilities.

This option shall be implemented at the lowest altitude, which in this case is a prerequisite, limiting the consequences of snowfall, respectively the use of winter maintenance materials, which also alleviates the impact on water bodies.

This Option allows new paths to be made in the route adjustments to allow animals to access the river bed andthus drastically reduce their mortality (due to the need to cross the road lane).

No Sanitary Protection Zones (SPZs) in the vicinity of the surface water sources of potable water-supply shall be affected.

This option will have impact on two areas with potential flood risk - in the beginning of the village of Krupnik and in the end of the town of Kresna.

Ground water

This option makes the most of the existing route. A new road is to be built only at the bypassing of the town of Kresna. Practically, it will be implemented
to the maximum extent within the range of the road to the right of the existing road bed. The impact on underground water bodies is chiefly limited to their areas, near the surface, which is already exposed to the impact of the existing road and this Option will alleviate the impact, due to the improvement of the traffic conditions - chiefly the mitigation of traffic accident risk.

The route will not affect any Sanitary Protection Zones (SPZs) near underground water sources of potable water-supply or near sources of mineral waters.

The tunnel excavations will take place in the slopes, near the riverbed, where the ground waters are drained, due to the presence of a deeply-penetrating gully net and significant cracking of the rock massive in high rate (This is a reference to the tunnels on the railway line, constructed in the slope, on the opposite side of the Struma River.)

This option shall be implemented at the lowest altitude, which in this case is a prerequisite, limiting the consequences of snowfall, respectively the use of winter maintenance materials, which also alleviates the impact on water bodies.

The Option G20-blue initially passes by a tunnel, through an area, where underground water with increased radioactivity is found, and at the end of the road route passes near the residential buildings at the crossing of the town of Kresna.

The Earth bowels

This Option uses the existing road. The right roadway is developing in
close proximity to the left roadway. This enables the reinforcement of the slope and the prevention of future landslips and events, referred to jointly as “geological risk “ which are characteristic for this area.

In this way, the requirements of the Ordinance on the conditions, order and bodies to carry out the analysis, assessment and mapping of the risks of disasters are complied with (prom. With respect to art. In connection with Article 3 of the above Ordinance, a Methodology for Geological Risk Assessment, approved by Order No. RD-02-14-1241 / 15 December 2014 of the Minister of Regional Development and Public Works was prepared.

According to available data, the relatively long tunnel at the top of the right roadway will pass through the exploration drill area, where the water sample shows increased radioactivity.

Waste

The expected quantities of generated waste during construction - earth and rock materials that do not meet the project design specifications for incorporation into construction for Option G20 - Blue, shall be 1,192,402 m^3.

The expected quantities of the waste, generated during construction - earth and rock material, which do not meet the design specifications for use in the construction of Option G20 – Red amount to 262,688 m^3 and for the Eastern Option G10.50 - 1,856,432

m^3, for Eastern Option G20 - 2,936,137 m^3. The expected quantities of waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* for the long tunnel option are 4,579,586 m3.

Noise

When performing the construction activities of Option G20 - Blue, the expected limit exceedance of the regulated noise limits will be up to 29.0 dBA.

The expected exceedance for Eastern Option G20 shall be up to 26 dBA, for Option G20 – Red shall be up to 29 dBA, for the Long Tunnel Option – up to 29 dBA. The expected exceedances for Eastern Option G10.50 - up to 26 dBA for the left road lane and up to 29 dBA for the right road lane.

During the operation, the expected exceedance of the regulated noise limit values in Option G20 – Blue are up to 16.0 dBA. The expected exceedances for Option G20 - Red are up to 16 dBA, for Eastern Option G20 are up to 14 dBA, for Long Tunnel Option - up to 16 dBA. The expected exceedances for the Eastern Option G10.50 - up to 13 dBA.

Health Assessment

During the construction period, routine risks are to be expected, as associated with road construction activities - uncoordinated emissions, excessive noise levels due to the operation of construction machines and traumatised species by unintentional operation or unexpected emergency situations. If all personal protective equipment and guidelines, as detailed in the Health and Safety Plans, are followed, no inadmissible impacts are expected.

Continuous impacts shall be expected during the operational phase, upon the residents in the vicinity of the route in the town of Simitly and the town of Kresna, which is expressed in abnormal noise levels of up to 16 dBA and excess concentration of nitrogen oxides from road traffic.

<u>OPTION G20 - RED, Stage of Preliminary/Conceptual Design, 2015</u>

The project route starts South of 'Krupnik' road junction, at km 376 + 000. In the Kresna Gorge, one road lane follows in its main part the existing road E79 and the other is developing on a new terrain with tunnels and facilities in the western terrain of the gorge. Upon the exit from the Kresna gorge, it will pass East of the town of Kresna and end at road junction 'Kresna'.

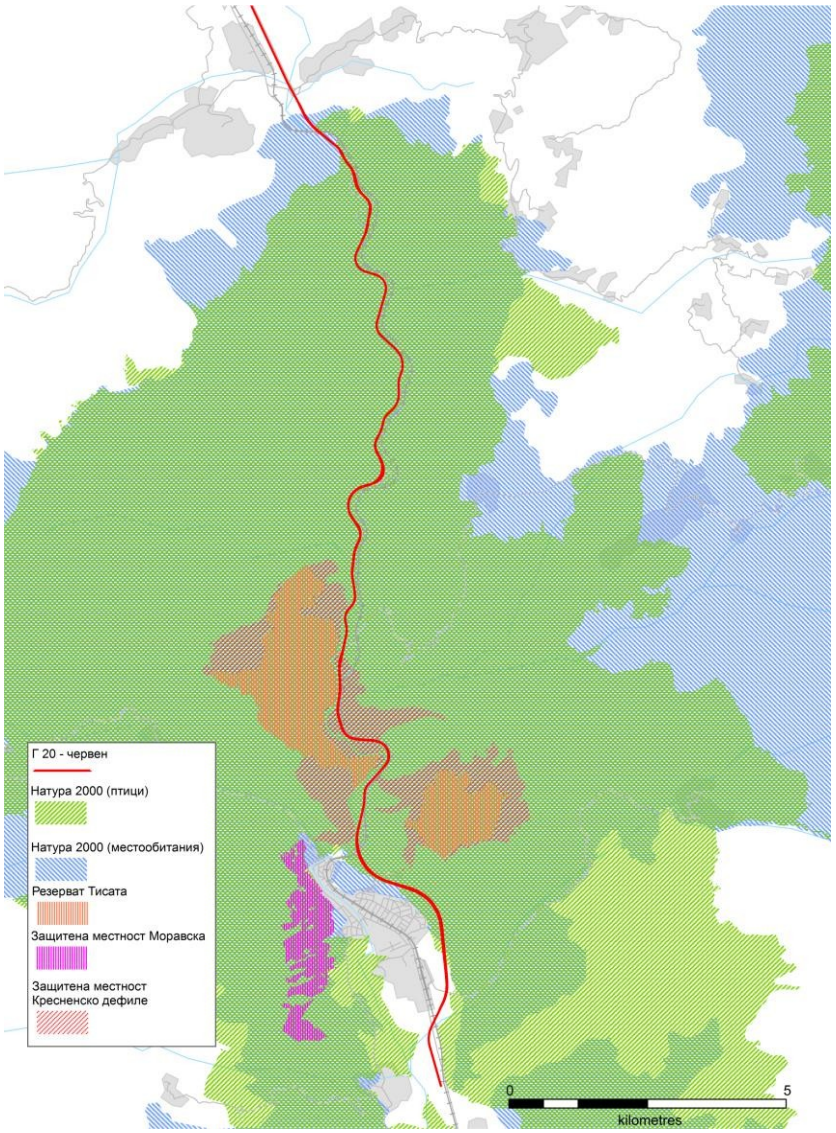

Figure No. 1-3. Layout Plan of Option G20 - red

We have enclosed the layout plan of the project route, **Option G20 – Red**, on a topographic map, in scale of 1:25,000 – Annex No. 3 and 3a, in '.*shp' format.

Under the 2015 project, the start of this option is km 376 + 000.

The route of G20 Option - Red for Lot 3.2 of the Struma Motorway is developing to the right of the existing road and parallel to it, passing east of the village of Krupnik. From km 376+400 to km 377+000, recreation areas shall be constructed on both sides of the Struma Motorway. At km 377 + 480 (left) a motorway control center has been designed, which is connected to the existing road I-1, which is to be preserved in the area under consideration and is connected with road junction 'Krupnik' at km 378 + 450. In the section of stop-by recreation sites in the East, the existing I-1 road is being reconstructed.

In the section from km 378 + 035 to km 378 + 185 a new bridge should be built on the Struma river. The elevations in this section at km 376 + 000 are aligned with the elevations in the end of Lot

3.1, after which they decrease and follow the elevations of road I-1. In the water basin of the Struma river it will take into account the high waters of the river.

The overall dimensions in the section from km 376 + 000 to km 378 + 450 is a motorway type - A29.

At km 378+450 ('Krupnik' road junction) the road develops into two separate roadways, with a

design speed of 80 km/h.

Left roadway

The beginning of the section under consideration is at km 376 + 000 after the existing road junction 'Krupnik', where the Kresna gorge begins. From km 378 + 450 to km 380 + 200, the left lane follows the trail and the level of the existing road, using the existing bridges of the Rezena river and the Struma river, as it passes over the 'Sofia-Kulata' railway line.

From km 380 + 190 to km 380 + 340 a new bridge is provided on the Struma river, from km 380 + 400 to km 380 + 520 - a new tunnel, parallel to the railway tunnel and again a new bridge on the Struma river (from km 380 + 570 to km 380 + 750), then switches to the existing road, using the existing two bridges and a tunnel. At km 381+000 and 381+260 road connections are designed to the camps of the extreme water sports community (kayaking and rafting). From km 381 + 400 to km 385 + 800, the left lane follows the existing road that it rarely leaves.

Between km 386+330 and km 386+670, the lane uses the existing 340 m tunnel, and at km 387+780 it passes by the existing 'Kresna hanche'. At km 389 + 950, the construction of road junction "Oshtava" is planned.

This Option ends at km 399+832 ≡ km 397+600 of Lot 3.3.

Right roadway

It will be developing on a new terrain, to the right of the existing road, using new bridges to cross the Rezena river (km 378 + 520), the Struma river and the railway line 'Sofia - Kulata' (from km 379 + 025 to km 379 + 225).

In the section from km 379 + 900 to km 380 + 230 (the left road lane), the right road lane goes to the left and passes right above it, then goes back to the level with it on its right side, and with a series of new four bridges and two new tunnels, reaching km 381 + 400. In the section from km 384 + 300 to km 385 + 800, the left road lane follows the existing road, which strongly winds, and the right road lane rises to the left and develops to the right in the slope. Up to km 386+310, the right lane runs parallel to the left lane and has overall dimensions G20 and follows the levelling of the existing road. A new tunnel follows to km 386 + 690, after which the right road lane is built above the left from km 386 + 680 (from the mileage on the left lane) to km 387 + 470. Then the two roadways run parallel up to km 387 + 960, where the right road lane is in the slope above the left. From km 388 + 000 to km 388 + 820 (under the kilometres of the left road lane), a two-level facility is planned again, i.e. the right road lane above the left. Then the right road lane develops in parallel and in close proximity to the left road lane to km 390 + 000, where the Oshtava road junction is planned, which connects with the villages of Oshtava and Stara Kresna. The roadway continues to the right (west) of the existing road, and at a higher level, to the right of the slope and the roadway below, without interfering with the existing road. The two roadways shall be completely independent and have two separate and different levelling. Approaches are provided to the Struma river for exit of the people, descending the river with kayaks and rafting.

Section from km 390+000 to km 393+000.

The existing road shall be being developed in the vicinity of 'Kresnensko

The project routes, in the Blue and Red Option, are entirely within the scope of the existing road, according to the geodetic mapping in 2016 and removal of a clear factual error.

Section from km 393+100 to km 399+832 ≡ km 397+600 (Lot 3.3)

The road section starts just before the town of Kresna, bypassing the city from the East, whereas the two road lanes situational and horizontally developing along with the G20

overall dimensions.

From km 393+100 to km 393+800, the motorway shall be developed around and above the existing road, with the two roadways running parallel to one another.

From km 393 + 900 to km 394 + 200 and from km 394 + 350 to km 394 + 620, crossing twice the Struma river.

At about km 394 + 580, crossing Road I-1 and the railway line 'Sofia-Kulata', then crossing from km 394+750 to km 394+950 Vlahinska and develops on her left bank.

After km 395+800 three tunnels have been projected:

- the first - 400 m long;
- the second - 200 m long;
- the third - 240 meters long.

After the last tunnel, a 630 m long viaduct will be constructed to km 397+650.
The route continues to the south after the town of Kresna.

At km 398 + 900, it crosses the railway line "Sofia-Kulata" and at km 399+165 - road I-1, which will be reconstructed to build a road junction.

This Option ends at km 399+832 ≡ km 397+600 of Lot 3.3.

Width of the Road

Overall dimensions G20

The road section from km 378+300 up to km 399+350 has been provided to be built with G20

- 2 x 2 traffic lanes 2 x (2 x 3.25) = 13.00 m
- 2 x 2 asphalted guiding strips 2 x (2 x 0.5) = 2.00 m
- 2 x 1 banked earth base 2 x 1.50 = 3.00 m
- middle dividing strip 1 x 2.00 = 2.00 m

Total=20.00 m

Overall dimensions A29

For the sections from km 376 + 000 to km 378 + 000 and from km 399 + 300 to km 399 + 979 ÷ 397 + 600, the overall dimensions become A29, just like the overall dimensions in the other sections of the Struma Motorway

- 2 x 2 traffic lanes 2 x (2 x 3.75) = 15.00 m
- 2 x 2 asphalted guiding strips 2 x (2 x 0.75) = 3.00 m
- 2 x 2 strips for emergency stops 2 x 2.50 = 5.00 m
- 2 x 1 banked earth base 2 x 1.25 = 2.50 m
- middle dividing strip 1 x 3.50 = 3.50 m

Total = 29.00 m

Pavement

Direct route

The pavement structure is designed for 'very heavy' traffic category and for elastic modulus – En = 370 mPa, preserving the homogeneity of the pavement in the previous sections of the Struma Motorway:

- Split mastic (SMA)0/11S with polymer additives 4.0 cm
- Asphalt mix for bottom layer (binder) 0/22 6.0 cm
- Asphalt mix for main layer Ao 12.0 cm
- Crushed stone with cement stabilization (0-63mm) 20.0cm
- Crushed stone (0-63мм) 24.0cm

Road junctions

Three-way traffic junctions need to be executed for trouble-free crossing:

- 'Krupnik' road junction – km 378+423
- 'Oshtava' road junction - on the Road IV-10063 to the village of Stara Kresna and the village of Oshtava - km 389 + 940

- Road junction 'Kresna' – on the Road I-1 to the town of Kresna and the town of Kulata - km 398 + 975 x Entering and Exit from the Highway to Route I-1 (Road connection to the town of Kresna) - connections will be constructed for entering and exiting the motorway, in the direction of 'Sofia - Kresna' and 'Kresna - Sofia' - about km 393 + 600

Road connections

- Road connection from road I-1 to the control centre at km 377+480 of the 'Struma' motorway:
- Road connection to a gas station at km 379 + 082 (379 + 085)
- Road connections to the rafting platform at km 381+000 and km 381+260
- Road connections to the Recreation site (left lane) from km 387+660 to km 388 + 00
- Road connections to the rafting platform (left roadway) from km 389+100 to km 389+320
- Road connections with Road I-1 at km 394+004 (394+002)
- Additional approaches are provided for the exit of the participants in the extreme sports on the Struma river at km 383 + 000 and km 386 + 000.

Sites for long-lasting and short-term recreation

- Sites for long-time recreation from km 376 + 500 to km 376 + 900
- Short-term recreation areas at km 397 + 500 to 397 + 700

The implementation of Option G20 - red is related to the construction and the reconstruction of the following sites:

Overhead roads, new – 3,800 m′;
Viaducts, new - 1,165 m;
New tunnels - 2,892 m', existing - 410 m'
Supporting walls - 8,140 m'

Large facilities

Viaducts, overhead roads

No.	From km to km		Explanatory Text	Road lane left/right	Length (m)
1.	386 + 680	387 + 460	New pipe-rack/overhead road in two levels, right road lane Over the left, dimensions G10.49	Right	78 0
2.	388 + 000	388 + 820	New pipe-rack/overhead road on two levels - right road lane over the left, dimensions G10.50	Right	82 0
	392+791 (392+580)	392+930 (393+080)	New Viaduct, dimensions G10.50, left and right road lane of different length. Odometer and length of the right road lane - in brackets.	left/right	139 (422)
3.	390 + 100	392 + 300	New pipe-rack/overhead road in two levels, right road lane over the left, dimensions G10.50	Right	2,200

4.	398 + 392 (398 + 681)	398 + 375 (398 + 690)	New Viaduct on Route I-1, Railway Line Sofia-Kulata and Sulun gorge, dimensions: Left road lane 16.65 m; Right road lane - 11.15 m. Left and right road lane of different length. Odometer and length of the right road lane - in brackets.	Left/right	289 (315)

Overpasses, underpasses, interpasses

No.	Kilometre distance	Explanatory text	road lane Left/right
1	376 + 183	Agricultural road, overall dimensions G29	Left/right
2	378 + 423	Road overpass / Krupnik Road Junction/ Design of new road junction 'Krupnik' - overpass on the Struma Motorway, G29 dimensions / including 2 locks x 3.5m /	Left/right
3	379 + 180	**Agricultural underpass, Width G10.50**	
4	389 + 940	Road Overpass / Oshtava Road Junction/ Designing a new road junction 'Oshtava' - overpass over the Struma	Left/right
5	395 + 180	Agricultural underpass, width G10.50	Left/right
6	396 + 553	Agricultural underpass , width G10.50	Left/right
7	396 + 920	Agricultural underpass, width L=31м /2x G10,50/	Left/right
8	397 + 340	Agricultural underpass width L=24 м /2 x G10.50/	Left/right
9	397 + 857	Underpass of road BLG2131 New road underpass, dimensions /2x G10.50 /	Left/right
10	398 + 016	Agricultural underpass, width 2x G10.50	Left/right
11	398 + 975	Road underpass / Kresna Road Junction / Design of new road junction 'Kresna' - road underpass under the Struma Motorway, dimensions L = 22 m	Left/right
12	399 + 374	Agricultural underpass, width G29	Left/right

Tunnels

No.	From km to km		Explanatory Text	left tube/right	Length (m)
1	380 + 399	380+524.70	New 'Momina Skala', width G10.50	Left	126
2	380+446.85	380+511.35	New 'Momina Skala', width G10.50	Right	64
3	381 + 100	381+570	Existing 'Zaichar', overall dimensions G10.50	Left	70
4	381+111.50	381+149.45	New „Zaichar”, width G10.50	Right	38
5	386 + 325.	386 + 665	Existing 'Chervena skala', overall dimensions G10.50	Left	340
6	386+292.06	386+623.45	New „ Chervena skala”, width G10.50	Right	331
7	394+523.15	394 + 774	New „Tissata”, width G10.50	Left	248
8	394+544.20	394+767.50	New „Tissata”, width G10.50	Right	223
9	395+679.15	396+067.10	New „Kresna 1” width G10.50	Left	388
10	395+639.55	396 + 069.45	New „Kresna 1”, width G10.50	Right	430
11	396+157.95	396+390.75	New 'Kresna 2', overall dimensions G10.50	Left	233
12	396+173.60	396+413.05	New 'Kresna 2', overall dimensions G10.50	Right	239
13	396+590.55	396+866.85	New 'Kresna 3', overall dimensions G10.50	Left	276
14	396+580.30	396+876.60	New 'Kresna 3', overall dimensions G10.50	Right	296

Tunnelling will be carried out, based on the classic drill-and-blast method, with reinforced concrete facing. For shorter tunnels, ventilation and fire extinguishing equipment is not required, but only a lighting installation.

Bridges

No.	From km to km		Explanatory Text	Road lane left/right	Length (m)
1	378 + 049	378 + 188	A new bridge on the Struma river, Overall dimensions G29	Left/right	139
2	378 + 504	378 + 531	A new bridge on the Rezena river, overall dimensions G29	Left/right	27
3	379 + 046	379 + 264	Existing bridge on the Struma river and RW 'Sofia-Kulata' Line, road lane, overall dimensions G12	Left	167
4	379 + 037	379 + 260	A new bridge on Struma and railway line Sofia-Kulata, overall dimensions G10.50	Right	223
5	380 + 168	380+420.	A new bridge on the Struma river, overall dimensions G10.50	Right	252
6	380 + 180	380 + 345	A new bridge on the Struma river, overall dimensions G10.50	Left	165
7	380 + 568	380 + 679	A new bridge on the Struma river, overall dimensions G10.50	Left	111
8	380 + 560	380 + 748	A new bridge on the Struma river, overall dimensions G10.50	Right	188
9	380 + 973	381 + 077	Existing bridge on the Struma river, road lane, overall dimensions G12	Left	104
10	380 + 971	381 + 083	A new bridge on the Struma river, overall dimensions G10.50	Right	112
11	381 + 175	381 + 259	Existing bridge on the Struma river, G12 overall dimensions	Left	84
12	381 + 176	381 + 256	A new bridge on the Struma river, overall dimensions G10.50	Right	80
13	385 + 990	386 + 000	New bridge L=10m, width G10.50	Right	10
14	390 + 151	390 + 296	Existing bridge on the Struma river, the Struma river, overall dimensions G10.50 - to the overhead road in two levels	Left	145
15	393 + 966	394 + 495	A new bridge on the Struma river, overall dimensions G10.50	Left	529
16	393 + 959	394 + 508	A new bridge on the Struma river, overall dimensions G10.50	Right,	553
17	394 + 820	394 + 959	A new bridge on Vlachinska, overall dimensions G10.50	Left	139
18	391+350	394 + 938	A new bridge on Vlachinska, overall dimensions G10.50	Right	138

Support walls

- Reinforced concrete supporting walls:

No	Kilometre situation		L (m)	H_{ave} (m)	Location
	to km	to km			
Direct route					
1	376 + 000	376 + 050	50	5.0	Right
2	380 + 025	380 + 130	105	7.5	between the two roadways
3	380 + 150	380 + 170	20	2.0	left roadway - left
4	380 + 345	380 + 370	25	4.0	left roadway - right
5	380 + 410	380 + 430	20	4.0	right lane - right
6	380 + 670	380 + 710	40	4.0	left roadway - left
7	380 + 765	380 + 810	45	7.0	Between the two roadways under the embankment
8	380 + 950	380 + 990	40	8.0	between the two roadways
9	381 + 085	381 + 095	10	6.0	right roadway - left
10	381 + 570	381 + 670	100	6.5	left roadway - left
11	381 + 890	382 + 070	180	5.5	left roadway - left
12	382 + 170	382 + 490	320	5.0	left roadway - left
13	382 + 750	382 + 835	85	4.5	left roadway - left
14	382 + 870	382 + 970	100	9.0	between the two roadways
15	382 + 990	383 + 070	80	3.0	left roadway - left
16	383 + 350	383 + 610	260	6.5	left roadway - left
17	384 + 370	384 + 450	80	2.0	between the two roadways
18	384 + 990	385 + 110	120	9.0	between the two roadways
19	385 + 150	385 + 250	100	10.0	between the two roadways
20	385 + 350	385 + 450	100	4.5	left roadway - left
21	385 + 470	385 + 570	100	10.0	between the two roadways
22	385 + 630	385 + 710	80	5.0	left roadway - left

23	385 + 750	385 + 930	180	7.0	left roadway - left
24	386 + 670	386 + 690	20	10.0	between the two roadways
25	387 + 490	387 + 710	220	7.8	between the two roadways
26	387 + 570	387 + 690	120	5.0	left roadway - left
27	388 + 510	388 + 610	100	4.0	left L
28	388 + 770	388 + 810	40	10.0	between the two roadways L
29	388 + 950	389 + 090	140	7.0	left roadway - left
30	389 + 090	389 + 190	100	3.0	between the two roadways L
31	389 + 410	389 + 450	40	5.0	Left
32	391 + 350	391 + 390	40	1.5	right-right L
33	391 + 510	391 + 550	40	2.5	right right L
34	392 + 410	392 + 450	40	4.5	between the two roadways
35	392 + 690	392 + 790	100	10.0	between the two roadways
36	392 + 930	393 + 070	140	3.0	between the two roadways L
37	393 + 810	393 + 830	20	5.0	Right - under the
38	397 + 810	397 + 840	30	2.0	left roadway - left
39	397 + 860	397 + 920	60	3.5	left roadway - left
Road					
'Oshtava' Road Junction					
1	10	280	270	3.0	Right
Road connections with ROAD I-1 at km 394+004					
1	40	300	260	3.5	Right
Road connection to the Rafting site, at km 381+000					
1	70	150	80	2.5	Left

- reinforced embankment walls

No	**Kilometre situation**		**L (m)**	**H_{ave} (m)**	**Location**
	to km	**to km**			
1	379 + 850	380 + 025	175	7.5	between the two roadways
2	380 + 130	380 + 210	80	5.0	between the two roadways
3	380 + 670	380 + 765	95	7.5	between the two roadways
4	382 + 290	382 + 510	220	4.5	between the two roadways
5	382 + 690	382 + 870	180	8.0	between the two roadways
6	382 + 970	383 + 170	200	7.5	between the two roadways
7	383 + 230	383 + 530	300	4.5	between the two roadways
8	384 + 450	384 + 510	60	3.5	between the two roadways
9	384 + 560	384 + 650	90	7.5	between the two roadways
10	384 + 850	384 + 990	140	8.5	between the two roadways
11	385 + 250	385 + 470	220	8.5	between the two roadways
12	385 + 570	386 + 060	490	7.0	between the two roadways
13	388 + 810	389 + 090	280	7.5	between the two roadways
14	392 + 370	392 + 410	40	6.5	between the two roadways

- anchored walls

No	**Kilometre situation**		**L (m)**	**H_{ave} (m)**	**Location**
	to km	**to km**			
1	379 + 790	379 + 850	60	5.5	between the two roadways
2	380 + 810	380 + 950	140	7.5	between the two roadways
3	382 + 510	382 + 690	180	8.0	between the two roadways
4	383 + 170	383 + 230	60	7.5	between the two roadways
5	384 + 510	384 + 560	50	5.5	between the two roadways
6	384 + 650	384 + 850	200	8.0	between the two roadways
7	385 + 110	385 + 150	40	8.0	between the two roadways
8	386 + 060	386 + 260	200	10.0	between the two roadways
9	387 + 710	387 + 980	270	7.5	between the two roadways
10	388 + 740	388 + 770	30	9.0	between the two roadways

- reinforcing walls

No	Kilometre Position		L (m)	H_{ave} (m)	Location
	to km	to km			
Direct route					
1	382 + 110	382 + 210	100	6.0	Left
2	396 + 450	396 + 490	40	6.5	Left
Road					
Road connection to Gas-station					
1	350	450	100	2.0	Left

Option G20 - red, passes through the Municipalities of Simitly and Kresna – district of Blagoevgrad.

RECONSTRUCTION OF FACILITIES OF OTHER AUTHORITIES

In the course of the project, reconstructions will be required of the power electricity lines Networks, water pipelines, gas pipelines, irrigation ducts, fibre optical cables, etc. The reconstructions shall be:

- Reconstructions of HV networks - 110 kV networks. They shall be implemented in the segment between km 378 + 500 and km 379 + 500. This will include the installation of 9 new pillars.
- Reconstruction of networks LV and Medium voltage. - 20 kV. The reconstructions will take place all the way along the road at 22 places. It will include dismantling of pillars and removal of shafts, comprised in the road track and construction of new shafts - 7 pcs. and steel-armoured pillars - 13 pcs.
- Reconstructions of communication cables and facilities. The optical cables shall be impacted. The reconstructions take place all the way along the route. The design will include the installation of pipes for optical cables, of diameter 40 mm - 13 pieces, made of PVC pipes of diameter, 110 mm in concrete casing of diameter 110, in concrete casing - 16 units and shafts - 37 units.
- Reconstruction of gas pipelines. The existing gas pipelines intersect in three places, the reconstruction includes the construction of a protected concrete casing.
- Reconstructions of water pipelines. They will comprise the replacement of the affected parts of the pipes, where they intersect with the road route. It shall be implemented in sections from km 378 + 000 to km 378 + 500 and from km 397 + 500 to km 399 + 400. It will include the replacement of potable- domestic water supply lines with asbestos-cement pipes of diameter 125 (mm), potable water pipelines, of diameter 80- asbestos-cement of diameter 32 mm, diameter 120 mm, diameter 150 mm; Potable water supply pipeline - diameter 250 mm, made of asbestos-cement;
- Reconstructions of irrigation systems. It would include the relocation of open irrigation channels and irrigation pipelines outside the track. It will be implemented in the sections from km 376 + 200 to km 378 + 500 and from km 394 + 000 to km 399 + 400. It will include reconstructions of drainage channels from 'Krupnik' draining field in 2 sections, the Main Irrigation Channel - 'Left, 'Pirin' RailWay Station' - in 5 sections, the Deviation of the Main Irrigation Channel - 'Left, 'Pirin' Railway Station' - in 5 sections. The reconstruction of the pipelines falls within the scope of the road route, where it is necessary to replace parts of them, which remain under the road bed. It will include the main pipeline, made of PVC, 250 mm - 2 pcs. of pipe-intersections; Internal irrigation pipeline Œ160 mm, made of steel, internal irrigation line of diameter 120 mm, made of polyester and diameter 140 mm, made of polyester.
- The existing monitoring and analysis facilities at 'the 'West Aegean Region Basin Directorate' (WARBD) Blagoevgrad

✓ UCAF - Underground Chemical Analysis Facility, falling within the limits of the Krupnik Road Junction at km 378+380;

✓ PMSW - Point of monitoring surface waters and PCBs - - Point of Hydro-biological monitoring of the Rezena river, falling within the scope of the roadway 378+535;

Summary of the expected impact on components and factors of the environment (air; surface waters; ground waters; bowels of the earth; waste; noise) and human health from the EIA

Ambient air

The carbon dioxide equivalent amount of greenhouse
Gases in Option G20 - Red during construction shall be 1,550 tons of equivalent CO_2 per year. The estimated volume of blasting works for the tunnels shall be approximately 300 tons of blasting/detonating powder and in the gorge - about 340 tons of blasting powder.

During the operation of the highway, the significance of impact for **Option G20 - Red** of Lot 3.2 of the Struma Motorway shall be **significant**. High significance of impact in **part 0 Common beginning Simitly – Cherniche of Lot 3.1/Lot 3.2** of the Struma Motorway – Option G20 – red. During the operation of the motorway, the impact rate shall be very high in residential areas (mid-sensitivity receptors) in the vicinity of Road E79 in the 'Dalgata' residential area, town of Simitly. The impact shall have moderate significance in **Part I - Krupnik - Stara Kresna** in Lot 3.2 of the Struma Motorway - Option G20 - Red. During the operation the impact is estimated to be medium in the agricultural buildings and single residential buildings (low-sensitivity receptors). Low impact significance will be observed in **sub-section III** and in **sub-section IV** of **part II Stara Kresna – Kresna** of Lot 3.2 of the Struma Motorway – Option G20 – red.

The carbon dioxide equivalent amount of greenhouse gas emissions for Option G20 - Red in the time of motorway operation shall be **24,830** tonnes of equivalent CO_2 per year.

Surface waters

Option G20 – Red has very close characteristics to those of Option G20-blue, of which it is a direct option. Everything that was introduced for the G20-blue option is practically the same for this option.

The difference concerns the construction of facilities, more characteristic of urbanized territories – 3 overhead roads of total length - 3,800 m.

No Sanitary Protection Zones (SPZs) in the vicinity of the surface water sources of potable water-supply shall be affected.

This option will have impact on two areas with potential flood risk - in the beginning of the village of Krupnik and in the end of the town of Kresna.

Ground waters

Option G20 – Red has very close characteristics to those of Option G20-blue, of which it is a direct option. Everything that was introduced for the G20-blue option is practically the same for this option.

The difference concerns the construction of facilities, more characteristic of urbanized territories – 3 overhead roads with a total length of 3,800 m, which – according to our judgement do not improve the route, due to the need of construction of foundations for those overhead roads, areas, necessary for their maintenance and areas, ensuring traffic safety at the lower level, which practically renders these facilities pointless. The possibility for traffic accidents and spills on the upper level of the overhead roads results in high hazards for the roadway below.

The total length of the tunnels is the shortest in this Option, but – as already mentioned – these are to be constructed in the conditions of maximum draining of the natural rock and in fact do not affect the condition of the ground waters.

The route will not affect any Sanitary Protection Zones (SPZs) near underground water sources of potable water-supply or near sources of mineral waters.

The Earth bowels

Similar data can be provided for this Option as well. The difference shall be in respect that in this option, the road lanes in three sections are positioned one above the other in both directions.

The excavation materials are commensurate with those of Option G20 - blue, yet double embankment quantities shall be required, which is a prerequisite for disrupting other areas to provide those materials.

The required tunnel works have the smallest volume in this option.

Waste

The expected quantities of generated waste during construction - earth and rock materials *that do not meet the project design specifications for incorporation into construction* for Option G20 - Red, shall be 262,688 m^3.

The expected quantities of the waste, generated during construction - earth and rock material, which do not meet the design specifications for use in the construction of Option G20 – blue amount to 1 192 402 m3, for the eastern Option G10.50 - 1 856 432 m3, for the eastern Option G20 - 2 936 137 m3. The expected quantities of waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* for the long tunnel option are 4,579,586 m3.

Noise

When performing the construction activities of Option G20 - Red, the expected limit exceedance of the regulated noise limits will be up to 29.0 dBA.

The expected exceedance for eastern Option G20 are up to 26 dBA, for Option G20 – blue are up to 29 dBA, for the long tunnel Option – up to 29 dBA. The expected exceedances for Eastern Option G10.50 - up to 26 dBA for the left road lane and up to 29 dBA for the right road lane.

During the operation, the expected exceedance to the regulated limit values of the level of noise for Option G20 – red are up to 16.0 dBA. The expected exceedance for Option G20 – Blue are up to 16 dBA, for the eastern Option G20 - up to 14 dBA, for the long tunnel Option – up to 16 dBA. The expected exceedances for Eastern Option G10.50 - up to 13 dBA

Health Assessment

During the construction period, routine risks are to be expected, as associated with road construction activities - uncoordinated emissions, excessive noise levels due to the operation of construction machines and traumatised species by unintentional operation or unexpected emergency situations. If all personal protective equipment and guidelines, as detailed in the Health and Safety Plans, are followed, no inadmissible impacts are expected. Temporary exceeding of the noise levels is also expected, as a result of the traffic of heavy trucks for the construction on the territory of Simitly and Kresna.

Continuous impacts shall be expected during the operational phase, upon the residents in the vicinity of the route in the town of Simitly, which is expressed in abnormal noise levels of up to 16 dBA and excess concentration of nitrogen oxides from road traffic.

EASTERN OPTION G 10.50, Stage of Feasibility Study, 2016

In the beginning of 2016, the Road Infrastructure Agency assigned the Design (Stage of Feasibility/Pre-investment Study) of a new option with division of traffic in Lot 3.2 of the Struma Motorway. The new project option - Eastern Option G 10.50 divides the traffic in two roadways, whereas the right one (two lanes with one-way traffic from Sofia to Kulata) shall be provided with rehabilitation and strengthening of the existing E79 road with implementation of measures for biodiversity conservation and eastern bypass of the town of Kresna on a new terrain, and for the left roadway (two lanes with one-way traffic from Kulata to Sofia) a new design solution of the route has been projected on a new terrain - distanced to the east of the Kresna Gorge).

The design solution of 2016 proposes to implement two separate individual roadways, with the possibility of simultaneous execution in shorter terms. The separation of the roadways allows the traffic to be safely and freely secured, the traffic being passed on one road lane, the other road lane being executed and vice versa.

The divided roadways require cross-connections between them in the direction of movement and traffic detours in the event of crashes, natural disasters and others.

The developed option for the right road lane allows for maximum use of the existing road E79, whereas before the town of Kresna is planned an eastern bypass of the city on a new terrain.

The left road lane shall be executed independently on a new terrain east of the Kresna Gorge, also through the construction of tunnels and viaducts.

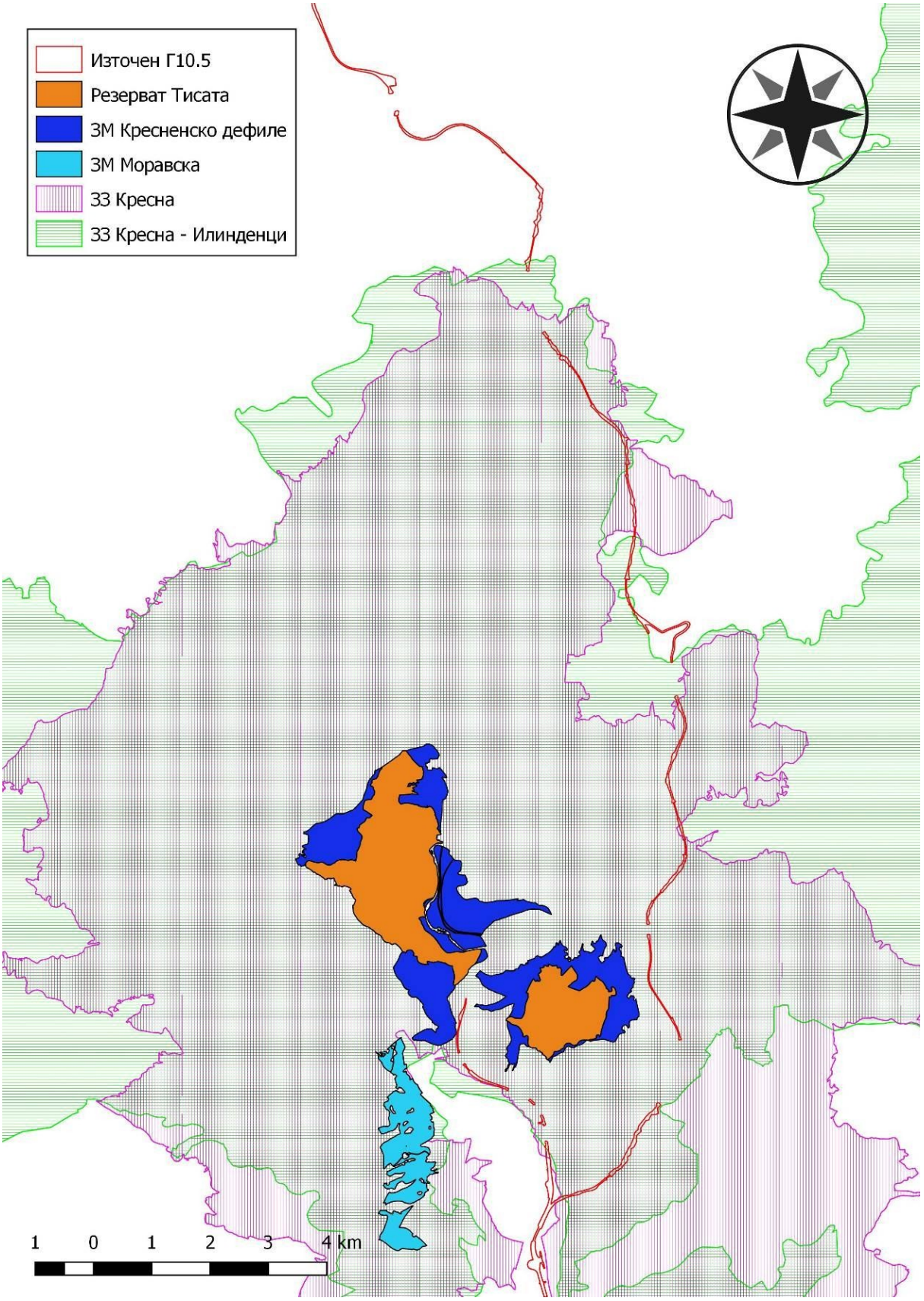

Figure No.1-4. Situation plan of Eastern Option G 10.50

We have enclosed a situation plan of the project route, **Eastern Option /Option/ G 10.50**, upon a topographic map in scale M 1:25000 - Appendix No.4 and 4a in ".*shp" format.

Road track

The project route should be developed as two independent road lanes with overall dimensions 7 / 10.50 for $V_{des.}$ = 80 km / h.

The two roadways are developed independently of each other, one of which uses the entire existing road and the other road lane is on a new terrain, and it is necessary to provide tunnels, viaducts, retaining walls and reinforced embankments.

Technical solution

- Design speed - V_{des} = 80 kn/hour
- Maximum longitudinal inclination - 6 %
- Minimum longitudinal inclination - 0.5%
- Crosswise inclination in - 2.5%
- Crosswise inclination in a - according to R
- Minimum radius of horizontal curves - R= 350 m
- Minimum radius of vertical curves
- convex vertical curves - R= 5,000
- concave vertical curves - R= 3,000
- Minimum radius of curves without transition - 1,500 m

Outline dimensions 10.50

- Traffic lanes - 2 x 3.50 m;
- A third, slow-traffic lane - 1 x 3.00 m;
  - From km 376 + 500 to km 385 + 200
  - From km 392+500 to km 399+100
- Guiding strips (made from asphalt concrete) - 2 x 0.25 m;
- Banked earth base strips - 2 x 1.50 m;
- Trenches
- Safety facilities
- Acclivities/Slopes

With regard to the construction of the tunnels, besides the main tube has been designed a second one that performs the emergency function.

Longitudinal profile

The right lane follows the existing E79 road and its heights.
The left road lanes shall be on a new terrain and will follow its peculiarities. The level positioning of the motorway meets the following requirements:

✓ Compliance with the key technical parameters, corresponding to $V_{des.}$

✓ Providing smoothness and homogeneity of the motorway route;

✓ Ensuring proper draining of the roadway and the adjacent terrains;

✓ Ensuring the necessary overall dimensions and clearances, when crossing agricultural and other roads from the Republican road network, railway lines;

✓ Ensuring the draining/outflow of maximum water quantities from bridges on rivers and water obstacles;

✓ Providing optimum balance of the earth masses in the excavations and embankments;

✓ Positioning of the grade line at an optimum elevation, when using the existing road.

Pavement

Direct route

The pavement structure is designed for 'very heavy' traffic category and for elastic modulus – En = 370 mPa, preserving the homogeneity of the pavement in the previous sections of the Struma Motorway:

- Split mastic (SMA)0/11S with polymer additives - 4 cm
- Asphalt mixture for the lower layer (binder) 0/22 – - 8 cm
- Asphalt mixture for the basic layer Ao - 18 cm
- Crushed stone with selected grain size (0-63 mm) - 20 cm
- Crushed stone (0-63 mm) - 20 cm
- Zone A - materials, group A-1 - 50 cm

Right roadway

The start of the route is at km 373 + 300 (the end of Lot 3.1) and follows the existing road, passes through the town of Simitly and then develops along the existing road through the Kresna gorge, the two lanes being in the direction of the Hellenic Republic. The roadway shall be built by rehabilitation of the currently existing road, not leaving the current boundaries of the E79 road until the town of Kresna, where the existing road is replaced for a new route, similarly to **Option G20-red**, bypassing the residential area from the East, reaching Lot 3.3.

The new construction (Eastern bypass of the town of Kresna) starts at km 393 + 600, after km 394 + 500 the road route develops in the eastern direction to km 396 + 000, passing through 4 tunnels, which pass the road under the rock pyramids in the eastern periphery of the town of Kresna. Then the road continues in the south direction, and with a wide arc enters just before the viaduct, before the road junction 'Kresna' at km 400 + 371.81. The new construction of a town bypass will include the construction of viaducts, tunnels, bridges and other facilities.

The route ends at km 400 + 371.81 = km 397 + 000 of Lot 3.3.

The new construction of the bypass of the town of Kresna (after the planned rehabilitation of the right road lane) will include the construction of the following facilities:

Bridges 2 facilities - 691 m;
Viaducts 1 facility - 387 m;
Tunnels 4 facilities - 1,266 m';
Supporting walls 245 m'.

Large facilities

x **Tunnels**

to km	to km	length (m)
394 + 544	394 + 787	243
395 + 628	396 + 081	453
396 + 162	396 + 412	220
396 + 568	396 + 888	320
TOTAL		***1,266***

Tunnelling will be carried out, based on the classic drill-and-blast method, with reinforced concrete facing. For shorter tunnels, ventilation and fire extinguishing equipment is not required, but only a lighting installation.

- **Bridges**

to km	to km	length (m)	facility type
393 + 959	394 + 512	553	A new bridge on the
391+350	394 + 938	138	A new bridge on
TOTAL		***691***	

- **Viaducts**

from km	to km	Length (m)	average height (m)
399 + 700	400 + 016	316	10.0
TOTAL		**316**	

- **Overpasses, underpasses, interpasses**

Kilometre distance	facility type	Length (m)
395 + 195	Farming underpass-new inclined underpass with L = 8m, right	36
356 + 547	Farming underpass-new inclined underpass with L = 8m, right	36
396 + 935	Farming underpass-new inclined underpass with L = 8m, left and right	36
397 + 342	Farming underpass-new inclined underpass with L = 8m, left and right	24
397 + 849	New inclined underpass with L = 12m, left and right	24
398 + 104	Farming underpass-new inclined underpass with L = 8m, left and right	24
400 + 320	New inclined underpass with L = 23m, left and right	26
TOTAL		**206**

- Supporting and reinforcing walls - average height (3 – 6.5 m)

from	to km	length (m)
393 + 870	394 + 020	200
396 + 430	396 + 475	45
TOTAL		*245*

Left roadway

The left road lane of Lot 3.2 of the 'Struma' Motorway is planned on a new terrain, East of the Kresna Gorge:

The left roadway starts at km 373 + 300 (100 m after crossing the Oranovo mine railway line), left of the existing road and develops parallel to it to km
373 + 600, then goes southeast, parallel to the river Gradevska, between the Oranovo and 'Dalga mahala' residential areas of the town of Simitly. At km 375 + 775 the road II-19 'Simitly - Predela - Gotse Delchev' is intersected on two levels, with a road junction, by setting up the road junction to connect the road track of Lot 3.2 to the town of Bansko and vice versa.

After intersection of II-19 it enters the slope, using a tunnel of L = 350 m and thereafter a viaduct with L = 200 m.

From km 376 + 500, it takes a south-eastern direction, bypasses the village of Poleto, at km 379 + 880 crosses the road Poleto - Brezhani, and at km 380 + 840, it crosses the flow of the Brezhanska river.

In the section from km 381 + 500 to km 385 + 500 there is a zone, a food habitat of vultures and a tunnel with length L = 1.330 m is being constructed. Brezhanska river. In the section from km 381 + 500 to km 385 + 500, West of the road route, there is a site, a food habitat of vultures and a tunnel with length L = 1.330 m is being constructed. The longitudinal inclination is about 4.35%, improving the technical solutions for the tunnel and the viaducts.

In the section from 385 + 500 to km 389 + 800, the option develops southwards after the vultures' food habitat, west of the village of Rakitna, developing

parallel to the Rakitna - Mechkul road, crossing the road at about km 383 + 900, passing west of the village of Mechkul and continuing to the south and east of the village of Stara Kresna.

In the section from km 384 + 100 to km 389 + 600, the road track is offset in the east direction, crossing the route of a transit gas pipeline once.

From km 389 + 600 to km 396 + 000, the option develops in the south direction.
From km 396+000 to km 399+300, this Option continues to the Southwest, near the existing road to the Village of Vlahi. At km 399 + 880, turn to the right roadway (bypass of the town of Kresna).

The route ends at km 400 + 371.81 = km 397 + 000 of Lot 3.3.

In the places where the roadway passes into a tunnel, sites are formed around the portals to build the service infrastructure.

Due to the higher longitudinal inclinations, present in the beginning and the end of the road, in order to improve the throughput and ensure the necessary safety, a third lane for slow vehicles is to be constructed in the following sections:

- From 376+500 to km 385+200 - 8.7 km;
- From 392+500 to km 399+100 - 6.6 km.

The new construction east of the gorge shall include the construction of the following facilities:

Bridges 1 facility. - 96 m;
Viaducts 18 units. - 5087 m';
Tunnels 5 facilities -
4200 m; Support walls - 943 m.

Large facilities

- **Tunnels**

from	**to km**	**length (m)**
375 + 900	376 + 250	350
380 + 892	382 + 022	1130*
387 + 820	389 + 010	1190 *
393 + 230	393 + 440	210
395 + 350	396 + 670	1320 *
TOTAL		***4,200***

* The project provides for the construction of an emergency tube with the dimensions of the main tube.
tube.

The construction of the tunnels will be in the classical manner with drilling and explosive

works and reinforced concrete lining. For shorter tunnels, ventilation and fire extinguishing equipment is not required, but only a lighting installation.

- **Bridge**

from km	to km	length (m)	facility type
373 + 565	373 + 650	96	A bridge on the

- **Viaducts**

from km	to km	Length (m)	average height (m)
376 + 300	376 + 500	200	21.0
378 + 562	379 + 372	810	87.0
379 + 600	379+700	100	18.0
380 + 300	380 + 670	370	50.0
382 + 112	382 + 192	80	15.0
382 + 466	382 + 536	70	14.0
382 + 750	383 + 520	770	80.0
384 + 770	384 + 950	180	20.0
385 + 860	386 + 030	170	24.0
386 + 770	387 + 050	280	30.0
387 + 220	387 + 390	170	18.0
390 + 900	391 + 190	290	46.0
391 + 580	391 + 840	260	45.0
392 + 610	392 + 830	220	48.0
393 + 850	393 + 940	90	9.0
394 + 360	395 + 010	650	90.0
398 + 140	398 + 230	90	12.0
399 + 700	399 + 987	287	15.0
TOTAL		**5,087**	

- **Overpasses, underpasses, interpasses**

Kilometre distance	Facility type	Length (m)
373 + 835	Road	20
375 + 775	Road underpass on road II-19	38
379 + 500	Road overpass	36
384 + 520	Road overpass	36
389 + 060	Road overpass	36
390 + 745	Agricultural overpass (AOP)	70
391 + 315	AOP	70
392 + 320	Road underpass	38
398 + 840	Road underpass	15
399 + 055	Road underpass	15
399 + 440	Road underpass	20
TOTAL		**394**

- Supporting and reinforcing walls - average height (3-6.5 m)

from	to km	length (m)
377 + 925	377 + 975	50

TOTAL	50

- Reinforced embankment walls - average height (5-8 m)

from km	to km	length (m)
376 + 925	377 + 025	100
379 + 575	379 + 622	47
380 + 025	380 + 675	650
380 + 725	380 + 775	50
382 + 532	382 + 578	46
TOTAL		**893**

Small facilities and walkways for animals

To conduct water from the gullies, drains and other low lands the construction of small facilities is projected - culverts. After the preparation of a detailed motorway draining plan, the precise number and type of the necessary facilities, required to carry the water from trenches, gullies etc. to the most appropriate locations, will be determined.

The selected livestock facilities have been inspected for the design maximum dimensional quantities of water that are likely to pass with a 1% provisioning in the reduced cross-section without allowing the flooding of dry paths.

For this purpose facilities are provided with the following openings:

- *pipe culverts - of diameter 150 mm - 33 pieces;*
- pipe culverts of diameter (mm) 150 - facilities for animals – 9pcs.

Note: The pipe culverts, to be used as animal passageways shall only carry the water quantities from the ditch of the motorway - in case of rain-, snow-fall etc. The water, passing through the culvert will not be much and it will not flow constantly, as during most of the year, the facilities will remain „dry“ and this will not obstruct the animal passage through them.

- *rectangular drains*

✓ Rectangular drain culverts 200/200 - 3 units.

✓ Rectangular drain 400/250 - 2 units.

✓ Rectangular culvert 200/200. facilities for animals – 16 pcs.

✓ Rectangular drain culverts 300/250, animal facility - 2 units.

Note: Rectangular drain culverts that would serve as a passageway for wild animals shall be modified to provide dry passageways for wild animals and respectively - the water quantities passing through the facility shall be designed so that there would be no danger of flooding the dry passageway.

- **Road connections**

The design solution for the Eastern Option G10.50 provides two independent roadways, for one-way traffic each, which requires cross road connections between both roadways along the existing roads and the organization of road junctions (or road connections in two levels) of the **left** roadway (from Kulata in the direction of Sofia):

✓ Road junction 'Simitly' - km 375+775;

✓ Road junction 'Poleto' - km 379+500;

✓ Road junction 'Mechkul' - km 384+000;

✓ Road junction 'Stara Kresna' - km 388+450;

✓ Road junction 'Kresna' - km 400+371.81.

The project provides for the construction of a road connection in the **right** road lane (The existing road E79) Sofia - Kresna - km 393 + 600.

Rehabilitation of existing roads, 'Preliminary Study of Lot 3.2 of the Struma Motorway - Eastern Option G 10.50, Stage of Feasibility Study, 2016.

- **Right roadway:** Rehabilitation of the existing E79 road in

the Kresna Gorge

The types of works to be performed include:

- ✓ Removal of the humus layer, including loading and transportation;
- ✓ A general, ordinary excavation, including loading and transportation;
- ✓ Excavation for trenches and drain culverts;
- ✓ Excavation for facilities in earth and rocky soils;
- ✓ Excavation for bringing down rocky soils;
- ✓ Excavation for the cleaning of grooves, drains, culverts and walls;
- ✓ Making of embankments in rocky soils;
- ✓ Cleaning and profiling of banked earth strips;
- ✓ Removal of the existing safety net for falling stones, loading and transport to a landfill;
- ✓ Demolition, loading and disposal of dangerously overhanging rocks and all related costs;
- ✓ Bringing down and removing rock fragments and debris under the Alpine method, including all related costs;
- ✓ Strengthening of rocky slopes with high-strength nets, anchoring blocks, horizontal and vertical steel ropes and all associated costs;
- ✓ Destruction of existing asphalt pavement, including digging, loading, transport to landfill and unloading;
- ✓ Grindings / technological and preliminary repairs / of existing asphalt pavement, including loading, transportation, landfill unloading;
- ✓ Crushing of concrete curbs and concrete strips and transportation to landfill;
- ✓ Dismantling a single steel safety fence and transporting to depot/landfill;
- ✓ Supply and laying of binder for profiling and levelling layers of different thickness and widths;
- ✓ Supply and laying of binder for patches of varying thickness and width;
- ✓ Supply and laying of dense asphalt for wear layer;
- ✓ Supply and laying of dense asphalt for emergency strips, collaring and sites;
- ✓ Making a first bitumen spill;
- ✓ Making a second bitumen spill;
- ✓ Supply and laying of asphalt for the bottom layer;
- ✓ Supply and laying of base material with different width and thickness of the layer;
- ✓ Delivery and laying of banked earth base material with different width and thickness of the layer;
- ✓ Delivery and laying of concrete curbs of 8/16 size, including all related costs;
- ✓ Supply and installation of steel road restricting systems (SRRS), including all related costs;
- ✓ Supply and installation of horizontal marking, including all related costs;
- ✓ Supply and installation of standard reflective road signs, including All related costs and expenses;
- ✓ Supply and installation of non-standard reflective road signs, including All related costs and expenses;
- ✓ Supply and installation of Italian grooves for drainage of road embankments, including all related costs;
- ✓ Production of panelled/lined draining trenches;
- ✓ Supply and production of transverse drains;
- ✓ Making of concrete rigs and all associated costs;
- ✓ Construction of new pipe culverts;
- ✓ Construction of a new top structure of large bridges over the river. the Struma river;
- ✓ Formwork on small and large facilities;
- ✓ Reinforcing works on large facilities;
- ✓ Concrete works in small and large facilities;
- ✓ Making waterproofing - asphalt primer + warm bitumen screed on the road slab, transitional slabs, pavement blocks, dilatation joints, incl. All related costs;

✓ Making clearance joints in bridge facilities;

- ✓ Delivery and installation of made of PVC pipes, of diameter 50 mm and of diameter 110 mm and all related costs;
- ✓ Delivery and installation of a combined railing;
- ✓ Reconstruction of TT cables and all related costs;
- ✓ Relocation, supply and installation of 20 kV power lines;
- ✓ Raising the levels of existing rainwater shafts.

- **Left roadway: Rehabilitation of municipal roads**

The following municipal roads will be rehabilitated, which represent also Crosswise connections between the two roadways:

- ✓ Road E79 – Poleto village – Brezhany village
- ✓ Road Mechkul village – Brezhany village
- ✓ Road E79 – Stara Kresna village – Oshtava village
- ✓ Road the town of Kresna – Vlahi village.

The Eastern Option G 10.50 crossing the Simitly and Kresna municipalities – Blagoevgrad Region.

RECONSTRUCTION OF FACILITIES OF OTHER AUTHORITIES IN THE **EASTERN OPTION G 10.50 - LEFT ROADWAY**

RECONSTRUCTION OF ELECTRICAL EQUIPMENT 0.4 kV and 20
0.4 kV Electrical facilities: At km 379 + 000 and km 398 + 060

20 kV electrical equipment: At km 379 + 510 km 382 + 000 km 382 + 160 km 382 + 410 km 384 + 165 km 388 + 405 km 398 + 157 km 398 + 847 km 398 + 861 km 399 + 480 km399 + 850 km 399 + 870 and km 400 + 085

RECONSTRUCTION OF ELECTRICAL EQUIPMENT 110 kV and 400 kV

Verification of the vertical overall dimensions at the intersection of existing overhead power lines 400 kV and 110 kV, as follows:

'Pirin' 400 kV, Overhead Power Line: At km 378 + 430; km 379 + 950; km 380 + 000; km 380 + 050; km 382 + 500 and km 396 + 760

Overhead power line 110 kV Granit: at km 398+860

ELECTRICAL FACILITIES 0.4 kV and 20 kV

The project provides for the construction of power lines and cable lines, 20 kV and transformer stations 20 / 0.4 kV at the road junctions and the recreation site in the construction of the Struma motorway, Lot 3.2.

Construction of power lines 20 kV and CTP 20 / 0.4 kV at road junctions and recreation grounds

- Road junction „Poleto" at km 379+490
- Road junction „Mechkul" at km 384+260
- Road junction „Stara Kresna" at km 387+690
- Road connection 'Stara Kresna', at km 388 + 435
- Recreation site, town of Kresna, left road lane at 399 + 470

Lighting in the section of road junctions and recreation areas

The construction of street lighting is provided in the following places:

- Road junction „Poleto” at km 379+500

- Road junction „Mechkul” at km 384+265
- Road junction „Stara Kresna” at km 387+690
- Recreation area, left road lane at km 399 + 500

Reconstruction of communication facilities

- Reconstruction of optical cable at km 380+680
- Reconstruction of optical cable at km 384+270
- Reconstruction of optical cable at km 388+450
- Reconstruction copper cable at km 399+115
- Reconstruction of copper cable from km 399+840 to 400+608
- Reconstruction of optical cable from km 400+110 to km 400+538

Water supply pipelines

- Reconstruction of the existing water pipeline, of diameter 110 mm, made of PE from Brezhany to Poleto village
  - km 379+500
- Reconstruction of the existing water supply pipeline, of diameter 110 mm, made of asbestos cement for the village of Stara Kresna -
  388 + 430
- Reconstruction of the existing water pipeline of diameter 150 mm to Slyvnitsa village at km
  400 + 870

Irrigation channels

- km 399+125 – reconstruction of the main irrigation channel 'Left Pirin Railway Station'
- km 399+220 - reconstruction of the main irrigation channel 'Left Pirin Railway Station'
- km 399 + 580, reconstruction of the deviation of the main irrigation channel, 'Left Pirin Railway Station'
- km 399+552 - deviation of the main irrigation channel 'Left Pirin Station'
- from km 399+650 to km 399+715 - deviation of the main irrigation channel 'Left Pirin Railway Station'

PRESSURE IRRIGATION PIPELINES

Existing pressure irrigation pipelines, falling within the range of the roadway:

- Main irrigation pipeline, made of PVC, diameter 250 mm from km 398+476 to km 398+544
- Internal irrigation pipeline, of diameter 160mm, made of steel, at km 400+090
- Main irrigation pipeline, made of PVC, of diameter 280 mm, from km 400+260 to 400+400

GAS PIPELINE

- Reconstruction of the Transit Gas Pipeline to the Hellenic Republic at the intersection of km 390 + 170
- Reconstruction of the Transit Gas Pipeline to the Hellenic Republic at the intersection of km 399 + 240
- Reconstruction of the existing transit pipeline to the Hellenic Republic, diameter DN 700 and $P_{op.}$ = 5.4 MPa at km 400 + 130

BYPASS OF THE TOWN OF KRESNA - RIGHT ROADWAY

RECONSTRUCTION OF ELECTRICAL EQUIPMENT 0.4 kV and 20 kV

- At km 394+730 Overhead transmission line 20 kV „Pastrets”
- At km 394+730 Overhead transmission line 20 kV „Breznitsa”
- At km 395 + 380 Overhead power lines 20 kV 'Breznica' and 20 kV 'Pastrec'
- At km 395 + 520 Overhead power lines 20 kV 'Hanove' and 20kV 'Defile'
- At km 396 + 530 Overhead power lines 20 kV 'Hanove' and 20kV 'Defile'
- At km 396 + 580 Overhead power lines 20 kV 'Breznica' and 20 kV 'Pastrec'
- At km 398 + 150 Overhead power line 20 kV 'Pastrets', railway station deviation

RECONSTRUCTION OF ELECTRICITY FACILITIES 110 kV

- Overhead transmission line 110 kV „Granite” at km – 396+725
- 110 kV Overhead power line, 'Granite' at km - 396 + 725
- 110 kV Overhead power line 'Granite' at km - 396 + 930

ELECTRICAL FACILITIES 0.4 kV and 20 kV

Power supply lines 20 kV and CTP 20/0,4 kV at the road junctions and rest areas and power supply lines 20 kV for the tunnels.

- At km 393 + 896 - Road connection north of the town of Kresna, a new cable line 20 kV
- At km 395 + 690 - Road connection north of the town of Kresna, a new 20 kV overhead power line kV 'Defile'
- At km 395+690 Tunnel-2, Kresna, new overhead distribution line from overhead power line 20 kV 'Defile'
- At km 397 + 590 Recreation area, right roadway, Kresna, new overhead deviation from the 20 kV 'Morava' overhead power line
- At km 398 + 020, 'Kresna' road junction, New overhead deviation from Overhead Power Line 20 kV 'Slyvnitsa'

RECONSTRUCTION OF COMMUNICATION FACILITIES

- Reconstruction of optical cable from km 393+850 to km 394+070
- Reconstruction of copper cable from km 393+850to km 394+070
- Reconstruction of optical cable from km 394+200 to km 394+258
- Reconstruction of optical cable at km 394 + 550
- Reconstruction of copper cable at km 397 + 761

WATER SUPPLY PIPELINES

Reconstruction and relocation of the existing water and sewerage networks and facilities, crossing the Struma Motorway, Lot 3.2 and water supply and drainage of the recreation areas.

- Water supply to recreation areas in the section from km 397 + 590 to km L = 23.704m

IRRIGATION CANALS

Reconstruction of the existing open-air irrigation infrastructure of the agricultural lands, managed by 'Irrigation Systems' EAD - Struma - Mesta branch, the town of Dupnitsa with hydro-technical area 'Sandanski'.

- from km 394+900 to km 395+035 – main irrigation canal 'Left Pirin Railway Station'
- from km 395+433 to km 395+533 - main irrigation canal 'Left Pirin Railway Station'
- from km 395+640 to km 395+736 - main irrigation channel 'Left Pirin Railway Station'

- from km 396+050 to km 396+180 - main irrigation channel 'Left Pirin Railway Station'
- from km 396+785 to km 396+920 - supplying pipeline to main irrigation channel (MIC), diameter 120 cm
- from km 397+100 to km 397+563 - main irrigation channel 'Left Pirin Railway Station'
- km 397 + 350 - deviation of the main irrigation channel 'Left Pirin Railway Station'
- km 397 + 720 - deviation of the main irrigation channel 'Left Pirin Railway Station'
- km 397 + 755 - deviation of the main irrigation channel 'Left Pirin Railway Station'
- km 397 + 920 - deviation of the main irrigation channel 'Left Pirin Railway Station'
- km 397 + 950 - deviation of the main irrigation channel 'Left Pirin Railway Station'

Summary of the expected impact on components and factors of the environment (air; surface waters; ground waters; bowels of the earth; waste; noise) and human health from the EIA

Ambient air

The carbon dioxide equivalent amount of greenhouse gases for Eastern Option G10.50 during construction is 1,900 tons equivalent CO_2 per year. The estimated volume of blasting works for the tunnels shall be approximately 1,160 tons of blasting powder.

During the operation, the impact significance for the Eastern Option G10.50 of Lot 3.2 of the Struma Motorway shall be moderate. Moderate significance of impact in Part I Simitly - Mechkul / Krupnik of Lot 3.2 of the Struma Motorway - Eastern Option G10.50. During the operation of the highway, the impact rate shall be moderate in two single residential buildings (medium-sensitivity receptors) in the vicinity of the E79 road in the town of Simitly. Low significance of impact in Part II, Stara Kresna - Oshtava in Lot 3.2 of Struma Motorway – Eastern Option G10.50. Moderate significance of impact in Part III Oshtava – Kresna in Lot 3.2 of Struma Motorway – Eastern Option G10.50. During the operation, the impact rate shall be moderate in business/utility premises, adjacent to the road (low sensitivity receptors) around the road Vlahi - Kresna.

The carbon dioxide equivalent amount of greenhouse gas emissions for the Eastern Option G10.50 in the time of operation shall be 24,693 tonnes of equivalent CO_2 per year.

Surface waters

This option uses the existing right-lane of the route with a new bypass of the town of Kresna and leaves the road lane entirely on a new terrain.

The left roadway also affects another 4 surface water bodies – the Gradevska river, the Brezhanska river, the Ludata river and Dyavolska river (Oshtavska river).

These rivers are practically free from major sources of pollution and their environmental status is assessed as good and their chemical status as 'not established', which should mean it is good because it has no impact on these bodies and they were subjected to monitoring.

Unlike the first two options - G20-Blue and G20-Red, where the impact area has a stripe shape along the existing road, in the option under consideration, it should be assumed that the water from the whole area, locked between the existing road and the new route will be impacted.

This Option requires the construction of facilities - bridges and viaducts at high altitudes, sometimes over 100 m. Given the complex relief - deeply cut valleys, gullies and ravines, the construction of the viaducts and bridges has a potential risk of water pollution. These rivers are supplied by the melting of snow in the Pirin Mountains and have a pronounced seasonal character, in some cases, close to drying-up rivers.

No Sanitary Protection Zones (SPZs) in the vicinity of the surface water sources of

potable water-supply shall be affected.

This option will have impact on two areas with potential flood risk - in the beginning of the village of Krupnik and in the end - at the town of Kresna.

Ground water

This option uses the existing right-lane of the route with a new bypass of the town of Kresna and leaves the road lane entirely on a new terrain.

Road strips II and III of the sanitary protected zones (SPZs) are affected near the water sources of potable water supply – the Simitly Pumping Station and around the water sources from the mineral spring 'Oshtava – Hladkata Banya'. In the latter case, these areas are intersected with tunnel excavation, paired with an emergency tunnel and over 1,000 m in length.

Tunnels are currently under construction at the high levels of the water-catchment area, where the ground waters are fed and in this case the impact on their quantity may be significant, particularly during the construction, before the waterproofing operations.

Due to the longer length of the route, the use of winter maintenance materials will be larger and substantially more frequent due to the higher hypsometrical position of the left lane (approximately 540 m above sea level). for the Eastern Option G10.50, as opposed to 290-170 m in Options G20-Blue and G20-Red).

Left roadway of Eastern Option G10.50: Entirely on a new terrain, which is a prerequisite for the activation of negative geological phenomena - collapses, landslides, intensification of erosion and similar.

The option requires bridges over the deep gullies and river valleys, has not been studied and there is no evidence of the geo-technical situation. The road passes in close proximity to the 'Section Rakitna'. We may also expect occurence of radioactive substances.

Waste

The expected quantities of generated waste during construction - earth and rock materials *that do not meet the project design specifications for incorporation into construction* for Option G10.50 - shall be 1,856,432 m^3.

The expected quantities of the waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* of Option G20 – Blue amount to 1,192,402 m^3, for the G20 - Red are 262 688 m^3, for the Eastern Option G20 - 2,936,137 m^3. The expected quantities of waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* for the long tunnel option are 4,579,586 m^3.

Noise

When executing the construction works under the Eastern Option G10.50 the expected exceedance of the regulated noise limits is up to 26 dBA for the left roadway and up to 29 dBA for the right roadway.

The expected exceedances for the Eastern Option G20 are up to 26 dBA, for Option G20 - Blue and Red are up to 29 dBA, and for the long tunnel option - up to 29 dBA.

During the operation the expected exceedance over the regulated limit values for noise levels for the Eastern Option G10.50 are up to 13.0 dBA. The expected exceedance for Option G20 – red are up to 16 dBA, for the eastern Option G20 - up to 14 dBA, for the long tunnel Option – up to 16 dBA.

Health Assessment

During the construction period, routine risks are to be expected, as associated with road construction activities - uncoordinated emissions, excessive noise levels due to the operation of construction machines and traumatised species by unintentional operation or

unexpected emergency situations. If implementing all personal protective equipment and guidelines, as detailed in the Health and Safety Plans, no inadmissible impact is expected. Temporary exceeding of the noise levels is also expected, as a result of the traffic of heavy trucks for the construction on the territory of the town of Simitly.

Continuous impacts shall be expected during the operational phase, upon the residents in the vicinity of the route in the town of Simitly, which is expressed in exceeded noise elevations of up to 13 dBA. The traffic, affecting the residential area, is divided by directions into different routes, which reduces the impact on the residential areas.

'LONG TUNNEL OPTION', 'KRESNA' TUNNEL, Stage of Conceptual Design, 2015;

The beginning of the project area is km 376 + 000 at road junction Krupnik.

The beginning of the project area is km 376 + 000 at road junction Krupnik. The existing road junction for Krupnik and Chernice is located between the two rivers. Between the two rivers is situated the existing road junction for Krupnik and Chernice. The passing though the 'Kresna' tunnel is from km 379+267.015 to km 394+605.00/left tube and from km 379+255 to km 394+600 - right tube. After the exit of the Kresna tunnel, the motorway crosses an existing third-class road and the Struma River with a bridge and immediately afterwards the construction of road junction Kresna.

This Option is divided in road and tunnel part, whereas for each one a separate project is designed.

The route begins at road junction Krupnik with a motorway (road) section (of overall dimensions G29). The beginning of the section is at km 376+000, end of sections, at km 379+225 north portal, right roadway of the Kresna tunnel, km 379+267.015 North Portal, left roadway of the Kresna tunnel.

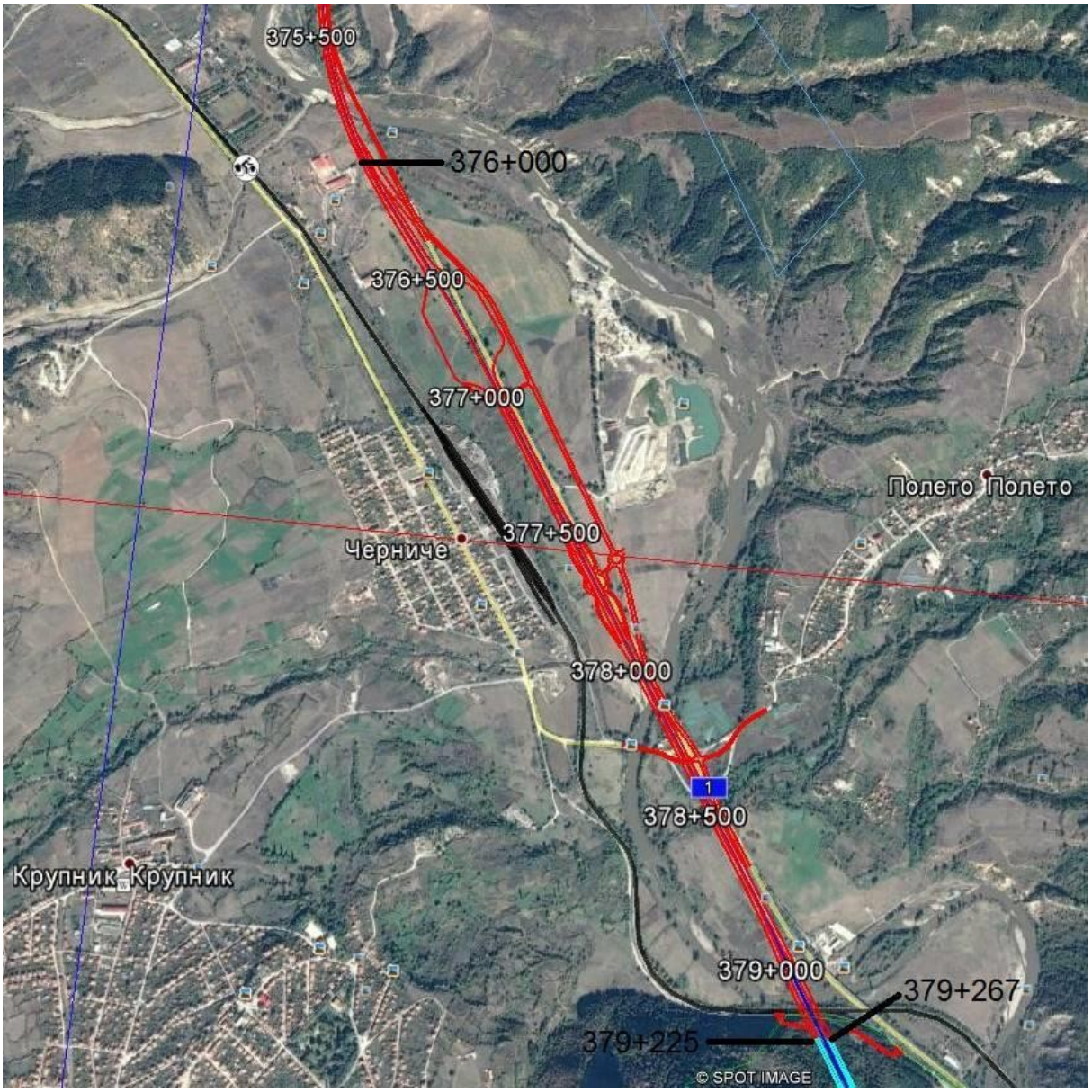

Figure No. II.1-5. Situation of road part, km 376+000, end of sections km 379+225 north portal, right roadway of the Kresna tunnel, km 379+267.015 north portal, left roadway of the Kresna tunnel

Large facilities

- Support wall from km 376 + 000 to km 376 + 080, L = 80 m;
- Support wall from km 376+920 to km 377+000, L = 80 m;
- Underpass at km 379 + 000, L = 9 m;
- Bridge over Krupnik road junction, km 377 + 700, L = 100 m;
- Support wall from km 378 + 000 to km 378 + 060, L = 60 m;
- Bridge over the Struma river, km 378 + 195, L = 132 m;
- Support wall from km 378 + 190 to km 378 + 220, L = 30 m;
- underpass on the road Brezhani - Krupnik, km 378 + 340, L = 10 m;
- Bridge over the Rezena, km 378 + 520, L = 72 m;
- Support wall from km 378 + 540 to km 378 + 840, L = 300 m;
- Support wall to road E79, L = 160 m;
- Bridge over the Struma river, railway line Sofia - Kulata, km 379 + 000, left roadway L =

330 m, right roadway L = 297 m;

Small facilities

- Rectangular drain culvert 200/200 at km 376 + 140;
- Rectangular drain culvert 200/200 at km 376 + 330;
- Rectangular drainage 200/200 at km 376 + 710;
- Rectangular drain culvert 200/200 at km 377 + 250;
- Rectangular drain culvert 200/200 at km 377+810;

Recreation sites

- Recreation sites, 2 facilities. - km 376 + 420 to km 376 + 920

After the bridge facility on the Struma river, the road route passes through a tunnel of length
15.4 km. The Kresna tunnel has been designed as a double tube tunnel with the possibility of evacuation in the second tube of the tunnel through transverse connections. The tunnel is located in the mountain areas, and its parameters correspond to a design speed of 120 km/h.

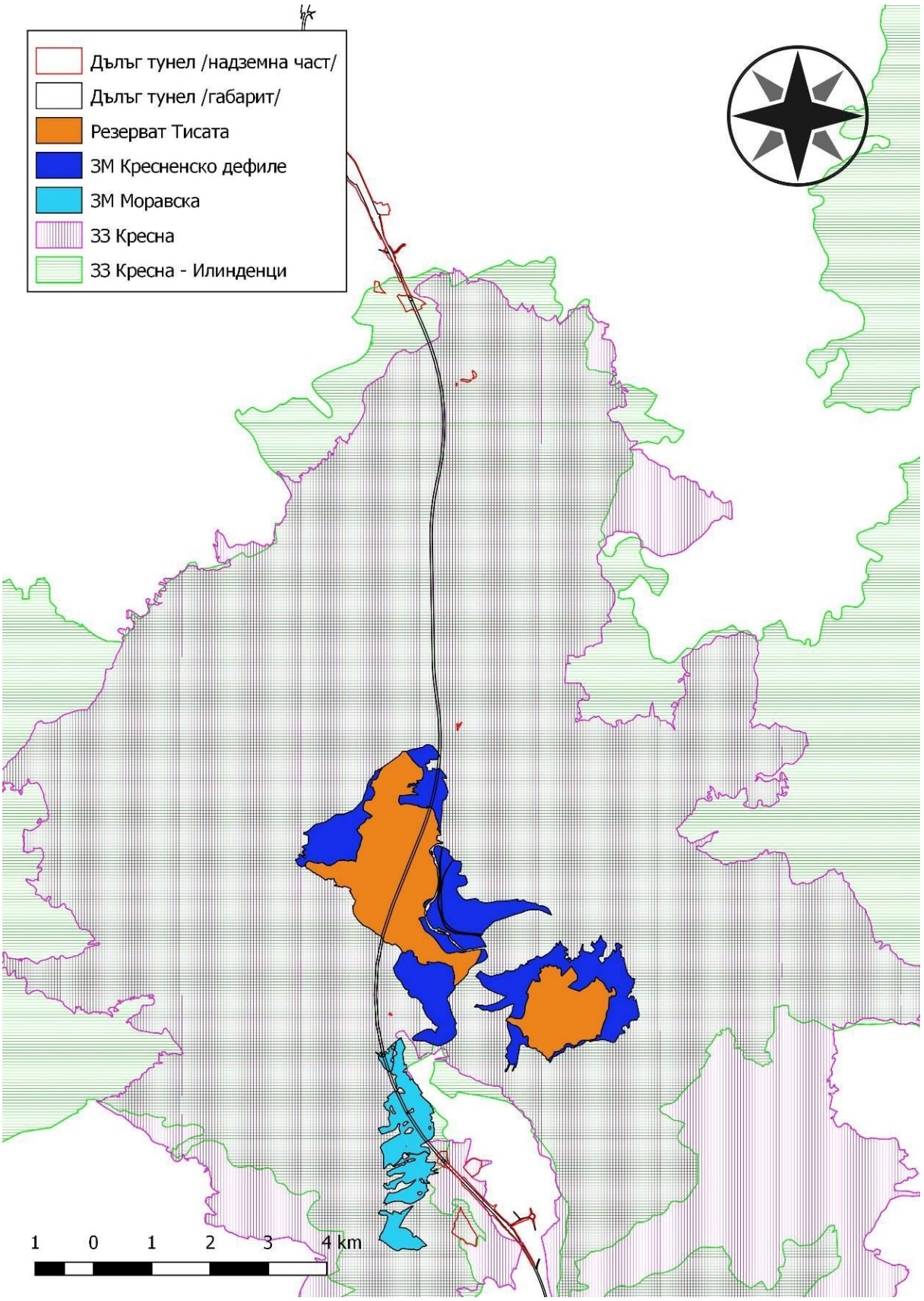

Figure No.1-6. *Situation plan of the Long Tunnel Option*

We have enclosed a situation plan of the project route, **a long tunnel option**, upon a topographic map in scale M 1:5000 - Appendix No.6 and 6a in ".*shp" format.

The main elements of the tunnel project are:

- gates/portals and pre-portal sites;
- permanent access roads to the portals;
- two tunnel tubes;
- intermediate access roads for the digging of tunnel;
- permanent ventilation tunnel;
- the construction sites and the sites for permanent and temporary waste disposal.

The total length of the tunnel and mileage of the portals shall be as follows:

Right tunnel tube (Km distance)		
North portal	End of portal – beginning of tunnel	379 + 205
	Tunnel for traffic - the beginning of the tunnel for traffic	379 + 227
South portal	Tunnel traffic portal - end of the tunnel for traffic	394 + 605
	End portal – End of the tunnel	394 + 625
Left tunnel tube (Km distance)		
North Portal	End of portal – beginning of tunnel	379 + 243
	Tunnel for traffic - the beginning of the tunnel for traffic	379 + 265
South portal	Tunnel traffic portal - end of the tunnel for traffic	394 + 600
	End portal – End of the tunnel	394 + 620
Total tunnel length [m]		
	Right tunnel tube	15 420,0
	Left tunnel tube	15 377,0
Length of the traffic section[m]		
	Right tunnel tube	15 378,0
	Left tunnel tube	15 335,0
Length of sections under the open-cut method [m]		
North portal	Right tunnel tube	22,0
	Left tunnel tube	22,0
South portal	Right tunnel tube	20,0
	Left tunnel tube	20,0

The project is divided into a Structural and Technological part.

The Structural part of the project contains the following components:

- north and south portal;
- access road to the ventilation tunnel at km 386+664.986;
- Double tunnel tube;
- crosswise connections;
- Drainage of the tunnel and the pavement of the tunnel;
- road pavement and sidewalks;
- Ventilation installations with technology centres on the Northern portal a the Southern portal;

- Cable routes at the North and South portal;
- fire fighting installation and water supply;
- external power supply;
- Access road at km 380+745.688;
- Access road at km 392+009.286.

The technological part of the project contains the following components:

- Electrical systems of the tunnel;
- tunnel management and control system;
- tunnel ventilation;
- tunnel lighting;
- SOS cabins;
- radio broadcasting and radio traffic;
- fire alarm;
- tunnel security system;
- tunnel transformer station;
- grounding system.

In its full length, the Kresna Tunnel shall be constructed under the classical tunnelling method with drill-blasting and reinforced concrete lining. 22 m long sections at the portals, respectively at the north and 20 m long at the southern portal will be executed by the open-cut method.

The Kresna Tunnel will be excavated from the two main tunnel portals (North and South Portals) and **from the intermediate access** (windows) **at km 380 + 745, km 386+664 and km 392+009**. The excavation of each tunnel tube will be carried out from eight faces.

After the „Kresna“ tunnel the road continues with a motorway (road) section (width G29). The beginning of the road section is at km 394 + 605 South portal, the right roadway of Kresna tunnel, km 394 + 600 South portal, left roadway of the Kresna tunnel.

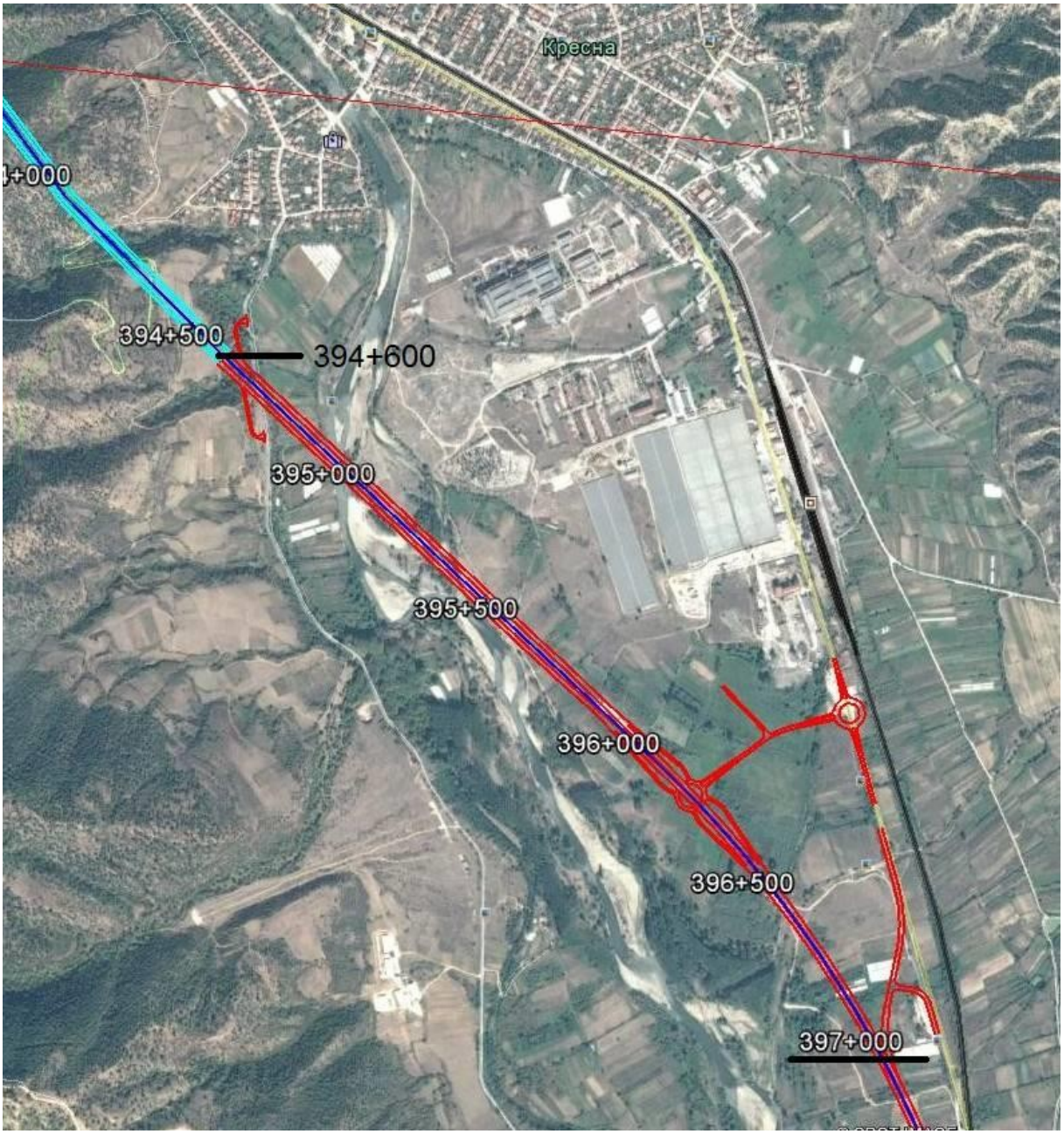

Figure No. II.1-7. Situation of the road section, km 394 + 605 south portal, right roadway of Kresna tunnel, km 394 + 600 south portal left roadway of tunnel Kresna, end of route 397 + 000, where it enters Lot 3.3.

Large facilities

- Bridge over a gully, Kresna road - Slivnitsa, km 395 + 030, L = 396 m;
- Agricultural underpass, km 395 + 830, L = 8 m;
- Kresna road junction, km 396 + 232, L = 132 m;
- Bridge over gully, km 395 + 590, L = 78 m;

Small facilities

- Rectangular drain culvert 3x250 / 450 at km 394 + 660;
- Rectangular drain culvert 3x250 / 450 at km 395+785;
- Tubular culvert of diameter Ø150, at km 396 + 080;
- Tubular culvert of diameter 100 mm, at km 0 + 485, toward road junction Kresna;
- Tubular culvert of diameter 100 mm, at km 0 + 120, toward Kresna road junction;
- Tubular culvert of diameter 150 mm, at km 396 + 340;

- Plate culvert L = 1.5 / 1.5 m, km 369 + 400;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 420;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 440;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 460;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 480;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 500;
- Plate culvert L = 1.5 / 1.5 m, km 369 + 520;
- Tubular culvert of diameter Ø 150, at km 396 + 740;
- Rectangular drain culvert 3x250 / 450 at km 396 + 893.

The project route ends at km 397 + 000, where it will be included in Lot 3.3.

Organization of implementation of the long tunnel option

Description of the accepted method of construction

The project provides for the excavation of the Kresna tunnel to be carried out under the New-Austrian Tunnelling Method (NATM), through drilling-blasting works and reinforced concrete lining. The stages of this method are:

-Excavation by drilling-blasting or tunnel excavator, removal of excavated masses;

-reinforcement of arches with anchors and steel frames;

-making of primary tunnel panelling, made of sprayed concrete;

-waterproofing;

-making of secondary tunnel panelling, made of reinforced concrete;

-draining and other finishing works.

Between the two tunnel tubes, escape passageways shall be made for people in the tunnel and for immediate access of the emergency teams in an emergency.

After the construction of the reinforced concrete structure of the tunnel and the portals begins the staged construction of tunnel installations:

-electrical system;

-ventilation system;

-lighting system;

-fire extinguishing;

-Control and Management System – video surveillance, light signalization for traffic management, fire alarm, radio broadcasts, etc.

After making the shafts and conduits, the bottom of the tunnel shall be filled with crushed stone and the traffic roadways will be built.

Intermediate access at km 380+745:

The construction of an access passage stems from the need to accelerate the construction of the Kresna Tunnel. Intermediate access will be used to transport the excavated material outside the tunnel and to deliver materials to the tunnel. After completion of the construction, the access will be closed and will not be used any further.

For intermediate access, power supply must be provided, as well as water supply for process water. The design provides for the existing power supply line, situated nearby, at a distance of approximately 200 m to be the power supply to the portal. The Struma River shall be the water-source for process water through a pipeline of approximate length 30 m.

30 m.

During the construction, there will be restrictions on the traffic rules on the existing E-79 road due to the movement of construction equipment.

The pre-portal platform for intermediate access shall be situated partially on the old route of road E-79, which currently is not used for traffic, but as a by-pass for the existing road tunnel.

Intermediate access at km 386+664 with ventilation tunnel:

The construction of an access passage stems from the need to accelerate the construction of the Kresna Tunnel. Intermediate access will be used to transport the excavated material outside the tunnel and to deliver materials to the tunnel. Upon the completion of construction, the access passage shall be used as a permanent horizontal ventilation tunnel.

For intermediate access, power supply must be provided, as well as water supply for process water. The project provides for the power supply to the portal to be the existing power line, which is located on the other side of the Struma river, at approximately 125 m. Water supply for process water shall be provided from the Struma river, through a pipeline of approximate length 124 m.

During the construction, there will be restrictions on the traffic rules on the existing E-79 road due to the movement of construction equipment.

The portal for intermediate access shall be the existing rest area on road E-79.

Intermediate access at km 392+009:

The construction of an access passage stems from the need to accelerate the construction of the Kresna Tunnel. Intermediate access will be used to transport the excavated material outside the tunnel and to deliver materials to the tunnel. After completion of the construction, the access will be closed and will not be used any further.

For intermediate access, power supply must be provided, as well as water supply for process water. The project provides that the power supply to the portal will be the existing power line, located at approximately 125 m. The project also provides to use as a source of process water the Dryanovska river, through an approximately 124 m long pipeline.

During the construction, there will be restrictions on the traffic rules on the existing E-79 road due to the movement of construction equipment.

Long tunnel operation

The operation of the Kresna tunnel, including the technological parts (ventilation, lighting, etc.), is planned to be managed by a control center, located near the village of Cherniche (north of the Kresna Gorge). Using the IT system, the central control system shall be connected with the technological centres, located on the northern and southern portal of the Kresna tunnel, from which it will also be possible to control the tunnel's work.

The long tunnel option passes through the municipalities of Simitly and Kresna - district of Blagoevgrad.

RECONSTRUCTION OF EQUIPMENT OF OTHER AUTHORITIES

Reconstruction of 110 kV Power lines

- From km 378 + 840 to km 379 + 100 Overhead Power Lines, 110kV 'Granite'
- From km 379 + 900 to km 380 + 900 Overhead Power Lines 110kV 'Granite';

Reconstruction of Electrical power lines up to 110 kV

- Km 376 + 040 overhead power lines, 20 kV, 'Tunela';
- From km 376+000 to km 376+200, Oranovo Mine two 20kV cables for steel pillars of overhead power lines;
- Km 376 + 308 overhead power lines 20 kV, 'Tunnela';
- Km 378 + 000 overhead power lines, 1 kV;
- From 378 + 200 to km 378 + 230 overhead power lines, 1 kV;
- Km 378 + 460 overhead power lines, 20kV, 'Defile';
- Km 378 + 520 Cable deviation from the overhead power lines 20kV, 'Defile';
- Km 378 + 323 overhead power lines, 20kV Shaft;
- From km 395+480 to km 395+720 overhead power lines 20kV 'Chugun' and overhead power lines 20kV 'Perun; overhead power lines 20kV „Leyar“ and „Morava“;
- From km 396+508 to km 396+514 overhead power lines 20kV 'Chugun' and overhead power lines 20kV 'Perun'; overhead power line 20kV 'Leyar' and 'Morava';
- Km 395 + 724 overhead power lines 20kV 'Slyvnitsa', 'Goreme'.

Power supply cables and lighting lines

- From km 397 + 400 to km 397 + 700 underground cables of the National Railway Company (NRC).

Existing water supply lines and sewer collectors, falling within the reach of the roadway

- km 378 + 207 - potable-water pipeline.

Irrigation pipelines and drainage channels

- From km 375 + 775 to km 377 + 311 - existing drainage channel;
- From km 394 + 670 to km 394 + 773 - existing irrigation channel;
- From km 395+635 to km 395+785 -existing irrigation channel;
- Km 397+332 - existing internal irrigation pipeline, made of PVC, diameter 160 mm;
- Km 395 + 000 - correction of berms, protective dikes and gabions - parts of the correction of the Struma river - sites for protection against the harmful effects of water;
- Km 395 + 465 - correction of berms, protective dikes and gabions - parts of the correction of the Struma river - sites for protection against the harmful influence of water.

Crossings and convergence of the Struma Motorway with gas supply and gas transmission facilities of Gas transmission companies

- Km 378 + 006 - underground gas pipeline;
- Km 378 + 712 - optical cable in the channel network;
- Km 378 + 435 - underground gas pipeline (execution pending);
- Km 379 + 000 - underground gas pipeline;
- Km 379 + 070 - optical cable in the channel network;
- Km 395 + 790 - gas pipeline;
- Km 396 + 770 - gas pipeline.

Reconstruction of communication cables

- From km 372 + 200 to km 378 + 280, copper and fibre optic cables;
- Km 378 + 690 - copper cable;
- Km 378 + 690 - optical cable;
- Km 378 + 800 - optical cable;
- Km 379 + 160 - Copper and Optical Cables;
- Km 390+460 - optical cable;
- From km 372 + 200 to km 378 + 280, copper and fibre optic cables;

- Km 391+620 - optical cable;
- From km 394 + 700 to km 394 + 780 - copper and optical cables;
- From km 397 + 500 to 397 + 600 - copper cables;

Summary of the expected impact on components and factors of the environment (air; surface waters; ground waters; bowels of the earth; waste; noise) and human health from the EIA

Ambient air

The carbon dioxide equivalent amount of greenhouse gases for the Long Tunnel Option during construction is 1,500 tons equivalent CO_2 per year. The estimated volume of blasting works for the tunnels shall be approximately 7,560 tons of blasting powder.

During the operation, the impact significance for the Long Tunnel Option of Lot 3.2 of the Struma Motorway shall be Significant. High significance of the impact in Part I Simitly – Krupnik with 'Kresna' tunnel in Lot 3.1 / Lot 3.2 of the Struma Motorway – long tunnel option. During the operation of the highway the impact rate shall be very high in the residential areas (medium sensitivity receptors) around the Road E79 from the 'Dalgata' residential area, town of Simitly. Low significance of the impact in part III Kresna – Slyvnitsa with 'Kresna' tunnel of Lot 3.1 / Lot 3.2 of Struma Motorway – in the long tunnel Option.

The carbon dioxide equivalent amount of greenhouse gas emissions for the Long Tunnel Option in the time of operation shall be **23,259** tonnes of equivalent CO_2 per year.

Surface waters

This option has the most significant impact on the quantitative and possibly on the chemical condition of surface waters.

Surface waters can be impacted quantitatively by redistribution of the groundwater drainage location on the right side of the water catchment area of the Struma river - from a distributed along the river in natural conditions to a point discharge of the drained waters at the beginning and the ending of the long tunnel. It is chemically impacted by discharging the waters from the tunneling and by changing the composition of the drainage discharge waters (ground waters change its drainage pathway and are also presumed to change their composition for an extended period of time).

This Option has the maximum impact on the waters during the construction of the facility. In addition to the main entrances to the tunnels, additional intervals are provided at km 380 + 745, km 386 + 664 and km 392 + 009 and a total of 16 outlets, from which waste water will be produced and additional water quantities will be required for technological needs.

No Sanitary Protection Zones (SPZs) in the vicinity of the surface water sources of potable water-supply shall be affected.

This option will have impact on two areas with potential flood risk - in the beginning of the village of Krupnik and in the end - at the town of Kresna.

Ground water

This option has the most significant impact on the quantitative and possibly on the chemical condition of surface waters.

Their quantitative status is influenced by a change in the movement path, respectively a change in drainage conditions.

In chemical respect, the change in groundwater composition is a consequence of changing their pathway and the occurrence of oxidation processes due to the drying of the mountain area, which, with the available information on hydrothermally altered zones, also implies this change in their composition.

There is no information on the composition of groundwater. There are indications of the presence of radioactivity (in the water of one sample, submitted to such analysis). Geological conditions imply the existence of hydrothermally altered zones, which are frequently related to the presence of ore mineralization (there is information about the ore deposit of
'Breznitsa' and for the presence of sections with increased radioactivity levels, associated with the presence of uranium mineralization).

This Option does not affect any Sanitary Protected Zones (SPZs) near underground water sources of potable water-supply or near sources of mineral waters.

The Earth bowels

This Option, regardless of its design phase - Conceptual design, is not recommended for implementation. The designer has himself assessed the project as lacking the necessary primary information for the design of the facilities and has also expressed doubts about the quality of the information. The study has established the existence of hydrothermal zones, which are considered as bearing ore mineralization - for example Breznica. Additionally, in one of the water samples (only one sample was taken for such analysis) was determined the presence of elevated values of radioactive elements. The presence of such waters is also associated with the mineralization of radioactive elements.

The above would cause issues with the deposition of these contaminated materials - with ore mineralization, including radioactive mineralization.

Waste

The expected quantities of generated waste during construction -
earth and rock materials *that do not meet the project design specifications for incorporation into construction* for the Long Tunnel Option, shall be 4,579,586 m^3.

The excavated earth and rock materials in the long tunnel option, which do not meet the project design specifications, the results of the conducted studies of the dose of gamma radiation and the analysis of the specific activity of natural radionuclides show values, which are two or three times higher than the background ones and the excavated earth and rock materials may not be used for construction works.

The large content of natural radionuclides in these rock quantities will pose a serious risk for the implementation of the Long tunnel Option and will require pre-construction of a special landfill for disposal of rock materials. Such a landfill can be built after the adoption of an EIA decision for the landfill itself and may be commissioned upon issuance of a Complex Permit.

For comparison, the expected quantities of the waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* of Option G20 – Red amount to 262,688 m^3 and for Option G20 - Blue shall be
1,192,402 m^3, for Eastern Option G10.50 - 1,856,432 m^3, for Eastern Option G20 are 2,936 137 m^3.

Noise

When executing the construction works under the Long Tunnel Option, the expected limit exceedance of the regulated noise limits will be up to 29.0 dBA.

The expected exceedance for Options G20 - Blue and Red shall be up to 29 dBA, for the Eastern Option – up to 26 dBA. The expected exceedances for Eastern Option G10.50 - up to 26 dBA for the left road lane and up to 29 dBA for the right road lane.

During the operation of the highway, the expected exceedance over the regulated limit values for noise levels in the Long Tunnel Option shall be up to 16.0 dBA. The expected exceedances for Option G20 - Blue and Red are up to 16 dBA, for the Eastern Option G20 - up to 14 dBA. The expected exceedance for the Eastern Option G10.50 - up to 13

dBA

Health Assessment

Construction works in the construction of the 'long tunnel option' will present serious health risks to the workers on the site for the following reasons:

- The geological structure poses the risk of manifestation of 'geological surprises,' including probable collapses and landslides during the construction of the tunnels, which may lead to many casualties among the construction workers;

- The available data of high values of radioactive substances in drained water, obtained during the monitoring of the water in the area of closed down uranium mining sites – 'Simitly" and 'Senokos" or from some exploration sites, for example 'Brezhani", as well as from the exploration of the 'Kresna' tunnel (Long Tunnel Option), where one of the water samples has shown values, exceeding the limits for water radioactivity, indicate a potential risk of excessive radioactivity of the water in the region used for irrigation and household purposes; Radioactivity of the water in the area, used for irrigation and household purposes;

- The results of the studies on the dose rate of radioactive radiation and the analysis of the specific activity of natural radionuclides show values that are two to three times higher than the background ones.

The large content of natural radionuclides will pose serious risks for the full-shift workers during the performance of longer tunnel work as a consequence of their long-term exposure to the excessive radioactive radiation.

In the operational phase, the gravest risks for the health of the population are associated with:

- Emergencies and car crashes in the long tunnel installations that have a negative impact not only on the drivers and occupants of the vehicles, involved in the incidents but also on the others, passing through the tunnel due to the rapid concentration and spreading of toxic gases in the enclosed tunnel space;

- The maintenance of the life supporting parameters of the ambient air environment in the long tunnel requires fault-free operation of the ventilation system which depends on the power supply. Any blocking of the ventilation system (power system failure, terrorist attack or malfunction/failure) will result in very rapid depletion of the oxygen in the tunnel tubes, with consequent risks for the health and life of those, travelling through them at that point of time.

EASTERN OPTION G20, OUT OF THE KRESNA GORGE, Stage of Feasibility Study, 2016.

In connection with the meetings and consultations, held in 2016, under the updated Assignment

on the EIA scope and Terms of Reference, the RIA instructed the designer of the Eastern Option G10.50 to submit a technical solution for the project route, so that the two roadways (four road lanes) to be developed on a new terrain outside the Kresna Gorge for V = 80 km / h.

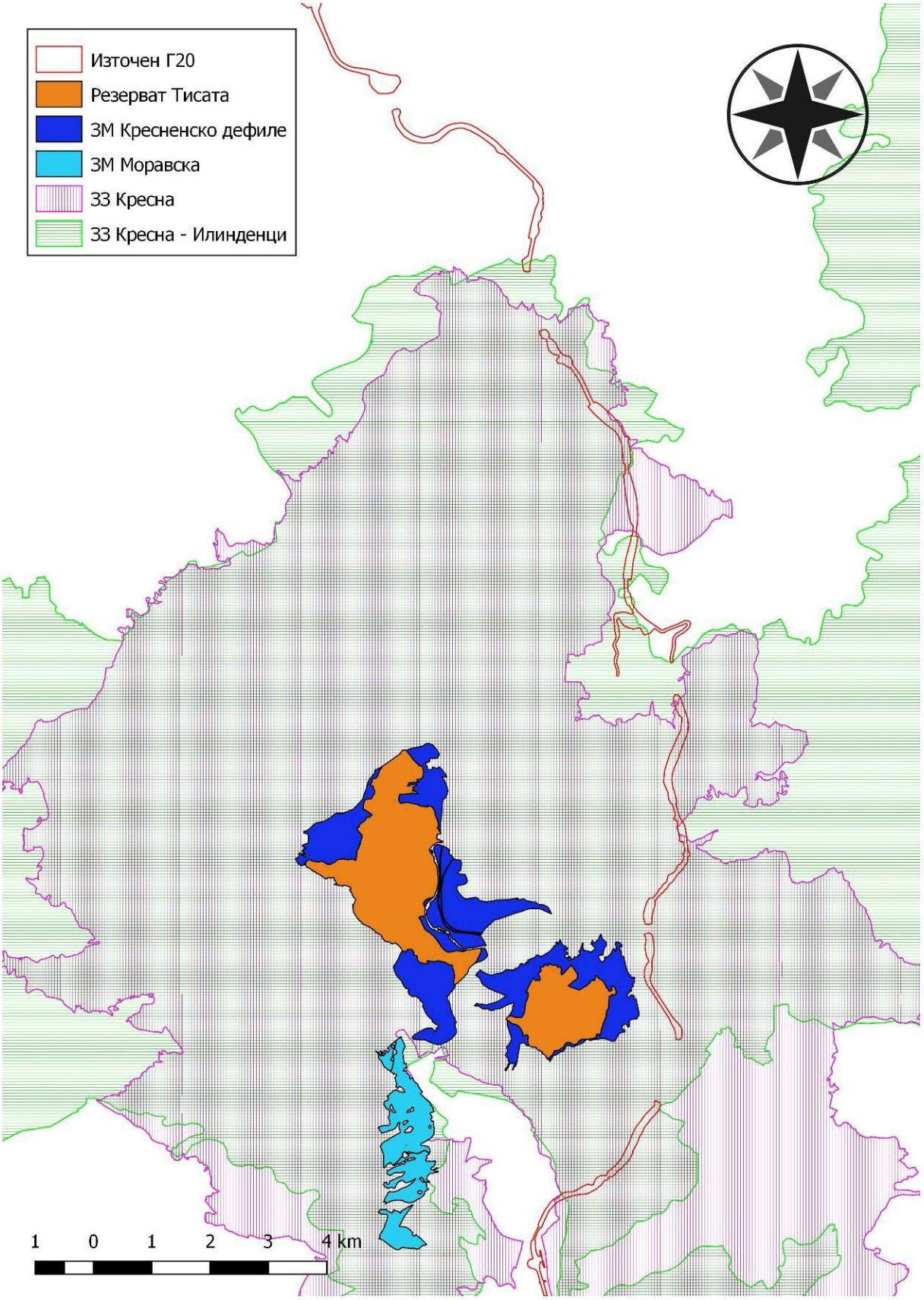

Figure No.1-8. Situation plan of the eastern option G20

We have enclosed a situation plan of the project route, **Eastern Option G20**, upon a topographic map in scale M 1:25000 - Appendix No.5 and 5a in ".*shp" format. The description of the project corresponds to the attached graphical part.

The project route starts at km 373 + 300. This Option will include a new track on a new terrain with overall dimensions G 20 with two roadways, two lane each, providing the two directions of traffic (from Sofia to the Hellenic Republic and from the Hellenic Republic to Sofia), in the eastern direction around the villages of Brezhani, Stara Kresna and Oshtava for $V_{des.}$ = 80 km / h.

Overall Dimensions G20.Traffic lanes

- 2 x 2 x 3.50 m;

- A third, slow-traffic lane:
  - *From 376 + 500 to km 385 + 200 - 2 x 3.00 m;*
  - *From 392 + 500 to km 399 + 100 - 2 x 3.00 m;*
- Guiding strips (asphalt concrete) - 2 x 0.25 m;

Banked earth base - 2 x 1.50 m;

Middle dividing strip - 1 x 2.00 m;

Trenches;

- Safety devices;
- Acclivities/slopes .

The two road lane shall be on a new terrain and will follow its peculiarities.

The level positioning of the motorway meets the following requirements:

- Compliance with the key technical parameters, corresponding to $V_{des.}$
- Providing smoothness and homogeneity of the highway route;
- Providing draining of the road bed and the adjacent territories;
- Ensuring the necessary overall dimensions and clearances, when crossing agricultural and other roads from the Republican road network, railway lines;
- Ensuring the draining/outflow of maximum water quantities from bridges on rivers and water obstacles;
- Providing optimum balance of the earth masses in the excavations and embankments;
- Position of the level at the optimum height

The road track begins at km 373 + 300 (100 m after crossing the railway line for Oranovo mine), to the left of the existing road to develop parallel to it up to km 373 + 600, then goes south-east, parallel to the Gradevska river, between the districts of the town of Simitly - Oranovo and 'Dalga' neighbourhood. At km 375+775, it crossed the road II-19 “Simitly – Predela – Gotse Delchev” on two levels, as a road interchange is created for a road connection of the Motorway to the town of Bansko and back. After the intersection of II-19 it enters into the slope, using a tunnel of L = 350 m and after it a viaduct of L = 200 m.

From km 376 + 500, it takes a south-eastern direction, bypasses the village of Poleto, at km 379 + 880 crosses the road Poleto - Brezhani, and at km 380 + 840, it crosses the flow of the Brezhanska river.

From km 378 + 000, the option takes a southeast direction, bypasses the village of Poleto, at km 379 + 500 crosses the road Poleto - Brezhani, at km 380 + 470 and the Rezena river.

This is followed by a 130 m long tunnel, whose track has undergone optimization and has a 4.35% longitudinal slope, improving the technical solutions for the tunnel and the viaducts around it.

In the section from 385 + 500 to km 389 + 800, this option develops in the south direction, west of Rakitna village, parallel to the Rakitna - Mechkul road, at about 383 + 900 it crosses the road, passes west of Mechkul village, continues to the south and east of the village of Stara Kresna at km 387 + 670, it crosses the road 'Stara Kresna - Oshtava', passing by a tunnel under the road.

From km 390 + 000 to km 396 + 000, this option continues to develop in the Southern

direction. From km 396 + 000 to km 399 + 800, the route goes Southwest, near the existing road to the village of Vlahi. At km 399 + 800 it will be included in the Red Option from 2015 (Bypassing the town of Kresna). The route ends at km 400 + 371.81 = km 397 + 000 of Lot 3.3.

At the points where the road route passes into a tunnel, a separate tube is envisaged for each roadway, which requires in turn an increase of the distance between them in order to secure the necessary distance between the tubes. Platforms are designed before the portals/gateways, which serve for the construction of the servicing infrastructure.

Due to the higher longitudinal slopes at the beginning and end of the track, in order to improve the throughput and to ensure safety, a third lane has been provided for slow-moving vehicles in both directions, in the following sections:

- From 376 + 500 to km 385 + 200
- From 392 + 500 to km 399 + 100

LARGE FACILITIES

x **Tunnels**

from	to km	length (m)
375 + 900	376 + 250	350
380 + 892	382 + 022	1130
387 + 820	389 + 010	1190
393 + 230	393 + 440	210
395 + 350	396 + 670	1320
TOTAL		***4,200***

Tunnelling will be carried out, based on the classic drill-and-blast method, with reinforced concrete facing. For shorter tunnels, ventilation and fire extinguishing equipment is not required, but only a lighting installation.

x **Bridge**

from km	to km	length (m)	Facility type
373 + 565	373 + 650	96	A bridge on the

x **Viaducts**

from km	to km	Length (m)	average height (m)
376 + 300	376 + 500	200	21.0
378 + 562	379 + 372	810	87.0
379 + 600	379+700	100	18.0
380 + 300	380 + 670	370	50.0
382 + 112	382 + 192	80	15.0
382 + 466	382 + 536	70	14.0
382 + 750	383 + 520	770	80.0
384 + 770	384 + 950	180	20.0
385 + 860	386 + 030	170	24.0
386 + 770	387 + 050	280	30.0
387 + 220	387 + 390	170	18.0
390 + 900	391 + 190	290	46.0
391 + 580	391 + 840	260	45.0
392 + 610	392 + 830	220	48.0
393 + 850	393 + 940	90	9.0
394 + 360	395 + 010	650	90.0

398 + 140	398 + 230	90	12.0
399 + 700	399 + 987	287	15.0
TOTAL		**5,087**	

- **Overpasses, underpasses, interpasses**

Kilometre distance	**Facility type**	**Length (m)**
373 + 835	Road	20
375 + 775	Road underpass on road II-19	38
379 + 500	Road overpass	36
384 + 520	Road overpass	36
389 + 060	Road overpass	36
390 + 745	AOP	70
391 + 315	AOP	70
392 + 320	Road	38
398 + 840	Road	15
399 + 055	Road	15
399 + 440	Road	20
TOTAL		**394**

- Supporting and reinforcing walls - average height (3-6.5 m)

from	**to km**	**length (m)**
377 + 925	377 + 975	50
TOTAL		50

- Reinforced embankment walls - average height (5-8 m)

from km	**to km**	**length (m)**
376 + 925	377 + 025	100
379 + 575	379 + 622	47
380 + 025	380 + 675	650
380 + 725	380 + 775	50
382 + 532	382 + 578	46
TOTAL		**893**

SMALL FACILITIES AND WILD ANIMAL PASSAGEWAYS

To conduct water from the gullies, drains and other low lands the construction of small facilities is projected - culverts. After the detailed drainage plan for the motorway has been prepared, the exact number and type of facilities for this purpose shall be specified, as required for the draining and outflow of the water quantities from the trenches and gullies to the most adequate places.

The selected livestock facilities have been inspected for the design maximum dimensional quantities of water that are likely to pass with a 1% provisioning in the reduced cross-section without allowing the flooding of dry paths.

For this purpose facilities are provided with the following openings:

-pipe culverts - of diameter 150 mm - 33 units.

-pipe culverts - of diameter 150 mm - wild animal facilities - 9 units.

Note: The pipe culverts, to be used as animal passageways shall only carry the water quantities from the ditch of the motorway, formed in rain, snow-fall etc. The water, passing through the culvert will not be much and it will not flow constantly, as during most of the year, the facilities will remain 'dry' and this will not obstruct the animal passage through them.

-rectangular drains

✓ Rectangular drain culverts 200/200 - 3 units.

✓ Rectangular drain 400/250 - 2 units.

✓ Rectangular culvert 200/200, animal facilities – 16 pcs.

✓ Rectangular drain culverts 300/250, animal facility - 2 units.

Note: Rectangular drain culverts that would serve as a passageway for wild animals shall be modified to provide dry passageways for wild animals and respectively - the water quantities passing through the facility shall be designed so that there would be no danger of flooding the dry passageway.

ROAD JUNCTIONS

The present design solution provides for two separate roadways, each providing for traffic in one direction.

This would require cross-connections between the two roadways on the existing roads and the arrangement of road junctions (or road connections on two levels) of the left roadway

✓ Road connection on the Mechkul - Brezhani road

✓ Road connection on the Mechkul - Rakitna road

✓ Road connection on the road 'Stara Kresna - Oshtava'

✓ Road connection on the Kresna - Vlahi village

ENGINEERING NETWORKS

The route implementation of the Struma Motorway in Lot 3.2 under this Option will affect the following engineering networks:

- Gas pipelines;
- Power lines
- High Voltage (HV) 20 kV;
- High Voltage (HV) 110 kV;
- water supply pipelines;
- cables;
- irrigation channels.

REHABILITATION OF MUNICIPAL ROADS

The following municipal roads will need to be rehabilitated, they also represent a cross-connection between the Struma Motorway and the road in the Kresna gorge:

- Road E 79 - Poleto - Brezhany;
- The Mechkul - Brezhany Road;
- The Road E79, from Stara Kresna to Oshtava;
- The Kresna - Vlahi Road.

The route of the Eastern Option G20 ends at km 400 + 400+371.81≡ km 397+000 from Lot 3.3.

The eastern Option G 20 will pass through the municipalities of Simitly and Kresna - district of Blagoevgrad.

RECONSTRUCTION OF EQUIPMENT OF OTHER AUTHORITIES/DEPARTMENTS /RECONSTRUCTION OF ELECTRICAL FACILITIES, 0.4 kV and 20 Kv **Electrical facilities 0.4 kV:** At km 379 + 000 and km 398 + 060;

20 kV Electrical equipment: At km 379+510 km 382+000 km 382+160 km 382+410 km 384+165 km 388+405 km 398+157 km 398+847 km 398+861 km 399+480 km 399+850 km 399+870 and km 400+085.

RECONSTRUCTION OF ELECTRICAL EQUIPMENT 110 kV and 400 kV

Verification of the vertical overall dimensions at the intersection of existing overhead power lines 400 kV and 110 kV, as follows:

'Pirin' 400 kV, Overhead Power Line: At km 378 + 430; km 379 + 950; km 380 + 000; km 380 + 050; km 382 + 500 and km 396 + 760

Overhead Power Lines 110 kV 'Granit': - at km 398+860

ELECTRICAL FACILITIES 0.4 kV and 20 kV

The project provides for the construction of power lines and cable lines, 20 kV and transformer stations 20 / 0.4 kV at the road junctions and the recreation site in the construction of the Struma motorway, Lot 3.2.

Construction of power lines 20 kV and CTP 20 / 0.4 kV at road junctions and recreation grounds

- Road junction „Poleto" at km 379+490
- Road junction „Mechkul" at km 384+260
- Road junction „Stara Kresna" at km 387+690
- Road connection 'Stara Kresna', at km 388 + 435
- Recreation site, town of Kresna, left road lane at 399 + 470

Lighting in the section of road junctions and recreation areas

The construction of street lighting is provided in the following places:

- Road junction „Poleto" at km 379+500
- Road junction „Mechkul" at km 384+265
- Road junction „Stara Kresna" at km 387+690
- Recreation area, left road lane at km 399 + 500

Reconstruction of communication facilities

- Reconstruction of optical cable at km 380+680
- Reconstruction of optical cable at km 384+270
- Reconstruction of optical cable at km 388+450
- Reconstruction copper cable at km 399+115
- Reconstruction of copper cable from km 399+840 to 400+608
- Reconstruction of optical cable from km 400+110 to km 400+538

Water supply pipelines

- Reconstruction of the existing water pipeline, of diameter 110 mm, made of PE from Brezhany to Poleto village - km 379+500
- Reconstruction of the existing water supply pipeline, of diameter 110 mm, made of asbestos cement for the village of Stara Kresna - 388 + 430
- Reconstruction of the existing water pipeline of diameter 150 mm to Slyvnitsa village at km 400 + 870

Irrigation channels

- km 399+125 – reconstruction of the main irrigation channel 'Left Pirin Railway Station'
- km 399+220 - reconstruction of the main irrigation channel 'Left Pirin Railway Station'
- km 399 + 580, reconstruction of the deviation of the main irrigation channel, 'Left Pirin Railway Station'
- km 399+552 - deviation of the main irrigation channel 'Left Pirin Station'

- from km 399+650 to km 399+715 - deviation of the main irrigation channel 'Left Pirin Railway Station'

PRESSURE IRRIGATION PIPELINES

Existing pressure irrigation pipelines, falling within the range of the roadway:

- Main irrigation pipeline, made of PVC, diameter 250 mm from km 398+476 to km 398+544
- Internal irrigation pipeline, of diameter 160mm, made of steel, at km 400+090
- Main irrigation pipeline, made of PVC, of diameter 280 mm, from km 400+260 to 400+400

GAS PIPELINE

- Reconstruction of the Transit Gas Pipeline to the Hellenic Republic at the intersection of km 390 + 170
- Reconstruction of the Transit Gas Pipeline to the Hellenic Republic at the intersection of km 399 + 240
- Reconstruction of the existing transit pipeline to the Hellenic Republic, diameter DN 700 and $P_{op.}$ = 5.4 MPa at km 400 + 130

Summary of the expected impact on components and factors of the environment (air; surface waters; ground waters; bowels of the earth; waste; noise) and human health from the EIA

Ambient air

The carbon dioxide equivalent amount of greenhouse gases for Eastern Option G10.50 during construction is 2,200 tons equivalent CO_2 per year. The estimated volume of blasting works for the tunnels shall be approximately 2,016 tonnes of blasting powder.

The significance of the impact for east Option G20 (two roadways) of Lot 3.2 of Struma Motorway during operation shall be significant. High significance of the impact in part I of Simitly – Mechkul' of Lot 3.1/Lot 3.2 of the Struma Motorway – Eastern Option G20 (two roadways). During the operation of the highway the impact rate shall be very high in residential areas (medium sensitivity receptors) of the residential areas 'Dalgata mahala' and Oranovo, in the town of Simitly. Low significance of impact in Part II, Stara Kresna - Oshtava in Lot 3.2 of Struma Motorway – Eastern Option G20 (two roadways). Low impact significance in part III of Oshtava – Kresna of Lot 3.2 of the Struma Motorway – Eastern Option G20 (two roadways).

The carbon dioxide equivalent amount of greenhouse gas emissions for the Long Tunnel Option in the time of operation shall be **25,332** tonnes of equivalent CO_2 per year.

Surface waters

The eastern option G20 is an analogue of the eastern option G10.50.

The difference is that it is entirely constructed on a new terrain. In fact, the notes made for the Eastern option G10.50 are also valid here, but with double weight because of the double lanes of the track.

This would concern the use of twice the amount of winter maintenance material, as well as larger quantities, compared to other options, due to the greater length of the track, double impact on the construction of viaducts and bridges.

No Sanitary Protection Zones (SPZs) in the vicinity of the surface water sources of potable water-supply shall be affected.

The Option concerns two areas with a potential flood risk - in the beginning of the town of Simitly and in the end - at the town of Kresna.

Ground water

The eastern option G20 is an analogue of the eastern option G10.50.

The difference is that it is entirely constructed on a new terrain. In fact, the notes made for the Eastern option G10.50 are also valid here, but with double weight because of the double lanes of the track.

This is particularly relevant in the case of sanitary protection zones, the use of double amounts of winter maintenance materials, as well as larger water quantities for tunnel cleaning, due to the longer road length, respectively the pairing of all tunnel excavations.

The Earth bowels

on an entirely new terrain, which is a prerequisite for activating negative geological phenomena, such as collapses, landslides, erosion enhancement and similar.

The option requires bridges over the deep gullies and river valleys, has not been studied and there is no evidence of the geo-technical situation. A range of anomalies can be expected.

The magnitude of the impact on the earth bowels is almost comparable to that of Long Tunnel Option

Waste

The expected quantities of generated waste during construction - earth and rock materials *that do not meet the project design specifications for incorporation into construction* for Eastern Option G20 shall be 2,936,137 m^3.

The expected quantities of waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* of Option G20 – Blue amount to 1,192,402 m^3, for the G20 - Red are 262,688 m^3, and for the Eastern Option G10.50 - 1,856,432 m^3. The expected quantities of waste, generated during construction - earth and rock material, *which do not meet the design specifications for use in the construction* for the long tunnel option are 4,579,586 m3.

Noise

When executing the construction works under the Eastern Option G20, the expected limit exceedance of the regulated noise limits will be up to 29.0 dBA.

The expected exceedance for Options G20 - Blue and Red shall be up to 29 dBA, for the Long Tunnel Option – up to 29 dBA. The expected exceedances for Eastern Option G10.50 - up to 26 dBA for the left road lane and up to 29 dBA for the right road lane.

During the operation, the expected exceedance over the regulated limit values for noise levels in the Eastern Option G20 shall be up to 14.0 dBA. The expected exceedance for Options G20 - Blue and Red shall be up to 16 dBA, for the Long Tunnel Option – up to 16 dBA. The expected exceedances for Eastern Option G10.50 - up to 13 dBA

Health Assessment

During the construction period, routine risks are to be expected, as associated with road construction activities - uncoordinated emissions, excessive noise levels due to the operation of construction machines and traumatised species by unintentional operation or unexpected emergency situations. If implementing all personal protective equipment and guidelines, as detailed in the Health and Safety Plans,

no inadmissible impact is expected. Temporary exceeding of the noise levels is also expected, as a result of the traffic of heavy trucks for the construction on the territory of the town of Simitly.

Continuous impacts shall be expected during the operational phase, upon the residents in the vicinity of the route in the town of Kresna, which is expressed in abnormal noise levels of up to 14 dBA and excess concentration of nitrogen oxides from the road traffic.

The description of the Contracting Authority's design solutions for 'Improving the route of Lot 3.2 of the Struma Motorway and the degree of information detail in the Impact Rate Assessment Report (IAR) corresponds to the level of the study and the design of the different options. The preparation of the assessments has adequately taken into consideration the design and construction specifications of the linear sites, as well as the information, available at the relevant time from the design of the different options of Lot 3.2 of the Struma Motorway, and also the information, provided by the Contracting Authority, including the data, agreed upon with the Contracting Authority.

When using a blasting method in tunnel works, the design sizing of drilling and blasting works shall be carried out according to the requirements of Appendix No. 7 of Art. 141 of the current Labour Safety Regulations for blasting works, so as to prevent any negative impact (seismic impact, flying off and spread of rock throw-out) on people, buildings, facilities, infrastructural sites and others. Running tunnel excavations with drilling and blasting works is characterized by the use of minimum blasting volumes - about 100 kilograms of total weight for a section of about 35 m^2 in hard rocks. Given the fact that the explosion is carried out in at least 10 stages of delay, the burst quantity in one stage of delay per millisecond delay is no more than 10
kilograms. To determine the seismic impact of an explosion, only the amount of blast, initiated in one stage of millisecond delay, is taken into consideration.

Subject to the provisions of the Road Act, the scope of the road is the area, on which the roadway / road bed/ and the restricting boundary strips are located on both sides, together with the airspace above it at a height, defined by the Road Design Standards. The width of the road range outside the settlements and within the urbanized areas with unregulated adjacent terrains will be determined by the road design. The road facilities and sites, belonging to the road are included in the scope of the road, except for the maintenance sites of the national road network, the facilities for power supply and lighting and their adjacent areas and the snow protection facilities; these can be located outside the scope of the road.

Sites for storage of earth and rock material

Because of the nature of the construction, it will be expected to generate certain
certain quantities of earth and rock materials that do not meet the design specifications for use in the construction of Lot 3.2, in respect to which, storage sites were explored and proposed.

The Long Tunnel Option has provided for the location of preliminary storage sites for earth and rock materials, a site at the northern gate, comprising 19.947 decares and two sites at the South Portal, comprising 63.650 decares and 138.977 decares.

Another two storage sites have been proposed for earth and rock materials (which will be used for the construction of Lot 3.1 and Lot 3.3 of the

'Struma' Motorway), as follows: A site in the land of the village of Zheleznitsa with a capacity of 4,500,000 m^3, total area of 454.780 decares and a site on the territory of the village of Ilindentsi with a capacity of 1,500 000 m^3, total area of 123,686 decares. These two sites are not presently existing, are not used for the storage of earth and rock masses.

During the construction of Lot 3.2, the existing roads of the National Road Network, the existing municipal roads, the existing forest, field and agricultural roads will be used. Also, the route under construction will be used. Should it become necessary during the construction of Lot 3.2, that new access roads be built, the competent environmental authority should be notified and the environmental legislation implemented accordingly.

2. A description of the features of other plans, programs and projects / investment proposals, existing and / or in the process of development or approval, which, in combination with the assessed investment proposal, may have adverse effects on the protected zones

According to the Ordinance on Compatibility Assessment, 'cumulative impacts' are impacts upon the environment, which result from the increase of the effect of the evaluated plan, program and design/project / investment proposal when it is added to the effect of other past, current and / or expected future impacts, regardless of the implementing entity. Cumulative impacts may be the result of individual plans, programs and designs/projects / investment proposals of insignificant impact, if considered separately, yet of significant impact, considered jointly, and implemented in a number of instances, within a certain period of time.

According to the reports of the Ministry of Environment and Water and the Regional Inspectorates of Environment and Water of Blagoevgrad, as well as the information on their web-pages, 109 investment proposals, plans, programs or projects have been addressed in the two protected zones until November 2016 (Table 2-1). Excluded are duplicates or those whose procedure is terminated.

Two IPs - for WWTP on the Struma river and modification of the MWPS on the Vlahi river (IP29 and 109

- the numbers correspond to those in Table 2-1) were not approved and one investment proposal (IP98) was terminated in 2017. Two investment proposals - for MHPPs in the village of Gradevo and Photo-voltaic plant in the village of Ilindentsi (IP34 and 68) are outside the boundaries of the protected zones and could not have an impact on them. Five investment proposals are duplicated - after approval by the competent authority, they have not been implemented, and for the same areas in later periods have been launched and, in most cases, approved other investment proposals. In the analysis of the cumulative impact, the later procedures have been taken into account. For IP18 this is IP20, for IP 28 - IP109 (which is not approved) and for IP 60, 70 and 77 - IP105.

Eight procedures are for forest management projects (FMPs) or changes to those that do not generally change the character of habitats (according to the relevant decisions). No cumulative effect is expected.

Investment proposal No.2 is for reclamation of an existing landfill, which improves the nature of the terrain. No cumulative effect is expected.

The RMP (Regional Master Plans) for water and sewerage systems are four, and provide for improved water supply and sewerage, including the quality of surface waters. No permanent impacts on the natural habitats and species subject to conservation in the Protected Zones are expected (according to the decisions) and however future investment proposals, related to these plans are subject to separate procedures. No cumulative effect is expected.

With reference to the construction of the tunnel option, a geological survey has been approved, which will only have impacts in certain points (from the drilling) and temporary effects (from the trampling/rolling of the surface, caused anxiety to certain species). No cumulative effect is expected.

The reconstruction of the Radomir - Kulata railway line has no direct impact on the natural habitats and habitats of the species, which are subject to conservation in the protected zones - no new construction works will be carried out within the boundaries of the two protected zones, only reconstructions. Anxiety will not increase with rail transport as there will be no significant increase in traffic and speed. By implementing the relevant measures (under both projects), the risk of mortality and the barrier effect will be lower than the current one. Negative cumulative impact is not expected.

No impact is expected from the RBMP in the West Aegean River Basin District (WARBD) for the period 2016-2021 within the boundaries of the Protected Zones (according to the decision), and any further IPs, related to this plan shall be subject to a separate procedure. No cumulative effect is expected.

All objectives of the RBMP in the WARBD for the period 2016-2021 are aimed at protecting the water bodies. In addition, future investment proposals, related to this plan shall be subject to a separate procedure. Negative cumulative impact is not expected.

Four investment proposals (IP17, 19, 20 and 21) are for the extraction of inert materials from the Struma river. IPs were approved in 2007, and have either not been implemented until the moment or the affected areas have been restored in their original state. No cumulative effect is expected.

Five investment proposals do not directly affect natural habitats (where they are within the boundaries of Kresna - Ilindentsi Protected Zone), as well as habitats of species, subject to conservation in Protected Zone (IP46 - Photo-voltaic plant in the place of the existing warehouse, IP 49 - a shaft/well in an existing gas station, IPs 74 and 91 - a plant for wooden chips and a kindergarten in regulated land plots, IP76 - a site for a crushing and sorting plant in a built-up area). No cumulative effect is expected.

Twenty-four investment proposals do not affect natural habitats, subject to conservation in the PZs (where they are within the boundaries of the Kresna - Ilindentsi PZ) and do not change the nature of terrain as a habitat of animal species (IP27, 54, 90 - buildings within the boundaries of
courtyards; IP39, 81, 89, 94, 97, 102, 104, 105, 106, 107 - orchards / vineyards in the place of fields; IP40, 82 - temporary / portable constructions in coniferous vegetation and ruderal terrains around existing roads; IP42 - retaining wall on the Breznishka river; IP43 - location of mobile asphalt mixer in a highly ruderal location; IP44, 45, 47, 73 - Photo-voltaic plant in highly ruderal terrains and intensively cultivated fields; IP67 - building of a residential building in a field; IP92, 93 - fish-ponds in existing ponds). No cumulative effect is expected.

Nine investment proposals do not directly concern natural habitats (where they are within the boundaries of the Kresna - Ilindentsi Protected Zone), as well as habitats of species, subject to conservation in the Protected Zone, also affected by the Struma Motorway (Investment Proposals with numbers 22, 23, 26, 33, 36, 37, 38, 72, 95). IP22 and 26 (MWPS on the Nevrazumska river and the Oshtavska river) were not implemented (approved in 2007 and 2008, respectively). The buildings of the plants are in the place of a collapsed building and in the
coniferous vegetation. The water catchment devices are of the alpine type, the pipelines and electric cables are underground types, in the easement of existing forest and field roads. The ecological minimum has been ensured in the catchment areas until their collaring and discharge. No cumulative effect is expected.

IP35 (MWPS Komatinitsa-Manastira) is in such procedure since 2008. Only the

catchments and pipelines are comprised within the boundaries of the protected zones and the latter shall be restored as habitats of species, protected in the PZs. The Investment Proposal does not directly affect the natural habitats, influenced by the Struma Motorway. No cumulative effect is expected.

The Master Plan of the municipality of Sandansky within the boundaries of the Protected Zone provides for development zones in the place of existing ones - existing yards around the village of Ploski, as well as the adjoining sporting grounds of the village. No cumulative effect is expected.

The Municipal Plan of Development (MDP) of Simitly municipality is a framework document, outlining a sequence of specific actions, set out in other documents of the same order (e.g. RBMPs), the specific activities being evaluated in the relevant documents. investment proposals, deriving from the Municipal Plan of Development (MDP) are subject to a separate procedure with greater specificity. No cumulative impact can be expected.

Of the other investment proposals (IPs), plans, programs or projects that may have cumulative effects along with the current investment proposal, 29 concern the Protected Zone-Kresna-Ilindentsi and
22 have reference to the Protected Zone Kresna (IP24 and 79, as well as IP50 and 51 are considered together due to their apparent connection). These are discussed in section 5.2.

Table 2-1: Other investment proposals (IPs), plans, programs or projects that may refer to the Protected Zone 'Kresna-Ilindentsi' and Kresna Protected Zone.

No.	Document No.	Stage	Authority	Investment proposal	Land	Protected Zone - 'Kresna-Ilindentsi'.	Protected Zone
1	15-OC-2010.	Approved	MOEW	Forest Management Project (FMP)	-**	No Data***	No Data
2	22-OC-2010	Approved	MOEW	Reclamation of landfill	Kresna	12.533	12.533
3	106-OC-2010	Approved	MOEW	Forest Management Project (FMP)	-	42199.000	15408.000
4	19-10/2010.	Approved	MOEW	Rakitna Mines	Rakitna	123.200	34.141
5	142-OC-2010.	Approved	MOEW	Forest Management Project (FMP)	-	55411.000	No Data
6	10-OC-2011	Approved	MOEW	Forest Management Project (FMP)	-	13926.000	No Data
7	15-7/2011.	Approved	MOEW	'Pirinka' opencast mine	Ilindentsi	137.774	309.306
8	EC-9/2013.	Approved	MOEW	RMP (Regional Master Plans) for Water	-	No Data	No Data
9	EC-12/2013	Approved	MOEW	RMP for WSUC 'Strimon'	-	No Data	No Data
10	EC-19/2013	Approved	MOEW	RMP for WSUC 'Uvex'	-	No Data	No Data
11	EO-20/2013.	Approved	MOEW	RMP for WSUC Blagoevgrad	-	No Data	No Data
12	67-OC-2013	Approved	MOEW	Geological study	-	0.000	0.000
13	6-ПР/2015.	Approved	MOEW	Struma Motorway, Lot 3.3	-	0.000	364.187
14	4-4 / 2016	Approved	MOEW	Radomir-Kulata railway line	-	0.000	0.000
15	EC-24 / 8 August 2016	in procedure	MOEW	RBMP in the West Aegean River Basin District (WARBD) 2016-2021.	-	No Data	No Data
16	EO-22 /19.12.2016.	Approved	MOEW	RBMP in WARBD 2016-2021	-	No Data	No Data
17	БД-06-ПР/2007.	Approved	RIEW	Extraction of inert materials	Strumyani	0.000	60.000
18	БД-26-ПР/27.02.2007	Approved	RIEW	Extraction of inert materials	Krupnik	7,000	7,000
19	БД-30-ПР/2007.	Approved	RIEW	Extraction of inert materials	D. Gradeshnica	0.000	40,000
20	БД-38-ПР/2007.	Approved	RIEW	Extraction of inert materials	Krupnik	30,000	30,000
21	БД-39-ПР/2007.	Approved	RIEW	Extraction of inert materials	Strumyani, G. Krushitsa, Kamenitza	0.000	90.000
22	БД-53-ПР/2007.	Approved	RIEW	MWPS	Senokos, Oshtava	No Data	0.000
23	6-ПР/31.01.2008.	Approved	RIEW	Expansion of production workshop	Stara Kresna	1.516	1.516
24	10-ПР/21.02.2008.	Approved	RIEW	MWPS	Vlahi	17.399	0.000

25	БД-27-ПР/2008.	Approved	RIEW	Wind generators 2 facilities.	Stara Kresna	0.200	0.200
26	20-OC/13.03.2008.	Approved	RIEW	MWPS	Senokos, Oshtava	7.737	0.000
27	21-OC/17.03.2008.	Approved	RIEW	Expansion of residential building	Oshtava	0.200	0.200
28	22-OC/18.03.2008.	Approved	RIEW	MWPS	Vlahi	No Data	0.000
29	28-OC / 04.04.2008	Not approved	RIEW	MWPS	-	No Data	0.000
30	БД-43-ПР/2008.	Approved	RIEW	Holiday Village	G. Breznitsa	5.030	5.030
31	46-OC/17.06.2008.	Approved	RIEW	MWPS	Oshtava	No Data	No Data
32	50-OC/26.06.2008.	Approved	RIEW	Residential building	G. Breznitsa	0.500	0.500
33	52-OC/27.06.2008.	Approved	RIEW	MWPS	Senokos, Oshtava, Stara Kresna	No Data	0.000
34	59-OC/24.07.2008.	Approved	RIEW	MWPS	Gradevo	0.000	0.000
35	БД-63-ПР/2008.	in procedure	RIEW	MWPS	Brestovo	No Data	1.000
36	67-OC/22.08.2008.	Approved	RIEW	Water & Sewerage Utility Company	Stara Kresna	6.766	6.766
37	69-OC/28.08.2008.	Approved	RIEW	Residential building	Vlahi	1.000	0.000
38	БД-19-ПР/2009.	Approved	RIEW	WWTP Kresna	Kresna	0.000	No Data
39	25-OC/04.03.09.	Approved	RIEW	Orchard	Kresna	65.000	65.000
40	БД-22-ПР/2009.	Approved	RIEW	Camping site	Krupnik	4.955	4.955
41	3-OC/2009.	Approved	RIEW	Photo-voltaic plant	D. Gradeshnica	141.506	141.506
42	БД-34-ПР/2009.	Approved	RIEW	Support wall on the Brezinska river	G. Breznitsa	No Data	No Data
43	51-OC/2009.	Approved	RIEW	Deploying mobile machinery	Ilindentsi	5.534	5.534
44	55-OC / 29.07.2009	Approved	RIEW	Photo-voltaic plant	Ilindentsi	5.130	0.000
45	56-OC / 29.07.2009	Approved	RIEW	Photo-voltaic plant	Ilindentsi	4.561	0.000
46	71-OC / 16.09.2009	Approved	RIEW	Photo-voltaic plant	Ilindentsi	1.510	0.000
47	72-OC / 17.09.2009	Approved	RIEW	Photo-voltaic plant	Ilindentsi	1,000	0.000
48	78-OC / 02.11.2009	Approved	RIEW	Photo-voltaic plant	Kresna	0.000	9.598
49	БД-64-ПР/2009.	Approved	RIEW	Well/Open pit	Poleto village	0.001	0.000
50	БД-67-ПР/2009.	Approved	RIEW	Greenhouses	D. Gradeshnica	0.000	7.440
51	БД-02-ПР/2010.	Approved	RIEW	Greenhouses	D. Gradeshnica	0.000	5.618

No.	Document No.	Stage	Authority	Investment proposal	Land	Protected Zone - 'Kresna-Ilindentsi'.	Protected Zone 'Kresna'
52	3-ОС/2010.	Approved	RIEW	Photo-voltaic plant	Kresna	0.000	10.036
53	21-ОС/22.06.2010.	Approved	RIEW	Warehouse	G. Breznitsa	1,728	1,728
54	23-ОС/24.06.2010.	Approved	RIEW	Reconstruction of hotel	Oshtava	0.469	0.000
55	27-ОС / 22.07.2010	Approved	RIEW	Base station	Stara Kresna	0.400	0.400
56	35-ОС/01.09.2010.	Approved	RIEW	Residential building	G. Breznitsa	2.400	2.400
57	37-ОС/14.09.2010.	Approved	RIEW	Farm	Slyvnitsa	10.864	15.349
58	41-ОС/02.12.2010.	Approved	RIEW	Entertainment facility	Brestovo	4.020	0.000
59	БД-22-ЕО/2010.	in procedure	RIEW	Photo-voltaic plant	Ilindentsi	24.824	0.000
60	БД-01-ЕО/17.03.2011.	Approved	RIEW	Photo-voltaic plant	Kresna	0.000	37.117
61	14-ОС/24.03.2011.	Approved	RIEW	Forest Management Project (FMP)	Gradevo	553.000	0.000
62	БД-02-ЕО/30.03.2011.	Approved	RIEW	Photo-voltaic plant	D. Gradeshnica	21.894	0.000
63	БД-08-ПР/2011.	Approved	RIEW	Well/Open pit	D. Gradeshnica	0.000	No Data
64	18-ОС/19.05.2011.	Approved	RIEW	Greenhouses	D. Gradeshnica	0.000	6.240
65	21-ОС / 31.05.2011	Approved	RIEW	Forest Management Project (FMP)	Sushitsa	15,000	0.000
66	22-ОС / 31.05.2011	Approved	RIEW	Forest Management Project (FMP)	Sushitsa	15,000	0.000
67	25-ОС/22.06.2011.	Approved	RIEW	Residential building	Ilindentsi	3.180	0.000
68	БД-12-ЕО/25.07.2011.	Approved	RIEW	Photo-voltaic plant	Ilindentsi	0.000	0.000
69	БД-26-ПР/2011.	Approved	RIEW	Building of Resorts	Vlahi	1.497	1.497
70	БД-04-ЕО/2011.	Approved	RIEW	Photo-voltaic plant	Kresna	0.000	48.862
71	БД-01-ЕО/12.01.2012.	in procedure	RIEW	Photo-voltaic plant	Rakitna, Mechkul	48.700	0.000
72	07-ОС/22.03.2012.	Approved	RIEW	Base station	Kresna	0.154	0.000
73	БД-05-ЕО/17.04.2012.	Approved	RIEW	Photo-voltaic plant	Ilindentsi	4.883	0.000
74	13-ОС/29.05.2012.	Approved	RIEW	Production workshop	G. Breznitsa	No Data	No Data
75	14-ОС / 03.07.2012	Approved	RIEW	Forest Management Project (FMP)	G. Ribnitsa	56.013	0.000
76	24-ОС / 12.09.2012	Approved	RIEW	Industrial site	Kresna	No Data	No Data
77	БД-01-ЕО/23.10.2012.	Approved	RIEW	Photo-voltaic plant	Kresna	37.100	37.100
78	27-ОС / 25.10.2012	Approved	RIEW	MWPS	Tsaparevo, Goreme	No Data	0.000

No.	Document No.	Stage	Authority	Investment proposal	Land	Protected Zone - 'Kresna-Ilindentsi'.	Protected Zone 'Kresna'
79	32-ОС / 27.11.2012	Approved	RIEW	Expansion of MHPP	Vlahi	No Data	No Data
80	БД-52-ПР/2012.	Approved	RIEW	Church	Ploski	3.381	3.381
81	БД-53-ПР/2012.	Approved	RIEW	Orchard	D. Gradeshnica	28.538	28.538
82	29-ОС/03.10.2013.	Approved	RIEW	Entertainment facility	Poleto village	2.500	0.000
83	БД-01/2013.	Approved	RIEW	Ilindentsi opencast mine	Ilindentsi	238.471	0.000
84	34-ОС/14.12.2013.	Approved	RIEW	Warehouse	Ilindentsi	1.170	2.498
85	БД-67-ПР/2013.	Approved	RIEW	Farm	Karpelevo	6.721	0.000
86	37-ОС/20.12.2013.	in procedure	RIEW	Forest Road	G. Breznitsa	12.328	0.000
87	БД-01-ПР/2014.	Approved	RIEW	Micro-reservoir	Ilindentsi	1,000	1,000
88	15-ОС / 14.04.2014	Approved	RIEW	Building of Resorts	Ploski	1.502	0.000
89	БД-38-ПР/2014.	Approved	RIEW	Orchard	Kresna	0.000	8.060
90	22-ОС / 24.06.2014	Approved	RIEW	Residential building	G. Breznitsa	2.432	2.432
91	БД-61-ПР/29.08.2014.	Approved	RIEW	Kinder garden	G. Breznitsa	No Data	No Data
92	БД-13-ПР/2015.	Approved	RIEW	Fishery	Ilindentsi	0.000	19.645
93	БД-17-ПР/09.04.2015.	Approved	RIEW	Fishery	Stara Kresna	20.311	0.000
94	БД-19-ПР/2015.	Approved	RIEW	Orchard	D. Gradeshnica	0.000	39.662
95	31-ОС / 24.06.2015	Approved	RIEW	Forest Road	Oshtava	96.400	0.000
96	БД-01/2015	Approved	RIEW	Municipality Development Plan (MDP) of Sandanski	-	No Data	No Data
97	БД-39-ПР / 2015.	Approved	RIEW	Orchard	D. Gradeshnica	24.281	27.281
98	БД-16-П / 2017.	terminated	RIEW	Open-pit mine Osenov Rid	Kresna	31.000	31.000
99	БД-18-ЕО-2015	Approved	RIEW	MDP of Simitli Municipality	-	No Data	No Data
100	БД-53-ПР / 2015	Approved	RIEW	Farm	Krupnik	12,000	0.000
101	15-ОС / 15.04.2016	Approved	RIEW	Expansion of production workshop	Ilindentsi	2.173	7.671
102	22-ОС / 20.05.2016	Approved	RIEW	Orchard	Kresna, G. Breznitsa	1.628	7.908
103	БД-31-ПР / 2016	Approved	RIEW	Farm	G. Breznitsa	3.001	3.001
104	28-ОС / 25.07.2016	Approved	RIEW	Orchard	Ilindentsi	No Data	No Data
105	БД-46-ПР / 2016	Approved	RIEW	Vineyards	Kresna	35.428	210.067

No.	Document No.	Stage	Authority	Investment proposal	Land	Protected Zone - 'Kresna-Ilindentsi'.	Protected Zone 'Kresna'
106	33-ОС / 09.09.2016	Approved	RIEW	Orchard	D. Gradeshnica	10.560	4.655
107	38-ОС / 17.09.2016	Approved	RIEW	Orchard	Ilindentsi	4.978	0.000
108	БД-70-ПР / 2016	Approved	RIEW	Farm	Slyvnitsa	0.000	6.034
109	БД-02 / 01.12.2014	Not approved	RIEW	Changes to MHPP	Vlahi	No Data	No Data

* - affected area of the Protected Zone; ** - more than 3 land areas; *** - No data.

3 Description of the elements of the investment proposal, which, alone or in combination with other plans, programs and projects / investment proposals, could have a significant impact on protected zones or their elements.

The present investment proposal refers the "Improving of the road route of Lot 3.2 of the Struma Motorway". The road route in all options under consideration falls within the BG0002003 - 'Kresna' Protection Zone of wild birds and BG0000366 - 'Kresna-Ilindentsi' Protected Zone for the protection of natural habitats, wild fauna and flora.
The implementation of the investment proposal shall be in two phases - the stage of construction and the stage of operation. The impacts on natural habitats and species subject to conservation in the protected zones have also been considered in this manner. For Eastern Option G10.5, due to its peculiarity - separated left and right roadway, no specific distinction is made, when the impacts are the same on both lanes.

Stage of Construction
Large volumes of earthworks (ditches, embankments) of linear nature will be carried out to build the bed of the motorway route. Earthworks will be executed within the construction lane, which will not go beyond the motorway. The construction of the bridge facilities will be related to activities on the banks of the rivers and in the river, in the construction of their abutment walls. Construction sites will be established to accommodate construction and assembly equipment, temporary storage of building materials and waste, storage of humus and excavated earth and rock materials within the range.
All these activities are related to expected impacts on the environmental components, including any impacts on elements of protected zones - natural habitats and species subject to conservation, which are affected by the construction of the motorway.

Stage of Operation
The operation of the motorway will be related to road traffic, with expected impacts on certain environmental components, including any impacts on elements of protected zones - natural habitats and species protected in them. These are: The generation of noise in the environment is likely to cause disturbance to sensitive animal species; fragmentation of habitats of animal species, including any interruption of bio-corridors; destruction of individual specimens (mortality) in the collision with vehicles.

Elements and activities of the investment proposal

- ***Road route of the motorway*** - Linear structure in a ground excavation or embankment in which the highway route and its facilities will be constructed - tunnels, junctions, viaducts, underpasses, overpasses, drainage facilities, rest areas, reconstruction of engineering networks, construction sites and others within the range.
- ***Bridges and viaducts*** - facilities for crossing water bodies, field roads, etc. .;
- ***Tunnel portal areas*** - entrance/exit of the tunnels and areas around them;
- ***Movement of construction and service transport equipment;***
- ***Reclamation*** - in the range of the motorway and restoration of damaged terrain in the construction of the motorway route and the accompanying facilities.
- ***Vehicle traffic during the operation of the highway***

A description of the activities of the investment proposal and its potential impact on habitats, plant and animal species is presented in Table 3-1.

Table 3-1: Description of the activities of the investment proposal and its potential impact on habitats, plant and animal species.

No.	Activities under the investment proposal	Nature of potential impact
	Construction works	
1.	*Terrain preparation and construction of the linear section of the highway and facilities to it - tunnels, road junctions, underpasses, overpasses, drainage facilities, rest areas, reconstruction of engineering networks, construction sites*	- Destruction of natural habitats and habitats of species; - fragmentation of natural habitats and habitats of species; - Barrier effect; - Damage to habitats due to pollution by dust emissions and exhaust emissions.
2.	*Bridges over rivers*	- Destruction of natural habitats and habitats of species; - Barrier effect; - pollution of habitats of aquatic species.
3.	*Movement and operation of transport and construction equipment*	- Disturbance of nearby sensitive animal species; - Mortality of individual numbers of the species.
4.	*Reclamation and rehabilitation activities*	- entry of unnatural and local and / or invasive plant species and change in the structure and species composition of the habitats
	Operation of the Motorway	
1.	*Vehicle traffic. Maintenance of the road track and its scope, planning and equipment repairs.*	- Disturbance of nearby sensitive animal species; - Mortality of individual numbers of the species. - Barrier effect; - Damage to habitats due to pollution by dust emissions and exhaust emissions.

We can summarize that the nature of activities, related to the implementation of the investment proposal and the investment proposal itself, both in the construction and in the operation, implies the following impacts on the protected zones and their elements under the most unfavourable conditions:

- **Direct destruction of natural habitats and habitats of species**, subject to conservation in the protected zone at the site of construction - the road route with its elements, temporary landfills and temporary roads (if any), reconstruction of engineering networks. All territories in the range of the road route are directly affected. Temporary damage to aquatic habitats may occur if the passing through the water bodies does not use pillars of bridges or the areas in the range, yet outside the pillars where they are foreseen are not occupied in the water bodies. The percentage of impact between the affected area and the area of the habitat / habitat of the species in the area is used to assess the extent of impact. Option G10.5, given that the existing road will be used for the right canal, direct impacts on natural habitats and habitats of species, subject to conservation in the area will not occur. Therefore, these are

considered only for the left roadway and the crossing of Kresna.

- **Fragmentation of natural habitats** subject to conservation in the protected zone - when a site (polygon), occupied by a given natural habitat is affected so that the remaining part / parts of it are insufficient to maintain / preserve their characteristics of the natural habitat affected or these characteristics are negatively affected. The deterioration or even loss of these characteristics is due to the so-called "Edge effect", in which the abiotic (e.g. sunshine, air humidity, soil humidity, etc.) and / or biotic factors of the environment (species composition of the environment) are changed in the strip, immediately adjacent to the boundaries of the polygons, occupied by a given habitat of the tree, bush or grass floor) (by Andren 1994, Bennett & Saunders 2010, Didham 2010, Fahrig 2003, Franklin et al. 2002).
For Option G10.5, given that the existing road will be used for the right canal, direct impacts on natural habitats, subject to conservation in the area will not occur. Therefore, these are considered only for the left roadway and the crossing of Kresna.

- **Fragmentation of habitats of species**, subject to conservation in the area - When a site (polygon), occupied by a habitat of some species is affected, so that the remaining part / parts thereof are insufficient to maintain / preserve their habitat characteristics for that species. Many of the species require a certain size of polygons with potential habitats to be used from the respective type, whereas this size shall be species specific. Option G10.5, given that the existing road will be used for the right canal, direct impacts on habitats of species, subject to conservation in the area will not occur. Therefore, these are considered only for the left roadway and the crossing of Kresna.

- **Barrier effect** - When the road route crosses locations that play or may play a role in bio-corridors so that individual number of the species concerned may not migrate freely. That may occur due to the inability of individual numbers of some species to overcome the route and / or the accompanying facilities, or the high mortality of those individual numbers that cross it, or the "reluctance", caused by disturbance. The results are inability or difficult migration (in the broad sense of the word, it may be over-the-clock, nutritionally related or seasonal, associated with certain abiotic factors or reproduction or displacement) and / or fragmentation of the populations of the species concerned.

- **Disturbance of animal species** - as a result of noise and the presence of construction and transport equipment and people during construction and traffic during operation, as well as light pollution during construction (when working at night or illuminating the construction sites) and operation of the facility; the impact of disturbance is species-specific, and for the more sensitive species an impact limit of 300 m from the noise source is accepted. It might result in mortality in leaving the babies / egg abandonment, or in hibernation (for bats), which is assessed below. When using a blasting method in tunnel works, no disturbance is to be expected, as the design sizing of drilling and blasting works shall be carried out according to the requirements of Appendix No. 7 of Art. 141 of the current Labour Safety Regulations for blasting works, so as to prevent any negative impact on people, buildings, facilities, infrastructural sites and others (Please refer to Para.1).

- **Mortality** (**destruction** of individual plants) of individual numbers of species - in the construction of the road and its adjacent facilities and from traffic during operation - directly from motor vehicles or indirectly - in case of disturbance (see above) or pollution of the aquatic environment (see below).

- **Damage to natural habitats** due to dust and exhaust emissions during construction and operation, and substances used in the winter maintenance of the road. A more significant impact is expected within the limits of the scope, as estimated in the direct destruction of the habitats. Therefore, it is not evaluated separately.

- **Pollution of habitats of aquatic species** subject to conservation in the protected zone. It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction or incidents during the Motorway's operation. The expected impact range may include the entire construction site, also downstream of the source of contamination. It may result in the mortality of the affected

individual representatives of the species assessed above or the deterioration of their condition.

- **Invasion of invasive and / or foreign (not typical of the area)** - in recultivation of the affected terrains and landscaping of the site with such species. If no such species are used, there will be no impact, which is why it is not evaluated separately.

4. Description of protected zones, habitats, types and purposes of conservation, and their accounting (reporting), when preparing the investment proposal.

Lot 3.2 of the Struma Motorway is located in an environmentally sensitive area. The road route under all considered options falls within the limits of BG0002003 'Kresna' and BG300366 'Kresna-Ilindentsi'.

4.1. Protected zone 'Kresna - Ilindentsi', code BG 0000366

A protected zone under Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora;
Type K - Protected Zone under the Habitats Directive, which overlaps the Protected Zone under the Birds Directive.
Area of the Protected Zone – 485,964.28 decares.

Characteristics:
The zone consists of several separate cores, connected with river valleys. It presents a "buffer" zone of Pirin National Park to the west, it also includes the highest parts of the Maleshevska and Vlahina Mountains on the border with Macedonia, and between them the deep Kresna Gorge, of the Struma river. Unique biodiversity is concentrated in the area. Here the Rila-Rhodopes have the best environmental connection with the mountains along the border between Bulgaria and Macedonia. At the same time, the Struma River is an environmental corridor for species migration to the south and to the north. The steep mountain slopes present a strong barrier to these migrations, and the Kresna Gorge region is an unique and highly vulnerable bio-corridor. The region includes natural and semi-natural sub-alpine ecosystems in Pirin, as well as areas with vegetation characteristic of the continental sub-Mediterranean and southern parts of the Meso-Mediterranean climate. There is an exceptional European climatic gradation from north to south: For about 20 km in the valley the moderate annual temperature varies by 1 degree. There are representatives of pre-glacial, Mediterranean vegetation and fauna in the area, as well as relic glacial species in its higher parts. The zone includes the northern boundaries of many species and Mediterranean plant communities, including *Platanus orientalis, Querqus coccifera, Phyllirea media, Juniperus excelsa*. Some forest-occupied monocultures are excluded from the area. Between the villages of Ploski and Ilindentsi (WGS 84 N 41 ^{0} 39'02.2 ", E 23 ^{0} 15'15.6", 490 m above sea level) is located 'Zandana' - a complex of 3 caves where the reproductive colonies of the Rhinolophus and migratory groups / colonies of other bat species. Other types of bats are also found in rock crevices and abandoned buildings in the protected zone.

Objectives of protection:

- Conservation of the area of natural habitats and habitats of species and their populations subject to conservation within the protected zone;
- Preserving the natural state of the natural habitats and habitats of the protected species in the Protected Zone, including the natural species composition, typical species and the environment;
- Where necessary, restoration of the area and natural state of the priority habitats and habitats of species, as well as of the populations of species, protected in the framework of the Protected Zone.

Subject of protection:
Natural habitats

Code	Habitats	Coverage %	
		EDF	MOEW 2013
4060	Alpine and Boreal heaths	0.00000	0.42000
4070*	Shrub communities with *Pinus mugo*	0.03000	0.02500
5210	Shrubs with *Juniperus spp.*	0.10300	0.12000
6110 *	Open calcific or basal grasslands from Alysso-Sedion albi	0.00200	0.00060
6210 (*)	Semi-natural dry grass and bush communities on limestone (Festuco-Brometalia) (*important habitats of orchids)	4.00000	5.35000
6220*	Pseudostepes with cereal and annual class plants Thero-Brachypodieta	6.00000	4.50000
6230*	Species rich in of grassland on silicate terrain in the mountains	0.00000	0.16000
62A0	Eastern sub-Mediterranean dry grasslands	0.10000	0.03000
62D0	Early Mizia acidophilous grasslands	0.00000	0.90000
6420	Mediterranean wetlands of high grasses from the Molinio-Holoschoenion union	0.01000	0.00330
6430	Hydrophilic communities of high grasses in the plains and the mountain to the Alpine zone	0.60000	0.04000
6510	Lowland hay meadows	0.02000	0.02900
Code	**Habitats**	**Coverage %**	
		EDF	**MOEW 2013**
6520	Mountain hay meadows	0.20000	2.60000
8110	Silica scree from the alpine to the snow belt	0.00000	0.05000
8120	Scree on calcareous terrains and calcium shale on the high mountains	0.10000	0.00000
8210	Chasmophyte vegetation on silicate rocky slopes	0.50000	0.05000
8220	Chasmophyte vegetation on silicate rocky slopes	0.10000	0.10000
8230	Silicate rocks with pioneer vegetation from the Sedo-Scleranthion or Sedo albi-Veronicion dillenii	0.24000	0.11000
8310	Unspoiled caves	0.01000	NA[1]
9110	Luzulo-Fagetum beech forests	0.47000	3.49000
9130	Beech forests of the Asperulo-Fagetum type	9.68000	9.53000
9150	Thermophilic Beech Forests (Cephalanthero-Fagion)	3.13000	0.30100
9170	Oak-hornbeam forests of the Galio-Carpinetum type	6.97000	6.50000
9180 *	Mixed Tilio-Acerion alluvial forests on slopes and steep slopes	0.07030	0.00650
91AA *	Pubescent oak (Quercus pubescens) Forests	8.21000	7.60000
91BA	Mizia forests of the European silver fir /*Abies alba*/	0.45000	0.32700
91AA	Rila-Rhodope and Stara Planina white-wood forests	8.46000	7.51000
91M0	Balkan-pine forests and forests	2.26800	2.39000
91WO	Mizia beech forests	0.26500	0.00000
91Z0	Mizia forests of silver-linden lime	0.00001	0.04300
91E0 *	Alluvial forests of *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Pandion, Alnion incanae, Salicion albae)	0.00540	0.18500
9260	Forests of *Castanea sativa*	0.00000	0.01000
92A0	River assemblies of *Salix alba* and *Populus alba*	0.00010	0.00890
92C0	Forests of *Platanus orientalis*	0.07330	0.16000
92D0	Southern riverside galleries and shrubs (Nerio-Tamaricetea and Securinegion tanctoriae	0.00250	0.00500
9410	Acidophilic forests of Picea in the Alpine Belt (Vaccinio-Piceetea)	0.01910	0.16000
9530 *	Sub-Mediterranean pine forests with endemic black pine species	3.38000	3.34000
9560 *	Endemic forests of *Juniperus spp.*	1.23000	2.33000
95A0	Forests of white and black fir	1.14000	1.10000

1 - Not applicable.

Code	TYPE	Population		Overall assessment	
		EDF	MOEW 2013	EDF	MOEW 2013
1303	The lesser horseshoe bat (*Rhinolophus hipposideros*)	C	**C**	**C**	**C**
1304	(Rhinolophus ferrumequinum)	C	B	**C**	B
1305	The Mediterranean horseshoe bat (*Rhinolophus*	C	**C**	**C**	**C**
1307	(Myotis blythii)	C	**C**	B	B
1308	(Barbastella barbastellus)	C	**C**	A	**C**
1310	The common bent-wing bat, Schreibers' long-fingered	C	D	**C**	-
1316	(Myotis capaccinii)	C	D	**C**	-
1321	(Myotis emarginatus)	**C**	B	A	B
1323	The Bechstein's bat (*Myotis bechsteinii*)	**C**	**C**	A	**C**
1324	(Myotis myotis)	**C**	**C**	A	B
1352	The European/the grey wolf (*Canis lupus*)	**C**	**C**	A	A
1354	The brown bear (*Ursus arctos*)	**C**	**C**	A	B
1355	The Eurasian otter (*Lutra lutra*)	**C**	D	A	B
2609	The Romanian hamster or Dobrudja hamster	D	-	-	-
Code	**TYPE**	**Population**		**Overall assessment**	
		EDF	**MOEW 2013**	**EDF**	**MOEW 2013**
2635	The marbled polecat (*Vormela peregusna*)	C	**C**	B	B
1171	The southern crested newt (*Triturus karelinii*)	C	**C**	B	B
1193	The yellow-bellied toad (*Bombina variegata*)	C	**C**	A	A
1219	The spur-thighed tortoise (or Greek tortoise) (*Testudo*	C	**C**	A	A
1217	Hermann's tortoise (*Testudo hermanni*)	C	**C**	A	A
1220	The European pond turtle (*Emys orbicularis*),	C	**C**	B	B
1279	The four-lined snake, the Bulgarian ratsnake (*Elaphe*	A	A	A	A
1293	The European ratsnake or leopard snake (*Zamenis*	B	B	A	A
1130	The asp (*Aspius aspius*)	C	**C**	A	A
1134	The European bitterling (*Rhodeus sericeus amarus*)	C	**C**	B	B
1137	The Marica /the Italian barbell (*Barbus plebejus*)	B	-	A	-
1149	The spined loach (*Cobitis taenia*)	C	**C**	B	B
1032	The thick shelled river mussel (*Unio crassus*)	C	**C**	A	A
1093	The stone crayfish (*Austropotamobius torrentium*)	B	**C**	A	A
1037	The green snaketail or the green gomphid	C	**C**	A	A
4046	The Corduleaster dragonfly (*Corduleaster heros*)	**C**	**C**	A	A
1060	The large copper (*Lycaena dispar*)	**C**	**C**	B	B
1074	The eastern eggar (*Erigaster catax*)	B	B	A	B
1078	The Large Copper butterfly (*Callimorpha*	**C**	**C**	A	B
4042	Polyommatus (*Polyommatus eroides*)	**C**	**C**	**C**	**C**
1083	The stag beetle (*Lucanus cervus*)	**C**	**C**	A	B
1086	The *Cucujus cinmberinus*	B	**C**	A	B
1087	The Alpine Rosalie (*Rosalia alpina*)	**C**	**C**	A	B
1088	The great capricorn beetle, (*Cerambyx cerdo*)	**C**	**C**	A	B
1089	The Morimus funereus beetle (*Morimus funereus*)	**C**	**C**	A	B
4022	*Probaticus subragosus*	B	A	A	B
4053	The common parakaloptenus (*Paracaloptenus caloptenoides*)	**C**	D	A	**C**
4023	The *Propomacras cypriacus*	B	-	A	-
4033	*Erannis ankeraria*	A	-	B	-
4035	The *Gortyna borelli lunata*	A	-	A	-
4080	The Immuneella cress (*Centaurea immanuelis-oewii*)	A	B	**C**	A

4.2. The Kresna Protected zone, code BG 0002003

Protected Zone under Directive 2009/147 / EC on the conservation of wild birds.
Type J - Protected Zone under the Birds Directive, which overlaps the Protected Zone under the Habitats Directive. The protected zone was designated by Order No. РД-748 / 24 October 2008, issued by the Minister of Environment and Waters, published in the SG, no. 97/2008.
Area of the Protected Zone - 234956 decares.

Characteristics:
Kresna is located in south-western Bulgaria along the Struma River valley, in the Kresna Gorge region. To the south it reaches the villages of Palat and Drakata and to the north - to the village of Krupnik. To the east, it comprises part of the skirts of Pirin, and to the west - part of the valley of Maleshevska mountains. The climate is trans-Mediterranean. The Kresna Gorge is a rock complex upon silicate foundation. It includes heavily rocky and steep slopes, a large rock massif with vertical walls and smaller rock habitats. South of the gorge, hills of Mediterranean vegetation, altitude up to 500 m above sea level. The mixed forests of *Quercus pubescens* , *Carpinus orientalis* and *Fraxinus ornus* and *Juniperus excelsa* and Oaky oak with a sub-forest of evergreen Mediterranean shrubs. In some places, forests of woody juniper dominate, with red *Juniperus oxycedrus* . The Drakata (*Paliurus spina-cristi*) and the kukucha (*Pistacia terebinthus*) are found mostly in the gullies. In the more southern regions, there are also some typical Mediterranean evergreen species such as *Quercus coccifera* and *Greenpeace* (*Phillyrea media*). Typical are the communities of pubescent oak (*Quercus pubescens*) and the Oriental hornbeam (*Carpinus orientalis*). Forests of the Greek juniper (*Juniperus excelsa*) and mixed *Juniperus excelsa* and pubescent oak (*Quercus pubescens*) with a subforest of Mediterranean bushes are habitats that determine the high percentage of Mediterranean species in the ornithofauna of the area (over 30%). In the valley of the Struma river, south of Blagoevgrad and in the foothills of Pirin are represented communities of the Eastern platanus (*Platanus orientalis*). In the lower parts of these areas along the rivers, on the wetlands, the willows and alder communities (*Salix spp.* And *Alnus spp.*) predominate. Endemic is the Dylian *Minuartia* (*Minuartia dilijane*). In some *places the Austrian pine or black pine* (*Pinus nigra*), arable land and pastures are also found in some places.

Conservation objectives, according to the order for declaring the protected zone:

- Conservation and maintenance of habitats of bird species, protected in the protected zone to achieve their favourable conservation status.
- Restoration of habitats of bird species subject to conservation in the protected zone for which their conservation status is necessary.

Subject of protection:

No.	Type	Local	Migration population			Assessment	
			Reproduction	Spen	Passing by	Population	Total Score
1	Accipiter brevipes Shorthaired hawk		4-7 couples		P	A	A
2	Accipiter nisus Small hawk	4-5 couples				C	C
3	Actitis hypoleucos Short-tailed Cuckoo		4-6 couples		P	C	C
4	Aegypius monachus Black Vulture				1-2 individual representatives of	C	B
5	Alcedo atthis Landed Tern	9-11 couples				C	C
6	Alectoris graeca graeca Mountain skewer	30-45 couples				C	B
7	Anas platyrhynchos Blue-headed Duck	1-9 couples				D	
8	Anthus campestris Polish brandy		5-10 couples		P	C	B

9	Aquila chrysaetos Rock Eagle	1-1 couples				C	C
10	Aquila clanga Large Spotted Eagle				1-5 individual representatives of the species	C	B
11	Aquila heliaca Krestat (Imperial Eagle)		1 ind. repr.		1 ind.	C	C
12	Aquila pomarina Small Spotted Eagle		1-1 couples		P	C	C
13	Ardea cinerea Gray Heron				2-2 individual representatives of the species	C	C
14	Bubo bubo Owl	4-5 couples				C	C
15	Burhinus oedicnemus Turilik		1-1 couples			C	C
16	Buteo buteo Common Buzzard	7-15 couples				C	C
17	Buteo rufinus White-tailed Buzzard	3-4 couples				C	B
18	Calandrella brachydactyla Short-haired lark		5-10 couples		P	C	C
19	The European nightjar/Eurasian		70-160 couples		P	C	B
20	The little ringed plover (*Charadrius*		25-35 couples		P	C	C
21	The White Stork (*Ciconia*		5-5 couples		P	C	C
22	The Black Stork (*Ciconia*		4-4 couples		P	C	C
23	The short-toed snake eagle		3-6 couples		P	C	B
24	The western marsh harrier (*Circus*				P	C	C
25	The European roller (*Coracias*		10-12 couples		P	C	C
26	The corn crake, corncrake or		3-3 couples			C	C
27	The middle spotted woodpecker	20-30 couples				C	C
28	The Syrian Spotted Woodpecker (*Dendrocopos*	35-50 couples				C	C
29	The Black Woodpecker	2-2 couples				C	C
30	The ortolan, or ortolan bunting		240-340 couples		P	C	A
31	The Dalmatian Falcon (*Falco*		0-1 couples		P	A	B
32	The Hawk falcon (*Falco*	0-1 couples			2-3 individual representatives of the species	B	B
33	The Mediterranean falcon (*Falco eleonorae*)				20-50 individual representatives of the species	C	B
34	The peregrine falcon (*Falco*		3-5 couples			B	B
35	The Eurasian hobby (*Falco*		1-1 couples			C	C
36	The common kestrel (*Falco*		25-30 couples			C	C
37	The red-footed falcon (*Falco*				P	C	C
38	The semicollared flycatcher (*Ficedula semitorquata*)		0-1 couples			C	C

39	The common moorhen (*Gallinula*	1-3 couples				D	
40	The griffon vulture (*Gyps fulvus*)	2-4 couples			10-30 individual representatives of the species	B	B
41	The booted eagle (*Hieraaetus*		1-1 couples		P	C	C
42	The olive-tree warbler (*Hippolais olivetorum*)		45-60 couples			B	A
43	The red-backed shrike (*Lanius collurio*)		740-900 couples		P	C	B
44	The lesser grey shrike (*Lanius*		20-25 couples		P	C	C
45	The masked shrike (*Lanius nubicus*)		15-20 couples			B	A
46	The woodlark or wood lark (*Lullula*	600-620 couples				C	A
47	The calandra lark or European calandra-lark	5-10 couples				C	C
48	The European bee-eater		60-60 couples		P	C	C
49	The red kite (*Milvus milvus*)				1-2 individual representatives of the species	C	B
50	The Egyptian vulture (*Neophron*		0-1 couples			C	C
51	The Dalmatian pelican (*Pelecanus*				10-30 individual representatives of the species	C	C
52	The European honey buzzard		4-6 couples		P	C	B
53	The grey-headed	5-10 couples				C	C
54	The sand martin or bank swallow		100-100 couples			C	C
55	The barred warbler (*Sylvia nisoria*)		50-70 couples		P	C	B

5. Description and analysis of the impact of the investment proposal on the subject and objectives of protection of protected zones.

5.1. Description and analysis of the impact of the investment proposal on types of natural habitats and species subject to conservation in protected zones.

This evaluation examines the two protected Natura 2000 sites that are affected by the various options of Lot 3.2 of Struma Motorway, in accordance with the instructions of the competent authority for the environment, given by letter of outgoing Reference No. EIA-85 / 13 May 2015 of the Ministry of Environment and Water and letter of outgoing Reference No. EIA-85 / 13 January 2017.

The elements and activities, provided for in the individual options and the expected types of impacts, arising from them are addressed separately for each of the protected zones under consideration. The expected impacts on the subject-matter of conservation in them - types of natural habitats, habitats of species or species are also considered and evaluated separately.

The identification of the expected potential impacts from the implementation of the individual design options has been carried out in the two project phases - during the construction and during the operation. All possible types of impacts, arising from the project have been taken into account.

The expected impacts of the implementation of the individual project options are determined on the basis of the specific elements and activities, described for each project, as well as on the basis of the results of the consultations with the specialized departments and the stakeholder public community.

In making the assessment, the information on the subject-matter and the conservation objectives in the established (standard) data forms (EDF) for each of the protected zones concerned, the order for declaring protection zone BG0002003 Kresna for the protection of wild birds and the publicly available Information System for Natura 2000 protected zones in Bulgaria - http://natura2000.moew.government.bg/ .

Four levels of assessment have been accepted to determine the magnitude of the impact, allowing to take into account the different parameters of impact significance:

- **No impact** (0) - does not affect any natural habitats, species and their habitats that are subject to conservation in the protected zone.
- **Insignificant impact** (1) - impact that will be short-term and / or will affect an insignificant area of a natural habitat or species and the affected area / part of the population is small enough not to cause a change in the functions and / or structure of the natural habitat / population of the species within the boundary of the protected zone.

Taking into account the expected impacts and expert judgement, where possible, measures may be proposed to prevent or mitigate the impact to insignificant.

- **Moderate impact** (2) - an impact that will be long-term and / or will affect on a significant area of a natural habitat or species but will not change the function and / or the structure of the natural habitat / population of the species within the protected zone.

These impacts are also taken into account in combination with other factors that are mandatory in determining mitigation measures to prevent or mitigate the impact.

- **Significant impact** (3) - an impact that will be long-term and / or will affect a significant area of the relevant natural habitat / species and could change the functions and / or the structure of the natural habitat / population of the species within the protected zone.

Appropriate, enforceable and controllable mitigation measures must be applied to significant impacts. In case the assessment of the effect of their implementation shows that the degree of impact does not change, option solutions are proposed and considered.

For habitats of significant size, a threshold value greater than 0.5% is accepted of the area of the respective habitat in the zone.

With respect to amphibians and reptiles, a specific impact assessment scale has been implemented, as the indicators for the conservation status and the methodological approach for their assessment (according to the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013, see methodologies for determining the threshold values of the species concerned) differ significantly from those for other groups of animals and natural habitats. The rates of impact, accepted here to assess the degree of impact are defined as follows:

Rate 0 - No impact. No impact on the species is expected, as it does not occur in the enclosures of the affected protected zone (not recorded during the field studies, there is no literature on the presence in this territory; no potential habitats of the species in the protected zone, according to the respective specific report under the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW, 2013).

Rate 1 - Insignificant impact. The expected impact will be short-term, spatially limitted (within no more than 1% of the area of potential habitats of the species in the area defined in the respective specific report, according to the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I ", MOEW 2013) and will not result in any change in the conservation status of the species within the protected zone under any of the criteria. The impact is within the limits of natural changes and can be naturally offset by the ecosystem or limited by measures. The need to implement measures is based on expert judgement, unless the threshold values of protected species within the protected zone is defined as 'unfavourable - poor' (according to the specific report

of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Stage I species, MOEW 2013), where implementation of measures and / or alternative solutions is mandatory.

Rate 2 - Moderate impact. The expected impact will be long-term and / or will affect a significant area (more than 1% of the area of potential habitats of the species in the area, defined in the relevant specific report, according to the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I ", MOEW 2013), but will not result in any changes in the conservation status of the species within the protected zone under any of the criteria. It is imperative to apply measures (and / or alternative solutions in case that the threshold value of the species in the protected zone under consideration is 'unfavourable - poor"), which could reduce the impact to 1 - insignificant impact.

Rate 3 - significant impact. The expected impacts will be long-term and / or will affect a significant area (more than 1% of the area of potential habitats of the species in the area, defined in the relevant specific report, according to the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I ", MOEW 2013), resulting in changes in the conservation status of the species within the protected zone by one or more of the criteria.

Appropriate, enforceable and controllable mitigation measures must be applied to mitigate significant impacts. In case the assessment of the effect of their implementation shows that the degree of impact does not change, alternative solutions are proposed and considered.

• **BG0000366 'Kresna - Ilindentsi' Habitat Protected Zone**

=> ***Types of natural habitats subject to conservation in the Protected Zone***

According to the established data form (EDF) for the habitats, subject to conservation in the Kresna-Ilindentsi Protected zone, there are 34 habitat types from Appendix I to Directive 92/43 / EEC. As a result of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW 2013), 5 new habitats have been identified and two of them in the established data form have not been found. Thus, 37 types of natural habitats are subject to conservation in the protected zone.

According to the mapping, carried out by us, within the range of the different options there are 11 types of natural habitats: 5210 Shrubs of *Juniperus spp.*, 6210 (*) Semi-natural dry-grass and shrub communities on limestone (Festuco-Brometalia), 6220 * Pseudostepes with Grain-Grayopodeta grain and annual plants, 6430 Hydrophilic grasslands in the plains and the mountain to the alpine belt, 8220 Hazomite vegetation on silicate rocky slopes, 91AA* Eastern oak forests , 91M0 Balkan-pine forests, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae, 92A0 *Salix alba* and *Populus alba* galleries, 92C0 Forests of *Platanus orientalis* and 9560* Endemic *Juniperus spp* . (Appendix No. 7.1).

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013), within the ranges of the different options there are 5 further types of natural habitats: 6510 Sierra grasses, 8230 Silicate rocks with pioneer vegetation from Sedo-Scleranthion or Sedo albi-Veronicion dillenii, 9170 Oak-hornbeam forests of the Galio-Carpinetum type, 91Z0 Mizia limestone forests and 92D0 South riverside gorges and shrubs (Nerio- Tamaricetea and Securinegion tinctoriae).

5210 Shrubs with *Juniperus* spp.

Mediterranean and sub-Mediterranean hard-leaf evergreen shrubs with predominant prickly juniper, prickly cedar, cade juniper (*Juniperus oxycedrus*). They represent the final stage of the degradation of xerothermic oak forests in South Bulgaria. They develop upon highly eroded cinnamon forest soils, rarely in ecotypes with a pronounced hyperthermia. In the communities of red juniper there are separate trees or groups of trees of *Quercus pubescens* , *Q. virgiliana* ,

Carpinus orientalis , *Fraxinus ornus* , *Pistacia terebinthus*, *Pyrus amygdaliformis* and others, representing the remains of the former forests. Floral wealth is great.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MEW 2013), the area of the habitat in the protected zone is 579.00 decares.

Assessment in the region of the IP

The habitat is found in the Eastern option G10.50 and in the Eastern Option G20. The following species of plants are found in the sections, occupied by the habitat (Fig. 5.1-1):

N	Type	Family		N	Type	Family
1.	*Juniperus oxycedrus*	Cupressaceae		12	*Aegilops sp.*	Poaceae
2	*Quercus pubescens*	Fagaceae		13	*Bromus squarrosus*	Poaceae
3	*Carpinus orientalis*	Betulaceae		14	*Pteridium aquilinum*	Dennstaedtiaceae
4	*Fraxinus ornus*	Oleaceae		15	*Asparagus acutifolius*	Liliaceae
5	*Paliurus spina-christi*	Rhamnaceae		16	*Trifolium angustifolium*	Fabaceae
6	*Pyrus amygdaliformis*	Rosaceae		17	*Eryngium campestre*	Apiaceae
7	*Pyrus pyraster*	Rosaceae		18	*Achillea clypeolata*	Asteraceae
8	*Pinus nigra*	Pinaceae		19	*Euphorbia barrelieri*	Euphorbiaceae
9	*Rosa sp.*	Rosaceae		20	*Astragalus onobrychis*	Fabaceae
10	*Chrisopogon gryllus*	Poaceae		21	*Onobrychis lasiostachya*	Fabaceae
11	*Festuca valesiaca*	Poaceae		2	*Teucrium polium*	Lamiaceae

Figure No.5.1-1: Habitat 5210 Shrubs with *Juniperus spp* in the range of eastern options.

As a result of our own mapping, carried out in the present study, it was found that habitat 5210 was spread over a larger area within the scope of the two options than the area

(within the ranges) according to the project 'Mapping and Determination of the Conservation Status of Natural habitats and species - Stage I "(MoEW 2013). This underestimation may be due both to the lack of habitat data (of the forest cadastre, the restituted property mapping) and of the actual expansion of its area, for the sake of grassland habitats or long abandoned arable land. To avoid overestimating the impacts of the two options, in the present assessment we are in alignment with the data of the MOEW (2013). This approach has been accepted with the assumption that the larger area, established in the mapping itself is directly proportional to the larger area of habitat distribution in the Protected Zone. In this way, the greater area, established by us in percentage terms would be similar to the percentage that is affected by project data.

Impacts:

Option G20 - Red
When implementing this option, habitat 5210 will not be affected.
Option G20 - Blue
When implementing this option, habitat 5210 will not be affected.
Eastern Option G10.50
Direct destruction at the site of construction
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013), the total area of the habitat that will be affected during the implementation of this option will be 0.953 decares, representing 0.16% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.
Fragmentation
The implementation of the IP in this option affects the peripheral parts of two polygons of the habitat. Given the small area affected and the adaptive capabilities of some of the characteristic species (*Juniperus oxycedrus, Paliurus spina-christi, Carpinus orientalis*), we believe that fragmentation will not actually occur.
Long Tunnel Option, 'Kresna' tunnel
When implementing this option, habitat 5210 will not be affected.
Eastern Option G20
Direct destruction at the site of construction
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013), the total area of the habitat that will be affected during the implementation of this option will be 7.952 decares, representing 1.37% of its area in the zone. The impact in this case is determined to be **significant,** requiring measures to mitigate it.
Measures - the range of the road route from km 383 + 900 to km 384 + 100, to the right in the direction of increasing mileage and from km 389 + 510 to km 389 + 570 to the left in the direction of increasing mileage, should be reduced to the limits of the overall dimensions.
Effect - Decrease affected area to 0.265 acres, or 0.05% of the habitat area in the zone. Subject to this condition, the impact will be insignificant.
Fragmentation
The implementation of the investment proposal in this option affects the peripheral parts of three polygons of the habitat. Given the small area affected and the adaptive capabilities of some of the characteristic species (*Juniperus oxycedrus, Paliurus spina-christi, Cotinus coggygria*), fragmentation is considered insignificant. With the implementation of measures to reduce direct destruction (see above), there will in practice be no such fragmentation.

6210(*) Semi-natural dry grass and bush communities on limestone (*Festuco-Brometalia*) (*important habitats of orchids)
They are xerothermic and xeromezothermic grass communities of the order *Festucetalia*

valesiacae. They have a secondary origin and are formed in the place of deciduous /broad-leaved forests, cleared/cut down in the past. They form pasturelands on the hilly terrain. The most common species are *Dichantium ischaemum, Chrysopogon gryllus, Stipa spp.* , *Festuca valesiaca, Poa angustifolia,* and others. In some places, predominantly in the region of the ForeBalkans (PredBalkana), these communities are characterized by a more mesophilic character. The important sites for orchids are determined if a large number of orchids occur in a particular habitat; If a population of at least one species is established but it is atypical for that territory and if one or more species of orchids are found to be rare for that territory.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MEW 2013), the area of the habitat in the protected zone is 25991.8 decares.

Assessment in the region of the IP

The habitat is found within the scope of all options. In the sections, occupied by the habitat in Options G20 blue, G20 Red and the Long Tunnel Option, Kresna tunnel, the following types of plants were found:

N	Type	Family		N	Type	Family
1	*Crataegus monogyna*	Rosaceae		10	*Euphorbia cyparissias*	Euphorbiaceae
2	*Paliurus spina-christi*	Rhamnaceae		11	*Achillea clypeolata*	Asteraceae
3	*Jasminum fruticans*	Oleaceae		12	*Hypericum perforatum*	Hypericaceae
4	*Rosa canina*	Rosaceae		13	*Eryngium campestre*	Apiaceae
5	*Clematis vitalba*	Ranunculaceae		14	*Clinopodium vulgare*	Lamiaceae
6	*Chrysopogon gryllus*	Poaceae		15	*Cynodon dactylon*	Poaceae
7	*Teucrium chamaedrys*	Lamiaceae		16	*Centaurea saloniteana*	Asteraceae
8	*Phleum phleoides*	Poaceae		17	*Plantago lanceolata*	Plantaginaceae
9	*Dactylis glomerata*	Poaceae				

In the sections, occupied by the habitat in Options Eastern G10.50 and Eastern G20, Kresna tunnel, the following types of plants were found (Fig. 5.1-2):

N	Type	Family		N	Type	Family
1	*Pyrus pyraster*	Rosaceae		11	*Cynodon dactylon*	Poaceae
2	*Ulmus minor*	Ulmaceae		12	*Daucus carota*	Apiaceae
3	*Pinus nigra*	Pinaceae		13	*Cichorium inthybus*	Asteraceae
4	*Juniperus oxycedrus*	Cupressaceae		14	*Rumex sp.*	Polygonaceae
5	*Paliurus spina-christi*	Rhamnaceae		15	*Scabiosa triniifolia*	Dipsacaceae
6	*Rosa sp.*	Rosaceae		16	*Dactylis glomerata*	Poaceae
7	*Prunus spinosa*	Rosaceae		17	*Hypericum perforatum*	Hypericaceae
8	*Rubus sp.*	Rosaceae		18	*Colchicum autumnale*	Liliaceae
9	*Chrisopogon gryllus*	Poaceae		19	*Trifolium angustifolium*	Fabaceae
10	*Festuca valesiaca*	Poaceae				

Figure 5.1-2: Habitat 6210(*) Semi-natural dry grass and bush communities on limestone (Festuco-Brometalia) in the range of the Eastern options.

Impacts:

Option G20 - Red

Direct destruction at the site of construction

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013) and the results of our own mapping, the total area of the habitat that will be affected during the implementation of this option will be 3.138 decares, representing 0.01% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects two polygons of the habitat, by completely destroying one of the polygons. The area of the remaining untouched parts of the other will be sufficient to maintain the characteristic species composition and to preserve their nature as a 6210 natural habitat. Fragmentation will be insignificant.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of the our own mapping, the total area of the habitat that will be affected during the realization of this option is 1.596 decares, representing 0.01%% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects two polygons of the habitat. The area of the remaining intact part of that one will be insufficient to preserve its nature habitat 6210, and practically the whole polygon will become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of the this polygon.

Eastern Option G10.50

Direct destruction at the site of construction

According to the results of the our own mapping, the total area of the habitat that will be affected during the realization of this option is 14.084 decares, representing 0.05% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 9 polygons of the habitat. The area of the remaining intact part of three of them will be insufficient to preserve its nature habitat 6210, and practically the whole polygon will become another type of soil covering. Fragmentation will be insignificant, given the small total area of the parts of these three polygons. For the remaining 6 polygons, the remaining intact part will be sufficient to preserve the nature of the habitat 6210.

Eastern Option G20

Direct destruction at the site of construction

According to the results of the our own mapping, the total area of the habitat that will be affected during the realization of this option is 105.805 decares, representing 0.41% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 13 polygons of the habitat. The area of the remaining intact part of 9 of them will be insufficient to preserve its nature habitat 6210, and practically these 9 polygons will become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of these 9 polygons. For the remaining 4 polygons, the remaining intact part will be sufficient to preserve the nature of the habitat 6210.

The Long tunnel option- the 'Kresna' tunnel

Direct destruction at the site of construction

According to the results of the our own mapping, the total area of the habitat that will be affected during the realization of this option is 9.571 decares, representing 0.04% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects two polygons of the habitat. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 6210 natural habitat. Fragmentation will be insignificant.

6220* Pseudostepes with cereal and annual class plants Thero-Brachyopodeta

Xerothermic and Xeromezothermic grasslands with predominance of annual cereals such as *Brachypodium distachyon, Aegilops neglecta, Cynosurus echinatus, Lagurus ovatus, Bromus intermedius, Bromus fasciculatus* and others. Accompanying species from the perennial group are *Cynodon dactylon, Poa bulbosa, Dactylis glomerata* ssp. *Hispanica* and others. These communities are rich in annual species and geophysical species (*Allium, Muscari, Ophrys, Romulea*). They are not densely occupied, they occupy mainly dry eroded terrains or fields with shallow soils. The active vegetation period for them is during the early spring months,

while the soils are still relatively moist.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MEW 2013), the area of the habitat in the protected zone is 22069.50 decares.

Assessment in the region of the IP

The habitat is found in the range of the Long Tunnel Option, the 'Kresna' Tunnel, the Eastern Option G10.50 and Eastern Option G20. According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013), it is also found within the boundaries of Options G20 red and G20 blue, yet the field studies established that it was in fact abandoned arable lands, occupied by weed vegetation. In the sections, occupied by the habitat in Options Eastern G10.50 and Eastern G20, Kresna tunnel, the following types of plants were found (Fig. 5.1-3):

N	Type	Family		N	Type	Family
1	*Ouercus pubescens*	Fagaceae		14	*Scabiosa argentea*	Dipsacaceae
2	*Pyrus amygdaliformis*	Rosaceae		15	*Euphorbia cyparissias*	Euphorbiaceae
3	*Juniperus oxycedrus*	Cupressaceae		16	*Verbascum sp.*	Scrophulariaceae
4	*Rosa sp.*	Rosaceae		17	*Teucrium polium*	Lamiaceae
5	*Chrisopogon gryllus*	Poaceae		18	*Cichorium intybus*	Asteraceae
6	*Festuca valesiaca*	Poaceae		19	*Lolium perenne*	Poaceae
7	*Teucrium chamaedrys*	Lamiaceae		20	*Sanguisorba minor*	Rosaceae
8	*Dactylis glomerata*	Poaceae		21	*Daucus carota*	Apiaceae
9	*Chondrilla juncea*	Asteraceae		2	*Stipa sp.*	Poaceae
10	*Cynosurus cristatus*	Poaceae		23	*Aegilops triuncialis*	Poaceae
11	*Eryngium campestre*	Apiaceae		24	*Delphinium balcanicum*	Ranunculaceae
2	*Xeranthemum annuum*	Asteraceae		25	*Trifolium angustifolium*	Fabaceae
13	*Bromus intermedius*	Poaceae				

Figure 5.1-3: Habitat 6220 * Pseudostepes with cereal and annual plants of the Thero-Brachyopodeta class, within the range of the eastern options.

Impacts:

Option G20 - Red
When implementing this option, habitat 6220 will not be affected.
Option G20 - Blue
When implementing this option, habitat 6220 will not be affected.
Eastern Option G10.50
Direct destruction at the site of construction
According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 55.861 decares, representing 0.25% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.
Fragmentation
The implementation of the IP in this option affects 23 polygons of the habitat. The area of the remaining intact part of 16 of them will be insufficient to preserve its nature habitat 6220, and practically these 16 polygons will become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of these 16 polygons. For the remaining 7 polygons, the remaining intact part will be sufficient to preserve the nature of the 6220 habitat.
Eastern Option G20
Direct destruction at the site of construction
According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 199.417 decares, representing 0.9% of its area in the

zone. The impact in this case is defined as **moderate**, since no changes in the functions of the natural habitat within the boundary of the protected zone are expected.

Fragmentation

The implementation of the IP in this option affects 29 polygons of the habitat, by completely destroying some of the polygons. The area of the remaining intact part of 10 of them will be insufficient to preserve its nature habitat 6220, and practically these 10 polygons will become another type of soil covering. Fragmentation will be **moderate,** given the relatively large area of the directly affected polygons, which together with the area of the fragments may exceed 1% of the area of the habitat in the area. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 199.417 decares, representing 0.9% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

Implementation of the IP in this option affects 1 polygon of the habitat, with the area remaining intact so as to maintain its character as a natural habitat 6220. Fragmentation will be insignificant.

6430 Hydrophilic communities of high grasses in the plains and the mountain to the Alpine zone

A basic condition to the growing of high grass vegetation is the presence of high soil and air moisture. Most common high-intensity coenosis are formed along the banks of the rivers and the streams from the plains up to 2500 m above sea level in the mountains. They usually occupy narrow stripes (up to 2-3 m) by the running water and wet banks, most often upon gravel or clay soils. The species composition of the caenoses is very diverse and depends on the altitude and light, as well as the surrounding communities. Depending on that, three main subtypes are differentiated.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of the habitat in the protected zone is 181.30 decares.

Assessment in the region of the IP

The habitat is found within the boundaries of Options G20 red and G20 blue - one polygon, which has not been reported under the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013). According to this project, the habitat is found within the boundaries of the Eastern Option G10.50, in the Kresna bypass and in Eastern Option G20, at the crossing of Vlahinska river. However, the terrain, designated for Eastern Option G10.50 is part of a mosaic of uncultivable arable land (vegetable and orchard gardens, corn, lucerne, shrub and tree vegetation) and cannot be classified as a habitat 6430 (Fig. 5.1-4). In the Eastern Option G20, the designated site of the terrain is occupied by habitat 91E0 and has been mapped, respectively evaluated as such.

The following species of plants are found in the sections, occupied by the habitat: *Epilobium hirsutum, Petasites hybridus, Lythrum salicaria, Mentha longifolia* .

Figure No.5.1-4: Habitat 6430, according to the project (light blue contour) and nature of the terrain. Red contour - range by the Eastern Option G10.50.

Impacts:

Option G20 - Red

Direct destruction at the site of construction

According to the results of the our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.068 decares, representing 0.04% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a very small part of the periphery of one polygon from the habitat, with the area of the remaining intact part being sufficient to maintain the characteristic species composition and retain its character as a natural habitat 6430. Fragmentation will not practically be present.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.139 decares, representing 0.08% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a very small part of the periphery of one polygon from the habitat, with the area of the remaining intact part being

sufficient to maintain the characteristic species composition and to maintain its character as a natural habitat 6430. Fragmentation will not practically be present.

Eastern Option G10.50

When implementing this option, habitat 6430 will not be affected.

Long Tunnel Option, 'Kresna' tunnel

When implementing this option, habitat 6430 will not be affected.

Eastern Option G20

When implementing this option, habitat 6430 will not be affected.

6510 Lowland hay meadows

The mesophyllic hay meadows of the Molinio-Arrhenatheretea class (Arrhenatherion, Deschampsion). They develop on rich soils - mostly alluvial meadows and reed beds in rivers, wetlands and valleys. Communities dominated by cereal grasses and very rich miscellaneous herbs. Most of them are mowed 1-2 times a year after the end of the active growing season. Occurring from wet to dry subtypes. The active pasture leads to impoverishment and soil drying.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of the habitat in the protected zone is 140.70 decares.

Assessment in the region of the IP

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOEW 2013), the polygons of the habitat fall under the eastern option G10.50, at the crossing of Kresna - 0.099 decares, and option G20 red - 0.593 decares. However, the terrain, designated for Eastern Option G10.50 is part of a mosaic of uncultivable arable land (vegetable and orchard gardens, corn, lucerne, shrub and tree vegetation) and may not be classified as a habitat 6510 (Fig. 5.1-5).

Habitat 6510 is unaffected by any of the options considered.

Figure 5.1-5: Habitat 6510, according to the project (light blue outlines) and nature of the terrain. Red outlines - range in option G20 red; Yellow outlines - covers Eastern Option G10.50.

8220 Chasmophyte vegetation on silicate rocky slopes

The habitats are presented by vertical (over 70 °) silicate rocky slopes and walls in the mountains and foothills (Silenion lerchenfeldianae, Androsacetalia vandelii). They are characterized by poor vegetation. This vegetation varies greatly depending on exposure, altitude, geographical area and the degree of porosity of the rock.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of the habitat in the protected zone is 511.40 decares.

Assessment in the region of the IP

The habitat is found within the boundaries of options G20 red and G20 blue.

Impacts:

Option G20 - Red

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 1.133 decares, representing 0.22% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a very small part of the periphery of 4 polygons from the habitat, with the area of the remaining intact part being sufficient to maintain the characteristic species composition and retain its character as a natural habitat 8220. Fragmentation will not practically be present.

93

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.815 decares, representing 0.16% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a very small part of the periphery of 2 polygons from the habitat, with the area of the remaining intact part being sufficient to maintain the characteristic species composition and retain its character as a natural habitat 8220. Fragmentation will not practically be present.

Eastern Option G10.50

When implementing this option, habitat 8220 will not be affected.

Long Tunnel Option, 'Kresna' tunnel

When implementing this option, habitat 8220 will not be affected.

Eastern Option G20

When implementing this option, habitat 8220 will not be affected.

8230 Silicate rocks with pioneer vegetation from the *Sedo-Scleranthion* or *Sedo albi-Veronicion dillenii*

Pioneer communities of Sedo-Scleranthion and Sedo albi-Veronicion dillenii, colonizing the surface of dry silicate, bare, inland - offshore rocks in the plain, hilly and mountainous areas up to 1,000 m above sea level. The communities are open and dominated by lichens, mosses and members of the Crassulaceae family.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW 2013), the area of the habitat in the protected zone is 527.00 decares.

Assessment in the region of the IP

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOEW 2013), the polygons of the habitat fall under the Eastern Option G20 - 0.378 decares, option G20 red - 0.011 decares, and option G20 blue - 0.309 decares.

Our own mapping has established that the terrain in Option G20 Red and Option G20 blue is occupied by oak forest (91AA), albeit on silicate basis (Fig. 5.1-6), and that of the Eastern Option G20 - of Pine trees. Such vegetation may not be classified as habitat 8230.

Habitat 8230 is not affected in any of the options considered.

Figure No.5.1-6: Habitats 8230 according to the project (light blue outlines) and nature of the terrain. Red outlines - range in option G20 red; Blue outlines - range by G20 blue.

9170 Oak-hornbeam forests of the *Galio-Carpinetum type*

Mixed mesophilic forests with predominance of *Quercus petraea* agg. And *Carpinus betulus* and with the participation of *Fagus sylvatica, Tilia cordarta, T. platyphyllos* and others, and more rarely *Quercus cerris* and *Q. frainetto*. In the grassy layer, most common are *Cardamine bulbifera, Festuca heterophylla, Melica uniflora, Galium odoratum* and *Mercurialis perennis* . They are formed on the border between the low mountainous area of the mixed deciduous forests and the belt of the beard, beech and coniferous forests at an altitude above 500 m. They have a close connection with the mesophilic beech forests. Characteristic is the development of spring grass sinus. They are distinguished from the pine forests with *Quercus petraea* and *Carpinus betulus* (91G0) by the predominant involvement of mountain and European flora elements.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW 2013), the habitat area in the protected zone is 31719.30 ha.

Assessment in the region of the IP

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MoEW 2013), the polygons of the habitat fall under the eastern option G10.50 - 0.509 decares and the Eastern option G20 - 3.967 decares.

Our own mapping has found that the considered territory is occupied by pine-tree crops, which may not be classified as habitat 9170 (Fig. 5.1-7).

Habitat 9170 is not affected in any of the options considered.

Figure 5.1-7: Habitats 9170 according to the project (light blue outlines) and nature of the terrain. Red outlines - within the scope of the Eastern Option G20; Yellow outline - within the boundaries of Eastern Option G10.50.

91AA* Eastern forests of pubescent oak (Quercus pubescens

This habitat includes xerothermic forests dominated by pubescent oak (*Quercus pubescens*), which are found in places with transitional Mediterranean, transitional continental and euxinian climate. They are distributed in southern Bulgaria - mainly in the Thracian Plain, the Tundzha Plain, the Eastern Rhodopes, the Black Sea coast and the valleys of the Struma and Mesta rivers. These forests are part of the mixed oak forests, usually occupying the driest and warmest slopes on the slopes, mostly south or west. These forests are scattered, bright and in varying degrees of anthropogenic degradation. In their species composition, many tree, grass and shrub species are involved, which penetrate the surrounding forests, shrubs, meadows and open rocky terrains. The tree layer, where the pubescent oak dominates or coincides, reaches a height of 5-6 m. The trees are branched and often curved. In addition to *Quercus pubescens* , *Acer campestre, A,* is often found in this tree layer, *Hyrcanum, A. Monspessulanum, Fraxinus ornus, Pistacia terebinthus, Quercus cerris, Q. dalechampii, Q. frainetto, Q. virgilliana*. The Oriental hornbeam (*Carpinus orientalis*) has a greater phyto-coenosis role than in the continental oak forests. In the *shrubland level, Colutea arborescens, Cornus sanguinea, Coronilla emerus* subsp. *Emeroides, Cotinus coggygria, Crataegus monogyna, Juniperus oxycedrus, Paliurus spina-christi, Syringa vulgaris* and, more rarely, in certain locations - *Phillyrea latifolia* . In the grassy level, there are mainly species typical of xerothermic oak forests, among which many Mediterranean species. Typical are processes, related mainly to degradation due to the anthropogenic activity - pasture, felling, burning.

Assessment within the boundaries of Protected Zones

According to the data of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MEW 2013), the area of the habitat in the protected zone is 36927.50 decares.

Assessment in the region of the IP

The habitat is found within the scope of all options. In the sections, occupied by the habitat in Options G20 blue, G20 Red and the Long Tunnel Option, Kresna tunnel, the following types of plants were found (Fig. 5.1-8):

No	Type	Family		N	Type	Family
1	*Quercus pubescens*	Fagaceae		23	*Chrysopogon gryllus*	Poaceae
2	*Fraxinus ornus*	Oleaceae		24	*Teucrium polium*	Lamiaceae
3	*Quercus cerris*	Fagaceae		25	*Dichantium ischaemum*	Poaceae
4	*Carpinus orientalis*	Betulaceae		26	*Dactylis glomerata*	Poaceae
5	*Acer campestre*	Aceraceae		27	*Melica ciliata*	Poaceae
6	*Celtis australis*	Ulmaceae		28	*Centaurea stoebe*	Asteraceae
7	*Pistacia terebinthus*	Anacardiaceae		29	*Sempervivum marmoreum*	Crassulaceae
8	*Paliurus spina-christi*	Rhamnaceae		30	*Silene alba*	Caryophyllaceae
9	*Syringa vulgaris*	Oleaceae		31	*Viscaria vulgaris*	Caryophyllaceae
10	*Juniperus oxycedrus*	Cupressaceae		32	*Euphorbia cyparissias*	Euphorbiaceae
11	*Cotinus coggygria*	Anacardiaceae		33	*Fumana procumbens*	Cistaceae
12	*Jasminum fruticans*	Oleaceae		34	*Convolvulus cantabrica*	Convolvulaceae
13	*Crataegus monogyna*	Rosaceae		35	*Goniolimon collinum*	Plumbaginaceae
14	*Rosa canina*	Rosaceae		36	*Teucrium chamaedrys*	Lamiaceae
15	*Colutea arborescens*	Fabaceae		37	*Berteroa incana*	Brassicaceae
16	*Clematis vitalba*	Ranunculaceae		38	*Odontites lutea*	Scrofulariaceae
17	*Asparagus acutifolius*	Liliaceae		39	*Dasypirum villosum*	Poaceae
18	*Achillea clypeolata*	Asteraceae		40	*Cichorium inthybus*	Asteraceae
19	*Festuca valesiaca*	Poaceae		41	*Hypericum perforatum*	Hypericaceae
20	*Achillea pseudopectinata*	Asteraceae		42	*Eryngium campestre*	Apiaceae
21	*Thymus striatus*	Lamiaceae		43	*Sedum maximum*	Crassulaceae
22	*Crupina crupinastrum*	Asteraceae		4	*Cynodon dactylon*	Poaceae

Figure No.5.1-8: Habitat 91AA * Eastern forests of Pubescent Oak in the Kresna Gorge region.

In the sections, occupied by the habitat in Options Eastern G10.50 and Eastern G20, Kresna tunnel, the following types of plants were found (Fig. 5.1-9):

N	Type	Family		N	Type	Family
1	*Ouercus pubescens*	Fagaceae		2	*Asparagus acutifolius*	Liliaceae
2	*Quercus cerris*	Fagaceae		23	*Sanguisorba minor*	Rosaceae
3	*Carpinus orientalis*	Betulaceae		24	*Alopecurus sp.*	Poaceae
4	*Fraxinus ornus*	Oleaceae		25	*Carduus sp.*	Asteraceae
5	*Pyrus amygdaliformis*	Rosaceae		26	*Chrisopogon gryllus*	Poaceae
6	*Pyrus pyraster*	Rosaceae		27	*Festuca valesiaca*	Poaceae
7	*Prunus cerasifera*	Rosaceae		28	*Trifolium angustifolium*	Fabaceae
8	*Acer campestre*	Aceraceae		29	*Daucus carota*	Apiaceae
9	*Ulmus minor*	Ulmaceae		30	*Scabiosa argentea*	Dipsacaceae
10	*Mains sylvestris*	Rosaceae		31	*Artemisia scoparia*	Asteraceae
11	*Pinus nigra*	Pinaceae		32	*Brachypodium sylvaticum*	Poaceae
12	*Morus sp.*	Moraceae		33	*Teucrium polium*	Lamiaceae
13	*Paliurus spina-christi*	Rhamnaceae		34	*Galium sp.*	Rubiaceae
14	*Pistacia terebinthus*	Anacardiaceae		35	*Teucrium chamaedrys*	Lamiaceae
15	*Juniperus oxycedrus*	Cupressaceae		36	*Dactylis glomerata*	Poaceae
16	*Prunus spinosa*	Rosaceae		37	*Cynosurus cristatus*	Poaceae
17	*Crataegus monogyna*	Rosaceae		38	*Eryngium campestre*	Apiaceae

N	Type	Family		N	Type	Family
18	*Rubus sp.*	Rosaceae		39	*Bromus intermedius*	Poaceae
19	*Colutea arborescens*	Fabaceae		40	*Euphorbia cyparissias*	Euphorbiaceae
20	*Rosa sp.*	Rosaceae		41	*Xeranthemum annuum*	Asteraceae
21	*Clematis vitalba*	Ranunculaceae				

Figure 5.1-9: Habitat 91AA * Eastern forests of Pubescent Oak in the eastern region.

Impacts: **Option G20 - Red**

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 94,143 decares, representing 0.255% of its area in the area. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 18 polygons of the habitat, by completely destroying one of the polygons. The area of the remaining unaffected part at three of the remaining polygons will be insufficient to maintain the characteristic species composition and to maintain its nature habitat 91AA, and in practice these 3 polygons will become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of the affected 3 polygons. For the remaining 14

The remaining intact part will be sufficient to maintain its nature of natural habitat 91AA.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 106.830 decares, representing 0.29% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 16 polygons of the habitat. The area of the remaining unaffected part at three of the remaining polygons will be insufficient to maintain the characteristic species composition and to maintain its nature habitat 91AA, and in practice these 3 polygons will become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of the affected 3 polygons. For the remaining 13 polygons, the remaining intact part will be sufficient to preserve the nature of the 91AA habitat.

Eastern Option G10.50

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 144.738 decares, representing 0.39% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 25 polygons of the habitat. The area of the remaining unaffected part in 12 of the polygons will be insufficient to maintain the characteristic species composition and to maintain its nature habitat 91AA, and these 12 polygons will practically become another type of soil covering. Fragmentation will be insignificant given the small total area of the parts of the affected 12 polygons. For the remaining 13 polygons, the remaining intact part will be sufficient to preserve the nature of the 91AA habitat.

Eastern Option G20

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 468.077 decares, representing 1.27% of its area in the zone. The impact in this case is determined to be **significant**. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

Fragmentation

The implementation of the IP in this option affects 26 polygons of the habitat, by completely destroying one of the polygons. The area of the remaining unaffected part in 10 of the affected polygons will be insufficient to maintain the characteristic species composition and to maintain its nature habitat 91AA, and these 10 polygons will practically become another type of soil covering. Fragmentation would be *moderate*, given the relatively large area of directly affected polygons. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 40.391 decares, representing 0.11% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects two polygons of the habitat. The area of the remaining unaffected part in one of the polygons will be insufficient to maintain the characteristic species composition and to maintain its nature habitat 91AA, and that polygon will practically become another type of soil covering. Fragmentation will be insignificant, given the small area and number of affected polygons.

91M0 The Balkan-Pannonian Oak-Durmast forests

Subcontinental xerothermic oak forests, dominated mainly by *Quercus cerris* and *Q. frainetto* . In the foothills also *Q. petraea* agg., and in Strandja - *Q. polycarpa* . They form the xerothermic oak belt between 150-600 (800) meters across the country. They are found in dry, but relatively rich grey forest and cinnamon soils. Their floristic composition is varied and depends on environmental conditions.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOE 2013), the area of the habitat in the protected zone is 11,616.60 decares.

Assessment in the region of the IP

The habitat is found within the scope of all options. In the sections, occupied by the habitat in Options G20 blue, G20 Red and the Long Tunnel Option, Kresna tunnel, the following types of plants were found:

N	Type	Family		N	Type	Family
1	*Quercus cerris*	Fagaceae		16	*Melica uniflora*	Poaceae
2	*Carpinus betulus*	Betulaceae		17	*Lamium garganicum*	Lamiaceae
3	*Ostrya carpinifolia*	Betulaceae		18	*Cyclamen hederifolium*	Primulaceae
4	*Tilia tomentosa*	Tiliaceae		19	*Stellaria media*	Caryophyllaceae
5	*Carpinus orientalis*	Betulaceae		20	*Stellaria holostea*	Caryophyllaceae
6	*Quercus pubescens*	Fagaceae		21	*Lamium purpureum*	Lamiaceae
7	*Fraxinus ornus*	Oleaceae		2	*Brachypodium sylvaticum*	Poaceae
8	*Sorbus aucuparia*	Rosaceae		23	*Mycelis muralis*	Asteraceae
9	*Acer pseudoplatanus*	Aceraceae		24	*Galium aparine*	Rubiaceae
10	*Sorbus torminalis*	Rosaceae		25	*Geranium sp.*	Geraniaceae
11	*Rosa sp.*	Rosaceae		26	*Corydalis marschalliana*	Ranunculaceae
12	*Cornus sanguinea*	Comaceae		27	*Viola sp.*	Violaceae
13	*Hedera helix*	Araliaceae		28	*Scabiosa triniifolia*	Dipsacaceae
14	*Clematis vitalba*	Ranunculaceae		29	*Parietaria officinalis*	Urticaceae
15	*Dactylis glomerata*	Poaceae				

Impacts: **Option G20 - Red**

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 13.771 decares, representing 0.12% of its area in the zone. The impact in this case is determined

as **insignificant,** i.e. the affected area is small enough not to cause a change in the functions of the natural habitat within the boundary of the protected zone.

Fragmentation

The implementation of the IP in this option affects the peripheral parts of four polygons of the habitat. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 91M0 natural habitat. Fragmentation will be insignificant.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 21.575 decares, representing 0.19% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects the peripheral parts of four polygons of the habitat. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 91M0 natural habitat. Fragmentation will be insignificant.

Eastern Option G10.50

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 6.665 decares, representing 0.06% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects the peripheral parts of a polygon from the habitat. The remaining intact area will be sufficient to maintain the characteristic species composition and preserve its nature as a 91M0 habitat. Fragmentation will be insignificant.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 2,758 decares, representing 0.02% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects the peripheral parts of a polygon from the habitat. The remaining intact area will be sufficient to maintain the characteristic species composition and preserve its nature as a 91M0 habitat. Fragmentation will be insignificant.

Eastern Option G20

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 17.774 decares, representing 0.15% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation
The implementation of the IP in this option affects the peripheral parts of a polygon from the habitat. The remaining intact area will be sufficient to maintain the characteristic species composition and preserve its nature as a 91M0 habitat. Fragmentation will be insignificant.

91Z0 Mizia forests of silver-linden lime
Xerophilic to mesoxeric forests, dominated by *Tilia tomentosa* , distributed in the continental regions of Northern Bulgaria. They are found mainly in the hilly plains and in the foothills - the largest are the massifs in Ludogorie, the northern and eastern slopes on a diverse base: loess, limestone and others. In some places, the lime has expanded its distribution secondary, mainly as a result of selective cutting down of the oaks - *Quercus cerris, Q. petraea agg., Q. robur*, with which they often form mixed coenoses. The composition of these forests includes both xerothermic species of the order Quercetalia (*Helleborus odorus, Ligustrum vulgare*) and more mesophilic than the order Fagetalia and Carpinion (*Scilla bifolia, Staphylea pinnata*).
Assessment within the boundaries of Protected Zones
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MEW 2013), the area of the habitat in the protected zone is 212.10 decares.
Assessment in the region of the IP
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOEW 2013), the polygons of the habitat fall under the scope of option G20 blue - 10.503 decares and option G20 red - 6.274 decars. Two of the polygons that are affected are mapped as a mosaic of the 91Z0 and 91AA habitat, where the 91Z0 habitat occupies 30% and 50%, respectively. One polygon is mapped as 'clean' 91Z0. The field study found that these terrains were northeast and eastern, more mesophilic, more shady. As a result, more mesophilic species predominate, including any *Tilia tomentosa* , which has a 30-40% coverage, but dominates *Quercus cerris* , reaching up to 50% coverage. Such forests may not be classified as a 91Z0 habitat. We classify them as 91M0 (see above), their area is added to 91M0, and they are rated as such.
Habitat 91Z0 is not affected in any of the options considered.

91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
Riverside forests in the lowlands and mountains. They develop on rich alluvial soils, periodically flooded by seasonal rise at river level. According to the methodology for mapping of this type of habitat there are four types. The protected zone is only represented under Type 1: Monodominant forests of *Alnus glutinosa* with a single participation of *Fraxinus oxycarpa* (Alno-Padion Union) in the lower rivers of the Black Sea-Mediterranean basin. The soils are rich, very damp to damp, deep, with signs of sprouting and reduced ventilation. Sometimes, the black alluvial communities have a discontinuous, shady location along the rivers, which is why they have the character of 'galleries".
Assessment within the boundaries of Protected Zones
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the habitat area in the protected zone is 899.50 decares.
Assessment in the region of the IP

The habitat is found in the range of all options without the Long tunnel option, the 'Kresna' tunnel. In the sections, occupied by the habitat in Options G20-Blue, G20 Red and the Eastern Option G10.50, Kresna tunnel, the following types of plants were found:

N	Type	Family	N	Type	Family
1	*Alnus glutinosa*	Betulaceae	12	*Rubus sp.*	Rosaceae
2	*Platanus orientalis*	Platanaceae	13	*Tamus communis*	Dioscoreaceae
3	*Salix fragilis*	Salicaceae	14	*Clematis vitalba*	Ranunculaceae
4	*Salix alba*	Salicaceae	15	*Calystegia sepium*	Convolvulaceae
5	*Salix purpurea*	Salicaceae	16	*Setaria viridis*	Poaceae
6	*Populus nigra*	Salicaceae	17	*Saponaria officinalis*	Caryophyllaceae
7	*Ulmus minor*	Ulmaceae	18	*Orlaya grandiflora*	Apiaceae
8	*Robinia pseudoacacia*	Fabaceae	19	*Dioica urtica*	Urticaceae
9	*Juglans directed*	Juglandaceae	20	*Dactylis glomerata*	Poaceae
10	*Cornus sanguinea*	Comaceae	21	*Ranunculus acris*	Ranunculaceae
11	*Amorpha fruticosa*	Fabaceae	2	*Euphorbia amygdaloides*	Euphorbiaceae

In the sections, occupied by the habitat in Options Eastern G10.50 and Eastern G20, Kresna tunnel, the following types of plants were found (Fig. 5.1-10):

N	Type	Family	N	Type	Family
1	*Alnus glutinosa*	Betulaceae	11	*Euonymus sp.*	Celastraceae
2	*Salix alba*	Salicaceae	12	*Rubus sp.*	Rosaceae
3	*Ostrya carpinifolia*	Betulaceae	13	*Humulus lupulus*	Cannabinaceae
4	*Populus albă*	Salicaceae	14	*Hedera helix*	Araliaceae
5	*Populus tremula*	Salicaceae	15	*Dactylis glomerata*	Poaceae
6	*Platanus orientalis*	Platanaceae	16	*Brachypodium sylvaticum*	Poaceae
7	*Robinia pseudoacatia*	Fabaceae	17	*Parietaria officinalis*	Urticaceae
8	*Morus sp.*	Moraceae	18	*Dioica urtica*	Urticaceae
9	*Fraxinus ornus*	Oleaceae	19	*Chelidonium majus*	Papaveraceae
10	*Sambucus nigra*	Caprifoliaceae	20	*Aegopodium podagraria*	Apiacea

Figure 5.1-10: Habitat 91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae).

Impacts: **Option G20 - Red**

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.530 decares, representing 0.06% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 3 polygons of the habitat, by completely destroying one of the polygons. The area of the remaining untouched parts in two of them will be insufficient to maintain the characteristic species composition and to preserve their nature as a 91E0 natural habitat. Fragmentation will be insignificant, given the small total area and number of affected polygons.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 2.529 decares, representing 0.28% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation
The implementation of the IP in this option affects 2 polygons of the habitat, by separating one of the polygons into parts. The area of the remaining intact parts of this polygon will be insufficient (1-2 trees) to maintain the characteristic species composition and preserve their character as a natural habitat 91E0. Fragmentation will be insignificant, given the small area and number of affected polygons.

Eastern Option G10.50

Direct destruction at the site of construction
According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 10.231 decares, representing 1.14% of its area in the zone. The impact in this case is determined to be **significant,** i.e. mitigation measures shall be needed.
Measures – the route range from km 384+300 to km 384+470, and from km 389+130 to km 389+280 (left roadway) should be reduced to the overall dimensions.
Effect - Reduction of the affected area to 2.997 decares, or 0.33% of the area of the habitat in the area.
Fragmentation
The implementation of the IP in this option affects 5 polygons of the habitat. The area of the remaining unaffected part in all five will be sufficient to maintain the characteristic species composition and to preserve its character as a natural habitat 91E0. Fragmentation will be insignificant given the small total area of the parts of the affected polygons. By applying measures to limit the area of direct impact, fragmentation will be reduced.

Long Tunnel Option, 'Kresna' tunnel

When implementing this option, habitat 91E0* will not be affected.

Eastern Option G20

Direct destruction at the site of construction
According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 29.348 decares, representing 3.26% of its area in the zone. The impact in this case is determined to be **significant**. Due to the large number and large size of affected polygons, the implementation of mitigating measures, such as reduced range in certain sections or other realizable measures shall be impossible.
Fragmentation
The implementation of the IP in this option affects 7 polygons of the habitat. The area of the remaining unaffected part in two of them will be insufficient (1-2 trees) in order to maintain the characteristic species composition and to preserve the character of the natural habitat 91E0. Fragmentation will be insignificant given the small total area of the parts of the affected polygons. For the remaining 5 polygons, the remaining intact part will be sufficient to preserve the nature of the habitat
6210.

92A0 Riverside galleries of *Salix alba* and *Populus alba*

Riverside forest communities in the Mediterranean basin, dominated by *Salix alba, S. fragilis, Populus alba, P. nigra . Quercus robur, Alnus glutinosa, Ulmus minor* , and the shrub level - *Cornus sanguinea, Viburnum opulus, Euonymus europaeus, Frangula alnus* . The participation of lianas is characteristic. They are spread over wetlands along the rivers in the lowlands and lower parts of the mountain slopes. The soils are peat bog or alluvial.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of the habitat in the protected zone is 433.20 decares.

Assessment in the region of the IP

This habitat is found within the range of all options, excluding the Eastern Option G20. In the sections occupied by the habitat (along the Struma river), the following types of plants were found (Fig. 5.1-11):

N	Type	Family		N	Type	Family
1	*Salix alba*	Salicaceae		11	*Rosa sp.*	Rosaceae
2	*Salix fragilis*	Salicaceae		12	*Clematis vitalba*	Ranunculaceae
3	*Platanus orientalis*	Platanaceae		13	*Rubus caesius*	Rosaceae
4	*Populus nigra*	Salicaceae		14	*Dactylis glomerata*	Poaceae
5	*Populus albă*	Salicaceae		15	*Cichorium inthybus*	Asteraceae
6	*Prunus cerasifera*	Rosaceae		16	*Dioica urtica*	Urticaceae
7	*Ulmus minor*	Ulmaceae		17	*Lythrum salicaria*	Lythraceae
8	*Ficus carica*	Moraceae		18	*Sambucus ebulus*	Caprifoliaceae
9	*Robinia pseudoacatia*	Fabaceae		19	*Solanum dulcamara*	Solanaceae
10	*Amorpha fruticosa*	Fabaceae				

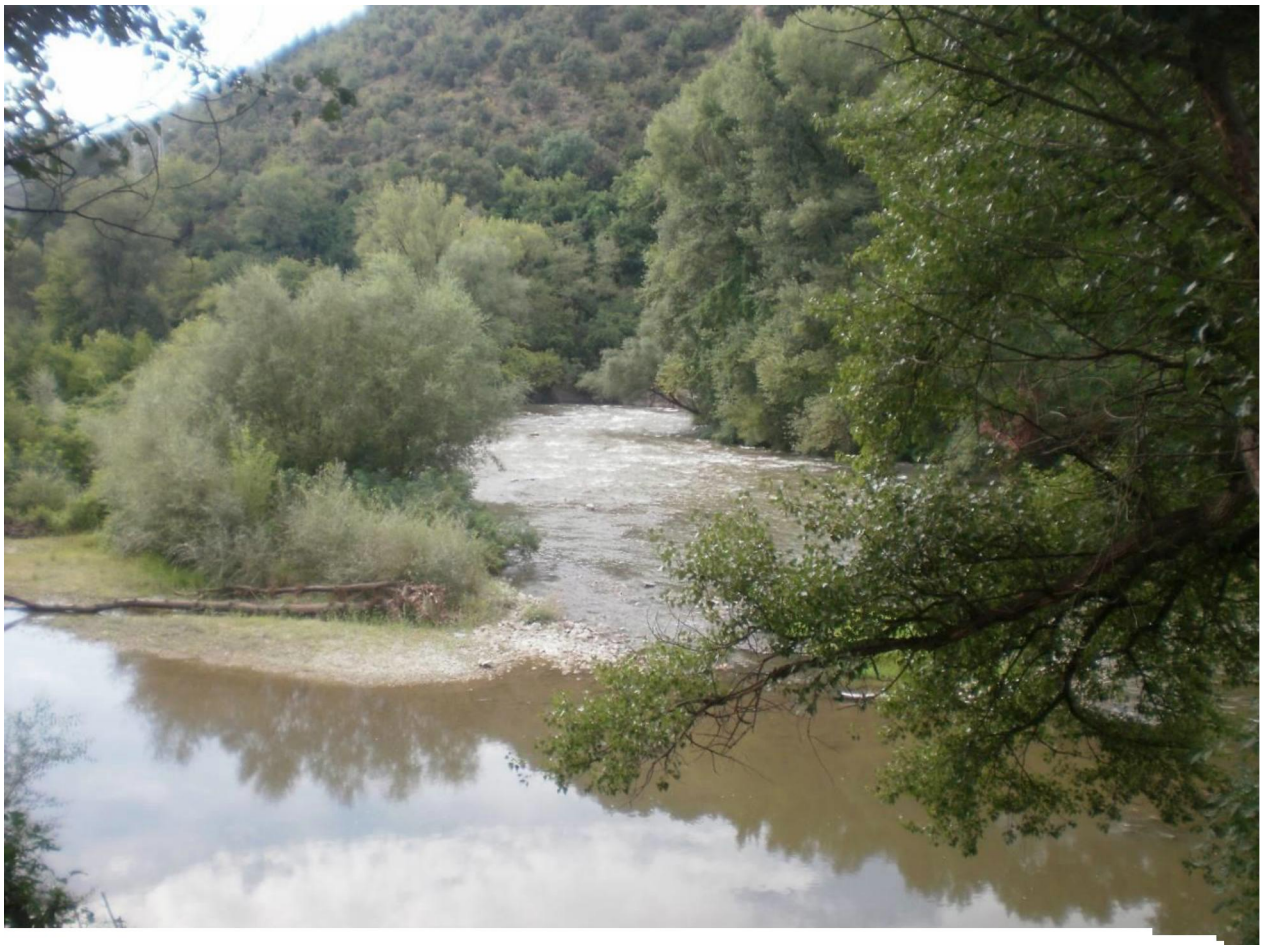

Figure 5.1-11: Habitat 92A0 Riverside galleries of *Salix alba* and *Populus alba* .

Impacts: **Option G20 - Red**

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 14.768 decares, representing 3,41% of its area in the zone. The impact in this case is determined to be **significant**. Due to the large number and size of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other realizable measures.

Fragmentation

The implementation of the IP in this option affects 22 polygons of the habitat. The area of the remaining untouched parts in 9 of them will be insufficient to maintain the characteristic species composition and to preserve their nature as a 92A0 natural habitat. Six of these polygons are affected along their length, effectively destroying the entire polygons. Fragmentation will be *significant*, combined with the direct loss of the habitat. Due to the large number and size of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other implementable measures.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 17.957 decares, representing 4.15% of its area in the zone. The impact in this case is determined to be **significant**. Due to the large number and size of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other realizable measures.

Fragmentation

The implementation of the IP in this option affects 21 polygons of the habitat. The area of the remaining untouched parts in 10 of them will be insufficient to maintain the characteristic species composition and to preserve their nature as a 92A0 natural habitat. Three of these polygons are affected along their length, effectively destroying the whole habitat. Combined with the direct loss of the habitat, fragmentation will be *significant*. Due to the large number and size of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other implementable measures.

Eastern Option G10.50

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 2.151 decares, representing 0.5% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects 4 polygons of the habitat. The area of the remaining unaffected part at 3 of these polygons will be insufficient (1-2 trees) to maintain the typical species composition and to maintain its character as a natural habitat 92A0. Fragmentation will be insignificant, given the small area and number of affected polygons.

Eastern Option G20

When implementing this option, habitat 92A0 will not be affected.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction at the site of construction
According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.814 decares, representing 0.19% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.
Fragmentation
The implementation of the IP in this option affects the peripheral parts of 2 polygons of the habitat. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 92A0 natural habitat. Fragmentation will be insignificant, given the small total area and number of affected polygons.

92C0 Forests of *Platanus orientalis*
Includes riverine forests dominated by eastern platanus (*Platanus orientalis*). Its distribution in Bulgaria is localized in two main areas. One includes the localities of the Eastern and Middle Rhodopes in the valley of the Arda river and along the Bachkovo River (from Asenovgrad to Bachkovo Monastery). The other area covers the valleys of the Mesta and Struma rivers, south of the Kresna Gorge. In the first region, the eastern platinum occurs single or in groups, and in the latter it forms much larger and significantly more conserved communities. In the woods of the communities, the eastern platter dominates, such as *Alnus glutinosa, Juglans regia* (secondary spread), *Salix alba* and others.
Assessment within the boundaries of Protected Zones
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOEW 2013), the area of the habitat in the protected zone is 785.10 decares.
Assessment in the region of the IP
The habitat is found within the boundaries of the Long Tunnel Option, the Kresna Tunnel (South Portal Depot), in the G20 Blue and G20 Red Options. The following species of plants are found in the sections, occupied by the habitat (Fig. 5.1-12):

N	Type	Family		N	Type	Family
1	*Platanus orientalis*	Platanaceae		15	*Arum maculatum*	Araceae
2	*Salix alba*	Salicaceae		16	*Petasites hybridus*	Asteraceae
3	*Ostrya carpinifolia*	Betulaceae		17	*Euphorbia amygdaloides*	Euphorbiaceae
4	*Ailanthus altissima*	Simaroubaceae		18	*Asparagus acutifolius*	Liliaceae
5	*Populus nigra*	Salicaceae		19	*Aristolochia clematitis*	Aristolochiaceae
6	*Robinia pseudoacacia*	Fabaceae		20	*Chelidonium majus*	Papaveraceae
7	*Ulmus minor*	Ulmaceae		21	*Parietaria officinalis*	Urticaceae
8	*Sambucus nigra*	Caprifoliaceae		2	*Tanacetum vulgare*	Asteraceae
9	*Amorpha fruticosa*	Fabaceae		23	*Calamintha nepeta*	Lamiaceae
10	*Clematis vitalba*	Ranunculaceae		24	*Dioica urtica*	Urticaceae
11	*Rubus sp.*	Rosaceae		25	*Saponaria officinalis*	Caryophyllaceae
12	*Vitis sylvestris*	Vitaceae		26	*Cichorium inthybus*	Asteraceae
13	*Tamus communis*	Dioscoreaceae		27	*Dactylis glomerata*	Poaceae
14	*Brachypodium sylvaticum*	Poaceae				

Figure 5.1-12: Habitat 92C0 Forests of *Platanus orientalis* in the area of the landfill at the southern portal of the Kresna Tunnel.

Impacts:

Option G20 - Red

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 10.079 decares, representing 1.28% of its area in the zone. The impact in this case is determined to be significant. Due to the large area of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other realizable measures.

Fragmentation

The implementation of the IP in this option affects 9 polygons of the habitat. The area of the remaining untouched parts in 4 of them will be insufficient to maintain the characteristic species composition and to preserve their nature as a 92C0 natural habitat. Three of these polygons are affected along their length, effectively destroying the whole habitat. Fragmentation will be significant, combined with the direct loss of the habitat. Due to the large area of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other implementable measures.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 17,388 decares, representing 2.21% of its area in the zone. The impact in this case is determined

as **significant**. Due to the large area of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other realizable measures.

Fragmentation

The implementation of the IP in this option affects 9 polygons of the habitat. The area of the remaining untouched parts in 4 of them will be insufficient to maintain the characteristic species composition and to preserve their nature as a 92C0 natural habitat. These polygons are affected along their length, effectively destroying the whole habitat. Fragmentation will be significant, combined with the direct loss of the habitat. Due to the large area of the affected polygons and the nature of the terrain, it is impossible to apply mitigating measures, such as reducing the range of certain sections or other implementable measures.

Eastern Option G10.50

When implementing this option, habitat 92C0 will not be affected.

Eastern Option G20

When implementing this option, habitat 92C0 will not be affected.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 8.543 decares, representing 1.09% of its area in the zone. The impact in this case is determined to be **significant,** i.e. mitigation measures shall be needed.

Measures:

- the northwest boundary of the landfill at the southern portal of the Kresna Tunnel to move 50m inwards so as not to affect the gully from the northwest, respectively the polygon of habitat 92C0.

Effect - Elimination of the impact of this option on the habitat in the area.

Fragmentation

Implementation of the IP in this option affects 1 polygon of the habitat, practically destroying it. The impact in this case is defined as moderate. With the implementation of measures to reduce direct destruction (see above), there will practically occur no fragmentation.

92D0 Southern riparian galleries and shrubs (Nerio-Tamaricetea and Securinegion tinctoriae)

The habitat consists of riparian sand and gravel deposits of alluvial terraces with scattered Tamaris communities (*Tamarix*). They occur mainly on the rivers in southern Bulgaria with a Mediterranean regime of high water, but isolated in other places in the country including any near the Danube river. They are encountered in separate spots between the riparian tree vegetation and have a derived nature - they have arisen in the place of destroyed forests of *Saliceta albae, Saliceta fragilis, Populeta nigrae, Populeta albae*. Typical species are: *Salix purpurea , Salix fragilis , Tamarix ramosissima, Tamarix tetrandra* .

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of the habitat in the protected zone is 24.4 decares.

Assessment in the region of the IP

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MoEW 2013), a polygon of the habitat falls within the scope of option G20 red - 0.27 decares. In the field study, it was found that the part, falling within the boundaries of this option represents a detour of the existing road with the adjacent ruderal vegetation occupying the embankment of the road body and may not be classified as a habitat 92D0 (Fig. 5.1-13).
Habitats 92D0 are not affected in any of the options considered.

Figure 5.1-13: Habitats 92D0 according to the project (green outlines) and nature of the terrain. Red outlines - within the boundaries of Option G20 red.

9560 * Endemic forests with *Juniperus spp.*

Juniperus excelsa and its phytocoenoses occur only in the regions with a pronounced Mediterranean climate - in the Rhodope Mountains - around Krichim ("The burnt gun' reserve), Asenovgrad (very limited along the Rivers' Chepelare) and more widely only in the valley of the Struma river (in the Kresna Gorge). In the Rhodopes, the communities with the participation of this species are small and strongly degraded. In the valley of Struma, the habitat is spread in the Kresna Gorge, in the lowest parts of the valleys of the rivers Vlahina, Otsovska and the Protected Site 'Moravska''. The most representative communities are in the Tisata Reserve and in its former buffer zone now recategorised at the Protected Site 'Kresna Gorge''. They are 'pseudo-maki' - sclerophyllious evergreen and deciduous shrubs and low trees with many open places and rich grass cover. The communities with the participation of tree juniper are distributed mainly at an altitude of between 100 and 300-400 m. Along the Struma tributaries, they rise up a little higher and occur only on the southern slopes of their valleys. The slope is relatively high - 20-40° on average. The soils are shallow. They are severely eroded and in many places soil cover is missing. The projected coverage of the tree and shrub layer in the communities under consideration is about 30-50%. The participation of tree juniper most often ranges from 2 to 4 - 5 individual numbers per ten trees. Others are dominant in the tree and shrub layer

are *Carpinus orientalis, Fraxinus ornus* and *Quercus pubescens* . Of lesser numbers are *Pistacia terebinthus* , *Pyrus amygdaliformis* . The shrub level is dominated by *Paliurus spina-christi* and *Jniperus oxycedrus* . The rest of the species are far behind and are found in certain places. These are *Asparagus acutifolius, Coronilla emerus* , *Jasminum fruticans, Phillyrea latifolia, Rosa glutinosa* . Relatively rarely only *Colutea arborescens* and *Osyris alba* are found in the lowest parts. The first tree level is very well developed and is very diverse. The predominantly thermophilic xerophytes, predominantly of southern and eastern origin, spread on dry rocky places. The presence of some species of Pontic origin is also characteristic.

Assessment within the boundaries of Protected Zones

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species Stage I' (MOE 2013), the area of the habitat in the protected zone is 11325.90 decares.

Assessment in the region of the IP

The habitat is found in the range of all options without the Long tunnel option, the 'Kresna' tunnel. The following species of plants are found in the sections, occupied by the habitat (Fig. 5.1-14):

N	Species	Family		N	Species	Family
1	*Juniperus excelsa*	Cupressaceae		20	*Teucrium pollium*	Lamiaceae
2	*Quercus pubescens*	Fagaceae		21	*Chondrilla juncea*	Asteraceae
3	*Carpinus orientalis*	Betulaceae		2	*Koeleria nitidula*	Poaceae
4	*Pistacia terebinthus*	Anacardiaceae		23	*Centaurea stoebe*	Asteraceae
5	*Pyrus amygdaliformis*	Rosaceae		24	*Poa bulbosa*	Poaceae
6	*Juniperus oxycedrus*	Cupressaceae		25	*Eryngium campestre*	Apiaceae
7	*Phillyrea latifolia*	Oleaceae		26	*Achillea clypeolata*	Asteraceae
8	*Jasminum fruticans*	Oleaceae		27	*Goniolimon collinum*	Plumbaginaceae
9	*Paliurus spina-christi*	Rhamnaceae		28	*Dianthus gracilis*	Caryophyllaceae
10	*Rosa sp.*	Rosaceae		29	*Silene conica*	Caryophyllaceae
11	*Verbascum sp.*	Scrofulariaceae		30	*Convolvulus canthabrica*	Convolvulaceae
12	*Euphorbia myrsinites*	Euphorbiaceae		31	*Sedum sp.*	Crassulaceae
13	*Dactylis glomerata*	Poaceae		32	*Euphorbia barrelieri*	Euphorbiaceae
14	*Chrysopogon gryllus*	Poaceae		33	*Astragalus onobrychis*	Fabaceae
15	*Aegilops sp.*	Poaceae		34	*Hypericum olympicum*	Hypericaceae
16	*Dichantium ischaemum*	Poaceae		35	*Salvia viridis*	Lamiaceae
17	*Bromus squarrosus*	Poaceae		36	*Thymus sp.*	Lamiaceae
18	*Festuca valesiaca*	Poaceae		37	*Asparagus acutifolius*	Liliaceae
19	*Teucrium chamaedrys*	Lamiaceae				

Figure 5.1-14: Habitat 9560* Endemic forests of *Juniperus spp* .

Impacts: **Option G20 - Red**

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 0.011 decares, representing 0.0001% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects the peripheral parts of one polygon from the habitat. No individual numbers of *Juniperus excelsa* are affected. The remaining intact area of the polygon will be sufficient to maintain the characteristic species composition and preserve its nature as a 9560 habitat. Fragmentation will not practically be present.

Option G20 - Blue

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 1.355 decares, representing 0.01% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a very small part of the periphery of two polygons of the habitat. The remaining intact area of the polygon will be sufficient to maintain the characteristic species composition and preserve its nature as a 9560 habitat. Fragmentation will be insignificant.

Eastern Option G10.50

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 2.9 decares, representing 0.03% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a polygon of the habitat, by dividing it into two parts. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 9560 natural habitat. Fragmentation will be insignificant.

Eastern Option G20

Direct destruction at the site of construction

According to the results of our own mapping, the total area of the habitat that will be affected during the realization of this option is 12.594 decares, representing 0.11% of its area in the zone. The impact in this case is defined as **insignificant,** i.e. The affected area is small enough not to cause a change in the functions of the natural habitat within the boundaries of the protected zone.

Fragmentation

The implementation of the IP in this option affects a polygon of the habitat, by dividing it into two parts. The area of the remaining untouched parts will be sufficient to maintain the characteristic species composition and preserve their character as a 9560 natural habitat. Fragmentation will be insignificant.

Long Tunnel Option, 'Kresna' tunnel

When implementing this option, habitat 9560 will not be affected.

=> *Plant species, subject to conservation in Protected Zone*

4080 Immunoelle *(Centaurea immanuelis-loewii)*

It grows **on** dry rocky places and scree, south or south-west, on acidic bedrock. It participates in the formation of open xerothermic communities. Populations are vital and are usually comprised of 100 to 400 individual representatives of the species, located on a very limited area (about 300 to 1,000 m).

Evaluation of the population in the area. In the protected zone 'Kresna-Ilindentsi", a specimen of *Centaurea immanuelis-loewii was found.* In the studies, related to the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage **I'** (MoEW 2013), about 600 individual numbers are listed on an area of 3.37 ha, of which about half are vegetative. The density is 0.018 individual numbers per square meter. The established locality is east of the town of Kresna, just north of the Kresna road - Vlahi village. The total area of the habitats of the *Centaurea immanuelis-loewii* in the Kresna-Ilindentsi Protected zone is 22.29 ha.

Evaluation of the population in the territory of the investment proposal. The Eastern Option G10.5 and the Eastern Option G20 options are in close proximity to the area, mapped by the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage **I'** (MOEW 2013), the distance

between the closest points of the boundary of the established locality and the boundaries of the options is 45 and 25 m respectively (in the Eastern Option G20 it passes closer).

Impacts:
None of the options directly affect the locality of the species. The remoteness of Eastern Option G10.5 and Eastern Option G20, as well as their location with respect to the established locality, passes south of the existing road on the left bank of the Razkola river (the opposite slope), while the established locality is north of the existing road, on the right bank, does not imply indirect impacts on the species population.

=> *Animal species, subject to conservation in Protected Zone*
Impacts on species were assessed on the basis of data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage **I'** (MoEW 2013; 7.2).

- » Invertebrates *(Invertebrata)*
1093 The stone crayfish (*Austropotamobius torrentium*)
Distribution and biology. A relatively widespread species, predominantly in Southwest Bulgaria, Western Rhodopes, Western Stara Planina, Central Balkan and Sredna Gora. It occurs in smaller mountain rivers and streams, as well as in the upper and middle streams of larger rivers. It prefers rocky river beds and convenient hiding areas along the coast (rhizomes of coastal tree vegetation). Highly oxybiotic species that does not tolerate low oxygen content, pollution and high temperatures. Oligosarbose species. It has been established from 180 to 1,600 - 1,700 m above sea level, predominantly in the area between 400 and 900 m.
Evaluation of the population in the area. On the basis of the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage **I'** (MOE 2013), the area of the potential habitats of the species is 386.73ha (about 80% of the total length of the rivers in the **Protected Zone**). The effectively occupied habitats are 149,20 ha. There are 4 georeferenced rivers of identified localities in **Protected Zones**. In the established data form, the overall rating of the **Protected Zone** for species conservation is '**A**', **and its** population is labeled as good 'B'. The assumed reference abundance is 0.004 ind. / m *(**Ab** = 0.004 ± 0.0 \) Evaluation of the population in the territory of the investment proposal.*
There are no identified localities of the species within the scope of Lot 3.2, where the construction of bridge structures and retaining walls has been projected. The option routes cross several smaller mountain rivers, as well as lowland (drying) gullies from the catchment area of the Struma River.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in riverbeds. 1,177 acres will be affected, or 0,03% of the potential habitats of the species in the area. The natural hydrological regime of the rivers will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact shall be insignificant.
Pollution of habitats
The temporary turbidity within the boundaries of construction activities will not alter the ecological status of rivers, parts of which are mapped as potential

habitats of the species. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. This is guaranteed by the existing legislation (Directive 98/91 / EC, Directive 2008/68 / EC, Directive 2010/35 / EC), according to which substances, liable to cause contamination in accidents are transported in limited quantities. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact shall be insignificant.

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. There will be no barrier effect for the stone crayfish /Austropotamobius torrentium/.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. There will be no impact.

Mortality

During the construction it is possible to destroy specimens of the species during construction works on the banks and in the tributaries of Struma river. Since the boundaries of the options do not fall into an effective habitat of the species, mortality of individual representatives of the species is unlikely. At a reference abundance of 0.004 individual representatives of the species / m ^{2} (*Ab* = 0.004 ± 0.01), the probable number of individual representatives of the species during the construction of the entire affected area will be about 1,177 acres of about 5 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (significant number of eggs, egg and small crayfish development until the second flushing on the female's abdomen, etc.). In case of an emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the stone crayfish /Austropotamobius torrentium/. The impact on the population in the area will be **insignificant**.

Option G-20 - Red

Direct destruction of habitats

In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 1.48 decares, or 0.038% of the potential habitats of the species in the area. The natural hydrological regime of the rivers will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact shall be insignificant.

Pollution of habitats

The temporary turbidity in the range of construction activities will not alter the ecological status of rivers, parts of which are mapped as potential habitat types. During the operation of the Motor Highway it is possible to contaminate surface waters in case of accidents, without exceeding

the permissible concentrations in accordance with Ordinance No. H-4 of 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact shall be insignificant.

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. There will be no barrier effect for the stone crayfish /Austropotamobius torrentium/.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No construction of impermeable barriers for the species in water streams is foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. There will be no impact.

Mortality

During the construction, it is possible to destroy individual representatives of the species of the species during construction works on the shores and in the river of the tributaries of the Struma river. The area is not an effective habitat of the species, which is why it is unlikely. At a reference abundance of 0.004 individual representatives of the species / m ^{2} (*Ab* = 0.004 ± 0.01), the probable number of individual representatives of the species during the construction of the entire affected area will be about 1,48 acres of about 6 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (significant number of eggs, egg and small crayfish development until the second flushing on the female's abdomen, etc.). In case of an emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the stone crayfish */Austropotamobius torrentium*/. The impact on the population in the area will be **insignificant**.

Eastern Option G10.50

Direct destruction of habitats

The road route under this option crosses several smaller mountain rivers, as well as lowland (drying) gullies, where the species does not occur. In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 5.9 decares, or 0.15% of the potential habitats of the species in the area. The natural hydrological regime of the rivers will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. Given the small impact area, the impact will be **insignificant**.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW

for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. There will be no barrier effect for the stone crayfish /Austropotamobius torrentium/.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No construction of impermeable barriers for the species in water streams is foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. There will be no impact.

Mortality

Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the mountain streams. Since the boundaries of the option do not fall into an effective habitat of the species, mortality of individual representatives of the species is unlikely. At a reference abundance of 0.004 individual representatives of the species / m ^{2} ($Ab = 0.004 \pm 0.01$), the probable number of individual representatives of the species during construction in the total affected area of 5.9 decares will be about 24 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (significant number of eggs, egg and small crayfish development until the second flushing on the female's abdomen, etc.). In case of an emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the stone crayfish */Austropotamobius torrentium*/. The impact on the population in the area will be **insignificant**.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

The road route under this option crosses several smaller mountain rivers, as well as lowland (drying) gullies, where the species does not occur. In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 16.39 decares, or 0.42% of the potential habitats of the species in the area. The natural hydrological regime of the rivers will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. Given the small impact area, the impact will be **insignificant**.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no changes in the environmental state of the water bodies in the scope of the Struma Motorway and no destruction of habitats. Given the small impact area, the impact will be **insignificant**.

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. There will be no barrier effect for the stone crayfish /Austropotamobius torrentium/.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No construction of impermeable barriers for the species in water streams is foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. There will be no impact.

Mortality

Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the mountain streams. At a reference abundance of 0.004 individual representatives of the species / m ^{2} (*Ab* = 0.004 ± 0.01), the probable number of individual representatives of the species during the construction of the entire affected area will be about 16,39 acres of about 66 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (significant number of eggs, egg and small crayfish development until the second flushing on the female's abdomen, etc.). In case of an emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the stone crayfish */Austropotamobius torrentium*/. The impact on the population in the area will be **insignificant**.

'Long Tunnel Option', 'Kresna' Tunnel

The implementation of this option in the stage of the construction and the operation of the facility will not affect the habitats of the species. No impact is expected.

1032 Thick shelled river mussel /*Unio crassus*/

Distribution and biology. It is found across Bulgaria (from 0 to 930 m above sea level), mainly in the middle streams of the inner rivers, preferring a mud-clayey or mud-sandy bottom in rivers and streams with pure flowing waters and high oxygen content. The species presents a burial filter, usually found at a depth of 1.0-1.5 m, fed with the plankton and detritus (dead organic matter).

Evaluation of the population in the area. On the basis of the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW 2013), the area of potential habitats of the species is estimated at 780,30 ha (about 20% of the total length of the rivers in the Protected Zone). Effectively occupied habitats, however, have a significantly smaller area - 32.71 ha. By parameters of the 'Bottom Substrate Characteristics' and 'Construction of Hydro technical Facilities, Shifting the Shore , the Nature Conservation Status (NCS) of the species is assessed as 'unfavourably unsatisfactory''. In the established data form, the overall assessment of the Protected Zone for species conservation is 'A' and of its population as 'C''. The assumed reference abundance is 0.003 ind. / m2 (Ab = 0.003 ± 0.007).

Evaluation of the population in the territory of the investment proposal. The species is found in one field along the Struma River (opposite the mouth of the Divilska river), in close proximity to the easement of the Investment Proposal.

Impacts:

<u>Option G-20 - Blue</u>

Direct destruction of habitats

In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 12.691 decares, or 0.163% of the potential habitats of the species in the area. The natural hydrological regime of rivers will not be changed, and the restoration of the habitats will occur promptly after completion of construction activities, except for the bridges (where foreseen). Given the small impact area, the impact will be **insignificant.**

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. Adult individual representatives of the species of the species do not perform active movements, but occupy new territories, moving passively, at the same time as the high-water river sediment or the free-floating glochidia attached to the gills of the fish, after being released by the host, falling upon suitable substrate, develop in adult individual representatives of the species. No construction of impermeable barriers for the river host species in water streams is foreseen. A barrier effect, preventing the spread of the species will not be induced.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No barriers in the water bodies are foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the water bodies. At a reference abundance of 0.003 individual representatives of the species / m^2 ($Ab = 0.004 \pm 0.01$), the probable number of individual representatives of the species during the construction of the entire affected area will be about 12,691 acres of about 38 individual representatives of the species. The species is part of the food chain of the predatory riverbed species and the loss of individual species does not lead to significant changes in the species' population characteristics, as evolutionary mechanisms have been introduced to ensure the survival of the species

(Development of several million freely moving glochidia) after fertilization, development of larvae on gill of host fish, hematophobicism in case of impossibility of fertilization, prolonged life cycle). In case of emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the thick shelled river mussel /scientific name *Unio crassus*/. The impact on the population in the area will be **insignificant.**

Option G-20 - Red

Direct destruction of habitats

In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 15.22 decares, or 0.195% of the potential habitats of the species in the area. The natural hydrological regime of rivers will not be changed, and the restoration of the habitats will occur promptly after completion of construction activities, except for the bridges (where foreseen). Given the small impact area, the impact will be **insignificant.**

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. Adult individual representatives of the species of the species do not perform active movements, but occupy new territories, moving passively, at the same time as the high-water river sediment or the free-floating glochidia attached to the gills of the fish, after being released by the host, falling upon suitable substrate, develop in adult individual representatives of the species. No construction of impermeable barriers for the river host species in water streams is foreseen. A barrier effect preventing the spread of the thick shelled river mussel /*Unio crassus*/ will not be induced.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No barriers in the water bodies are foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality:

Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the water bodies. At a reference abundance of 0.003 individual representatives of the species / m^2 ($Ab = 0.004 \pm 0.01$), the probable number of individual representatives of the species during construction in the total affected area of 15.22 decares will be about 46 individual representatives of the species. The species is part of the food chain of

predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (the development of several million free-flowing glochidia after fertilization, development of larvae on host fish gills, hematophobicism in case of inability to fertilize, prolonged life cycle). In case of emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the thick shelled river mussel /scientific name *Unio crassus*/. The impact on the population in the area will be **insignificant.**

Eastern Option G10.50

Direct destruction of habitats

The road route under this option crosses several smaller mountain rivers, as well as lowland (drying) gullies, where the species does not occur. Part of the right canal crosses the Struma river in 2 places and the Vlahinska river at Kresna. In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. 20.65 decares will be affected, or 0.26% of the potential habitats of the species in the area. The natural hydrological regime of rivers will not be changed, and the restoration of the habitats will occur promptly after completion of construction activities, except for the bridges (where foreseen). Given the small impact area, the impact will be **insignificant.**

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. Adult individual representatives of the species of the species do not perform active movements, but occupy new territories, moving passively, at the same time as the high-water river sediment or the free-floating glochidia attached to the gills of the fish, after being released by the host, falling upon suitable substrate, develop in adult individual representatives of the species. No construction of impermeable barriers for the river host species in water streams is foreseen. A barrier effect preventing the spread of the thick shelled river mussel /*Unio crassus*/ will not be induced.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No barriers in the water bodies are foreseen. There will be no fragmentation.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality:
Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the water bodies. With a reference abundance of 0.003 ind. / m2 (*Ab* = 0.004 ± 0.01), the probable number of individual representatives of the species during construction in the total affected area will be about 20,653 acres of about 62 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (the development of several million free-flowing glochidia after fertilization, development of larvae on host fish gills, hematophobicism in case of inability to fertilize, prolonged life cycle). In case of emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the thick shelled river mussel /scientific name *Unio crassus*/. The impact on the population in the area will be **insignificant.**

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

The road route under this option crosses several smaller mountain rivers, as well as lowland (drying) gullies, where the species does not occur. In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. There will be 54.42 decares, or 0.70% of the potential habitats of the species in the area. The natural hydrological regime of the rivers will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. Given the small impact area, the impact will be **insignificant.**

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. Adult individual representatives of the species of the species do not perform active movements, but occupy new territories, moving passively, at the same time as the high-water river sediment or the free-floating glochidia attached to the gills of the fish, after being released by the host, falling upon suitable substrate, develop in adult individual representatives of the species. No construction of impermeable barriers for the river host species in water streams is foreseen. A barrier effect, preventing the spread of the thick shelled river mussel /*Unio crassus*/ will not be induced.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No barriers in the water bodies are foreseen. There will be no fragmentation.

Mortality:
Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the water bodies. In reference abundance 0,003 individual numbers. / M ^{2} *(Ab* = 0,004 ± 0,01) the likely number of individual representatives of the species during construction throughout the area affected 54,417 acres will be about 163 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (the development of several million free-flowing glochidia after fertilization, development of larvae on host fish gills, hematophobicism in case of inability to fertilize, prolonged life cycle). In case of emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the thick shelled river mussel /scientific name *Unio crassus*/. The impact on the population in the area shall be **insignificant.**

'Long Tunnel Option', 'Kresna' Tunnel

Direct destruction of habitats

The road route under this option crosses the Struma river. In the realization of this option during the construction of the bridge facilities, a temporary deterioration of the quality of potential habitats of species is to be expected due to the construction works in river beds. It will affect 3.327 decares, or 0.04% of the potential habitats of the species in the area. The natural hydrological regime of rivers will not be changed, and the restoration of the habitats will occur promptly after completion of construction activities, except for the bridges (where foreseen). Given the small affected area, the impact will be
insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not alter the environmental status of rivers, parts of which are mapped as potential habitat types. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. Given the small impact area, the impact will be **insignificant.**

Disruption of bio-corridors:

The road route will not have a barrier effect for the species, as it does not provide for hydro-technical facilities with full barriers of rivers and water streams. Adult individual representatives of the species of the species do not perform active movements, but occupy new territories, moving passively, at the same time as the high-water river sediment or the free-floating glochidia attached to the gills of the fish, after being released by the host, falling upon suitable substrate, develop in adult individual representatives of the species. No construction of impermeable barriers for the river host species in water streams is foreseen. A barrier effect, preventing the spread of the thick shelled river mussel /*Unio crassus*/ will not be induced.

Fragmentation of the habitats

During the construction of bridge facilities, temporary deterioration in the quality of potential habitats is expected, yet their recovery will occur promptly after completion of construction works. No barriers in the water bodies are foreseen. There will be no fragmentation.

Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
Direct mortality of individual representatives of the species is possible during construction activities along the river banks and in the water bodies. With a reference abundance of 0.003 ind. / m2 (*Ab* = 0.004 ± 0.01), the probable number of individual representatives of the species during construction in the total affected area of 3.327 decares will be 10 individual representatives of the species. The species is part of the food chain of predators, occupying river beds, which is why the loss of individual species would not lead to significant changes in the species population, since evolutionary mechanisms have been introduced to ensure its survival (the development of several million free-flowing glochidia after fertilization, development of larvae on host fish gills, hematophobicism in case of inability to fertilize, prolonged life cycle). In case of emergency spill of petroleum products in the construction period due to the small quantities in the crankcase and tanks, the volatility of the petroleum products, their insolubility in water and their transfer by the stream will not reached the lethal concentration for the thick shelled river mussel /scientific name *Unio crassus*/. The impact on the population in the area shall be **insignificant.**

1037 *Ophiogomphus cecilia*
Distribution and biology. The species is predominantly distributed in the middle and lower rivers of the big rivers all over the country and is a typical flat species (from 30 m to 500 m). The larvae of the species are representatives of the pen- and pseudo-phylophone coenosis, and the imago inhabits open areas (sandy banks, single stones, dirt roads) along rivers and streams with a slower flow. It flies from May to August / September. The species spends most of its life cycle in the larval stage (3-4 years) and only a few weeks as a flying imago (D'Aguilar et al. 1986, Münchberg 1932, Werzinger & amp; Werzinger 1994).
Evaluation of the population in the area. On the basis of the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW, 2013), the area of potential habitats of the species is 9915,22 ha (20,40% of the total area of the area). Effectively occupied habitats cover an area of 2036.83 ha (4.19% of the total area of the site and 20.54% of the total area of potential habitats). There are 2 georeferenced deposits of rivers in the PZ. In the established data form, the overall assessment of the Protected Zone for species conservation is 'A' and of its population as 'C". The accepted reference volume is 0.01 individual representatives of the species in the species / km.
Evaluation of the population in the territory of the investment proposal.
The species is found in one locality near the Struma River (opposite the mouth of the Divilska river). The Investment Proposal affects areas of the potential habitats of the species.

Impacts:

<u>Option G-20 - Blue</u>
Direct destruction of habitats
During construction, this option will affect 627,604 decares, or 0.633% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.
Pollution of habitats
The temporary turbidity in the range of construction activities will not change the ecological status of rivers, inhabited by nymphs. During the operation of the Struma Motorway, it is possible to get contaminated surface water in

emergency situations, without exceeding the permissible concentrations in accordance with Regulation No. H-4 of 14 September 2012 of the MoEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Option G-20 - Red

Direct destruction of habitats

During construction, this option will affect 614,211 decares, or 0.619% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

During construction, this option will affect 291,681 decares, or 0.29% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

During construction, this option will affect 776.9 decares, or 0.78% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During

During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

'Long Tunnel Option', 'Kresna' Tunnel

Direct destruction of habitats

During construction, this option will affect 274,200 decares, or 0.28% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality
During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

4046 *Cordulegaster heros.*
Distribution and biology. The species is known for single specimens from different parts of the country. It inhabits mountainous areas, and all messages are from places with altitudes above 400 m. It prefers the lithoreophilic caenosis. The larvae live in small rivers and streams (some of them dry) with rocky bottoms, among forests and shrubs. The imago prefers shady places, often found in forests. The shady places are formed by trees or havoc with steep, high slopes. It flies from June to August and can refer to the group of summer species. The species spends most of its life cycle in the larval stage (4-5 years) and only a few weeks as a flying imago (Zingstra et all. 2009, MOE 2013, D'Aguilar et al. 1986, Wildermuth & Martens 2014).
Evaluation of the population in the area. On the basis of the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of potential habitats of the species is 7759.36 ha (15.97% of the total area of the zone). The effectively occupied habitats are 220,40 ha (0,45% of the total area of the zone and 2,84% of the total area of the potential habitats). There are 2 georeferenced deposits of rivers in the PZ. In the established data form, the overall assessment of the HM for species conservation is 'A' and its population is assessed with 'C". The accepted reference volume is 0.01 individual representatives of the species in the species / km.

Evaluation of the population in the territory of the investment proposal.
The species is located in 2 remote localities from the investment proposal in the watershed of the Belishka (Shashka) river, Strumyani municipality. The proposed routes will impact small areas of polygons, mapped as potential habitats.

Option G-20 - Blue
Direct destruction of habitats
During construction, this option will affect 210,060 decares, or 0.27% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.
Pollution of habitats
The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.
Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Option G-20 - Red

Direct destruction of habitats

During construction, this option will affect 247,231 decares, or 0.32% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small.

Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

During construction, this option will affect 146.074 decares, or 0.19% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:

The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

During construction, this option will affect 414.209 acres, or 0.53% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats

The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:
The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
'Long Tunnel Option', 'Kresna' Tunnel
Direct destruction of habitats
During construction, this option will affect 103.729 acres, or 0.13% of the potential habitats of the species in the area. Upon completion of construction works, restoration of the aquatic habitats of the larval stage is expected. Given the small impact area, the impact will be insignificant.

Pollution of habitats
The temporary turbidity within the boundaries of construction activities will not change the environmental status of rivers, inhabited by nymphs. During the operation of the Struma Motorway it is possible to get contaminated surface waters in case of accidents without exceeding the permissible concentrations in accordance with Regulation No. H-4 dated 14 September 2012 of MOEW for characterization of surface water. There will be no change in the environmental status of water bodies within the Struma Motorway range and habitat destruction. The impact is considered insignificant.

Disruption of bio-corridors:
The road track will have no barrier effect on the daily flying insects, as it is an obstacle, which is not difficult to be overcome by the flying insects. The larvae do not perform any active movements at large distances, yet move passively alongside the water flow. A barrier effect will not be triggered.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction of bridge facilities and activities in the river beds, mortality of larvae is possible. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the

populations of the species, as well as the short period of flying of the reptile, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

4053 The common parakaloptenus *(Paracaloptenus caloptenoides)*

A representative of the grasshoppers living on rocky or sandy, dry habitats (slopes, slopes, pastures, etc.) at medium altitudes, mostly between 800 and 1600 m above sea level for the western form and 0 - 700 for the eastern form. The adult species appear in the summer. They remain on the ground, especially at the skirts of the gravel and stones buried, and are hiding in the nearby vegetation. Threats to the species include forest fires, insecticide use, habitat loss (degradation due to sprouting, afforestation, infrastructure projects). In some cases, infrastructure projects may lead to the emergence of new habitats.

Evaluation of the population in the area. The population of the species in the Protected Zone BG0000366 'Kresna Ilindentsi' falls within the spread of the western environmental form in our country. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage **I'** no localities and effectively occupied habitats of the species in the area have been established. The species have not been found even in seemingly very suitable habitats. It may not be in the protected zone, but since the check does not cover all possible habitats, the probability of occurrence may not be totally excluded. By deductive model are mapped potential habitats with an area of 527.30 ha. Due to the absence of finds and the lack of suitable habitats for the species, the accepted population reference value is '0".

Evaluation of the population in the territory of the investment proposal. The construction of **the Struma Motorway** does not affect habitats of common paracopterus *(Paracaloptenus caloptenoides).* The nearest mapped potential model habitats are more than 6 km east of the Kresna Gorge and are outside the scope of the 5 provided for options.

Impacts:

The species and its habitats are not affected by any of the options considered. **No impact is expected.**

1074 *Eriogaster catax*

The butterfly is characteristic of the deciduous forest belt. It inhabits an eco-zone of forest with shrubs, meadows in the middle of forests. The imago flies only at night in a short period in the fall - October. Its larvae, however, live in groups and can be found (rarely) in the spring on *Pyrus, Prunus, Prunus spinosa, Crataegus, Quercus* and *Populus.* Threats to *Eriogaster catax* are related to the total change of habitats **into** which developing larva, forest fires, changing species composition of plantations in forests, afforestation with alien and alien species, development of land, clearing of bushes, using pesticides and major infrastructure projects. The growth of potential habitats and habitats with pioneer shrub vegetation (no long-lasting and long-lasting) can be seen as a positive impact, as the larval feeding plants are of the pioneer species causing fouling. The imago has a short lifecycle and is less sensitive to changes in habitat.

Evaluation of the population in the area. The established data form of the protected zone include the species as a very rare species (V) with a number of 4 to 37 individual representatives of the species. Within the framework of field studies under the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the species is registered in a single established locality east of the road I-1 Simitli - Kresna, in the region of the deviation for Stara Kresna village. The modelling of the MaxEnt software has established a total area of the potential habitats of 6609.17 ha (13.60% of the area). The area of the occupied territories according to the final map is 73.56 ha. The abundance is low, one individual in one trap once, one individual in three traps and one individual for five nights in fifteen traps. The assumed reference abundance is 0.05 individual representatives of the species / ha. In field studies, established food plants are poorly represented.
Evaluation of the population in the territory of the investment proposal. The species is not established on the territory of the investment proposal. The proposed routes affect parts of polygons, mapped as potential habitats of the species. Certain localities are not affected.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the limits of the scope, fall 114,849 decares of potential habitats of the species, or 0,174% of their area in the zone. Given the small affected area, the impact is assessed as insignificant.

Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of small polygons with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
Option G-20 - Red
Direct destruction of habitats
Within the limits of the scope, fall 141.54 decares of potential habitats of the species, or 0.214% of their area in the zone. Given the small affected area, the impact is assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats
The IP concerns a very small part of small polygons with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
Eastern Option G10.50
Direct destruction of habitats
Within the boundaries of the scope, fall 208,384 decares of potential habitats of the species, or 0.32% of their area in the zone. Given the small affected area, the impact is assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of small polygons with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
Eastern Option G20, out of the Kresna gorge
Direct destruction of habitats
Within the boundaries of the scope, fall 768,693 decares of potential habitats of the species, or 1,16% of their area in the zone. Given that it will affect more than 1% of the area of potential habitats of the species in the area but will not change the conservation status of the species, the impact is assessed as moderate. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats

The investment proposal affects parts of polygons with potential habitats of the species, dividing some into parts. Given the fact that the species adheres to ecotone habitats and it inhabits those with a small area, including any forest meadows, fragmentation is considered as insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

'Long Tunnel Option', 'Kresna' Tunnel

Direct destruction of habitats

Within the boundaries of the scope are covered 167,724 decares of potential habitats of the species, or 0.25% of their area in the zone. Given the small affected area, the impact is assessed as insignificant.

Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of small polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, mortality of adult individual representatives of the species of the species is possible in vehicle crashes. Given the very low density of the populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

6199. The Jersey tiger (*Euplagia quadripunctaria*).

In Bulgaria it occurs in the lowest parts of the country, including the Black Sea coast, to about 1,600 m above sea level, in the mountains, mostly on warm, overgrown rocky slopes with hazelnut tree. It flies and feeds mostly in the daytime in July and August in shady places along bushes and on the outskirts of the woods. It is known in our country for many localities, scattered throughout the country. The larvae feed on dandelion (*Taraxacum*), *Lamium, Lonicera*, nettle (*Urtica*), raspberry (*Rubus idaeus*), the hazel(nut) tree (*Corylus*). The species is accepted in Europe as a paragrant-performing seasonal migrations (Zingstra et al. 2009).

Evaluation of the population in the area. The established data form of the protected zone is included as a rare species (R) of 10197-17092 individual representatives of the species. The field

studies of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOEW 2013), has located the species in 9 georeferenced localities in different parts of the area. The MaxEnt software has defined an area of 26382,2339 hectares, respectively 54,28% of the area of the zone. The area of the territories with optimal conditions for the species, according to the final mapping is 0.24 ha. The abundance is moderate, found with 1 individual per 1 trap or 1 to 3 specimens per three traps. The assumed reference abundance is 3 ind./ha (specimen/ha).
Evaluation of the population in the territory of the investment proposal. All five options affect individual areas of polygons, mapped as potential habitats of the species.
Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the scope are found 372,414 decares of potential habitats of the species, or 0,141% of their area in the zone. Given the relatively small affected area, the impact is assessed as insignificant.

Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of a practically large polygon with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, imago mortality is possible due to collision with the vehicles, but given the long period of the larval stage, the probability of this is small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant, given its high number.
Option G-20 - Red
Direct destruction of habitats
Within the boundaries of the scope fall 353,651 acres of potential habitats of the species, or 0,134% of their area in the zone. Given the relatively small affected area, the impact is assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of a practically large polygon with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, imago mortality is possible due to collision with the vehicles, but given the long period of the larval stage, the probability of this is small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant, given its high number.

Eastern Option G10.50

Direct destruction of habitats

Within the boundaries of the scope are found 352,742 decares of potential habitats of the species, or 0,13% of their area in the zone. Given the relatively small affected area, the impact is assessed as insignificant.

Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of a practically large polygon with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, imago mortality is possible due to collision with the vehicles, but given the long period of the larval stage, the probability of this is small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant, given its high number.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

Within the boundaries of the scope are found 1156.119 decares of potential habitats of the species, or 0.44% of their area in the zone within the range. Given the relatively small affected area, the impact is assessed as insignificant.

Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of a practically large polygon with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, imago mortality is possible due to collision with the vehicles, but given the long period of the larval stage, the probability of this is small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant, given its high number.

'Long Tunnel Option', 'Kresna' Tunnel

Direct destruction of habitats
Within the limits of the scope, 144,196 decares of potential habitats of the species, or 0.05% of their area in the zone. Given the relatively small affected area, the impact is assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of a practically large polygon with potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. During the operation of the motorway, imago mortality is possible due to collision with the vehicles, but given the long period of the larval stage, the probability of this is small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant, given its high number.

1060 *Lycaena dispar.*
In Bulgaria it is found almost everywhere on wet and rarely in dry grassy places near lakes, waders, ditches and other wetlands up to 1,000 m in the mountains. The caterpillar mainly feeds on green leaves of plants of the *Rumex* family - *Rumex hydrolapathum, Rumex crispus, Rumex aquaticus* . Butterflies fly from May to October. The populations are probably three depending on the altitude. Threats to the species are forest fires, insecticide use, habitat loss (degradation due to changes in plant cover, grassing, afforestation, large infrastructure projects, droughts due to changes in the water level).
Evaluation of the population in the area. In the established data form, the protected zone is included as a rare species (R) without population figures. Among the field studies under the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I' (MoEW 2013), the species is not registered. The modelling of the MaxEnt software has established a total area of potential habitats of 1,459.49 ha. The total area of the territories with optimal conditions for the species populations according to the final mapping is 102.83 ha.
Evaluation of the population on the territory of the investment proposal The species is not established on the territory of the IP for the construction of the Struma Motorway. The proposed options affect polygons, mapped as potential habitats.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the scope of this option are found, 96,653 decares of potential habitats of the species, or 0,662% of their area in the zone within this range. Given the small affected area, the impact is assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of large polygons, mapped as potential habitats of the species. Fragmentation will be insignificant.

Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. The operation of the motorway is likely to cause mortality of adult individual representatives of the species due to vehicle crashes. Given the very low density of the species populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
Option G-20 - Red
Direct destruction of habitats
Within the scope of this option are found, 108,12 decares of potential habitats of the species, or 0,741% of their area in the zone within this range. Given the small affected area, the impact has been assessed as insignificant.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of large polygons, mapped as potential habitats of the species. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. The operation of the motorway is likely to cause mortality of adult individual representatives of the species due to vehicle crashes. Given the very low density of the species populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.
Eastern Option G10.50
Direct destruction of habitats
Within the boundaries of the scope fall 93,036 decares of potential habitats of the species or 0.64% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.
Fragmentation of the habitats
The IP concerns a very small part of large polygons, mapped as potential habitats of the species. Fragmentation will be insignificant.
Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. The operation of the motorway is likely to cause mortality of adult individual representatives of the species due to vehicle crashes. Given the very low density of the species populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality will be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

Within the boundaries of the scope are comprised 216,492 decares of potential habitats of the species, or 1,48% of their area in the zone. Given that it will affect more than 1% of the area of potential habitats of the species in the area but will not change the conservation status of the species, the impact is assessed as moderate. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats

The investment proposal affects parts of polygons with potential habitats of the species, dividing some into parts. Given the fact that the species adhere to the ecotone habitats and it inhabits habitats of small area, including waders, ditches and other, fragmentation is considered as insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. The operation of the motorway is likely to cause mortality of adult individual representatives of the species due to vehicle crashes. Given the very low density of the species populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality would be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

The Long Tunnel Option, 'Kresna' Tunnel

Direct destruction of habitats

Within the scope of this option are found 114,082 decares of potential habitats of the species, or 0,78% of their area in the zone within this range. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the imago because of its high mobility - a flying insect. The larvae (caterpillars) move on a relatively small area. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

During the construction, the larva mortality is possible, when clearing tree vegetation and shrubs. The operation of the motorway is likely to cause mortality of adult individual representatives of the species due to vehicle crashes. Given the very low density of the species populations of the species, as well as the short period of flying of the imago/ adult daily flying insect/, combined with the long period in the larval stage, the probability of this is very small. Mortality would be within the limits of the natural changes in the population. The impact on the species population in the area will be insignificant.

4042 *Polyommatus eroides*

Spread predominantly in the mountains up to 2,300-2,400 m, with a lower distribution limit of 600 m. The breed is of one generation a year. It is widespread in June and July. The caterpillars feed on plants of the genera *Astragalus*, *Chamaecytisus* and *Genista*. They inhabit open meadows in the high parts of the mountains.

Evaluation of the species population in the area. In the established data form, the protected zone is included as rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MOEW 2013), the species is not registered. Through modelling, the MaxEnt software has established a total area of potential habitats of 2,812,28 ha. The total area of the territories with optimal conditions for the species populations according to the final mapping is 878,05 ha.

Evaluation of the species population in the territory of the investment proposal. The species is not established on the territory of the investment proposal. The proposed road routes do not affect any potential habitats in the 5 options, for they cross low altitudes.

Impacts:

The species and its habitats are not affected by any of the options considered. **No impact is expected.**

4033. *Erannis ankeraria (Desertobia ankeraria)*

Known from two finds in the country - the area of the railway stop at Stara Kresna and the volcanic ridge of Kozhuha. The imago is active from late February to early April. The female has very short wings and does not fly. The displacement of these species is carried out by the larvae, emitting a silk thread that serves as a balloon and is carried by the air currents. The breed is of one generation per year. It develops on oak trees - *Quercus pubescens* and *Quercus petraea* . It inhabits the sub-Mediterranean xerothermic oak, coppice forests, oak forests with a lot of clearance and groves up to 600 m of altitude. The pupae spends the winter (Beshkov & Zlatkov 2011, Mihoci & Franjevic 2011, Sattler 1991).

Evaluation of the species population in the area.

In the standard form, the protected area is included as a registered (R) species, without data on its population number. The species has not been reported in the framework of the project "Mapping and Determination of the Conservation Status of Natural Habitats and species - Phase I "(MoEW 2013). It is located in the area of the railway station near Stara Kresna.

Evaluation of the species population in the territory of the investment proposal.
The species has not been reported within the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), respectively no model of its potential habitats has been prepared. We could accept as such the Eastern Pubescent oak forests /*Quercus pubescens*/ (natural habitat 91AA), the area of which in the zone is 36,927.5 decares.

Impacts:

Option G20 - Red
Direct destruction of habitats
Within the scope of this option are found 94.388 decares of potential habitats of the species, or 0,256% of their area in the zone within this range. Given the small affected area, the impact has been assessed as insignificant.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, as the species inhabits scattered forests as well.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the male imago, because of its high mobility and the larvae, which are transmitted by the air currents. Females do not move. There will be no barrier effect.
Disturbance:
The species is insensitive to disturbance. No impact is to be expected.
Mortality:
There is likelihood of individual representatives of the species being present within the construction boundaries and probability of their mortality during construction. During the operation of the motorway, mortality of individual representatives of the species is also possible. Given the low population density, the short life cycle of the imago and the mobility of the male, the impact on the species population in the area will be insignificant.
Option G20 - Blue
Direct destruction of habitats
Within the scope of this option are found 107.075 decares of potential habitats of the species, or 0,29% of their area in the zone within this range. Given the small affected area, the impact has been assessed as insignificant.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, as the species inhabits scattered forests as well.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the male imago, because of its high mobility and the larvae, which are transmitted by the air currents. Females do not move. There will be no barrier effect.
Disturbance:
The species is insensitive to disturbance. No impact is to be expected.
Mortality:
There is likelihood of individual representatives of the species being present within the construction boundaries and probability of their mortality during construction. During the operation of the motorway, mortality of individual representatives of the species is also possible. Given the low population density, the short life cycle of the imago and the mobility of the male, the impact on the species population in the area will be insignificant.
Eastern Option G10.50

Direct destruction of habitats
Within the scope of this option are found 144.737 decares of potential habitats of the species, or 0,39% of their area in the zone within this range. Given the small affected area, the impact has been assessed as insignificant.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, as the species inhabits scattered forests as well.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the male imago, because of its high mobility and the larvae, which are transmitted by the air currents. Females do not move. There will be no barrier effect.
Disturbance:
The species is insensitive to disturbance. No impact is to be expected.
Mortality:
There is likelihood of individual representatives of the species being present within the construction boundaries and probability of their mortality during construction. During the operation of the motorway, mortality of individual representatives of the species is also possible. Given the low population density, the short life cycle of the imago and the mobility of the male, the impact on the species population in the area will be insignificant.
Long Tunnel Option, 'Kresna' tunnel
Direct destruction of habitats
Within the scope of this option are found 40.391 decares of potential habitats of the species, or 0,11% of their area in the zone within this range. Given the small affected area, the impact has been assessed as insignificant.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, as the species inhabits scattered forests as well.
Disruption of bio-corridors:
The nature of the investment proposal does not imply a barrier effect for the male imago, because of its high mobility and the larvae, which are transmitted by the air currents. Females do not move. There will be no barrier effect.
Disturbance:
The species is insensitive to disturbance. No impact is to be expected.
Mortality:
There is likelihood of individual representatives of the species being present within the construction boundaries and probability of their mortality during construction. During the operation of the motorway, mortality of individual representatives of the species is also possible. Given the low population density, the short lifetime of the imago and the mobility of the male, as well as the small length of the on-land parts, no impact on the population of the species in the area will practically occur.
Eastern Option G20
Direct destruction of habitats
Within the scope of this option are found, 468.077 decares of potential habitats of the species, or 1.27% of their area in the zone within this range. The impact has been assessed as moderate. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, as the species inhabits scattered forests as well.
Disruption of bio-corridors:

The nature of the investment proposal does not imply a barrier effect for the male imago, because of its high mobility and the larvae which are transmitted by the air currents. Females do not move. There will be no barrier effect.
Disturbance:
The species is insensitive to disturbance. No impact is to be expected.
Mortality:
There is likelihood of individual representatives of the species being present within the construction boundaries and probability of their mortality during construction. During the operation of the motorway, mortality of individual representatives of the species is also possible. Given the low population density, the short life cycle of the imago and the mobility of the male, the impact on the species population in the area will be insignificant.

4022 The Whipped Probatique *(Probaticus subrugosus)*.
Known from 10 finds, half of which from the Upper Thracian Plain, the rest - from South-Western Bulgaria and the Black Sea Coast. Still insufficiently explored species in the country. Attached to open, calcareous terrains with meadow vegetation. It is rarely found on dry slopes, overgrown with vegetation of the steppe type. The larvae grow for 1 year in the soil and feed on plant roots. In long drought they migrate into the deep layers of the soil and fall into diapause. The pupae stage is in the summer. The imago spends the winter. In April, at soil-air temperature of about 17-20°C, the adults emerge. They feed on plant debris, less often on saplings of dicotyledonous plants. They are active in the evening and at night, during the day they are hidden under stones and in abandoned holes of rodents. The larvae do not leave the surface soil layer, and the imago is active (leaving the underground habitats) for only 2 months (April-May) without leaving its biotopes. The eggs are laid in slits and cavities of the soil (Zingstras et al. 2009, Nabozhenko et al., 2016).
Evaluation of the species population in the area. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MOEW 2013), the species is not registered. Through modelling, the MaxEnt software has established a total area of potential habitats of 2904.06 ha. According to the final zone mapping, the total area of suitable habitats is 0.00 ha (There are no suitable habitats for the species in the protected zone).
Evaluation of the species population in the territory of the investment proposal.
The species is not established on the territory of the investment proposal. The proposed routes will impact small areas of polygons, mapped as potential habitats.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the scope of this option are found, 20.509 decares of potential habitats of the species, or 0.071% of their area in the zone within this range. Given the small affected area of the potential habitat for the species, the impact is assessed as insignificant.
Disruption of bio-corridors
The species leads a sedentary way of life and does not move out of their dwellings. The nature of the IP does not imply a barrier effect for the imago, as it adheres to habitats with specific conditions that it does not leave.
Fragmentation of the habitats
The IP affects a very small part of the periphery of one polygon with potential habitats without affecting the habitats. Fragmentation will not practically be present.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality

There is a likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when vegetation is removed, but this probability shall be insignificant due to the very low population density (if any) and the poor quality of the habitats. The impact on the species population in the area will be insignificant. The operation of the motorway is not likely to cause mortality of individual representatives of the species (imago and larvae). Larvae do not leave the surface soil layer, and the imago does not leave its biotopes.

Option G-20 - Red

Direct destruction of habitats

Within the scope of this option are comprised 21.667 decares of potential habitats of the species, or 0.75% of their area in the zone within this range. Given the small affected area of the potential habitat for the species, the impact is assessed as insignificant.

Disruption of bio-corridors

The species leads a sedentary way of life and does not move out of their dwellings. The nature of the IP does not imply a barrier effect for the imago, as it adheres to habitats with specific conditions that it does not leave.

Fragmentation of the habitats

The IP affects a very small part of the periphery of one polygon with potential habitats without affecting the habitats. Fragmentation will not practically be present.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is a likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when vegetation is removed, but this probability shall be insignificant due to the very low population density (if any) and the poor quality of the habitats. The impact on the species population in the area will be insignificant. The operation of the motorway is not likely to cause mortality of individual representatives of the species (imago and larvae). Larvae do not leave the surface soil layer, and the imago does not leave its biotopes.

Eastern Option G10.50

Within the boundaries of the scope fall 178.059 decares of potential habitats of the species, or 0.61% of their area in the zone. Given the small affected area of potential habitats, without impact on the suitable habitats for the species, the impact is assessed as insignificant.

Disruption of bio-corridors

The species leads a sedentary way of life and does not move out of their dwellings. The nature of the IP does not imply a barrier effect for the imago, as it adheres to habitats with specific conditions that it does not leave.

Fragmentation of the habitats

The investment proposal affects a small part of polygons with potential habitats without affecting the habitats. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is a likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when vegetation is removed, but this probability shall be insignificant due to the very low population density (if any) and the poor quality of the habitats. The impact on the species population in the area will be insignificant. The operation of the motorway is not likely to cause mortality of individual representatives of the species (imago and larvae). Larvae do not leave the surface soil layer, and the imago does not leave its biotopes.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats
Within the boundaries of the scope fall 747.158 decares of potential habitats of the species, or 2.57% of their area in the zone. Although the affected area of potential habitats is greater than 1%, the change is not significant to preserve the population size of the species in the area due to the poor quality of the habitats. The impact has been assessed as moderate. Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.
Disruption of bio-corridors
The species leads a sedentary way of life and does not move out of their dwellings. The nature of the IP does not imply a barrier effect for the imago, as it adheres to habitats with specific conditions that it does not leave.
Fragmentation of the habitats
The investment proposal affects a small part of polygons with potential habitats without affecting the habitats. Fragmentation will be insignificant.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
There is a likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when vegetation is removed, but this probability shall be insignificant due to the very low population density (if any) and the poor quality of the habitats. The impact on the species population in the area will be insignificant. The operation of the motorway is not likely to cause mortality of individual representatives of the species (imago and larvae). Larvae do not leave the surface soil layer, and the imago does not leave its biotopes.
The Long Tunnel Option, 'Kresna' Tunnel
In this option, the road route does not affect habitats of the species. There will be no impact.

1089 The Morimus funereus beetle (*Morimus funereus*)
Representative of saproxel beetles. It is found at 50 to 1,700 meters above sea level. It inhabits predominantly deciduous and mixed forests (*Fagus, Populus, Tilia, Acer, Salix, Carpinus, Quercus* , etc.), but also occurs in coniferous forests. The larvae grow under the bark of trees, where they feed on their core. (Zingstra et all.;
2009).
Evaluation of the species population in the area. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I" (MOEW 2013), have been established 3 georeferenced findings.
Potential habitats in the protected zone are forests with abundant deadwood and at least 1 tree in the old age on a territory of 1 hectare. Modelling with the help of MaxEnt software has identified a total area of potential habitats of 15,607.49 ha, of which 12,259.10 ha are suitable.
Evaluation of the species population on the territory of the investment proposal
The proposed road route options affect polygons, mapped as potential habitats.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the boundaries of the scope fall 137.509 decares of potential habitats of the species, or 0.112% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.
Disruption of bio-corridors
The nature of the investment proposal does not imply a barrier effect for the imago, as the adults do not move far away from the trees in whose wood the larvae develop. The larvae

move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns small parts of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant. Mortality is not expected during the operation of the highway. The imago is hiding under the bark of the trees and the fading noise, does not move away from the metamorphosis site and does not leave its biotopes.

Option G-20 - Red

Direct destruction of habitats

Within the limits of the scope are comprised 124.648 decares of potential habitats of the species, or 0.102% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the investment proposal does not imply a barrier effect for the imago, as the adults do not move far away from the trees in whose wood the larvae develop. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns small parts of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant. Mortality is not expected during the operation of the highway. The imago is hiding under the bark of the trees and the fading noise, does not move away from the metamorphosis site and does not leave its biotopes.

Eastern Option G10.50

Direct destruction of habitats

Within the limits of the scope are comprised 39.631 decares of potential habitats of the

species, or 0.03% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the investment proposal does not imply a barrier effect for the imago, as the adults do not move far away from the trees in whose wood the larvae develop. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns small parts of 2 large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant. Mortality is not expected during the operation of the highway. The imago is hiding under the bark of the trees and the fading noise, does not move away from the metamorphosis site and does not leave its biotopes.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

Within the boundaries of the scope are found 155.464 decares of potential habitats of the species, or 0,13% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the investment proposal does not imply a barrier effect for the imago, as the adults do not move far away from the trees in whose wood the larvae develop. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns small parts of 2 large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant. Mortality is not expected during the operation of the highway. The imago is hiding under the bark of the trees

and the fading noise, does not move away from the metamorphosis site and does not leave its biotopes.

The Long Tunnel Option, 'Kresna' Tunnel

Within the boundaries of the scope are found 6.186 decares of potential habitats of the species, or 0.01% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the investment proposal does not imply a barrier effect for the imago, as the adults do not move far away from the trees in whose wood the larvae develop. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns quite small parts of polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant. Mortality is not expected during the operation of the highway. The imago is hiding under the bark of the trees and the fading noise, does not move away from the metamorphosis site and does not leave its biotopes.

1083 The Stag Beetle (*Lucanus cervus*)

It is a rare species, common for Europe and Asia. The imago occurs along the trunks of old and thick oak trees (less often other trees), where it feeds on the juices, leaking from injured areas. It flies in the day with a clumsy and noisy flight. The female lays her eggs in old stumps, and the hatched larva eats rotting wood. The larval growth cycle is long and lasts for about 5 years. At the end, the larva becomes a pupa and the imago appears at the beginning of July. It inhabits old, oak or mixed, deciduous forests. It can also be seen in the city parks and gardens.

Evaluation of the species population in the area. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I" (MOEW 2013), have been established 4 geo-referenced localities. Due to the fact that the number of old trees per hectare can not be counted during the field work, the potential habitats are mapped based on an expert opinion on the presence / absence of old trees. Modelling with the help of MaxEnt software has identified a total area of potential habitats of 12,980.02 ha, of which 3120.6 ha are suitable.

Evaluation of the species population on the territory of the investment proposal.

The species is not established on the territory of the investment proposal. The proposed routes will impact small areas of polygons, mapped as potential habitats.

Impacts:

Option G-20 - Blue

Direct destruction of habitats

Within the boundaries of the scope are comprised 366.696 decares of potential habitats of the species, or 0.283% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

Option G-20 - Red

Direct destruction of habitats

Within the boundaries of the scope are found 313.448 decares of potential habitats of the species, or 0.241% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

Within the boundaries of the scope are found 180.963 decares of potential habitats of the species, or 0.14% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /*Certhia familiaris*/), so the loss of a small number of individual representatives of the species would not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure its survival (Full Cycle of metamorphosis, short life span of the imago and up to 5 years larvae development in different environments of the developmental phase).

Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

Within the boundaries of the scope are comprised 478.324 decares of potential habitats of the species, or 0.37% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual

representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

The Long Tunnel Option, 'Kresna' Tunnel

Within the boundaries of the scope are comprised 33.714 decares of potential habitats of the species, or 0.03% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant.

The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

1088 The Great Capricorn Beetle (*Cerambyx cerdo*)

A representative of saproxylic beetles, inhabiting broadleaved forests. Prefers sunny oak trees, sick or dying old oaks (mostly summer oak, rarely winter oak, beech or elm), more often humid trunks in sunny places of old forests and decaying forests. Residual localizations occur in old parks. The female lays up to 100 eggs on the bark of the trees. After 10-15 days, the larvae are hatched, which in the first year breed on the bark, and in the next 2 to 3 years they enter the wood. The pupa is formed in the carved openings, and the imago goes out in August, yet does not leave its galleries until May-June of next year.

Evaluation of the species population in the area. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I" (MOEW 2013), the species is not registered and no geo-referenced localities have been established. Due to the fact that the number of old trees per hectare can not be counted during the field work, the potential habitats are mapped based on an expert opinion on the presence / absence of old trees. Modelling with the help of MaxEnt software has identified a total area of potential habitats of 4,623.88 ha, of which 2,388.05 ha are suitable.

Evaluation of the species population on the territory of the investment proposal.

The species is not established on the territory of the investment proposal. The proposed route options do not affect suitable habitats, but concern small areas of polygons, mapped as potential habitats.

Impacts:

Option G-20 - Blue

Direct destruction of habitats

Within the boundaries of the scope are found 315.452 decares of potential habitats of the species or 0.682% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

Option G-20 - Red

Direct destruction of habitats

Within the boundaries of the scope are found 302.309 decares of potential habitats of the species, or 0.654% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural

changes. The impact upon the species population in the area will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

Within the boundaries of the scope are found 58.887 decares of potential habitats of the species or 0.13% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

Eastern Option G20, out of the Kresna gorge

Direct destruction of habitats

Within the boundaries of the scope are found 217.977 decares of potential habitats of the species, or 0.47% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual

representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

The Long Tunnel Option, 'Kresna' Tunnel

Within the boundaries of the scope are found 68.894 decares of potential habitats of the species or 0.15% of their area in the zone. Given the relatively small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There would be a possibility of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing the vegetation, yet this probability is insignificant. The species is part of the food chain of the dendrophilous birds (woodpeckers, tree-creepers /Certhia familiaris/), and therefore the loss of a small number of individual representatives of the species does not lead to significant changes in the population's characteristics, as evolutionary mechanisms have been introduced to ensure survival (full cycle of metamorphosis, short life span and up to 5 years larvae in different environments of developmental life). Because of the imago's short flight time and the low demographic abundance in the operation of the highway, only the mortality of individual representatives of the species is possible. Mortality will be within the limits of natural changes. The impact upon the species population in the area will be insignificant.

1087 The Alpine Rosalie (*Rosalia alpina*)

A relic species for the territory of Europe. The imago is an insect of medium size. It is found in old forests in the mountain range from 500 to 1,500 m with the participation of mostly beech and birch, but also elm, hornbeam, lime tree and chestnut. Other host trees are spruce, pine, poplar, willow, hawthorn, walnut, and pear tree. The adults are active in the sunny days from June to September. They can be found around the trees they came out of and on old fallen trees. They feed on the juice of bruised trees. After mating, the female lays her eggs in the freshly cut, dead or dying beech trees, in bark bruises or cracks. The larvae break through the woods and after 2-3 years they turn into pupae. The larvae are part of the woodpecker's food, and the number of many forest birds. Threats for the species are forest fires and the cutting of old beech forests.

Evaluation of the species population in the area. In the established data form, the protected zone is included as a rare species (R) without population data. Within the field studies under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MOEW 2013), the species is registered in 1 geo-referenced locality. Modelling with the help of MaxEnt software has identified a total area of potential habitats of 9,724.51 ha, of which 4,441.93 ha are suitable habitats.

Evaluation of the species population on the territory of the investment proposal.

The species is not established on the territory of the investment proposal. The proposed 4 option routes (without tunnelling) concern small areas of potential habitats.

Impacts:

Option G-20 - Blue

Direct destruction of habitats

Within the boundaries of the scope are found 0.9 decares of potential habitats of the species, or 0.001% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of small polygons with potential habitats of the species. Fragmentation will be insignificant, given the small total area of the parts of the impacted polygon.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant, given the small area affected and the small size of the affected polygon, and the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

Option G-20 - Red

Direct destruction of habitats

Within the boundaries of the scope are comprised 1.021 decares of potential habitats of the species, or 0.001% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of a small polygons with potential habitats of the species. Fragmentation will be insignificant, given the small total area of the parts of the impacted polygon.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant, given the small area affected and the small size of the affected polygon, and the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

Within the boundaries of the scope are found 6.889 decares of potential habitats of the species, or 0.01% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of a small polygons with potential habitats of the species. Fragmentation will be insignificant, given the small total area of the parts of the impacted polygon.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant, given the small area affected and the small size of the affected polygon, and the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

Eastern Option G20

Direct destruction of habitats

Within the boundaries of the scope are comprised 16.449 decares of potential habitats of the species or 0.02% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of two small polygons with potential habitats of the species. Fragmentation will be insignificant, given the small area and number of affected polygons.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant, given the small area affected and the small size of the affected polygon, and the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

The Long Tunnel Option, 'Kresna' Tunnel

In this option, the road route does not affect habitats of the species. There will be no impact.

1086. Cucujus (*Cucujus cinnaberinus*).

In Bulgaria it is established in several isolated localizations in the Eastern Balkan Mountains,

the Rila Mountains and the Maleshevska Mountains (Guéorguiev et al. 2008). An insect with complete transformation, whose life cycle includes 4 stages: egg, larva, pupa and imago. It inhabits preserved deciduous forests, including forests, located along the banks of rivers. The imago and the larvae live together in moist, rotting bark wood of standing and fallen trees (*Quercus* , *Fagus* , *Populus* , *Acer* , *Salix* , *Ulmus* , *Abies* and *Picea*).
Evaluation of the species population in the area. The Standard Form is missing data on the species population in the area - it is labelled as very rare (V). So far, the species has not been identified in the protected zone. On the basis of the results of the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the area of potential habitats of the species in the zone is 137563.600 decares. Appropriate habitats are missing.
Evaluation of the species population in the territory of the investment proposal. The species is not established on the territory of the investment proposal. The proposed 4 option routes (without tunnelling) concern small areas of potential habitats.

Impacts:
Option G-20 - Blue
Direct destruction of habitats
Within the boundaries of the scope are comprised 47.526 decares of potential habitats of the species, or 0.035% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.
Disruption of bio-corridors
The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the tree in which they reside in the stage of their life cycle. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, given the small area and number of affected polygons.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.
Mortality
There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant given the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.
Option G-20 - Red
Direct destruction of habitats
Within the boundaries of the scope are comprised 39.444 decares of potential habitats of the species, or 0.029% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.
Disruption of bio-corridors
The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.
Fragmentation of the habitats
The IP concerns a very small part of large polygons with potential habitats of the species. Fragmentation will be insignificant, given the small area and number of affected polygons.
Disturbance
The species has a primitive nervous system (ganglion type) and is insensitive to any

disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant given the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

Eastern Option G10.50

Direct destruction of habitats

Within the boundaries of the scope are comprised 30.225 decares of potential habitats of the species, or 0.02% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of 2 polygons with potential habitats of the species. Fragmentation will be insignificant, given the small area and number of affected polygons.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant given the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

Eastern Option G20

Direct destruction of habitats

Within the boundaries of the scope are comprised 102.648 decares of potential habitats of the species, or 0.07% of their area in the zone. Given the small affected area, the impact has been assessed as insignificant.

Disruption of bio-corridors

The nature of the IP does not imply a barrier effect on the imago, which is a flying insect. The larvae move along the dimensions of the wood of the tree they inhabit at the stage of their life cycle. There will be no barrier effect.

Fragmentation of the habitats

The IP concerns a very small part of 2 polygons with potential habitats of the species. Fragmentation will be insignificant, given the small area and number of affected polygons.

Disturbance

The species has a primitive nervous system (ganglion type) and is insensitive to any disturbance. No impact is to be expected.

Mortality

There is likelihood of destroying individual representatives of the species (imago and larvae) within the construction boundaries, when removing vegetation and of the imago during operation of the Struma motorway in the eventual crashes with the vehicles. However, this probability is insignificant given the low demographic abundance of the species. Mortality will be within the limits of natural changes. The impact on the species population in the area, even if mortality is observed, will be insignificant.

The Long Tunnel Option, 'Kresna' Tunnel
In this option, the road route does not affect habitats of the species. There will be no impact.

- »- Fish *(Pisces)*

1130 The Asp (*Aspius aspius*)
Distribution and biology.
In the past, the species has been reported for the Danube river and the adjacent swamps, as well as in the lower streams of some of its tributaries - the Iskar river, the Vit river and the Osam river. It has also been encountered in the rivers of the Aegean Basin - in the Struma River (at Simitli and Pirin Railway Station), in the Maritsa river, in the Tundja river, in the Vacha river, as well as in the Kamchia river (near the village of Zlokuchene). Over the past few years, it has been found in the Danube river and its tributaries - the Ogosta river (near the town of Mizia), the Iskar river (next to the bridge between Staroseltsi and Stavertsi villages) and in the Vit river (next to Riben village), as well as in the Aegean catchment area - the Struma River (one fish, caught at the town of Kresna), in the Maritsa river (very rarely at Parvomay). It inhabits the lower currents of perennial rivers, but also occurs in estuarine waters. It matures at 2-4 years. It breeds between April and May, migrating upstream. It spawns on stony substrate and on rapid flows at water temperature of 9-10°C. It is a predatory species. It feeds on fish, insects that have fallen in the water and even small waterfowl.
Assessment of habitats and species populations in the area.
The potential habitats of the Asp within the area cover a total area of 69.54 decares. According to an expert assessment, based on GIS analysis of the habitats of the species in the country and their distribution in the protected zones of the NATURA 2000 environmental network, the Kresna - Ilindentsi protected zone (BG0000366) includes an insignificant part (about 0.01%) of the total area of the habitats of the Asp *(Aspius aspius*) on the territory of Bulgaria. However, this zone plays an important role in the conservation of the species population in the country, as it is one of the few areas, protecting the Asp in the rivers of the Aegean Basin and in view of the geographic coherence requirements of the network of protected zones under the Habitats Directive. The Standard Form is missing data on the Asp population in the zone - it is labelled as very rare (V). According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the species is not registered in the area.
Assessment of the habitats and the population of the species on the territory of the investment proposal.
The presence of the Asp in the area needs confirmation because the species has not been registered in the protected zone in the last 18 years. However, the existence of potential habitats on the territory of the investment proposal must be taken into account, given the high importance of Kresna - Ilindentsi protected zone in view of the geographic coherence requirements of the protected zone network.

Expected impacts:

Option G20 - Red
Disruption of the habitats.
Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected, in the range of the option are comprised 6.846 decares, or 9,8% of the area of the potential habitats of the species in the zone. There will be no changes in the natural hydrological regime of the Struma River and the restoration of the habitats will occur quickly after completion of the construction activities. The impact has been assessed as moderate (Rate 2), given the large affected area on one hand

and its temporary nature on the other. Measures are needed to reduce the impact.
Measures – Construction of bridge facilities should not be carried out at the same time.
Effect - Decrease the affected area, respectively the impact.
Direct destruction of habitats
During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.342 decares will be affected or about 0.5% of the area's potential habitats in the area. There will be no changes in the natural hydrological regime of the Struma River. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).
Fragmentation of habitats of bird species
During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).
Barrier effect
A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).
Disturbance
The species is insensitive to disturbance. There will be no impact (rate 0).
Mortality of individual representatives of the species (including the fish roe)
The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).
Deterioration of the quality of aquatic environment (pollution)
It is associated with increased water turbidity and pollution by oil products from construction and transport equipment during construction and / or in emergency situations during the operation of the motorway. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact will be temporary and reversible upon the termination of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.
Option G20 - Blue
Disruption of the habitats.
Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected, in the range of the option are comprised 6.666 decares or 9.6% of the area of the potential habitats of the species in the zone. There will be no changes in the natural hydrological regime of the Struma River and the restoration of the habitats will occur quickly after completion of the construction activities. The impact has been assessed as moderate (Rate 2), given the large affected area on one hand and its temporary nature on the other.
Direct destruction of habitats
During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the

bridge facilities. Approximately 0.333 decares will be affected or about 0.5% of the area's potential habitats in the zone. There will be no changes in the natural hydrological regime of the Struma River. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality of aquatic environment (pollution)

It is associated with increased water turbidity and pollution by oil products from construction and transport equipment during construction and / or in emergency situations during the operation of the motorway. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

Eastern Option G10.50

Disruption of the habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected in the range of the option are comprised 0.205 decares, or 0.29% of the area of the potential habitats of the species in the zone. There will be no changes in the natural hydrological regime of the Struma River and the restoration of the habitats will occur quickly after completion of the construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.010 decares, or about 0.015% of the area's potential habitats, will be affected in the zone. There will be no changes in the natural hydrological regime of the Struma River. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments

formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination.

The impact will be temporary and reversible upon the termination of contamination. The impact has been assessed as insignificant (rate 1), given the relatively small area that may be affected.

The Long Tunnel Option, 'Kresna' Tunnel

Disruption of habitats.

It can be expected during construction. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected in the range of the option are comprised 0.812 decares, or 1.17% of the area of the potential habitats of the species in the zone. There will be no changes in the natural hydrological regime of the Struma River and the restoration of the habitats will occur quickly after completion of the construction activities. The impact has been assessed as moderate (Rate 2), given the large affected area on one hand and its temporary nature on the other.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. About 0.041 acres will be affected, or about 0.06% of the area's potential habitats in the area. There will be no changes in the natural hydrological regime of the Struma River. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (Rate 0).

Mortality of individual representatives of the species (including the fish roe)
The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).
Deterioration of the quality (pollution) of the environment of aquatic species
It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact will be temporary and reversible upon the termination of contamination. The impact has been assessed as insignificant (Rate 1), given the relatively small area that may be affected.

Eastern Option G20, out of the Kresna gorge
Disruption of habitats.
As there is no provision for the construction of bridges over the Struma River during the construction of the highway is not expected to damage the potential habitats of the species. There will be no changes in the natural hydrological regime of the Struma River. There will be no impact on raspberry habitats (rate 0).
Direct destruction of habitats
As there is no provision for the construction of bridges over the Struma River during the construction of the highway is not expected to destroy potential habitats of the species. There will be no changes in the natural hydrological regime of the Struma River. There will be no impact on the habitats of the Asp (Aspius aspius) (rate 0).
Fragmentation of habitats of bird species
As there is no provision for the construction of bridges over the Struma River, no impact will occur (rate 0).
Barrier effect
As there is no provision for the construction of bridges over the Struma River, no impact will occur (rate 0).
Disturbance
The species is insensitive to disturbance. There will be no impact (rate 0).
Mortality of individual representatives of the species (including the fish roe)
During the operation of the motorway, the possible contamination of the river with toxic substances in road emergencies may result in mortality of larvae and juvenile individual representatives of the species in the Struma River. Due to the remoteness of the road route of the highway from the Struma River and low probability of occurrence of emergencies situations with spills of toxic substances, the effect on the species population in the area is rather theoretical and is considered as insignificant (Rate 1).
Deterioration of the quality (pollution) of the environment of aquatic species
It is associated with increased water turbidity and oil pollution from the construction and transport equipment. The expected impact range may include the entire construction site, also downstream of the source of contamination, temporarily and reversibly upon completion of the construction. Since the habitats of the species may only be affected indirectly by the influx of contaminated water from the tributaries, the impact is assessed as insignificant (Rate 1).

1137 The Marica /the Italian barbel (*Barbus plebejus*)*
The species ***Barbus*** **plebejus,** included in the standard form of the Protected Zone is not

common for Bulgaria (Froese & Pauly 2011). The project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (of MoEW, 2013), used ***Barbus Bergi*** (Primorian Barbus) as an equivalent species, not found in this part of the country (Freyhof & Kottelat 2008), respectively, not present in the zone, therefore it is not mapped and not evaluated. Pursuant to the decisions of the biogeographical seminars, the species ***Barbus cyclolepis*** (the Marica /the Italian barbell) from the Bulgarian fauna is included in Annex V of Directive 92/43 / EEC (and not in Annex II) and therefore may not be used as equivalent of ***Barbus plebejus*** and to be assessed instead of it.

1149 The Spined Loach (*Cobitis taenia*)

Distribution and biology.

A species, common for the Struma River is the *Cobitis strumicae*, which for the National Environmental Network (NEN) of Natura 2000 zones, which covers the rivers of the Aegean catchment area, is accepted as equivalent to ***Cobitis taenia***. A bottom river species, it inhabits the shallow areas, mainly with sandy or sandy bottom in slow-flowing sections of rivers and still water. It feeds on small invertebrates. It is widespread in the water bodies of the rivers - Struma, Mesta, Maritsa, Tundzha and Arda.

Assessment of habitats and species populations in the area.

In the territory of Kresna - Ilindentsi Protected Zone, the Spined Loach (Cobitis taenia) is widely, yet unevenly distributed species. Due to the wide spread of the species within the scope of NEN Natura 2000, Kresna - Ilindentsi PZ includes an insignificant share (about 0.5%) of the area of its potential habitats in the country. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW, 2013), the total area of its potential habitats is estimated at about 1,043 decares and the total number of its species population - about 16,584 individual representatives of the species or up to 2% of the national species population (C). According to survey data from 2011-2013, the conservation status of the species in the area is favourable.

Assessment of the species population on the territory of the investment proposal.

Potential habitats of the species are the sand banks in shallow sections of the Struma River with slow flow - shallow wide spills, sections around the mouths of the tributaries, the lower flows of the tributaries. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW, 2013) and other available information, potential habitats of the species fall within the IP. According to the data from the same project, as well as from the studies, carried out in 2015-2016 for the purposes of the present Compatibility Assessment (CA), the effectively occupied habitats of the species in the area are of much smaller size and are located mainly in the Struma River itseld and the lower flows of the tributaries.

Expected impacts:

Option G20 - Red

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 19.186 decares, or 1.84% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact has been assessed as moderate (Rate 2), given the large affected area on one hand and its temporary nature on the other.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the

species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.959 decares will be affected, or about 0.09% of the area's potential habitats in the area. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

Option G-20 - Blue

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 15.757 decares, or 1.51% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact has been assessed as moderate (Rate 2), given the large affected area on one hand and its temporary nature on the other.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.788 acres will be affected, or about 0.08% of the area's potential habitats in the area. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

Eastern Option G10.50

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 4.005 decares, or 0.38% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.2 decares will be affected, or about 0.02% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats due to the drying and / or damage of parts of them is expected, yet their recovery will occur quickly after completion of construction activities. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

The Long Tunnel Option, 'Kresna' Tunnel

Disruption of habitats.

It can be expected during construction. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected, in the range of the option are comprised 2.831 decares, or 0.27% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.142 decares will be affected, or about 0.01% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species
It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as insignificant (rate 1), given the relatively small area that may be affected.

Eastern Option G20, out of the Kresna gorge

Disruption of habitats.
Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected, in the range of the option are comprised 3.939 decares, or 0.38% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats
No direct destruction of species habitats is expected, as no bridges will be built above the river in this option. Struma River, and at the crossing of the tributaries, no bridge pillars will be built in the riverbeds because of their small width and due to the long length of the bridge facilities, respectively their elements. The natural hydrological regime of the water bodies will not be changed. There will be no impact (rate 0).

Fragmentation of habitats of bird species
No fragmentation of habitats due to drying and / or damage of parts of the habitats during bridge construction is expected, as in this option no bridges will be built over the Struma River, and at the crossing of the tributaries, no bridge pillars will be built in the riverbeds because of their small width and due to the long length of the bridge facilities, respectively their elements. Accordingly, there will be no impact in its operation either (rate 0).

Barrier effect
No barrier effect is expected during the construction of the bridge facilities, since in this option no bridges will be built over the Struma River, and
at the crossing of the tributaries, no bridge pillars will be built in the riverbeds, because of their narrow width and due to the long length of the bridge facilities, respectively their elements. Accordingly, there will be no impact in the operation of the highway either (rate 0).

Disturbance
The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)
The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species
It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as insignificant (rate 1), given the relatively small area that may be affected.

1134 The European Bitterling (*Rhodeus sericeus amarus*)

Distribution and biology.

The European Bitterling (*Rhodeus sericeus amarus*) is a widespread species throughout the country. It inhabits slow-flowing rivers or still waters, sticking to coastal shallow areas. A characteristic feature of the species is that it puts its roe in the mantle hole of freshwater mussels (*Unio, Anodonta*) where it is incubated. Thus, the presence of the European Bitterling (Rhodeus sericeus amarus) is related to the presence of mussels. It feeds on microalgae.

Evaluation of the species population in the area.

On the territory of Kresna - Ilindentsi Protected Zone, the European Bitterling (Rhodeus sericeus amarus) is widely, but unevenly distributed species. Due to the wide spread of the species within NEN Natura 2000, Kresna - Ilindentsi PZ, it includes an insignificant share (about 0.3%) of the area of its potential habitats in the country. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW, 2013), the total area of its potential habitats is estimated at about 2,364 decares and the total number of its species population - about 973,259 individual representatives of the species or up to 2% of the national species population (C). According to study data from 2011-2013, the conservation status of the species in the area is favourable.

Evaluation of the species population in the territory of the investment proposal.

According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW, 2013) and other available information, the potential habitats of the species within the range of the Struma Motorway under the different options are in the coastal sections of Struma River with slow flow and in the lower flows of the tributaries. According to the data from the same project, as well as from the studies, carried out in 2015-2016 for the purposes of the present Compatibility Assessment (CA), the effectively occupied habitats of the species in the area are of much smaller size and are located mainly in the Struma River itself and in the lower flows of the tributaries.

Expected impacts:

Option G-20 - Red

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 12.870 decares, or 0.38% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.64 decares will be affected, or about 0.03% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

Option G-20 - Blue

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 9.58 decares, or 0.395% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.48 decares will be affected, or about 0.02% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of

emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (rate 2), given the large area that may be affected.

Eastern Option G10.50

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected, in the range of the option are comprised 6.888 decares, or 0.28% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.34 decares will be affected, or about 0.01% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (Rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (Rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the

habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as moderate (Rate 2), given the large area that may be affected.

The Long Tunnel Option, 'Kresna' Tunnel

Disruption of habitats

It can be expected during construction. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 2.306 decares, or 0.1% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

During the construction of the bridge facilities, it is expected that potential habitats of the species will be destroyed due to excavation activities in the riverbed. After the construction of the highway there will be permanently destroyed bottom habitats due to the pillars of the bridge facilities. Approximately 0.115 decares will be affected, or about 0.005% of the area's potential habitats in the zone. The natural hydrological regime of the water bodies will not be changed. Because of the insignificant percentage of permanently destroyed habitats, the impact has been assessed as insignificant (Rate 1).

Fragmentation of habitats of bird species

During the construction of bridge facilities, temporary fragmentation of habitats is expected, the temporary drying and or damage of habitat parts, yet their recovery will occur promptly after completion of construction works. Given the large length and area of the fragments formed and the temporary nature of the impact, it can be assumed that it will be insignificant (Rate 1).

Barrier effect

A barrier effect may arise during bridge construction, but given its temporary nature, the impact will be insignificant even if it occurs (Rate 1).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as insignificant (rate 1), given the relatively small area that may be affected.

Eastern Option G20, out of the Kresna gorge

Disruption of habitats.

Temporary damage to habitats during construction can be expected. It is related to the operation of machines in the riverbed and to their contamination from construction waste. The total area of the habitats (the riverbed) is accepted as affected; in the range of the option are comprised 12.942 decares, or 0.53% of the area of the potential habitats of the species in the zone. The natural hydrological regime of water bodies will not be changed, and the restoration of the habitats will occur promptly after the completion of construction activities. The impact on them has been assessed as insignificant (rate 1), given the small area affected and its temporary nature.

Direct destruction of habitats

No direct destruction of species habitats is expected, as no bridges will be built above the river in this option. the Struma River, and at the crossing of the tributaries, no bridge pillars will be built in the riverbeds because of their small width and due to the long length of the bridge facilities, respectively their elements. The natural hydrological regime of the water bodies will not be changed. There will be no impact (rate 0).

Fragmentation of habitats of bird species

No fragmentation of habitats due to drying and / or damage of parts of the habitats during bridge construction is expected, as in this option no bridges will be built over the Struma River, and at the crossing of the tributaries, no bridge pillars will be built in the riverbeds because of their small width and due to the long length of the bridge facilities, respectively their elements. Accordingly, there will be no impact in its operation either (rate 0).

Barrier effect

No barrier effect is expected during the construction of the bridge facilities, since in this option no bridges will be built over the Struma River, and at the crossing of the tributaries, no bridge pillars will be built in the riverbeds because of their small width and due to the long length of the bridge facilities, respectively their elements. Accordingly, there will be no impact in the operation of the highway either (rate 0).

Disturbance

The species is insensitive to disturbance. There will be no impact (rate 0).

Mortality of individual representatives of the species (including the fish roe)

The species is relatively resistant to increased turbidity of water as expected in bridge construction. During the construction it is possible to destroy the roe of fish. During the operation of the motorway, contamination of the river with toxic substances in case of emergency may result in mortality of larvae and juvenile individual representatives of the species. Because of the low probability of occurrence of emergency situations, associated with significant water pollution, the impact on the species population in the area is estimated to be insignificant (rate 1).

Deterioration of the quality (pollution) of the environment of aquatic species

It is associated with increased water turbidity and contamination by oil products from construction and transport equipment during construction and/or emergency situations during the Motorway's operation. The scope of expected impacts includes the entire area of the habitats (riverbed) within the scope of the option and downstream of the source of contamination. The impact has been assessed as insignificant (rate 1), given the relatively small area that may be affected.

- »- Amphibians (*Amphibia*)

1193 The Yellow-Bellied Toad (*Bombina variegata*)

Distribution and biology. It is found in the mountains and foothills in the western and central part of the country, up to 1500 m above sea level (sometimes at higher altitudes). **It** has not been located in the Thracian Plain and along the Black Sea, and in the Danube Plain there are only a few single finds. It inhabits mountain streams, small swamps, ponds, ditches, troughs, etc., but is not normally found in large still water bodies (dams, lakes) and rivers. It rarely leaves more than a few meters away from the water, but it can take a considerable distance, when the water is dried up or in the displacement of the small ones. It feeds on a variety of small invertebrate animals. Unlike many other amphibians, the breeding period is highly stretched over time and can continue until mid-summer. The female lays the eggs one by one or in small groups, and usually attaches them to aquatic plants or to the substrate. It spends the winter on the land.

Evaluation of the species population in the area. In the standard form there are no numerical data for the population, indicating that the species is ordinary (C) and that 23 localizations are registered. According to the 2011-2012 surveys (Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I, MoEW 2013), the average value of the relative number of the Yellow-Bellied Toad (Bombina variegata) in the area is 3.9 individual representatives of the species per 1 km of the route; The calculated total area of potential habitats is 35,551.72 ha (including 18,660.40 ha of poorly adapted, 10,885.85 ha suitable and 6,005.47 ha optimal habitats); The conservation status of the species is "unfavourable - unsatisfactory".

Evaluation of the species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, the species was found in all tested streams, but not in the Struma River. Probably the bulk of the local species population is concentrated along the streams of the Struma River, within the Kresna Gorge and in the higher parts of the surrounding mountains.

Impacts:

Option G20 - Blue

- Direct *destruction of habitats:*

Destruction of 669.9 decares is expected from the mapped potential habitats of the species, including 595.5 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this means a loss of about 0.19% of potential habitats, including 0.99% of the optimal ones. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- Deterioration *of the habitat quality:*

We would not expect the deterioration of habitats outside the area of direct destruction (the species is highly adaptable and sustainable - breeding is also made in puddles), therefore the implementation of the G20 - Blue option will have no impact (**Rate 0**).

- Fragmentation *of habitats:*

We would not expect fragmentation of the water habitats of the species, as the projected watercourses at the crossing points of the gullies are suitable for free passing of frogs.

Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, but the design of the intersection of gullies ensures the preservation of their function. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of "Option G20 - Blue" shall be without impact (**rate 0**).

- Disturbance:

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Option G20 - Red

- *Direct destruction of habitats:*

It is expected to destroy 688.0 decares from the mapped potential habitats of the species, including 580.0 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this means a loss of about 0.19% of potential habitats, including 0.97% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant - breeding is also made in puddles), therefore the implementation of "Option G20 - Red" shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts at the crossing points of small gullies are suitable for the free passage of frogs. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, but the design of the intersection of gullies ensures the preservation of their function. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of "Option G20 - Red" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 522.2 decares from the mapped potential habitats of the species, including 113.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this means a loss of about 0.15% of potential habitats, including 0.19% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant - breeding is also made in puddles), therefore the implementation of the "Eastern Option G10.50" shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts at the crossing points of small gullies are suitable for the free passage of frogs and the larger gullies will be passed through viaducts. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, yet the designed viaducts and culverts in the intersection of gullies ensure the preservation of their functionality. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of the Eastern Option G10.50 shall be without impact (**Rate 0**).

- Disturbance:

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the highway would be likely to cause running down of individual representatives of the species, yet those would be accidental and are not expected to affect the size of the species population.

The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

The Long Tunnel Option, 'Kresna' Tunnel

- Direct *destruction of habitats:*

Destruction of 228.0 decares is expected from the mapped potential habitats of the species, including 125.4 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this would mean a loss of about 0,06% of potential habitats, including 0.21% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- Deterioration *of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant - breeding is also made in puddles), therefore the implementation of the "Long Tunnel Option" shall have no impact (**Rate 0**).

- Fragmentation *of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species, consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be little chance of unintentional destruction of individual representatives of the species. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G20, out of the Kresna gorge

- Direct *destruction of habitats:*

It is expected to destroy 1,570.5 decares of the mapped potential habitats of the species, including 246.6 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this means a loss of about 0.44% of potential habitats, including 0.41% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant - breeding is also made in puddles), therefore the implementation of the "Eastern Option G20" would have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts at the crossing points of small gullies are suitable for the free passage of frogs and the larger gullies will be passed through viaducts. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the territory east of Kresna Gorge may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, yet the designed viaducts and culverts in the intersection of gullies ensure the preservation of their functionality. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of the Eastern Option G20 shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

1171 The southern crested newt *(Triturus karelinii)*

Distribution and biology. Widespread in most of the country, up to about 1,300 m above sea level (also at higher levels, by exception). Not spread around the Danube river and the lower currents of the Danube tributaries, has not been proven for Northwest Bulgaria. It inhabits a variety of water reservoirs with stagnant water - from large marshes and lakes to small ponds, wells, etc., as a rule, it avoids streams (rivers, streams, etc.). During the terrestrial phase, it is common for forests, shrubs, pastures and meadows with scattered shrubs and trees, etc., while adhering to the more damp places. It feeds on various aquatic and terrestrial invertebrates. It makes seasonal migrations, related to breeding and wintering. The breeding season starts immediately after the snow melts and lasts until mid or late spring. Fertilization occurs in the water and is preceded by specific marital behaviour. The female lays eggs that stick individually to the underwater plants. The eggs produce larvae, which by the end of the summer metamorphose and leave the water basins. Most adult leave the ponds in the second half of spring, but some remain in the water until mid or late summer. They can spend the winter in the water and on the land.

Evaluation of the species population in the zone. The standard form does not contain numerical data on the species population and its size has been indicated as rare species (R) and that five localizations are known. According to surveys from 2011-2012 (Project of Mapping and determination of the conservation status of natural habitats and species - Phase I

MoEW 2013) the average value of the relative number of the southern crested newt in the area is 0.5 individual representatives of the species per 10 hours exposure of one trap; The calculated total area of the potential habitats is 36,234.93 hectares (11,996.23 hectares less suitable, 14,392.30 ha suitable and 9,846.41 hectares of optimal habitats); The conservation status of the species is "unfavourable - unsatisfactory".

Evaluation of the species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, the species was not found. Probably the bulk of the local species population is concentrated around the still waters at the foot of the Pirin slopes, east of the Kresna Gorge.

Impacts: **Option G20 - Blue**

- *Direct destruction of habitats:*

It is expected to destroy 667.0 decares from the mapped potential habitats of the species, including 258.5 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the area, this means a loss of about 0.18% of potential habitats, including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction, therefore the implementation of the "Option G20- Blue" would have no impact (Rate **0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts in the intersection of gullies ensure the free passage of the crested newt. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, but the design of the intersection of gullies ensures the preservation of their function. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of "Option G20 - Blue" shall be without impact (**rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Option G20 - Red

- *Direct destruction of habitats:*

It is expected to destroy 651.3 decares from the mapped potential habitats of the species, including 260.8 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.18% of potential habitats,

including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction, therefore the implementation of the "Option G20- Red" would have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts in the intersection of gullies ensure the free passage of the crested newt. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, but the design of the intersection of gullies ensures the preservation of their function. Therefore, no disruption of bio-corridors is expected, i.e. the implementation of "Option G20 - Red" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 525.3 decares from the mapped potential habitats of the species, including 212.1 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.14% of potential habitats, including 0.22% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction, therefore the implementation of the "Eastern Option G10.50" would have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts at the crossing points of small gullies are suitable for the free passage of frogs and the larger gullies will be passed through viaducts. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the Kresna Gorge, in its lowest parts may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, yet the designed viaducts and culverts in the intersection of gullies ensure the preservation of their functionality. Therefore,

no disruption of bio-corridors is expected, i.e. the implementation of the Eastern Option G10.50 shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially at the crossing points of the gullies. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 228.0 decares from the mapped potential habitats of the species, including 74.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.08% of potential habitats, including 0.08% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction; hence the implementation of the "Long Tunnel Option" would have no impact (**Rate 0**).

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species; consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be little chance of unintentional destruction of individual representatives of the species. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:*

It is expected to destroy 1571.3 decares of mapped potential habitats of the species, including 776.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.43% of potential habitats, including

0.79% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction, therefore the implementation of the "Eastern Option G20" would have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected, as the designed culverts at the crossing points of small gullies shall be suitable for the free passage of the newt and the larger gullies will be passed through viaducts. Low fragmentation can be expected with regard to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species geographic range, the territory east of Kresna Gorge may not be defined as a bio-corridor at European, national or regional level. The gullies (the tributaries of Struma) are bio-corridors at the local level, yet the designed viaducts and culverts in the intersection of gullies ensure the preservation of their functionality.

Therefore, no disruption of bio-corridors is expected, i.e. the implementation of the Eastern Option G20 shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibration and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there is a possibility of accidental destruction of individual numbers of the species, especially at the crossing points of the gullies. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

♦ Reptiles (*Reptilia*)

1279 The four-lined snake/the Bulgarian ratsnake (*Elaphe quatuorlineata*)

Distribution and biology. It is only found in the southern part of the Struma valley (exceptionally up to about 600 m above sea level, yet usually lower), as it reaches north to the northern end of the Kresna Gorge. It inhabits dry and stony terrains with a well-developed micro-relief, overgrown with shrubs and thin forests; also scattered agricultural lands (small by size vineyards, orchards, etc.). Daily appearance. Feeds on birds and their eggs, rodents, shrew mice (of the family Soricidae) and others. Climbs very well on trees. The copulation is in May, and the eggs are laid in June or July. The young ones hatch after 1.5-2 months. Sexual maturity occurs on the third or the fourth year.

Evaluation of the species population in the zone. The standard form does not contain numerical data on the species population and its size has been indicated as rare species (R) and that 9 localizations are known. According to the surveys in 2011-2012 (Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase **D**, MoEW 2013), the relative number of the four-lined snake in the zone is 0.28 individual representatives of the species per 1 km route; The calculated total area of the potential habitats is 14,002.22 ha (including 8,308.03 ha of poorly adapted, 4,040.95 ha suitable and 1,653.24 ha of optimal habitats); The conservation status of the species is "unfavourable - poor". The ratio of the local population compared to the in the standard form is assessed as "A" (i.e.. in the area falls between 15% and 100% of the national species population), which means that **the Protected Zone Kresna - Ilindentsi** is of key importance to the conservation of the

species in Bulgaria. The northern boundary of the species geographic scope also passes through the zone. As a necessary measure to protect the species at national level Beshkov (2015a) states: "Not allow the construction of a highway in the Kresna Gorge".

Evaluation of the species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, 2 representatives of the species were observed (at about 300 m Southwest of the Kresna hanche). In all likelihood, the four-lined snake is to be found all across the Kresna Gorge, but mostly in its low parts. The species has never been found to the east of the gorge (the foothills of Pirin).

Impacts:

Option G20 - Blue

- *Direct destruction of habitats:*

It is expected to destroy 646.2 decares of mapped potential habitats of the species, including 108.6 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.46% of potential habitats, including 2.25% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Blue will lead to the creation of practically insurmountable barrier for the four-lined snake (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other and whose long-term existence possibilities would be doubtful. Combined with the relatively large area of destroyed optimal habitats in this Option, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts is a clearly distinct bio corridor, by which the species penetrate from south to north. Given the nature of the species scope of the four-lined snake, this bio-corridor is of key importance, not only at national but also at European level. The implementation of "Option G20 - Blue" will probably lead to a significant disruption of the bio-corridor function of the gorge. The impact could be defined as significant **(Rate 3**) and its nature is such that it may not be mitigated or compensated by applying measures, but only by choosing another option for the construction of Lot 3.2.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures of the type "catching and relocation of animals" could not be effective due to the hidden lifestyle and the low number of the four-lined snake. The operation of the Struma motorway may be expected to cause systematic running over of individual representatives of the species, leading to a reduction in their population size and would probably cast doubts on

the possibility of its existence in the long run. The impact will result in a change of the species status, by indicator "4.4. Mortality, resulting from road traffic, ranging from a "favourable level" to "unfavourable level - bad " and can be assessed as significant (**Rate 3**). Applying mitigation measures could not be effective, because of the nature of the terrain for the larger length of the planned route.
It is therefore necessary to choose another option for the construction of Lot 3.2.

Option G20 - Red

- *Direct destruction of habitats:*

It is expected to destroy 656.8 decares from the mapped potential habitats of the species, including 341.9 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.47% of potential habitats, including 2.07% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**Rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Red will lead to the creation of practically insurmountable barrier for the four-lined snake (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other and whose long-term existence possibilities would be doubtful. Combined with the relatively large area of destroyed optimal habitats in this Option, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts is a clearly distinct bio corridor, by which the species penetrate from south to north. Given the nature of the species scope of the four-lined snake, this bio-corridor is of key importance, not only at national but also at European level. The implementation of "Option G20 - Red" will probably lead to a significant disruption of the bio-corridor function of the gorge. The impact could be defined as significant **(Rate 3**) and its nature is such that it may not be mitigated or compensated by applying measures, but only by choosing another option for the construction of Lot 3.2.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures of the type "catching and relocation of animals" could not be effective due to the hidden lifestyle and the low number of the four-lined snake. The operation of the Struma motorway may be expected to cause systematic running over of individual representatives of the species, leading to a reduction in their population size and would probably cast doubts on the possibility of its existence in the long run. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**).

Applying mitigation measures could not be effective, given the nature of the terrain in the larger part of the planned route. It is therefore necessary to choose another option for the construction of Lot 3.2.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 355.5 decares of mapped potential habitats of the species, including 68.4 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.25% of potential habitats, including 0.41% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

With respect to the left roadway from 380 + 800 km to 396 + 600 in the range of the projected road route falls mainly on small, scattered polygons of poorly adapted habitats, where the probability of presence of the species is very small. The places with larger polygons of suitable or optimal habitats coincide with the projected viaducts, so fragmentation in the section from km 380 + 800 to km 396 + 600 is not expected. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. With respect to the right roadway (which passes almost only through optimal and suitable habitats along its entire length) it can be expected that the traffic will initially decrease almost twice, compared to the current figures, but in the long run, according to the general trend, it will probably increase gradually, reaching and surpassing its current value. This means that a practically insurmountable barrier will be created for the four-lined snake, i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (East and West). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other and whose long-term existence possibilities would be doubtful. The impact can be defined as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, yet for the whole option (including the right roadway) it is necessary to design effective defragmentation facilities, providing mitigation guarantees to a negligible extent.

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts (the road route on the right roadway) is a clearly defined bio-corridor, in which the species penetrate from the south to the north. Given the nature of the species scope of the four-lined snake, this bio-corridor is of key importance, not only at national but also at European level. On the other hand, the territories East of the Kresna Gorge (the route of the left roadway) do not represent a bio-corridor and the only territory that could have such functionality and crosses the projected route includes the low hills and gullies south of the town of Kresna. It can be expected that the traffic in the right roadway will initially decrease almost twice, compared to the current figures, but in the long run, according to the general trend, it will probably increase gradually, reaching and surpassing its current value. In this sense, the implementation of the "Eastern Option G10.50" (in particular the right roadway) will probably lead to a progressive disruption of the bio corridor function of the gorge, similarly to the choice of the zero option. The impact can be defined as significant (**Rate 3**). With respect to the left roadway, the impact can be mitigated by applying the respective measures, and for the whole option (including the right roadway), it is necessary to design effective defragmentation facilities, leading to mitigation of the impact to insignificant rate.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**)

without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of species, with respect to the left roadway, mostly in the section from km 396 + 600 to km 399 + 050, and in the right roadway - in the section from km 393 + 600 to km 397 + 100 (excluding the tunnels). During the operation of the left roadway there is a high probability of systematic running down of individual representatives of the species only in the section from km 396 + 600 to km 399 + 050. The operation of the right roadway is likely to cause systematic running down of representatives of the species along its entire length within the protected zone. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 217.2 decares of the mapped potential habitats of the species, including 100.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.16% of potential habitats, including 0.61% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species; consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of individual representatives of the species. During the operation, it may be expected that individual representatives of the species will be run down in the land sections of the projected route. The construction period will be relatively short and the length of the land sections will be small (roughly 0.5 km), but due to the fact that it is a relatively

large area of optimal habitats, the impact can be assessed as moderate (**Rate 2**), and mitigation measures are needed. **Eastern Option G20, out of the Kresna gorge**

- *Direct destruction of habitats:*

It is expected to destroy 1,019.6 decares of mapped potential habitats of the species, including 96.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.73% of potential habitats, including 0.58% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

From kilometre 380 + 800 to kilometre 396 + 600 within the projected route range are comprised mainly small scattered polygons of poorly fitting habitats, where the probability of presence of the species is very small. The places with larger polygons of suitable or optimal habitats coincide with the projected viaducts, so fragmentation in the section from km 380 + 800 to km 396 + 600 is not expected. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. In view of this, the impact can be assessed as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disruption of bio-corridors:*

Given the nature of the species area and its habitats, the territories East of the Kresna Gorge are not a bio-corridor. The only area that could have a bio corridor function and crosses the planned route includes the low hills and gullies, Southeast of the town of Kresna. The impact will be spatially limited and can be estimated as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of representatives of the species, mostly in the section from km 396 + 600 to km 399 + 050. During the operation of the motorway there will be high probability of systematically running down representatives of the species in the same area. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - unsatisfactory" and can be assessed as significant (**Rate 3**). By applying mitigation measures, the impact can be reduced to insignificant.

1293 *The European ratsnake or leopard snake* (*Zamenis situla*)

Distribution and biology. It is found in the southern part of the Struma valley (exceptionally up to about 600 m above sea level, yet usually lower), as it reaches north to the northern end of the Kresna Gorge. Isolated localizations have been found in the Assenovgrad region (a single localization, which according to Beshkov 2015b probably no longer exists) and along the South Black Sea coast (the coast of Sozopol and Nessebar, where
as of today, populations are likely to be completely destroyed due to the construction development of the localizations). It inhabits dry and stony terrains with a well-developed micro-relief, overgrown with shrubs and thin forests; also scattered agricultural lands (small by size vineyards, orchards, etc.). It is a night species. It feeds on small rodents, shrew mice (of the family Soricidae), newly hatched fowl, lizards, etc. The copulation is in May, and egg laying in June or July. The young ones hatch after 1.5-2 months. Sexual maturity occurs on the third or the fourth year.

Evaluation of the species population in the zone. The standard form does not contain numerical data on the species population and its size has been indicated as very rare species (V) and that 1 localization is known. According to the surveys in 2011-2012 (Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I, MOE 2013), the relative number of the leopard snake in the area is 0.13 individual representatives of the species per 1 km route; The calculated total area of the potential habitats is 8421.19 ha (including 4173.84 ha of poorly adapted, 2599.92 ha of suitable and 1647.42 ha of optimal habitats); The conservation status of the species is determined as "unfavourable - poor". Given the nature of the spread of the Leopard snake in Bulgaria, it is clear that Kresna - Ilindentsi Protected Zone is of key importance for the conservation of the species in Bulgaria. The northern boundary of the species geographic scope also passes through the zone. As a necessary measure to protect the species at national level, Beshkov (2015a) states: "Not allow the construction of a highway in the Kresna Gorge".

Evaluation of the species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, one representative of the species was observed (approximately 300 m Southwest of the Kresna hanche). In all likelihood, the leopard snake is to be found all across the Kresna Gorge, but mostly in its low parts. The species has never been found to the east of the gorge (the foothills of Pirin).

Impacts:

Option G20 - Blue

- *Direct destruction of habitats:*

It is expected to destroy 666.7 decares of the mapped potential habitats of the species, including 430.3 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.79% of potential habitats, including 2.61% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**Rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Blue will lead to the creation of practically insurmountable barrier for the European ratsnake or leopard snake (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This would probably result in fragmentation of species population, i.e. two subpopulations would be formed, which would be largely isolated from each other and whose long-term existence possibilities would be doubtful. Combined with the relatively large area of destroyed optimal habitats in this Option, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts is a clearly distinct bio corridor, by which the species penetrate from south to north. Given the nature of the species scope of the European ratsnake or leopard snake, this bio-corridor is of key importance, not only at national but also at European level. The implementation of "Option G20 - Blue" will probably lead to a significant disruption of the bio-corridor function of the gorge. The impact could be defined as significant **(Rate 3**) and its nature is such that it may not be mitigated or compensated by

applying measures, but only by choosing another option for the construction of Lot 3.2.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures of the type "catching and relocation of animals" could not be effective due to the hidden lifestyle and the low number of the European ratsnake or leopard snake. The operation of the Struma motorway may be expected to cause systematic running over of individual representatives of the species, leading to a reduction in their population size and would probably cast doubts on the possibility of its existence in the long run. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Applying mitigation measures could not be effective given the nature of the terrain in the larger part of the planned route. It is therefore necessary to choose another option for the construction of Lot 3.2.

Option G20 - Red

- *Direct destruction of habitats:*

It is expected to destroy 685.6 decares of mapped potential habitats of the species, including 422.8 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.81% of potential habitats, including 2.57% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Red will lead to the creation of practically insurmountable barrier for the European ratsnake or leopard snake (as a combination of factors: the large road width, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in most of the length of the Kresna Gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other and whose long-term existence possibilities would be doubtful. Combined with the relatively large area of destroyed optimal habitats in this Option, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts is a clearly distinct bio corridor, by which the species penetrate from south to north. Given the nature of the species scope of the European ratsnake or leopard snake, this bio-corridor is of key importance, not only at national but also at European level. The implementation of "Option G20 - Red" will probably lead to a significant disruption of the bio-corridor function of the gorge. The impact could be defined as significant **(Rate 3**) and its nature is such that it may not be mitigated or compensated by applying measures, but only by choosing another option for the construction of Lot 3.2.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-

lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures of the type "catching and relocation of animals" could not be effective due to the hidden lifestyle and the low number of the European ratsnake or leopard snake. The operation of the Struma motorway may be expected to cause systematic running over of individual representatives of the species, leading to a reduction in their population size and would probably cast doubts on the possibility of its existence in the long run. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Applying mitigation measures could not be effective given the nature of the terrain in the larger part of the planned route. It is therefore necessary to choose another option for the construction of Lot 3.2.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 262.4 decares of mapped potential habitats of the species, including 42.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.31% of potential habitats, including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

With respect to the left roadway from 380 + 800 km to 396 + 600 in the range of the projected road route falls mainly on small, scattered polygons of poorly adapted habitats, where the probability of presence of the species is very small. The places with larger polygons of low-adapted habitats coincide with the projected viaducts, so fragmentation in the section from km 380 + 800 to km 396 + 600 is not expected. The section from km 396 + 600 to km 399 + 050 in the range of the planned road route also comprise mainly poorly fitting habitats, but suitable and optimal habitats with a high rate of connectivity are present, therefore substantial fragmentation is expected to occur in this area. With respect to the right roadway (which passes almost only through optimal and suitable habitats along its entire length) it can be expected that the traffic will initially decrease almost twice, compared to the current figures, but in the long run, according to the general trend, it will probably increase gradually, reaching and surpassing its current value. It would mean that a practically insurmountable barrier will be created for the leopard snake, i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (East and West). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other and whose long-term existence possibilities would be doubtful. The impact can be defined as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

- *Disruption of bio-corridors:*

The Kresna Gorge in its lowest parts (the road route on the right roadway) is a clearly defined bio-corridor, in which the species penetrate from the south to the north. Given the nature of the species scope of the European ratsnake or leopard snake, this bio-corridor is of key importance, not only at national but also at European level. On the other hand, the territories East of the Kresna Gorge (the route of the left roadway) do not represent a bio-corridor and the only territory that could have such functionality and crosses the projected route includes the low hills and gullies south of the town of Kresna. It can be expected that the traffic in the right roadway will initially decrease almost twice, compared to the current figures, but in the

long run, according to the general trend it will probably increase gradually, reaching and surpassing its current value. In this sense, the implementation of the "Eastern Option G10.50" (in particular the right roadway) will probably lead to a progressive disruption of the bio corridor function of the gorge, similarly to the choice of the zero alternative. The impact can be defined as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of species, with respect to the left roadway, mostly in the section from km 396 + 600 to km 399 + 050, and in the right roadway - in the section from km 393 + 600 to km 397 + 100 (excluding the tunnels). During the operation of the left roadway there is a high probability of systematic running down of individual representatives of the species only in the section from km 396 + 600 to km 399 + 050. The operation of the right roadway is likely to cause systematic running down of representatives of the species along its entire length within the protected zone. The impact will result in a change of the species status, by indicator "4.4. Mortality, resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**).With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 228.0 decares of mapped potential habitats of the species, including 43.2 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.27% of potential habitats, including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species; consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of individual representatives of the species. During the operation, it may be expected that individual representatives of the species will be run down in the land sections of the projected route. The construction period will be relatively short and the length of the land sections will be small

(roughly about 0.5 km), but due to the fact that a relatively large area of optimal habitats is affected, the impact can be estimated as moderate (**Rate 2**) and mitigation measures shall be needed.

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:*

It is expected to destroy 569.2 acres of mapped potential habitats of the species, including 51.6 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.68% of potential habitats, including 0.31% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

From kilometre 380 + 800 to kilometre 396 + 600 within the projected route range are comprised mainly small scattered polygons of poorly fitting habitats, where the probability of presence of the species is very small. The places with larger polygons of low-adapted habitats coincide with the projected viaducts, so fragmentation in the section from km 380 + 800 to km 396 + 600 is not expected. The section from km 396 + 600 to km 399 + 050 of the planned road route also comprises mainly poorly fitting habitats, yet suitable and optimal habitats with a high rate of connectivity are present, therefore substantial fragmentation is expected to occur in this area. In view of this, the impact can be assessed as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disruption of bio-corridors:*

Given the nature of the species area and its habitats, the territories East of the Kresna Gorge are not a bio-corridor. The only area that could have a bio corridor function and crosses the planned route includes the low hills and gullies, Southeast of the town of Kresna. The impact will be spatially limited and can be estimated as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction, but not during the operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, mostly in the section from km 396 + 600 to km 399 + 050. During the operation of the motorway there will be high probability of systematically running down representatives of the species in the same area. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - unsatisfactory" and can be assessed as significant (**Rate 3**). By applying mitigation measures, the impact can be reduced to insignificant.

1220 The European pond turtle (*Emys orbicularis*),

Distribution and biology. It is common for the whole country up to about 1,100 m above sea level It inhabits marshes, lakes, dams, fish-ponds and other still water basins, as well as slowly flowing rivers and canals. It sticks to the shores of the water basins and rarely moves away from the water. It feeds on aquatic invertebrates, rarely with fish, frogs and larvae; sometimes it also consumes plant food. Eggs are usually laid in June, for which reason females can significantly move away from the pond. The little ones hatch in September. It spends the winter at the bottom of water basins, less often on land.

Evaluation of the species population in the zone. In the standard form, there is no numerical data on species population, and its size is indicated as present (P). During the 2011-2012 surveys (Project "Mapping and Determination of the Conservation Status of Natural Habitats

and Species - Phase I", MoEW 2013), the European pond turtle was not established in the area; The calculated total area of the potential habitats was 5,970.98 ha (including 5,488.21 ha of poorly adapted habitats, 438.01 ha of suitable and 44.76 ha of optimal habitats); The conservation status of the species is defined as "unfavourable - unsatisfactory".

Evaluation of the species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. According to Grozdanov et al. (2016), the European pond turtle was found near the village of Rakitna. During our studies, the species was not found, but the value of the Struma River as a potential habitat with a high degree of suitability was confirmed.

Impacts:

Option G20 - Blue

- *Direct destruction of habitats:*

It is expected to destroy 411.2 decares of mapped potential habitats of the species, including 10.8 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.69% of potential habitats, including 2.41% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant), therefore the implementation of "Option G20 - Blue" shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected (the Struma River). Slightly distinctive fragmentation can be expected with respect to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species area, the Struma River in the Kresna Gorge is a bio-corridor at the regional level. Designed bridge facilities could not interrupt the bio-corridor function of the river, i.e.. the realization of "Option G20 - Blue" shall have no impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially in the places where bridges will be built. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Option G20 - Red

- Direct *destruction of habitats:*

It is expected to destroy 434.9 decares of mapped potential
habitats of the species, including 9.2 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.73% of

potential habitats, including 2.05% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**rate 2**). Due to the large number and large area of the affected polygons, mitigating measures such as narrowing down on certain sections or other realizable measures are impossible.

- Deterioration *of the habitat quality:*

No impairment of habitats is expected outside the direct
destruction (the species is highly adaptive and resistant), therefore the implementation of "Option G20 - Red" shall have no impact (**Rate 0**).

- Fragmentation *of habitats:*

No fragmentation of aquatic habitats of the species is expected (the Struma River). Slightly distinctive fragmentation can be expected with respect to terrestrial habitats. The impact will Slightly
distinctive not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species area, the Struma River in the Kresna Gorge is a bio-corridor at the regional level. Designed bridge facilities could not interrupt the bio-corridor function of the river, i.e.. the realization of "Option G20 - Red" shall have no impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially in the places where bridges will be built. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 178.2 acres of the mapped potential habitats of the species, including 0.5 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.30% of potential habitats, including 0.12% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant), therefore the implementation of "Eastern Option G10.50" shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected (the Struma River). Low distinctive fragmentation can be expected with respect to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species area, the Struma River in the Kresna Gorge is a bio-corridor at the regional level, and the gullies east of the gorge can be considered as bio-corridors at the local level. The designed bridges, viaducts and

culverts could not interrupt the bio-corridor function of rivers, i.e.. the implementation of "East option G10.50" shall have no impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially in the places where bridges will be built. The operation of the Struma motorway, is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 101.3 decares of mapped potential habitats of the species, including 5.3 ha of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.17% of potential habitats, including 1.18% of the optimal habitats. The vast majority (more than 5 decares) of the optimal habitats are affected by the temporary landfill in intermediate access No.2. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant), therefore the implementation of the Long Tunnel Option shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species; consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially in the places where bridges will be built. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

Eastern Option G20, out of the Kresna gorge

- Direct *destruction of habitats:*

It is expected to destroy 571.2 decares of mapped potential habitats of the species, including 1.2 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.96% of potential habitats, including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Deterioration of the habitat quality:*

No impairment of habitats is expected outside the direct destruction (the species is highly adaptive and resistant), therefore the implementation of "the Eastern Option G20" shall have no impact (**Rate 0**).

- *Fragmentation of habitats:*

No fragmentation of aquatic habitats of the species is expected. Slightly pronounced fragmentation can be expected with respect to terrestrial habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Disruption of bio-corridors:*

Given the nature of the species range - the gullies, east of the Kresna gorge, might be considered bio-corridors at the local level. The designed bridges, viaducts and culverts could not interrupt the bio-corridor function of rivers, i.e.. the implementation of "Eastern Option G20" shall have no impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of individual representatives of the species, especially in the places where bridges will be built. The operation of the Struma motorway is likely to cause running over individual representatives of the species, yet those will be accidental and are not expected to affect the size of the species population. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

1217 Hermann's tortoise (*Testudo hermanni*)

Distribution and biology. It is found all around the country, at about 1,400 m above sea level, with the exception of Dobrudja and the high fields (also the surrounding mountains) of Western Bulgaria. Due to intensive agriculture, it has almost disappeared from the Thracian Lowland and from many areas of the Danube Plain. It inhabits deciduous forests, shrubs, pastures and meadows with scattered trees and shrubs, etc. It is most numerous in scattered oak forests in hilly and low-mountain areas. In spring and autumn, it is active almost all day, and in the summer months only in the morning and at dusk. Daily migrations occur in many places in the summer - to the "bottom" of the river valleys (in the morning) and back to the higher parts of the slopes (at dusk). It feeds on herbaceous plants, rarely with fallen fruits, etc. It usually reproduces twice a year and the first copulation in April or May and the second in July or August. The little ones hatch at the end of summer or autumn and in autumn sometimes they do not leave the "nest" but stay there for winter.

Evaluation of the species population in the zone. In the standard form, there is no numerical data on species population and its size is indicated, indicating that the species is common (C) and that 25 localizations are registered. According to the surveys in 2011-2012 (Mapping and Determination of the Conservation Status of Natural Habitats and Species Phase I, MoEW 2013) the average value of the relative number of Hermann's tortoise (Testudo hermanni) is in the range is 0.62 individual representatives of the species per 1 km route; The calculated total area of the potential habitats is 22,019.59 ha (including 6,793.59 ha of poorly adapted, 8,564.56 ha of suitable and 6,661.44 ha of optimal habitats); The conservation status of the species is "unfavourable-unsatisfactory".
Evaluation of species population on the territory of the investment proposal. According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, the species was found in many places in the area of each of the options.

Impacts:

Option G20 - Blue

- *Direct destruction of habitats:*

It is expected to destroy 669.9 decares of mapped potential habitats of the species, including 602.8 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.30% of potential habitats, including 0.90% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Blue will lead to the creation of practically insurmountable barrier for the turtles (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. Combined with the relatively large area of destroyed optimal habitats in this Option and the low mobility of the species, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which it penetrates from south to north in Southwester n Bulgaria. As far as the species does not strictly adhere to the lower parts of the gorge but is found throughout, no significant disturbance of the area's function as a bio-corridor can be expected. The impact can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures, such as "catching and relocation of animals" shall be difficult to apply in view of the length of the road route. During the operation of the Struma motorway, it is possible to expect systematic running down of individual representatives of the species, which will lead

to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Effective partitioning devices need to be designed, providing mitigation guarantees to insignificant extent.

Option G20 - Red

- *Direct destruction of habitats:*

It is expected to destroy 688.0 decares is expected from the mapped potential habitats of the species, including 587.8 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.31% of potential habitats, including 0.88% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Red will lead to the creation of practically insurmountable barrier for the turtles (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. Combined with the relatively large area of destroyed optimal habitats in this Option and the low mobility of the species, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which it penetrates from south to north in Southwester n Bulgaria. As far as the species does not strictly adhere to the lower parts of the gorge but is found throughout, no significant disturbance of the area's function as a bio-corridor can be expected. The impact can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures, such as "catching and relocation of animals" shall be difficult to apply in view of the length of the road route. During the operation, we could expect systematic running down of individual representatives of the species, which would lead to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Effective partitioning devices need to be designed, providing mitigation guarantees to insignificant extent.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 524.3 decares of mapped potential habitats of the species, including 108.6 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.24% of potential habitats, including 0.16% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

With respect to the left roadway from 380 + 800 km to 396 + 600 in the scope of the planned

road route also comprises mainly poorly fitting habitats and suitable habitats with a high degree of connectivity that will be fragmented. The designed viaducts and tunnels are not sufficient to ensure the long-term connection of habitats. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. With respect to the right roadway (which passes almost only through optimal habitats along its entire length) it can be expected that the traffic will initially decrease almost twice, compared to the current figures, but in the long run, according to the general trend, it will probably increase gradually, reaching and surpassing its current value. It would mean that a practically insurmountable barrier will be created for the Hermann's tortoise (Testudo hermanni), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided in two parts (East and West). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. The impact can be defined as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which
it penetrates from south to north in Southwester n Bulgaria. As far as the species does not strictly adhere to the lower parts of the gorge but is found throughout, no significant disturbance of the area's function as a bio-corridor can be expected as a consequence of the operation of the right roadway. The territories east of the Kresna Gorge do not present a bio-corridor, and the only area that could have a local bio- corridor function and crosses the projected route of the left roadway includes the low hills and gullies, southeast of the town of Kresna. The impact as a whole can be assessed as insignificant (**Rate 1**) without necessary mitigation measures.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-term, will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need to implement measures.

- *Mortality:*

With respect to the left roadway during construction, there is probability of unintentional destruction of individual representatives of the species, especially in the following areas: from km 382 + 000 to km 382 + 800, from km 386 + 050 to km 387 + 300, from km 389 + 000 to km 392 + 000, from km 393 + 400 to km 395 + 400 and from km 396 + 600 to Km 399 + 050. In the same sections, the operation of the motorway will have high probability of systematically running down individual representatives of the species. With respect to the right roadway during the construction of the new section for the crossing of the town of Kresna (from km 393 + 600 to km 397 + 000) there is high probability of accidental destruction of individual representatives of the species. During the operation of the Struma motorway, it is possible to expect systematic run down of individual representatives of the species along the entire length of the right roadway, which will lead to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). With regard to the left roadway, applying appropriate measures can mitigate the impact, yet for the whole Option (including the right roadway) it would be necessary to design effective partitioning structures, leading to mitigation of the impact to a insignificant extent.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 228.0 decares of mapped potential habitats of the species, including 195.4 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.10% of potential habitats, including 0.29% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species; consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of individual representatives of the species. During the operation, it may be expected that individual representatives of the species will be run down in the land sections of the projected route. Given the fact that the construction period will be relatively short and the length of the land sections is small (about 0.5 km in total), the impact can be assessed as insignificant (**Rate 1**).

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:*

It is expected to destroy 1569.4 decares of mapped potential habitats of the species, including 161.3 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.71% of potential habitats, including 0.24% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

From kilometre 380 + 800 to kilometre 396 + 600 within the projected route range are also comprises mainly poorly fitting habitats and suitable habitats with a high degree of connectivity that will be fragmented. The designed viaducts and tunnels are not sufficient to ensure the long-term connection of habitats. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. The impact will not lead to a change in the species **status** and may be assessed as moderate (**Rate 2**). The impact can be reduced to insignificant by applying mitigation measures.

- *Disruption of bio-corridors:*

Given the nature of the species area and its habitats, the territories East of the Kresna Gorge are not a bio-corridor. The only territory that could have a bio corridor function and crosses the planned route includes the low hills and gullies, Southeast of the town of Kresna. The impact will be spatially limited and can be estimated as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact

will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction, a possibility will exist of unintentional destruction of representatives of the species, mainly in the following sections: from km 382 + 000 to km 382 + 800, from km 386 + 050 to km 387 + 300, from km 389 + 000 to km 392 + 000, from km 393 + 400 to km 395 + 400 and from km 396 + 600 to Km 399 + 050. In the same sections, the operation of the motorway will have high probability of systematically running down individual representatives of the species. The impact will result in a change of the species status, by indicator "4.4. Mortality as a result of road traffic "from" favourable "to" unfavourable - unsatisfactory" and can be assessed as significant (**Rate 3**). By applying mitigation measures, the impact can be reduced to insignificant.

1219 The Spur-Thighed/Greek Tortoise (*Testudo graeca*)

Distribution and biology. It is common for the country, up to about 1,300 m above sea level, with the exception of North-Western Bulgaria and the high fields (also the surrounding mountains) of Western Bulgaria. Due to intensive agriculture, it has almost disappeared from the Thracian Lowland and from many areas of the Danube Plain. It inhabits the open spaces with scattered tree and bushy vegetation, and scattered forests and shrubs. In spring and autumn, it is active almost all day, and in the summer months only in the morning and at dusk. Seasonal migrations are observed in many places - from early summer to more afforested areas and late summer to more open. It feeds on herbaceous plants, rarely on fallen fruits, etc. Copulation is usually in April and the first half of May. The eggs are laid in the early summer, and the young birds are hatched in the end of the summer or early autumn.

Evaluation of the species population in the zone. In the standard form, there is no numerical data on species population and its size is indicated, noting that the species is common (C) and that 25 localizations are registered. According to the 2011-2012 surveys (Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I, MoEW 2013), the average value of the relative number of the Spur-Thighed/Greek Tortoise (Testudo graeca) in the zone is 0.57 individual representatives of the species per 1 km of the route; the calculated total area of potential habitats is 15,609.71 ha (including 7001.42 ha of poorly adapted, 4,239.49 ha suitable and 4,368.81 ha optimal habitats); The conservation status of the species is "unfavourable - unsatisfactory".

Evaluation of the species population on the territory of the investment proposal

According to the mapping of potential habitats (within the specific report under the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I", MoEW 2013), the territorial scope of the IP comprises barely-adapted, suitable and optimal habitats of the species. During our studies, the species was found in many places near the existing road E79 within the Kresna Gorge, as well as on the Melo hill (to the east and southeast of the town of Kresna).

Impacts:

Option G20 - Blue

- *Direct destruction of habitats:*

It is expected to destroy 669.8 decares of mapped potential habitats of the species, including 445.0 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.43% of potential habitats, including 1.02% of the optimal habitats. The impact will not lead to a change of the species status, yet given the relatively large area of the expected destruction of optimal habitats, it can be estimated as moderate (**Rate 2**). Due to the large number and large size of affected polygons, mitigating measures such as reduced range in certain sections or other realizable measures are impossible.

- *Fragmentation of habitats:*

It is expected that the implementation of Option G20 - Blue will lead to the creation of

practically insurmountable barrier for the turtles (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. Combined with the relatively large area of destroyed optimal habitats in this Option, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which it penetrates from south to north in Southwester n Bulgaria. To the extent that the species is not strictly attached to the lower parts of the gorge but is found throughout the gorge, we could not expect a significant disruption of the area's function, such as a bio-corridor. The impact can be assessed as insignificant (**Rate 1**) without the need for measures.

- Disturbance:

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures, such as "catching and relocation of animals" shall be difficult to apply in view of the length of the road route. During the operation of the Struma motorway, it is possible to expect systematic running down of individual representatives of the species, which will lead to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Effective partitioning devices need to be designed, providing mitigation guarantees to insignificant extent.

Option G20 - Red

- Direct *destruction of habitats:*

It is expected to destroy 687,9 decares of mapped potential habitats of the species, including 409.7 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.44% of potential habitats, including 0.94% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- Fragmentation *of habitats:*

It is expected that the implementation of Option G20 - Red will lead to the creation of practically insurmountable barrier for the turtles (as a combination of factors: the wide road, high speed of traffic and high traffic intensity), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided into two parts (east and west). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. Combined with the relatively large area of destroyed optimal habitats in this Option and the low mobility of the species, the impact can be assessed as significant (**Rate 3**).

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which it penetrates from south to north in Southwester n Bulgaria. As far as the species does not strictly adhere to the lower parts of the gorge but is found throughout, no significant disturbance of the area's function as a bio-corridor can be expected. The impact can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such

as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

During the construction there will be big probability of unintentional destruction of multiple representatives of the species, in view of the fact that the designed road route passes mainly through high quality (optimal and suitable) habitats. In this case, the implementation of measures, such as "catching and relocation of animals" shall be difficult to apply in view of the length of the road route. During the operation of the Struma motorway, it is possible to expect systematic running down of individual representatives of the species, which will lead to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). Effective partitioning devices need to be designed, providing mitigation guarantees to insignificant extent.

Eastern Option G10.50

- *Direct destruction of habitats:*

It is expected to destroy 399.8 decares of mapped potential habitats of the species, including 114.1 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.26% of potential habitats, including 0.26% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

With respect to the left roadway from 380 + 800 km to 396 + 600 in
The range of the planned route falls primarily in poorly adapted habitats. The areas, where habitats form large continuous polygons, coincide to a large extent with the projected viaducts and tunnels, so significant fragmentation in the section from km 380 + 800 to km 396 + 600 may not be expected. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. With respect to the right roadway (which passes almost only through optimal and suitable habitats along its entire length) we would expect that the traffic will initially decrease almost twice, compared to the current figures, but in the long run, according to the general trend, it will probably increase gradually, reaching and surpassing its current value. It would mean that a practically insurmountable barrier will be created for the Spur-Thighed/Greek Tortoise (Testudo graeca), i.e.. the habitats of the species in the larger part of the Kresna gorge will be divided in two parts (East and West). This is likely to result in fragmentation of the species population, i.e.. two subpopulations will be formed, which will be largely isolated from each other. The impact can be defined as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

- *Disruption of bio-corridors:*

The Kresna Gorge is generally a bio-corridor, by which
it penetrates from south to north in Southwester n Bulgaria. As far as the species does not strictly adhere to the lower parts of the gorge but is found throughout, no significant disturbance of the area's function as a bio-corridor can be expected as a consequence of the operation of the right roadway. Territories east of the Kresna Gorge do not present a bio-corridor and the only area that could have a local biocorridor function and crosses the projected route of the left roadway includes the low hills and gullies south of the town of Kresna. The impact as a whole can be assessed as insignificant (**Rate 1**) without necessary mitigation measures.

- Disturbance:

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

With respect to the left roadway during construction, probability of unintentional destruction of representatives of the species, especially in the section from km 396 + 600 to km 399 + 050. During the operation of the motorway there will be high probability of systematically running down representatives of the species in the same area. Regarding the right roadway in the time of construction of the new section (from km 393 + 600 to km 397 + 000) there will be high probability of unintentional destruction of representatives of the species. During the operation of the Struma motorway, it is possible to expect systematic run down of individual representatives of the species along the entire length of the right roadway, which will lead to a decrease in the population number. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - bad" and can be assessed as significant (**Rate 3**). With regard to the left roadway, the impact can be mitigated by applying appropriate measures, but for the whole Option (including the right lane) it is necessary to design effective partitioning structures leading to mitigation of the impact to a insignificant extent.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:*

It is expected to destroy 227.9 decares of mapped potential habitats of the species, including 129.9 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.15% of potential habitats, including 0.30% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

Fragmentation is not expected, as ground sections of the projected route have short lengths (less than 200 m). Consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disruption of bio-corridors:*

Within the scope of the projected land-based route, no bio-corridors are present for the species, consequently, the implementation of the "Long Tunnel Option" shall be without impact (**Rate 0**).

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibrations and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-term, will not lead to a change in species **status** and can be assessed as insignificant (**Rate 1**) without the need for measures.

- *Mortality:*

  During the construction there will be big probability of unintentional destruction of individual representatives of the species. Individual numbers could be run down during the operation of the highway in the land sections of the projected route. Given the fact that the construction period will be relatively short and the length of the land sections is small (about 0.5 km in total), the impact can be assessed as insignificant (**Rate 1**).

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:*

Destruction of 1,159.4 decares is expected from the mapped potential habitats of the species, including 187.2 decares of optimal habitats. Expressed as a percentage of the total area of mapped habitats in the zone, this would mean a loss of about 0.74% of potential habitats,

including 0.43% of the optimal habitats. The impact will not lead to a change in the species status and may be assessed as insignificant (**Rate 1**) without the need of implementing measures.

- *Fragmentation of habitats:*

From kilometre 380 + 800 to the kilometre 396 + 600 in the range of the projected route are comprised predominantly un-fitted habitats. The areas, where habitats form large continuous polygons, coincide to a large extent with the projected viaducts and tunnels, so significant fragmentation in the section from km 380 + 800 to km 396 + 600 may not be expected. In the section from km 396 + 600 to km 399 + 050 in the scope of the planned route, mainly suitable and optimal habitats with a high degree of connectivity, therefore substantial fragmentation is expected in this area. In view of this, the impact can be assessed as moderate (**Rate 2**). The impact will not lead to a change in the species status and can be reduced to insignificant by applying mitigation measures.

- *Disruption of bio-corridors:*

Given the nature of the species area and its habitats, the areas east of the Kresna Gorge do not present a bio-corridor. The only territory that could have a bio corridor function and crosses the planned route includes the low hills and gullies, Southeast of the town of Kresna. The impact will be spatially limited and can be estimated as moderate (**Rate 2**). By applying mitigation measures, the impact can be reduced to insignificant.

- *Disturbance:*

The species is probably less sensitive to the possible, permanent sources of disturbance, such as noise, vibration and light pollution. Some disturbance can be expected during construction (extreme noise, shocks, etc.), but not during operation of the Struma motorway. The impact will be short-lived, will not lead to a change in species **status** and may be assessed as insignificant (**Rate 1**) without the need for taking measures.

- *Mortality:*

The construction works would probably cause unintentional destruction of representatives of the species, especially in the section from km 396 + 600 to km 399 + 050. During the operation of the motorway there will be high probability of systematically running down representatives of the species in the same area. The impact will result in a change of the species status, by indicator "4.4. Mortality resulting from road traffic, "from" favourable "to" unfavourable - unsatisfactory" and can be assessed as significant (**Rate 3**). By applying mitigation measures, the impact can be reduced to insignificant.

♦ Mammals (Mammalia)

2609 The Romanian hamster/Dobrudja hamster (Mesocricetus newtoni)

Distribution and biology. The species inhabits herbaceous places, virgin/unbroken soil, field boundaries/boundary strips, rocky or shrubby places, lucerne, vineyards, fruit and vegetable gardens, cereals, sunflower plantations. Probably requires deep soils over 50-100 cm. In Bulgaria, the areas with deep loess soils are the most favourable. It is mostly active at night, but also looks for food during the day. It does not probably have a real hibernation, but is poorly active in the winter, falls into periods of hibernation that are interrupted by periodic meals and even opening the holes. It lives alone. Territorial type (individual territory about 1 ha). It gives 2-3 generations per year. It is common for our country in northern Bulgaria, isolated localizations are found to the south of Stara Planina mountains (Golemanski 2011, Zingstra et all. 2009, Macdonald and Barrett 1993).

Assessment in the area.

The Standard Form is missing data on the species population in the zone - it is labelled as present (P). It is not included in the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013). The zone is outside the geographical range of the species in the country (Golemanski 2011, MoEW 2013, Coroiu and Vohralík 2008).

Evaluation of the territory of the investment proposal.

The species is not found in the zone, or in the area of the investment proposal.

Impacts:
The species is not found in the zone, or in the area of the investment proposal. The implementation of Lot 3.2 of the Struma Motorway in all options will have no impact on the species.

1352 The European/grey wolf (*Canis lupus*)
Distribution and biology. In our country the species has permanent populations in the mountainous and border regions of Western Stara Planina, South-western Bulgaria, Eastern Rhodopes, Sakar, Strandja and other parts of the country. Years ago there was a tendency for the species to disappear completely from Bulgaria, recently it has expanded its territorial scope and its numbers have steadily increased. Monogamous species for the entire life-span of the couple. Couples are formed from late December to early February. They usually live in groups, most often these groups are made up of a breeding pair (alpha males and females) and its older generation. Territorial appearance. During the breeding season, the group (the pack) inhabits hard-to-reach areas with forests, shrubs, rocks, gorges, meadows, keeping close to the lair, in which the alpha couple breeds the young. In the autumn and winter, with the weaning of the young and their growth, it uses more territory, and in search of food it goes down in the plains and can be found anywhere where there is food - ungulates, rabbits, rodents, birds, carrion, generally avoiding areas with a stronger human presence. The oestrus is in January - February. The young population, 4-6 on average, is born in April. The family area is from 10,000 to 25,000 ha. The average density of the wolf population in the country is 2 - 4 individual representatives of the species per 10,000 ha. During the breeding season, it inhabits the mountain forests and the plain forests of north-eastern Bulgaria. The wolf is an extremely mobile species. Within their territory, wolves travel up to 50-60 km a day. It feeds on carrion, mice and rodents, deer, fawns, domestic animals and sometimes even reptiles and amphibians.
Assessment of the species population in the area
According to the standard form, the species population in the area comprises 12-13 individual representatives of the species. In addition, the Struma River Gorge is an important bio-corridor between Pirin and Maleshevska Mountain. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the species population is from 12 to 14 individual representatives of the species, divided into 4 family groups - two in the east and two in the western part of the zone. The area of the habitats of the species in the zone is 310,830 decares, as disruption occurs in the middle part, around E-79. The habitats, suitable for a core area occupy an area of 11,870 decares.
Evaluation of the territory of the investment proposal.
According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013) and the field studies carried out, the Eastern option G10.50 and Eastern Option G20 fall under the potential habitats of the species. However, given the high mobility of the species and the nature of the terrain, it would be possible that individual representatives of the species would pass into the area of impact (up to 300 m from the contours of the relevant ground elements) of the other options - the gorge could be crossed from East to West and backwards by wandering individual representatives of the species of unknown size and frequency, especially in the northern part.

Impacts:

Option G20 - Red
Direct destruction of habitats
Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.
Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the road route in this option does not cross bio-corridors of the species. It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the gorge from the East to the West and vice versa, especially in the northern part. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and mostly its night activity. During the operation, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of increased traffic and the barrier effect will not be significantly different from the current one. The impacts on the species will be insignificant.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant ground elements), this option lacks habitats of the species, incl. those, suitable for a core region. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above. No other impact is expected. The impact is defined as insignificant - Rate 1.

Mortality:

During the construction, mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment. During the operation of the highway, it would be possible that collisions with the vehicles would kill single individual representatives of the species, yet the probability is very low, since it would not affect the habitats of the species. The impact on the species population in the area will be insignificant, if such an incident occurs - Rate 1.

Option G20 - Blue

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Stage I' (MOE 2013), the road route in this option does not cross bio-corridors of the species. It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the gorge from East to West and vice versa, especially in the northern part. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant, given the high mobility of the species and mostly its night activity. During the operation, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of increased traffic and the barrier effect will not be significantly different from the current one. The impact on the species will be insignificant - Rate 1.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant ground elements), this option lacks habitats of the species, incl. those, suitable for a core region. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above. No other impact is expected. The impact is defined as insignificant - Rate 1.

Mortality:

During the construction, mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment. During the operation of the

highway, it would be possible that collisions with the vehicles would kill single individual representatives of the species, yet the probability is very low, since it would not affect the habitats of the species. The impact on the species population in the area will be insignificant, if such an incident occurs - Rate 1.

Eastern Option G10.50

Direct destruction of habitats

Within the scope of this option will be comprised 217.670 decares or 0.07% of the species' habitats. Given the small affected area, the impact is assessed as insignificant - Rate 1.

Fragmentation of the habitats

According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the left roadway of the route in this option concerns habitats of the species, separating one of them (north of Stara Kresna) in pieces. During the construction of this section, the areas remaining west of the road route could not be used because of their small size and inaccessibility. During operation, the connectivity of the polygon will be restored as bridges are provided in the northern and southern ends of the section. The impact has been assessed as insignificant - Rate 1.

Disruption of bio-corridors

According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the left roadway of the route in this option crosses bio-corridors of the species, which to some extent coincide with the potential habitats. During construction works, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and its predominantly night activity. During operation, the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.

Disturbance:

Outside of the core areas, the species is less sensitive to disturbance by passing cars (Lesmerises et al. 2012, Lesmerises et al. 2013, Taylor 2010, Whittington et al. 2005, Zimmermann et al. 2012) - uses busy roads to move on. At the same time, it avoids having its shelter with little ones near them. It avoids at any time and in any period of time construction and repair works.

In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises habitats of the species, including those, suitable for a core region. During the construction of this perimeter is expected disturbance and its avoidance of the species will lead to temporary loss of habitats. The impact has been assessed as insignificant - Rate 1.

In the area of the impact is comprised a polygon of habitats, suitable for a core area. During construction and operation, part of this polygon will probably become unusable for the species. The impact has been assessed as insignificant - Rate 1, given the relatively low traffic expected in the habitat of the species (no more than 7,000 vehicles per day as of 2040 in the left roadway) and the wider distribution of this habitat type than the under model (MoEW 2013).

Mortality:

During the construction, mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment. During the operation of the highway, due to the low sensitivity to disturbance from passing vehicles, the species shall be vulnerable to crashes with the vehicles (Huber et al. 2001, Lovari et al. 2007). Since the highway in this option crosses species habitats, the likelihood of collision is high. The impact on the species population in the area may be moderate - Rate 2. Mitigation measures are needed.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats
Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.
Disruption of bio-corridors
According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I' (MOE 2013), the road route in this option does not affect bio-corridors of the species. In addition, the road route crosses the zone underground, where the part of the zone, best suited for crossing of individual representatives of the species from West to East and vice versa, remains above the tunnel. Therefore, there will be no interruption of bio-corridors within the zone as a result of the implementation of this option.
Disturbance:
In the area of impact (up to 300 m from the contours of the relevant ground elements), this option lacks habitats of the species, incl. those, suitable for a core region. Disturbance upon potentially crossing individual representatives of the species will lead to insignificant barrier effect, expressed in eventual individual representatives of the species bypassing the site of construction works. Thereupon the impact shall be insignificant - Rate 1. During the operation of the highway, there will practically be no impact.
Mortality:
During the construction, mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment. No mortality is expected during the operation of the highway either, as it does not affect habitats of the species and the road track crosses the area underground, whereas the part of the area most suitable for crossing of species representatives from west to east and vice versa remains above the tunnel.
Eastern Option G20
Direct destruction of habitats
Within the scope of this option will be comprised 733.97 decares or 0.24% of the species' habitats. Given the small affected area, the impact is assessed as insignificant - Rate 1.
Fragmentation of the habitats
According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the road route in this option concerns habitats of the species, splitting one of them in parts (North of Stara Kresna). During the construction of this section, the areas remaining west of the road route could not be used because of their small size and inaccessibility. During operation, the connectivity of the polygon will be restored as bridges are provided in the northern and southern ends of the section. The impact has been assessed as insignificant - Rate 1.
Disruption of bio-corridors
According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the road route in this option crosses bio-corridors of the species, which to some extent coincide with potential habitats. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and mostly its night activity. During the operation of the motorway the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.
Disturbance:
Outside of the core areas, the species is less sensitive to disturbance by passing cars (Lesmerises et al. 2012, Lesmerises et al. 2013, Taylor 2010, Whittington et al. 2005, Zimmermann et al. 2012) - uses busy roads to move on. At the same time, it avoids having its shelter with little ones near them. It avoids at any time and in any period of time construction and repair works.
In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises habitats of the species, including those, suitable for a core region. During

the construction of this perimeter is expected disturbance and its avoidance of the species will lead to temporary loss of habitats. The impact has been assessed as insignificant - Rate 1.
In the area of the impact is comprised a polygon of habitats, suitable for a core area. During construction and operation of the highway, part of this polygon will probably become unusable for the species. Given the relatively high traffic (expected to reach as much as 13,000 cars per day by 2040), the impact has been assessed as moderate - Rate 2. Mitigating measures are impossible due to the highly developed hearing and sense of smell of this species.
Mortality:
During the construction, mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment. During the operation of the highway, due to the low sensitivity to disturbance from passing vehicles, the species shall be vulnerable to crashes with the vehicles (Huber et al. 2001, Lovari et al. 2007). Since the highway in this option crosses species habitats, the likelihood of collision is high. Given the relatively high traffic (expected to reach as much as 13,000 cars per day by 2040), the impact on the species population in the zone has been assessed as significant - Rate 3. Mitigation measures are needed.

1354 The brown bear (*Ursus arctos*)
Distribution and biology. The main population of the brown bear in Bulgaria is concentrated in two subpopulations - the Central Balkan and the Rila-Rhodope. The number of the species population in the Central Stara Planina Mountains in 2007 was 150-190 individuals (with the small ones). Females become sexually mature at 3 to 4 years of age, the males at 5 to 6 years. The oestrus is generally in May - June. The female gives birth once in 2 to 3 years mainly in caves, often around the upper boundary of the forest. The young, on average 2, are born most often in January, leave the lair in April and follow their mother for 2 years. In our country, the bear falls into lethargy from late December to January. Not all bears in Bulgaria fall into lethargy for a long sleep. Often male bears do not prepare a real lair, but stay in a nap in a niche. In our country, only pregnant bears have a definite lethargy. The area of territorial bears is usually between 1500 and 5000 ha. On average, approximately 75% of the bear's food is vegetable food. In the early spring, in bare areas, the bear seeks remains of acorns, stalks and roots of grass and bulbous plants, invertebrates and murine rodents. It feeds on the carcass of dead wild animals in the winter. Cases of successful feral pig hunting have been observed at feeding sites, yet only a few bears are looking for live prey throughout the year. It digs in ant-hills and formicaries and eats the ants and their larvae. In the past, it was more common. It inhabits coniferous and deciduous forests, usually over 600 - 1,000 m above sea level, subalpine shrubs up to 1,800 m above sea level, rock massifs and gorges. The main factors for its habitat are food and calmness. It spends the winter in rocky areas or dense forest plantations.
Evaluation of the population in the zone. According to the standard form, the species population in the area is 2-3 individual representatives of the species. The Struma River Gorge is an important bio-corridor between Pirin and Maleshevska Mountain. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the area is inhabited by 5-6 (maximum 7) individual representatives of the species, at least part of the species representatives spread their separate territories in the "Pirin" Protected Zone. Only the eastern, mountainous and difficult-to-reach area of Pirin is actually inhabited. According to the specific report, the area of potential habitats of the species is 220,000 decares and according to the digital data - 181,732.911 decares.
Evaluation of the population on the territory of the investment proposal.
According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the Eastern option G10.50 and Eastern Option G20 fall under the potential habitats of the species. These are, however,

small polygons (about 0.4 decare each) isolated from each other, which are devoid of biological significance for such a large and mobile species as the bear. However, given the high mobility of the species and the nature of the terrain, it would be possible that individual representatives of the species would pass into the area of impact (up to 300 m from the contours of the relevant ground elements) of these options, as well as of other options - the gorge could be crossed from East to West and backwards by wandering individual representatives of the species of unknown size and frequency, especially in the Northern part.

Impacts:

Option G20 - Red

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the gorge from East to West and vice versa, especially in the northern part. During construction works, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species. During the operation, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of increased traffic and the barrier effect will not be significantly different from the current one. The impact on the species will be insignificant - Rate 1.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises no habitats of the species. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above. No other impact is expected.

Mortality:

Mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment during construction and vehicles during operation. No impact is expected.

Option G20 - Blue

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the gorge from East to West and vice versa, especially in the northern part. During construction works, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant, given the high mobility of the species. During the operation, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of increased traffic and the barrier effect will not be significantly different from the current one. The impact on the species will be insignificant - Rate 1.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises no habitats of the species. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above.

No other impact is expected.

Mortality:

Mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment during construction and vehicles during operation. No impact is expected.

Eastern Option G10.50

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the road route from East to West and vice versa, especially in the northern part. During construction works, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant, given the high mobility of the species. During the operation of the highway, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of increased traffic. The impact on the species will be insignificant - Rate 1.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises no habitats of the species. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above - Rate 1. No other impact is expected.

Mortality:

Mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment during construction and vehicles during operation. No impact is expected.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction of habitats

Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.

Fragmentation of the habitats

Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.

Disruption of bio-corridors

The road route in this option crosses the zone underground, where the part of the zone, best suited for crossing of individual representatives of the species from West to East and vice versa, remains above the tunnel. Therefore, there will be no interruption of bio-corridors within the zone as a result of the implementation of this option.

Disturbance:

In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises no habitats of the species. Disturbance upon potentially crossing individual representatives of the species will lead to insignificant barrier effect, expressed in eventual individual representatives of the species bypassing the site of construction works. The impact on the species will be insignificant - Rate 1. There will be practically no impact during the operation of the highway.

Mortality:

Mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment during construction and vehicles during operation. No impact is expected.

Eastern Option G20

Direct destruction of habitats
Within the scope of this option there are no habitats of the species. There will be no direct destruction of the habitats of the species.
Fragmentation of the habitats
Within the scope of this option there are no habitats of the species. Fragmentation of habitats of the species will not exist.
Disruption of bio-corridors
It would be possible, however, that wandering individual representatives of the species of unknown size and frequency would cross the road route from East to West and vice versa, especially in the northern part. During construction works, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species. During the operation of the highway, the tunnels, viaducts and bridges, provided by this option will mitigate the effect of traffic. The impact on the species will be insignificant - Rate 1.
Disturbance:
In the area of impact (up to 300 m from the contours of the relevant on-ground elements), this option comprises no habitats of the species. Disturbance of eventual gorge-crossing individual representatives of the species would lead to the insignificant barrier effect, described above - Rate 1. No other impact is expected.
Mortality:
Mortality is not expected, because the species is fast enough and cautious to avoid heavy construction and transport equipment during construction and vehicles during operation. No impact is expected.

1355 The Eurasian otter (*Lutra lutra*)
Distribution and biology. It is found in the plains, along the sea coast and in the mountains - up to 1,500 m above sea level. The densest species population is found in Southeastern Bulgaria. It inhabits natural river currents and closed water basins, at least 15-20 km long, with old trees and abundant coastal vegetation - 'longoz'-type rain forest, alders and reeds (low shores), diverse and abundant fish fauna, abundance of crabs, frogs, vertebrate animals, molluscs. The section of the male may overlap that of 1 or more females. The burgoes are in the roots of coastal trees. The young (2-4) are born in March-August and follow their mother for a year's period. In Southeastern Bulgaria, the fish species occupies up to 93% of the prey, as ancillary food, hunting crustaceans, frogs, mammals, birds, reptiles. It catches its prey down to 4 m depths (Golemanski 2011).
Evaluation of the species population in the zone. According to the standard form, the population size of the species in the area is 7-15 individual representatives of the species. According to the data from the project 'Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I' (MoEW 2013), the population of the species comprises between 8 and 22 individual representatives of the species. The area of the water bodies and their banks suitable for dwelling by the otter is 14,301.058 dca.
Evaluation of the species population on the territory of the investment proposal.
According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013) and the field studies carried out, all options comprise potential habitats of the species. The species is found in the Struma River.

Impacts:

Option G20 - Red
Direct destruction of habitats
Within the scope of this option will be comprised 394.294 decares or 2.757% of the species' habitats. The affected area during the construction will be practically smaller, because where the Struma River, it passes by the existing road, the coastline is unusable because it has built-

up supporting walls that are vertical and with approximately 2 m high. Upon completion of construction, the affected area will be much smaller - only the pillars and the supports of the bridge facilities. Given its temporary nature, the impact will be moderate - Rate 2. By applying appropriate measures, it could be reduced.

Fragmentation of the habitats

During construction we could expect little fragmentation of the habitats - at the banks of the Struma River and of the river, when the bridges, crossing the river are built. The remaining sections between the individual bridges will be of sufficient size to preserve their habitat features (river stream with adjacent tree-shrub and herbaceous vegetation). Upon completion of bridge construction and during the operation of the motorway, there will be no fragmentation, as the river and its adjacent coasts outside the bridge pillars and bridge supports will recover. Given its temporary nature, the impact will be insignificant - Rate 1.

Disruption of bio-corridors

A barrier effect is expected during bridge construction, with practically separate sections of the river and the shore being inaccessible to the otters. Upon completion of bridge construction and during the operation of the motorway, a barrier effect will not exist, as the river and its adjacent coasts will restore their passability to the species. Bridges would not hinder the migration of individual representatives of the species. Given its temporary nature, the impact will be insignificant - Rate 1.

Disturbance:

During the construction of the motorway, resident representatives of the species will be expelled from the river section to other parts of their individual sections (including other ponds and river sections, outside the construction site). During the operation of the motorway, the levels of disturbance will not be so high as to prevent the return and habitation of resident representatives of the species in the river - the species is adaptable to a certain extent and registered along Struma River under the existing traffic. Given its temporary nature, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. Moreover, as a result of the disturbance, the representatives of the species, occupying the site, where the construction activities and construction machinery are deployed, will have already left the site. Hypothetically, during the operation of the motorway, mortality is rarely expected, in the areas with a small slope on the shore, where no upright retaining walls are constructed to allow individual representatives of the species to escape to the roadway. The reason being that migratory individual representatives of the species are expected to follow the flow of the river, which is not barred and only rarely, accidentally separate (mostly the young) individual representatives of the species from going to the roadway and being killed by cars. The impact has been assessed as insignificant - Rate 1.

Option G20 - Blue

Direct destruction of habitats

Within the scope of this option will be comprised 383.431 decares or 2.68% of the species' habitats. The affected area during the construction will be practically smaller, because where the Struma River, it passes by the existing road, the coastline is unusable because it has built-up supporting walls that are vertical and with approximately 2 m high. Upon completion of construction, the affected area will be much smaller - only the pillars and the supports of the bridge facilities. Given its temporary nature, the impact will be moderate - Rate 2.

Fragmentation of the habitats

During construction we could expect little fragmentation of the habitats - at the banks of the Struma River and of the river, when the bridges, crossing the river are built. The remaining sections between the individual bridges will be of sufficient size to preserve their habitat features (river stream with adjacent tree-shrub and herbaceous vegetation). Upon completion of bridge construction and during the operation of the motorway, there will be no

fragmentation, as the river and its adjacent coasts outside the bridge pillars and bridge supports will recover. Given its temporary nature, the impact will be insignificant - Rate 1.

Disruption of bio-corridors

A barrier effect is expected during bridge construction, with practically separate sections of the river and the shore being inaccessible to the otters. Upon completion of bridge construction and during the operation of the motorway, a barrier effect will not exist, as the river and its adjacent coasts will restore their passability to the species. Bridges would not hinder the migration of individual representatives of the species. Given its temporary nature, the impact will be insignificant - Rate 1.

Disturbance:

During the construction of the motorway, resident representatives of the species will be expelled from the river section to other parts of their individual sections (including other ponds and river sections, outside the construction site). During the operation of the motorway, the levels of disturbance will not be so high as to prevent the return and habitation of resident representatives of the species in the river - the species is adaptable to a certain extent and registered along Struma River under the existing traffic. Given its temporary nature, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. Moreover, as a result of the disturbance, the representatives of the species, occupying the site, where the construction activities and construction machinery are deployed, will have already left the site. Hypothetically, during the operation of the motorway, mortality is rarely expected, in the areas with a small slope on the shore, where no upright retaining walls are constructed to allow individual representatives of the species to escape to the roadway. The reason being that migratory individual representatives of the species are expected to follow the flow of the river, which is not barred and only rarely, accidentally separate (mostly the young) individual representatives of the species from going to the roadway and being killed by cars. The impact has been assessed as insignificant - Rate 1.

Eastern Option G10.50

Direct destruction of habitats

The affected area during construction under this option will be 47.789 decares, or 0.33% of the species habitats in the zone. Upon completion of construction, the affected area will be much smaller - only the pillars and the supports of the bridge facilities. Given its temporary nature and the small affected area, the impact will be insignificant - Rate 1.

Fragmentation of the habitats

Little fragmentation of the habitats is expected during the construction of bridges. The remaining unaffected sections will have sufficient area to preserve their habitat features (river stream with adjacent tree-shrub and herbaceous vegetation). Upon completion of bridge construction and during the operation of the motorway, there will be no fragmentation, as the river and its adjacent coasts outside the bridge pillars and bridge supports will recover. Given its temporary nature, the impact will be insignificant - Rate 1.

Disruption of bio-corridors

A barrier effect is expected during the construction of bridge facilities. Upon completion of bridge construction and during the operation of the motorway, a barrier effect will not exist, as the rivers and their adjacent coasts will restore their passability to the species. Bridges would not hinder the migration of individual representatives of the species. Given its temporary nature, the impact will be insignificant - Rate 1.

Disturbance:

During the construction of the motorway, resident representatives of the species will be expelled from the river section to other parts of their individual sections (including other ponds and river sections, outside the construction site). During the operation of the motorway, the levels of disturbance will not be so high as to prevent the return and habitation of resident

representatives of the species in the river - the species is adaptable to a certain extent and registered along Struma River under the existing traffic. Given its temporary nature, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. Moreover, as a result of the disturbance, the representatives of the species, occupying the site, where the construction activities and construction machinery are deployed, will have already left the site. Hypothetically during operation, mortality is expected very rarely, since in this option, the left roadway does not have any sections of small inclination on the shore, allowing individual representatives of the species to escape to the roadway. Due to facilities dimensions and the steep terrain, the supports of the bridges, where individual representatives of the species could come out on the road, remain outside the potential habitats of the species. With the right roadway, the reason being that migratory individual representatives of the species are expected to follow the flow of the river, which is not barred and only rarely, accidentally separate (mostly the young) individual representatives of the species from going to the roadway and being killed by cars. The impact has been assessed as insignificant - Rate 1.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction of habitats

Within the scope of this option will be comprised 42.093 decares or 0.29% of the species' habitats. The affected area during the construction will be practically smaller, because where the Struma River, it passes by the existing road, the coastline is unusable because it has built-up supporting walls that are vertical and with approximately 2 m high. Upon completion of construction, the affected area will be much smaller - only the pillars and the supports of the bridge facilities. Given its temporary nature and the small affected area, the impact will be insignificant - Rate 1.

Fragmentation of the habitats

During construction we could expect little fragmentation of the habitats - at the banks of the Struma River and of the river, when the bridges, crossing the river are built. The remaining unaffected sections will have sufficient area to preserve their habitat features (river stream with adjacent tree-shrub and herbaceous vegetation). Upon completion of construction and during operation, there will be no fragmentation, as the river and its adjacent and banks, outside the pillars and the bridge structures will be restored. Given its temporary nature, the impact will be insignificant - Rate 1.

Disruption of bio-corridors

We would expect temporary disruption of species bio-corridors (at the Struma River) during the construction. As a result of the construction of the bridge facilities, the population of the species along the river will remain divided. Considering the temporary nature of the impact, we believe the impact will be insignificant - Rate 1, since the habitats on the river will be of sufficient area.

Disturbance:

Almost all road elements within the boundaries of the zone are located in close proximity to the first-class road, so that the noise load will be no different from the existing one, as a result of the traffic on the road, to which the representatives of the species are already accustomed. During the construction of intermediate access 7, we would expect disturbance from the noise and the movement of construction equipment. The impact will be insignificant - Rate 1, as construction activities will be carried out during the day, and the otter is mostly active during the night.

Mortality:

The species is cautious enough and the construction machinery is generally slow enough to expect mortality on individual representatives of the species during construction. No mortality is expected during the operation of the highway either, because most of the road route in this

zone will be in a tunnel and the habitats of the species along the Struma River, at the northern portal of the Kresna Tunnel will have bridge facilities, so that individual representatives of the species will not be able to reach the roadway.

Eastern Option G20

Direct destruction of habitats

The affected area during construction under this option will be 53.746 decares or 0.38% of the species habitats in the zone. Upon completion of construction, the affected area will be much smaller - would only comprise the pillars of the bridge facilities, which will have minor area, due to the size of the facilities and the small width of the water bodies (mountain rivers). Given its temporary nature and the small affected area, the impact will be insignificant - Rate 1.

Fragmentation of the habitats

Little fragmentation of the habitats is expected during the construction of bridges. The remaining unaffected sections will have sufficient area to preserve their habitat features (river stream with adjacent tree-shrub and herbaceous vegetation). Upon completion of bridge construction and during the operation of the motorway, there will be no fragmentation, as the river and its adjacent coasts outside the bridge pillars and bridge supports will recover. Given its temporary nature, the impact will be insignificant - Rate 1.

Disruption of bio-corridors

A barrier effect is expected during the construction of bridge facilities. Upon completion of bridge construction and during the operation of the motorway, a barrier effect will not exist, as the rivers and their adjacent coasts will restore their passability to the species. Bridges would not hinder the migration of individual representatives of the species. Given its temporary nature, the impact will be insignificant - Rate 1.

Disturbance:

During the construction of the motorway, resident representatives of the species will be expelled from the river section to other parts of their individual sections (including other ponds and river sections, outside the construction site). During the operation of the motorway, the levels of disturbance will not be so high as to prevent the return and habitation of resident representatives of the species in the river - the species is adaptable to a certain extent and registered along Struma River under the existing traffic. Given its temporary nature, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. Moreover, as a result of the disturbance, the representatives of the species, occupying the site, where the construction activities and construction machinery are deployed, will have already left the site. During operation, no mortality is expected, since in this option, the roadways do not have any sections of small inclination on the shore, allowing individual representatives of the species to escape to the roadway. It is due to the fact that facilities dimensions and the steep terrain, the supports of the bridges, where individual representatives of the species could come out on the road, remain outside the potential habitats of the species. There will be no impact - Rate 0.

2635 The marbled polecat (*Vormela peregusna*)

Distribution and biology. Its habitats are scattered in plains, valleys, forest-less terrains in semi-mountainous areas. It is more common in Northeastern and Southeastern Bulgaria and in the high fields of Western Bulgaria. It inhabits meadows, pastures, stony terrains, deserted lands, including river valleys, drylands, canyons. It has also been found in arable lands, orchards, including the outskirts of populated areas. It prefers places of large colonial rodents. Its main prey are squid, hamsters, blind dogs, murine rodents, rarely frogs, reptiles, mollusks. Its hunting area is from 10 to 100 ha. It wanders within the boundaries of its territory and normally uses a hiding place only one time. The oestrus is generally in April-June. The pregnancy lasts from 8 to 11 months (with a latency period). Gives birth to 4 to 5 small

animals from January to May. (Golemanski 2011, Gorsuch and Lariviere 2005, Macdonald and Barrett 1993, Murariu et al. 2009).
Evaluation of the species population in the zone. The Standard Form is missing data on the species population in the zone - it is labelled as present (P). According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the species is not registered in the zone. Its potential habitats in the zone comprise 20,510 decares.
Evaluation of the species population on the territory of the investment proposal. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), potential habitats of the species fall within the range of all options, as long as it uses a wide range of habitats. However, they should be regarded as suboptimal, as the main prey of the species is absent.
Impacts:
Option G20 - Red
Direct destruction of habitats
Within the scope of this option will be comprised 14.716 decares or 0.072% of the species' habitats. Given the small area affected and the sub-optimal nature of the habitats, the impact shall be insignificant - Rate 1.
Fragmentation of the habitats
Minor fragmentation of habitats of the species is expected, as small areas of large polygons, extending far beyond the boundaries of the area are affected within the area. Outside the boundaries of the zone, the fragmentation will also be insignificant - Rate 1, since both sides of the track remain sufficient area territories to fulfil their functions as potential habitats of the species.
Disruption of bio-corridors
In principle, the road network has a proven barrier effect for the representatives of the Mustelidae family. However, within the boundaries of the zone, the route of this option affects small areas of large polygons, extending far beyond the boundaries of the area. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and mostly its night activity. During the operation of the motorway the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.
Disturbance:
Since the species is a nocturnal animal and during the day is hiding in underground shelters, during the construction, which is expected to be in the daylight, disturbance is not expected. During the operation of the motorway, small areas of large polygons, extending far beyond the boundaries of the area are concerned, and given the sub-optimal nature of the habitats, the impact will be insignificant - Rate 1.
Mortality:
During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. During the operation of the highway, the risk of collision is also small as it affects the peripheral parts of polygons with suboptimal habitats, where the presence of the species is unlikely. The impact on the species will be insignificant - Rate 1.
Option G20 - Blue
Direct destruction of habitats
Within the scope of this option will be comprised 15.620 decares or 0.08% of the species' habitats. Given the small area affected and the sub-optimal nature of the habitats, the impact shall be insignificant - Rate 1.
Fragmentation of the habitats
Minor fragmentation of habitats of the species is expected, as small areas of large polygons, extending far beyond the boundaries of the area are affected within the area. Outside the boundaries of the zone, fragmentation will also be insignificant, as both areas of the site

remain sufficient in area to perform its functions as potential habitats of the species. The impact shall be insignificant - Rate 1.

Disruption of bio-corridors

In principle, the road network has a proven barrier effect for the representatives of the Mustelidae family. However, within the boundaries of the zone, the route of this option affects small areas of large polygons, extending far beyond the boundaries of the area. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and mostly its night activity. During the operation of the motorway the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.

Disturbance:

Since the species is a nocturnal animal and during the day is hiding in underground shelters, during the construction, which is expected to be in the daylight, disturbance is not expected. During operation, as small areas of large polygons are affected that extend far beyond the boundaries of the area, given the sub-optimal nature of the habitats, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species cautious enough to avoid it. During the operation of the highway, the risk of collision is also small as it affects the peripheral parts of polygons with suboptimal habitats, where the presence of the species is unlikely. The impact on the species will be insignificant - Rate 1.

Eastern Option G10.50

Direct destruction of habitats

Within the scope of this option will be comprised 78.604 decares or 0.38% of the species' habitats. Given the small area affected and the sub-optimal nature of the habitats, the impact shall be insignificant - Rate 1.

Fragmentation of the habitats

According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the road route in this option affects 2 habitats of the species, splitting them in parts. During the construction of these sections, the areas remaining west of the road route could not be used because of their small size and inaccessibility. During the operation of the motorway the connectivity of one of the polygons will be restored, as bridges are provided in the northern and southern ends of the section. The impact has been assessed as insignificant - Rate 1, given the sub-optimal nature of the habitats.

Disruption of bio-corridors

In principle, the road network has a proven barrier effect for the representatives of the Mustelidae family. The road route in this option affects 2 polygons of habitats of the species, dividing them into parts. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high mobility of the species and mostly its night activity. During the operation of the motorway the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.

Disturbance:

Since the species is a nocturnal animal and during the day is hiding in underground shelters, during the construction, which is expected to be in the daylight, disturbance is not expected. During operation, given the sub-optimal nature of the habitats, the impact will also be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species - cautious enough to avoid it. During the operation of the motorway, the risk of collision is also small, as it affects polygons with suboptimal habitats

where the presence of the species is unlikely. The impact on the species will be insignificant - Rate 1.

Long Tunnel Option, 'Kresna' tunnel

Direct destruction of habitats

Within the scope of this option will be comprised 113.357 decares or 0.55% of the species' habitats. Given the small area affected and the sub-optimal nature of the habitats, the impact shall be insignificant - Rate 1.

Fragmentation of the habitats

Insignificant fragmentation of the species habitats is expected, as small areas of large polygons, extending far beyond the boundaries of the zone are affected within the area. Outside the boundaries of the zone, fragmentation will also be insignificant, as both areas of the site remain sufficient in area to perform its functions as potential habitats of the species. The impact on the species will be insignificant - Rate 1.

Disruption of bio-corridors

In principle, the road network has a proven barrier effect for the representatives of the Mustelidae family. However, within the boundaries of the zone, the route of this option affects small areas of large polygons, extending far beyond the boundaries of the area. During construction, this option will have a barrier effect as a result of disturbance, with virtually no impact, given the high mobility of the species and mostly its night activity, and the limited scale of on-ground works. During operation, most of the road route in the zone will be underground. Therefore, there will be no interruption of bio-corridors within the zone.

Disturbance:

Since the species is a nocturnal animal and during the day is hiding in underground shelters, during the construction, which is expected to be in the daylight, disturbance is not expected. During the operation of the motorway, small areas of large polygons, extending far beyond the boundaries of the area are concerned, and given the sub-optimal nature of the habitats, the impact will be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species - cautious enough to avoid it. During the operation of the highway, the risk of collision is also small as it affects the peripheral parts of polygons with suboptimal habitats, where the presence of the species is unlikely. The impact on the species will be insignificant - Rate 1.

Eastern Option G20

Direct destruction of habitats

Within the scope of this option will be comprised 287.205 decares or 1.4% of the species' habitats. Given the sub-optimal nature of the habitats, the impact will be insignificant - Rate 1.

Fragmentation of habitats

According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the road route in this option affects 3 habitats of the species, splitting them in parts. During the construction of these sections, the areas remaining West of the road route and East of the connection at Stara Kresna, could not be used because of their small size and inaccessibility. During the operation of the motorway the connectivity of one of the polygons will be restored, as bridges are provided in the northern and southern ends of the section. Given the sub-optimal nature of the habitats, the impact has been assessed as moderate - Rate 2. Mitigation measures are needed.

Disruption of bio-corridors

In principle, the road network has a proven barrier effect for the representatives of the Mustelidae family. The road route in this option affects 3 polygons of habitats of the species, dividing them into parts. During construction, this option will produce a barrier effect as a result of disturbance, the impact being defined as insignificant - Rate 1, given the high

mobility of the species and mostly its night activity. During the operation of the motorway the impact on the species will also be insignificant - Rate 1, due to the tunnels, viaducts and bridges, provided for this option.

Disturbance:

Since the species is a nocturnal animal and during the day is hiding in underground shelters, during the construction, which is expected to be in the daylight, disturbance is not expected. During operation, given the sub-optimal nature of the habitats, the impact will also be insignificant - Rate 1.

Mortality:

During construction, mortality is not expected, as construction and transport equipment is slow enough and the species - cautious enough to avoid it. During the operation of the motorway, the risk of collision is also small, as it affects polygons with suboptimal habitats where the presence of the species is unlikely. The impact will be insignificant - Rate 1.

- **Class Bats (*Chiroptera*)**

According to the updated Standard Form, ten bat species are subject to conservation in the Protected Zone. The Kresna Gorge and the adjacent slopes of Pirin present an area of particularly favourable conditions for bats. Intensive chitherothological studies have been carried out here during the last 15 years, proving its great importance to preserving extraordinary species richness, characterized by a high conservation value. Petrov (2001) reported 17 species of bats or more than half of the number, known for the territory of Bulgaria. Further studies of the Institute of Zoology and later on by the Institute of Biological Sciences with the Bulgarian Academy of Sciences (BAS) (unpublished data) confirmed the presence of most target species.

1303 The lesser horseshoe bat (*Rhinolophus hipposideros*)

In Bulgaria, the small horseshoe is one of the most common species with more than 270 habitats. It inhabits the territory of the whole country and is most often found in karst areas. It has not been found in the highest parts of the mountains. Most habitats are situated between 100-600 m, but it is relatively frequent up to about 1,300 m. A primarily cave species, mainly associated with rich karst regions. It is also common for residential areas. It uses many different shelters - buildings, cellars, artificial galleries, caves, etc., preferring those of wide opening. A relatively social type, but in the summer the males separate themselves and live alone. Reproduction is poorly studied in Bulgaria. It forms breeding groups in May-June. Breeding colonies are most often found in ceilings and basements of residential buildings, although they also inhabit small caves and rock slits. Winter shelters are specifically underground - caves, mining galleries and tunnels. It spends the winter separately or in rare groups, distanced between the individual representatives of the species. The small horseshoe is a stationary species. The distance between summer and winter shelters usually does not exceed 15 km. It hunts in deciduous and mixed forests, bushes, outskirts of forests, along rivers, overgrown with vegetation, around rocks in karst areas. It feeds on flying insects. The nutritional biology of the species in Bulgaria is poorly studied, but little known evidence suggests that representatives of the small horseshoe use alternative shelters and food habitats within a radius of about 5-10 km from the summer shelter (Golemanski 2011, Zingstra et all. 2009, Popov & Sedefchev 2003).

Status of the species in the Protected Zone: In the Standard Form, the overall assessment of the Protected Zone for species conservation is "C", and the number of the species population is estimated at 51-100 species representatives. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 13 localizations of the species are found in the Protected Zone. Some 34 species representatives were found in the known wintering localizations in the zone. Some 52 species representatives have been identified in the known summer localizations in the zone. The area of potentially suitable hunting

habitats is estimated at **8,777.3 ha** (18.1% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable". The monitoring of animal mortality that was carried out (Karaivanov, 2015) found two killed species representatives in the section of the road E-79 (I-1), passing through the protected area.

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, at some 85 m from the route (the nearest canton; Fig. 5.1-14). The territory is part of a **potential hunting habitat**, with construction activities affecting 32.39 hectares therefrom, or 0.541% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of the potential hunting habitat, we estimate the impact to be **of insignificant rate**
(1).

Figure 5.1-14: Abandoned railway canton with coordinates N41.7767740 and E 23.1551280, breeding shelter of *the Greater horseshoe (Rhinolophus ferrumequinum*), of the *small horseshoe (Rhinolophus hipposideros*), *of the Mediterranean horseshoe bat (Rhinolophus euryale)* and of Geoffroy's bat (*Myotis emarginatus*).

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road traffic will lead to higher levels of air pollution, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation
effect in the affected hunting territory of the species, it would also occur during construction. The small affected area of only 0.541% of the total area of the hunting habitat in the Protected

Zone will cause minor changes in its functional characteristics - an insignificant rate **of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during operation. The identified killed representatives of the species (Karaivanov 2015) show that the local population of the species is affected by the current traffic on the E-79 (I-1) road in the Kresna Gorge area, which is why we believe that the planned increased traffic on the route under assessment will determine the impact as **moderate - Rate (2).** Mitigation measures shall be needed.

- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).

- *Disruption of bio-corridors* No impact is expected for the species population, as all structural components of the highway and vehicle traffic would not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, 92 m from the route (the nearest - the canton). The territory is part of a **potential hunting habitat**, with construction activities affecting 31.91 hectares of it, or 0.364% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. Expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.364% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **Insignificant degree of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during operation. The killed representatives of the species, found in the survey (Karaivanov 2015) show that the local population of the species is affected by the current traffic on E-79 (I-1) in the area of

the Kresna gorge, therefore we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and bunker) are located on the opposite left bank of the Struma River, 98 m from the right roadway (the nearest - canthon). The territory is part of the **potential hunting habitat**, with construction activities, affecting 15.86 hectares of it or 0.18% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.18% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - an **insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during operation. The identified killed representatives of the species (Karaivanov 2015) show that the local population of the species is affected by the current traffic on the E-79 (I-1) road in the Kresna Gorge area, which is why we believe that the planned increased traffic on the route under assessment will determine the impact as **moderate - Rate (2).** Mitigation measures shall be needed.
- *disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line.
An additional favourable factor for the absence of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during the construction and traffic during operation. No impact (Rate 0).
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of the **potential hunting habitat**, with construction activities, affecting 5.66 hectares of it or 0.06% of its total area in the PZ. No further destruction of areas of the species

habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction.

The small affected area of only 0.06% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics -

Insignificant degree of impact (1).

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge

- *direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 45.71 hectares of it, or 0.52% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional area fragmentation is expected. The expected intensive road traffic will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species, it would also occur during construction. The small affected area of 0.52% of total area of the hunting habitat in Protected Zone will cause minor changes in its functional characteristics - an **insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1304 The greater horseshoe bat (*Rhinolophus ferrumequinum)*

In Bulgaria it is a common and wide-spread species for the whole country, excluding the highest parts of the mountains. Most habitats are between 100 and 500 m above sea level. It inhabits mainly karst areas, overgrown with tree and shrub vegetation. It uses various underground

shelters (caves, artificial galleries, bunkers, catacombs), basements and ceilings of residential buildings. Often, the greater horseshoe bat inhabits the same habitat along with other cave-like species. The greater horseshoe bat feeds in a radius of 2 to 10 km from the shelter, using open spaces, woods, shrubs, meadows, often near water areas. In the food spectrum, the large Coleoptera and butterflies (Lepidoptera, especially of the Noctuidae family) and to a lesser extent - the Hymenoptera and Diptera Families. In the summertime, the greater horseshoe bat uses alternative shelters and food habitats within a radius of about 15 km from the summer shelter. From the middle of April to the end of May, the females form breeding colonies. Their number ranges from several dozen to 700 representatives of the species. The birth of the young occurs between June 1-25, seldom later. It spends the winter in single numbers or in colonies that could amount up to 50 to 600-800 representatives. One to several wintering representatives of the greater horseshoe bat can be seen in almost every Bulgarian cave in the winter. In Bulgaria, the greater horseshoe bat does not make long-distance migrations. The seasonal migrations between summer and winter shelters are made at 20 to 95 km (MoEW 2013).

Status of the species in the Protected Zone: In the Standard Form, the overall assessment of the Protected Area for conservation of the species is "B" for the reproduction period and "C" for the winter period. Accordingly, the population of the species is found to be 1,000-1,500 individual representatives of the species for the summer period and 101-250 representatives of the species for the winter period. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 29 localizations of the species are found in the Protected Zone. A total of 195 species representatives were found in the known wintering sites of the zone. Some 1170 species representatives have been identified in the known summer localizations in the zone. It forms a multi-numbered mixed breeding colony with Geoffroy's bat *(Myotis emarginatus*) in an abandoned bunker and a railway canton (Fig. 5.1-14). The area of potential suitable hunting habitats is estimated at **7,723 ha** (15.9% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable".

Impact Assessment:

Option G-20 - Red

- *direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, at 85 m from the scope of the road route (the nearest -
the canton; Fig. 5.1-14). The territory is part of a **potential hunting habitat**, with construction activities affecting 25.54 hectares thereof, or 0.331% of its total area in Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.331% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - an **insignificant rate of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during operation. The species in the Kresna Gorge area is represented by a local breeding population, with spreading of young representatives of the species during the summer period being particularly vulnerable to crash due to their inexperience in flying and orientation. Therefore, we believe that the

planned increased traffic on the route under assessment will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, 92 m from the route (the nearest - the canton). The territory is part of a **potential hunting habitat**, with construction activities affecting 25.26 hectares of it, or 0.327% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* As a result of the construction activities, the vegetation in the range of the road route will be completely destroyed, which will lead to The corresponding proportional reduction in the habitual abundance of the habitats. No additional area fragmentation is expected. Expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.327% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - an **insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during operation. The species in the Kresna Gorge area is represented by a local breeding population, with spreading of young representatives of the species during the summer period being particularly vulnerable to crash due to their inexperience in flying and orientation. Therefore, we believe that the planned increased traffic on the route under assessment will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest one (the abandoned bunker) is situated on the southern side of Melo Hill near the town of Veliko Tarnovo, Kresna (N 41.708340 ° E 23.182970 °) and 45 m from the easement of the

road. In the shelter are found remains of bats, but without their direct registration. The territory is part of a **potential hunting habitat** with construction activities affecting 10.95 hectares thereof, or 0.14% of its total area in Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.14% of the total area of the hunting

a habitat in Protected Zone will cause minor changes in its functional characteristics - an **insignificant degree of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The species in the Kresna Gorge area is represented by a local breeding population, with spreading of young representatives of the species during the summer period being particularly vulnerable to crash due to their inexperience in flying and orientation. Therefore, we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.

- *Disturbance:* The route in this option passes in close proximity (45 m) to an established refuge of the species - abandoned bunker) is situated on the southern side of Melo hill. As a result of the construction and / or operation, the shelter may be abandoned. This impact has been assessed as **moderate (Rate 2**). Mitigation measures shall be needed.

- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel

- *direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat** and the construction activities will affect 4.61 hectares thereof, or 0.06% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.06% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - an insignificant rate **of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**

- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway

route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.
Summary Impact Assessment : **Insignificant degree (1).**
Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest one (the abandoned bunker) is situated on the southern side of Melo Hill near the town of Veliko Tarnovo, Kresna (N 41.708340 ° E 23.182970 °) and 45 m from the easement of the road. In the shelter are found remains of bats, but without their direct registration. The territory is part of a **potential hunting habitat**, whereas construction activities would affect 31.98 hectares thereof or 0.41% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.41% of the total habitat area of the Protected Area will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The species in the Kresna Gorge area is represented by a local breeding population, with spreading of young representatives of the species during the summer period being particularly vulnerable to crash due to their inexperience in flying and orientation. Therefore, we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* The route in this option passes in close proximity (45 m) to an established refuge of the species - abandoned bunker) is situated on the southern side of Melo hill. As a result of the construction and / or operation, the shelter may be abandoned. This impact has been assessed as **moderate (Rate 2**). Mitigation measures shall be needed.
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1305 The Mediterranean horseshoe bat (*Rhinolophus euryale*)
The most widespread and most numerous of the three types of "medium-size" horseshoe bats on the territory of the country. It is found in over 100 habitats, most of them between 0 - 700 m above sea level, however there are winter shelters at higher altitudes. Its localizations decrease to the south. It inhabits forested plain karst areas near water. It is almost entirely connected with the caves, but in non-karst areas it also settles in buildings. It feeds mostly on butterflies. Of the known breeding colonies today - 18 are in natural caves and one in underground tunnels in a building. The maximum number of births is between June 20 and July 10. The winter colonies are numerous - in caves and rarely in artificial galleries. It does not it migrates over long distances, but makes regular seasonal movements between the summer and the winter shelters (10-60 km) (Golemanski 2011). It avoids open large spaces. It hunts mostly on the outskirts of the forest massifs. It likes riparian forests, it uses both for hunting grounds and flight corridors.
Status of the species in the Protected Zone: In the Standard Form, the overall assessment of the Protected Zone for species conservation is "C", with the number of the population estimated to be 101 - 250 individual representatives of the species. According to data from the project

"Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 6 localizations of the species are found in the Protected Zone. A total of 178 species representatives were found in the known wintering sites in the zone. A total of 200 representatives of the species were established in the known summer localizations in the zone. The area of potentially suitable hunting habitats is estimated at **6,457 ha** (13.3% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, at some 85 m from the route (the nearest canton; Fig. 5.1-14). The territory is part of a **potential hunting habitat**, with construction activities affecting 22.54 hectares thereof, or 0.349% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional area fragmentation is expected. Expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.349% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).** Mitigation measures shall be needed.

- *disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. A further favourable factor for the absence of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and works in the time of construction and of traffic during the operation of the highway. No impact (Rate 0).
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, 92 m from the route (the nearest - the canton). The territory is part of a **potential hunting habitat**, with construction activities affecting 22.64 hectares thereof, or 0.351% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant -**

Rate (1).

- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.351% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rateof impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).** Mitigation measures shall be needed.

- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).

- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (the abandoned railway canton and the bunker) are located on the opposite left bank of the Struma River, 98 m from the right roadway (the nearest - the canthon). The territory is part of a **potential hunting habitat**, with construction activities affecting 8.76 hectares thereof, or 0.14% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.14% of the total habitats of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rateof impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).**

Mitigation measures shall be needed.
- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 3.49 hectares thereof, or 0.05% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road traffic will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.05% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rateof impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat** and the construction activities will affect 19.98 hectares thereof or 0.31% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.31% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rateof impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1307 The lesser mouse-eared bat (*Myotis blythii)*

In Bulgaria it is considered as a common and frequent species. It is found in 130 localizations all around the country, excluding the highest parts of the mountains. Most habitats are between 100 and 800 m above sea level. It is found in almost all karst and rocky areas of the country. The species is of Asian origin and is evolutionarily related to sunny, warm and open habitats. All year round, it inhabits underground shelters - karst, volcanic and sea caves and mining galleries, rarely single bats are found in buildings. In many cases, both in winter and in summer, the same habitats are inhabited by its twin - the *Myotis myotis* species. The maximum number of births is between May 20th and June 10th. Data on the biology of the species in Bulgaria is not yet published. In Switzerland it was found that over 60% of its food consists of large long-horned grasshoppers (of the Tettigoniidae family), which hunts in open areas, pastures and often in freshly cut meadows. In our country it makes regular seasonal migrations between winter and summer shelters within 50 to 80 km. In our country, spending winter begins in late November and continues until mid-March. During this period the species was found in many caves. Migration to breeding sites is likely to take place from the 10th to the 20th of April (MoEW 2013).

Status of the species in the Protected Zone: In the standard form, the overall assessment of the Protected Area for species conservation is "C", with the number of the population estimated at 251-500 individual representatives of the species. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 3 localizations of the species are found in the Protected Zone. In the known wintering localizations, a total of 4 species representatives were found in the area. Only 1 species representatives has been identified in the known summer localizations in the zone. The area of potential suitable hunting habitats is estimated at **31,202 ha** (64.2% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 45.15 hectares thereof, or 0.145% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.145% of the total area of the hunting habitat in the Protected Zone will cause

minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 44.15 hectares thereof, or 0.141% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small area affected of barely 0.141% of the total habitats of the Protected Area will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 43.36 hectares thereof, or 0.14% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.14% of the total habitats of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of

the species.
The track of the road falls into a potential hunting habitat, and it is possible
accidental mortality of hunting individual representatives of the species as a result of collision with moving vehicles. Determine the impact as **insignificant - Rate (1).**
- *disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The area is part of a **potential hunting habitat,** with construction activities affecting 24.50 hectares thereof, or 0.08% of its total area in the Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.08% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rateof impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. Determine the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 132.15 hectares thereof, or 0.42% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road traffic will lead to higher levels of air pollution, which is an additional factor to reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting area of the species, it also occurs during construction. The small affected area of 0.42% of the total area of the hunting habitat in the PZ will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of

the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**

- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.

- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1308 The barbastelle (*Barbastella barbastellus*)

Most often it has been found in the Central and Western Stara Planina Mountains and in the Western Rhodopes. Most shelters are found over 500 m above sea level. Some single individual representatives of the species have been registered in the lower parts (in the Kresna Gorge, in the Jernov village in the region of Pleven, Chernomorets village in the region of Burgas). It probably reproduces in most of the established habitats in the mountains, yet for the time being we have no specific data. The only reliable data about its breeding in Bulgaria is about the riverbed dunes of the Kamchia river. Most desirable are the wet forest habitats in the middle mountain range (700 - 1,400 m above sea level). In the winter, singles or groups of up to 30 individual representatives of the species are found in the coldest, entrance parts of the caves at temperatures around 0-2 °C. In the summer months, it lives under peeled, dead bark or cracks in deciduous trees, more often dead but also alive, avoiding those near the edge of the forest (less than 30 m). During this period the males live in a postnatal way, while the females are social, live in colonies that could be divided into smaller ones or reunited. Both sexes regularly change their shelters, the males more often, and most rarely - the nursing females who carry the small ones on their bellies. The distance between the individual shelters could reach 1 - 3 km. It hunts in forests, along rivers, in open areas. Hunting areas may be within 20 km of shelters (usually between 5 and 7) and are relatively constant for individual representatives of the species (but may overlap). Their area ranges from 450 to 950 decares. There are no data on the food spectrum in Bulgaria. In Central Europe it feeds on small butterflies and flies (Golemanski 2011, Cornes 2005, Ganser 2013, Russo et al. 2005, Zeale et al. 2012).

Status of the species in the Protected Zone: In the Standard Form, the overall assessment of the Protected Zone for species conservation is "C", with the number of the population estimated at 219 - 363 individual representatives of the species. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species Phase I" (MoEW 2013), the area of potential habitats is estimated at **10,730 ha** (22.08% of the area of the protected zone). The area of habitats of high quality by inductive model is estimated at 1,551.3 ha (3.2% of the area of the protected zone). There is a very low degree of fragmentation of high quality habitats in the area. The overall assessment of the conservation status of the species in the PZ is "unfavourably - unsatisfactory".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 34,65 hectares thereof or 0,323% of its total area in the PZ. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road traffic will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect

in the affected hunting territory of the species, it also occurs during construction. The small affected area of only 0.332% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rat of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* We would **not** expect disturbance of individual representatives of the species in the shelters, for there are no prerequisites for such shelters in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 31.24 hectares thereof, or 0.291% of its total area in the PZ. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road traffic will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species, it also occurs during construction. The small affected area of only 0.291% of the total area of potential
a habitat in Protected Zone will cause minor changes in its functional characteristics - an **insignificant degree of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The area is part of a **potential habitat,** with construction activities affecting 6.95 hectares thereof or 0.06% of its total area in the PZ. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation.

The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The road track does not interrupt local migration corridors. The small affected area of yet 0.06% of the total area of potential habitats in the Protected Zone will cause minor changes in its functional characteristics - **Insignificant degree of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 6.12 hectares thereof, or 0.06% of its total area in the PZ. During the operation of the highway, no further destruction of species habitats is expected. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.06% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rat of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 14.70 hectares thereof, or 0.14% of its total area in the PZ. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation

within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.14% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The road route falls into a potential hunting habitat, with possible incidental mortality of hunting representatives of the species, as a result of collision with moving vehicles.

We have defined the impact as **insignificant - Rate (1).**

- *disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.

- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1310 The common bent-wing bat/Schreibers' long-fingered bat (*Miniopterus schreibersii*)

The species is found all over the country, excluding the highest parts of the mountains. About 170 habitats are known, most of which are between 100 and 600 m above sea level. It is found in karst landscapes all over the country. It inhabits only underground shelters - caves and mining galleries, all year round. It forms numerous reproductive colonies. 19 breeding colonies and 5 non-propagating colonies are known. The maximum number of births is between June 20 and July 10. It spends the winter only in underground shelters. 14 winter shelters are known, but over 95% of the wintering population is in three caves - the Parnicite (the Greenhouses), the Devetashka, the Dyavolsko garlo. They make regular seasonal migrations between shelters (50-150 km). Their food habitats include, above all, the river banks, the lakes and dams, a variety of open habitats such as meadows and pastures, outskirts of forests, residential areas (around street lamps), scattered forests, extensively arable lands, up to about 5 - 20 km from the shelters. It avoids sloppy, dense forests. The hunting area is large, reaching up to thousands of hectares (Golemanski 2011, MoEW 2013, Rainho and Palmeirim 2011, Russo and Jones 2003, Vincent et al. 2011).

Status of the species in the Protected Zone: In the standard form, the overall assessment of the Protected Area for species conservation is "C", with the species population estimated at 51-100 species representatives. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), no localizations of the species have yet been found in the Protected Zone. The area of potential suitable hunting habitat is estimated at **12,929 ha** (26.6% of the area of the protected zone). During the monitoring of animal mortality (Karaivanov 2015) in the section of road E-79 (I-1) passing through the protected area, three killed species representatives were recorded, proving that the valley of the Struma River in the section of the Kresna Gorge is a preferred hunting habitat for the species.

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 57.34 hectares thereof, or 0.444% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.444% of the total area of the hunting
a habitat in Protected Zone will cause minor changes in its functional characteristics - an **insignificant degree of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The population of the species in the area of the PZ is estimated to be about 100 species representatives, and the valley of the Struma River in the Kresna Gorge is an important local migration corridor for the species (personal observations). On the existing route of the main road E-79 (I-1), have been found three dead species representatives, as a result of collisions with vehicles (Karaivanov, 2015). Therefore, we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 53.45 hectares thereof, or 0.413% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.413% of the total habitats of the habitats in the PZ will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The population of the species in the area of the PZ is estimated to be about 100 species representatives, and the valley of the Struma River in the Kresna Gorge is an important local migration corridor for the species (personal observations). On the existing route of the main road E-79 (I-1), have been found three dead species representatives, as a result of collisions with vehicles (Karaivanov, 2015). Therefore, we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.

- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 26.61 hectares thereof, or 0.21% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small area affected by only 0.21% of the total habitats of the habitats of the Protected Area will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The population of the species in the area of the PZ is estimated to be about 100 species representatives, and the valley of the Struma River in the Kresna Gorge is an important local migration corridor for the species (personal observations). On the existing route of the main road E-79 (I-1), have been found three dead species representatives, as a result of collisions with vehicles (Karaivanov, 2015). Therefore, we believe that the planned increased traffic on the road route under consideration will determine a **moderate level of impact (2).** Mitigation measures shall be needed.
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 12.11 hectares thereof, or 0.09% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road traffic will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.09% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rat of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat of very small

area, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**

- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.

- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 67.78 hectares thereof, or 0.52% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.52% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**

- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.

- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1316 The long-fingered bat (*Myotis capaccinii*)

The long-fingered bat (Myotis capaccinii) is a typical inhabitant of karst areas. It is common for the territory of the whole country, in the mountains up to about 1500 m. Most habitats are between 100 and 600 m above sea level. It inhabits only underground shelters, all year round - karst and volcanic caves, mining galleries, exceptionally humid basements of uninhabited buildings. It forms breeding colonies, ranging from a few tens to a few thousand (50 to 3000, most often 200-500, always blended with *Miniopterus schreibersii*). The maximum birth rate is in the period 20-25 May. It spends the winter only in underground shelters. The long-fingered bats (Myotis capaccinii) perform regular seasonal migrations between their shelters in the range of 50 to 150 km. In our country, spending winter begins in late November and continues until mid-March. During this period the species was found in many caves. Migration to breeding sites is likely after 10-20 April. It hunts over a water surface (slowly flowing rivers rich in nutrients), moving to a maximum of 10 km from the shelter. The individual hunting area varies from 3 to 100 decares (MoEW 2013, Almenar et al. 2006, Dietz & amp; Kiefer 2016).

Status of the species in the Protected Zone: At present, there is insufficient data for the accurate assessment of the status of the species in the Protected Zone. In the Standard Form, the overall assessment of the PZ for species conservation is "D", the zone is not essential to the conservation of the species. According to data from the project "Mapping and Determination of

the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), no localizations of the species have been found in the Protected Zone. The area of potentially suitable hunting habitat is estimated at **8,855 ha** (**18.2** % of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "unfavourable - unsatisfactory".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 57.34 hectares thereof, or 0.648% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.145% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The area is part of a **potential hunting habitat,** with construction activities affecting 53.45 hectares thereof, or 0.604% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.604% of the total habitats of the habitats in the PZ will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway

route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the hideaway of the species. The area is part of a **potential hunting habitat,** with construction activities affecting 26.61 hectares thereof, or 0.30% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.30% of the total area of the hunting habitat in the PZ will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The track of the road falls into a potential hunting habitat, and it is possible
accidental mortality of hunting individual representatives of the species as a result of collision with moving vehicles. We have defined the impact as **insignificant - Rate (1).**
- *disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 12.15 hectares thereof, or 0.14% of its total area in the Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitat. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.14% of the total habitats of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the

species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 67.78 hectares thereof, or 0.77% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitat. No additional fragmentation is expected during operation. The expected intensive road traffic will lead to higher levels of air pollution, which is an additional factor to
reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting area of the species, it also occurs during construction. The small affected area of 0.77% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1321 Geoffroy's bat (*Myotis emarginatus*)
There are 73 known localizations throughout the country. Most shelters and colonies are located in the low-mountain belt (up to 400-500 m above sea level). Single individual representatives of the species are registered up to about 1,600 m above sea level, in Central Stara Planina, at 1,550 m above sea level, in Rila Mountains, at 1,560 m above sea level in the Western Rhodopes. Characteristic inhabitant of the low mountainous karst regions. It dwells in caves, abandoned buildings, old military bunkers, and others. It is a thermophilic species. The temperature in breeding shelters may reach up to 35°C. Breeding colonies consist predominantly of females, most commonly blended with the horseshoes bats. Before the middle of August, shortly after all the youngsters learn to fly, the colony leaves the shelter and settles in another near or far shelter. One of the longest migrations of the species (105 km) has been established in Bulgaria - from the village of Muselievo, Nikopol district to the Water Vapes cave in the Central Balkan Mountains. It feeds mostly on spiders, flies, net-winged insects, and more rarely on butterflies. It hunts in deciduous forests, including parks, orchards and others. It hunts flies in livestock farms. In the winter, only single individual representatives of the species are found in caves in Bulgaria (Golemanski 2011, Dietz & Kiefer 2016).
Status of the species in the Protected Zone: In the standard form, the overall assessment of the Protected Area for the conservation of the species during the breeding season is "B", with the number of the population estimated at 1,200-1,700 individual representatives of the species. According to data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 3 localizations of the species are found

in the Protected Zone. In the known summer localizations, a total of 1,774 species representatives were found in the area. The area of potentially most favourable habitats is estimated at 533.7 ha (1.1% of the area of the protected zone). The area of potential hunting habitat is estimated at **19,576 ha** (40.3% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (the abandoned railway canton and bunker) are located on the opposite left bank of the Struma River, 85 m from the road route (the nearest is the canton; Fig. 5.1-14). The territory is part of a **potential hunting habitat,** with construction activities affecting 23.58 hectares thereof, or 0.120% of its total area in the PZ. During the operation of the highway, no further destruction of the area is expected habitats of the species. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0,120% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics -

Insignificant degree of impact (1).

- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.

The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).** Mitigation measures shall be needed.

- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).

- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and a bunker) are located on the opposite left bank of the Struma River, 92 m from the route (the nearest - the canton). The territory is part of a **potential hunting habitat,** with construction activities affecting 24.85 hectares thereof, or 0.127% of its total area in the Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**

- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road traffic will lead to higher levels of air pollution, which is an additional factor to reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting area of the species, it also occurs during construction. The small affected area of only 0.127% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).** Mitigation measures shall be needed.
- *Disturbance:* The nearest summer shelter (abandoned railway canton at 80 m from the project route) is located on the opposite (left) bank of the Struma River, and the field studies so far show that there is no concern about the existing intensive traffic on the E-79 (I-1) road, at the same distance from the shelter, as well as traffic on the existing railway line. An additional favourable factor for the lack of impact is the role of the Struma River as a "noise barrier", reducing the impact of machinery and activities during construction and traffic, during operation. No impact (Rate 0).
- *Disruption of bio-corridors* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.
Summary Impact Assessment : **Moderate rate of impact (2).**

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The closest ones (abandoned railway canton and bunker) are located on the opposite left bank of the Struma River, 98 m from the right roadway (the nearest - canthon). The territory is part of a **potential hunting habitat,** with construction activities affecting 13.52 hectares thereof, or 0.07% of its total area in the Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.07% of the total habitats of the Protected Area will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species.
The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving motor vehicles. The local breeding colony of the species in the Kresna Gorge region is of high number and therefore we believe that the planned increased traffic on the assessed road route will lead to an increased number of collisions with the vehicles and will determine a **moderate impact (2).** Mitigation measures shall be needed.
- *disturbance:* There is no expectation of disturbance for individual representatives of the

species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 6.91 hectares thereof, or 0.04% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.04% of the total area of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat,** with construction activities affecting 38.01 hectares thereof, or 0.19% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitat. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.19% of the total habitat area of the Protected Area will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway

route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1323 Bechstein's bat (*Myotis bechsteinii*)
Bechstein's bat is a dweller of old deciduous and mixed forests. It is known from 63 localities in the mountains, up to 1,650 m above sea level. The greatest concentration of localizations in the belt is 0-300 m (24 localizations, 42%) and in the belt 301-600 m (12 localizations, 21%). The largest number of individual representatives of the species is found in the strip and mixed forests in the 800-1,450 m. The forests, predominantly *Quercus cerris* forests, *Acer campestre* and less commonly *Carpinus betulus* or Eastern beech *Fagus orientalis* in Strandja are the preferred habitats in the lowland localizations of the species in our country. There is no data on the wintering of the species in Bulgaria. The species is known to be stationary and it is not known to perform seasonal migrations in our country. In Western Stara Planina have been found vertical migrations for breeding and swarming at the entrances of caves or abandoned mining galleries for the purpose of finding partners. Most often, at the end of May and in early June, the females form small breeding colonies (5-35 females) in tree trunks and give birth to a small one. Alimentation lasts for about 3 weeks, then by the end of August the young bats live together with their parents. The adult males usually live singly in different shelters (mostly small holes in trees). A characteristic feature of both sexes is the frequent change / alternation of shelter in the same area / section of the forest before and after the breeding season. It is known that females are strongly attached to the area, where they are born, and males are significantly more mobile and would very rarely stay in the area where they were born. Observations on their nutritional behaviour in Bulgaria show that the species feeds away from its shelter (50-450 m, seldom at larger distances). According to studies in other parts of the species scope (Luxembourg, England) - up to 700 - 1,400 m. It is mainly found in old deciduous forests, but also in conifers. The individual hunting area is small, 0.6 - 4.7 ha, often overlapping between individual representatives of the species from one colony. It spends the winter in caves (Golemanski 2011, MoEW 2013, Peshev et al. 2004, Dietz and Pir 2009; Fitzsimons et al. 2002, Fuszara et al. 1996, Napal et al. 2010, Schofield and Morris 2000).
Status of the species in the Protected Zone: In the standard form, the overall assessment of the Protected Area for species conservation is "C", with the population of the species being estimated at 101-201 representatives of the species. A dead representative of the species was found killed from collision with a vehicle on the E-79 road section of the Kresna Gorge (Karaivanov 2015), which proves its permanent presence in the area. According to the data from the project "Mapping and Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), the area of potential habitats is estimated at 4,833 ha (9.9% of the area of the protected zone). The area of high quality habitats is estimated at 406 ha (0.8% of the area of the protected zone). The connectivity of high quality habitats in the area is judged to be good. The overall assessment of the conservation status of the species in the Protected Zone is "unfavourable - unsatisfactory".

Impact Assessment:

Option G-20 - Red
- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. In the northern part of the gorge shall be affected high-quality habitats. The territory is part of a potential habitat and the construction activities will affect 19.49 hectares thereof, or 0.403% of its total area in the PZ. No further destruction of areas of species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential habitat, we estimate the impact with
Insignificant degree (1).

- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.403% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities may have direct impacts on individual representatives of the species, if their shelters are destroyed. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. A local population of the species has been formed, we have identified killed individual representatives of the species on the E-79 road (I-1), as a result of crashes with vehicles (Karaivanov, 2015). The planned increased traffic on the road route under consideration, which is also part of a local migration corridor, will bring about **significant rate of impact (3).** Mitigation measures shall be needed.
- *disturbance:* No disturbance of individual representatives of the species in **the shelters** is expected, as eventual inhabitants of the area are accustomed to the existing current traffic.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:
- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. In the northern part of the gorge shall be affected high-quality habitats. The territory is part of a **potential habitat,** with construction activities affecting 17.10 hectares thereof, or 0.354% of its total area in the PZ. No further destruction of areas of species habitats is expected during the operation of the motorway. Due to the continued removal of a small percentage of the area of the potential habitat, we estimate the impact with **Insignificant degree (1).**
- *Fragmentation of the habitat.* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.354% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities may have direct impacts on individual representatives of the species, if their shelters are destroyed. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. A local population of the species has been formed, we have identified killed individual representatives of the species on the E-79 road (I-1), as a result of crashes with vehicles (Karaivanov, 2015). The planned increased traffic on the road route under consideration, which is also part of a local migration corridor, will bring about **significant rate of impact (3).** Mitigation measures shall be needed.
- *Disturbance:* No disturbance of individual representatives of the species in **the shelters** is expected, as eventual inhabitants of the area are accustomed to the existing current traffic.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 5.68 hectares thereof, or 0.12% of its total area in the Protected Zone. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The road track does not interrupt local migration corridors. The small affected area of yet 0.06% of the total area of potential habitats in the Protected Zone will cause minor changes in its functional characteristics - **insignificant rate of impact (1).**
- *Mortality:* Construction activities may have direct impacts on individual representatives of the species, if their shelters are destroyed. The road route falls into potential habitat, where accidental mortality of hunting individual representatives of the species is possible as a result of collision with moving vehicles. A local population of the species has been formed, we have identified killed individual representatives of the species on the E-79 road (I-1), as a result of crashes with vehicles (Karaivanov, 2015). The planned increased traffic on the road route under consideration, which is also part of a local migration corridor, will bring about **significant rate of impact (3).** Mitigation measures shall be needed.
- *Disturbance:* No disturbance of individual representatives of the species in **the shelters** is expected, as eventual inhabitants of the area are accustomed to the existing current traffic.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Summary Impact Assessment: **Insignificant degree (1).**

The Long Tunnel Option, 'Kresna' Tunnel

- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat,** with construction activities affecting 3.33 hectares thereof, or 0.07% of its total area in the PZ. No further destruction of species habitats is expected during the operation of the highway. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the on-ground road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.07% of the total area of a potential habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**

- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The project scope of the road route and the construction activities would not affect effectively occupied shelters. No old-age forests - high-quality habitats shall be affected. The territory is part of a **potential habitat**, with construction activities affecting 14.11 hectares thereof or 0.29% of its total area in the PZ. During the operation of the highway, no further destruction of species habitats is expected. Due to the permanent deprivation of a small percentage of the area of potential habitats, we estimate the impact as **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.29% of the total habitat area of the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the motorway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

1324 The greater mouse-eared bat (*Myotis myotis*):
In Bulgaria it is considered as a common and frequent species. It is found in 200 localizations all around the country, excluding the highest parts of the mountains. Most habitats are found between 100 and 800 m above sea level. It is common for all karst regions in Bulgaria. In most cases it inhabits the same hideaways with *its twin - Myotis blythii*. All year round, it inhabits underground shelters - karst, volcanic and sea caves and mining galleries. It forms large breeding colonies, ranging from a few hundred to about 7,000 individual representatives of the species. They often blend with *M. blythii*. The maximum number of births is between May 20th and June 10th. In Switzerland it was found that over 46% of its food consists of large Ground beetles (of the Carabidae family). According to West European data, the greater mouse-eared bat (*Myotis myotis*) most often hunts in orchards and deciduous forests, and less often in mixed forests, vineyards, arable fields of small area, spruce forests. Food habitats are most often within 2-6 km radius, up to 15 km from the shelter. Females show exceptionally high phillotropy, with over 90% returning and reproducing in the shelter they were born in. In our country, they probably perform regular seasonal migrations between the winter and summer shelters from 20 to approx. 100 km. In our country, spending winter begins in late November and continues until mid-March (MoEW, 2013).
Status of the species in the Protected Zone: In the Standard Form, the overall assessment of the Protected Zone for species conservation is "C", with the population of the species estimated at 251-500 representatives of the species. According to data from the project "Mapping and

Determination of the Conservation Status of Natural Habitats and Species - Phase I" (MoEW 2013), 4 localizations of the species have been found in the Protected Zone. In the known wintering habitats, a total of 4 species representatives were found in the area. In the known summer localizations, a total of 3 species representatives were found in the area. The area of potentially most favourable habitats was estimated to be**302.9 ha** (0.6% of the area of the protected zone). The area of the potential hunting habitat is estimated as **3,1202 ha** (64.2% of the area of the protected zone). The overall assessment of the conservation status of the species in the Protected Zone is "favourable".

Impact Assessment:

Option G-20 - Red

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 45.15 hectares thereof, or 0.145% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No further area fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of yet 0.145% of the total area of potential habitats in the Protected Zone will cause minor changes in its functional characteristics - **insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Option G-20 - Blue:

- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 45.15 hectares thereof, or 0.141% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.141% of the total area of the hunting

a habitat in Protected Zone will cause minor changes in its functional characteristics - an **insignificant degree of impact (1).**

- *Mortality:* Construction activities will have no direct impact on individual representatives of

the species. The on-ground path of the road falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

Eastern Option G10.50
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 43.36 hectares of it, or 0.14% of its total area in the PZ. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. No additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.14% of the total are of the hunting habitat in the Protected Zone will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* There is no expectation of disturbance for individual representatives of the species in **shelters** due to the absence of such, as in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* It is not expected for the species population, as all components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for hunting and migrating individual representatives of the species.

The Long Tunnel Option, 'Kresna' Tunnel
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The area is part of a **potential hunting habitat**, with construction activities affecting 24.50 hectares thereof, or 0.08% of its total area in the Protected Zone. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* As a result of the construction activities, the vegetation in the range of the on-ground road route will be completely destroyed, which will lead to шhe corresponding proportional reduction in the habitual abundance of the habitats. **No** additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of only 0.08% of the total habitat area in **the Protected Zone** will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The on-ground path of the road falls into a potential hunting habitat, with mortality

of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We have defined the impact as **insignificant - Rate (1).**
- *Disturbance:* We would **not** expect disturbance of individual representatives of the species in **the shelters,** for there are no such shelters in the immediate vicinity of the Motorway route and in neighbouring territories.
- *Disruption of bio-corridors:* **No** impact is expected for the species population, as all structural components of the highway and vehicle traffic would not appear to be a permanent insurmountable barrier for the hunting and migrating representatives of the species.

Eastern Option G20, out of the Kresna gorge
- *Direct destruction of habitats:* The road route does not affect the species hideaways. The territory is part of a **potential hunting habitat**, with construction activities affecting 132.15 hectares thereof, or 0.42% of its total area in **the Protected Zone**. No further destruction of areas of the species habitats is expected during the operation of the motorway. Due to the permanent withdrawal of a small percentage of the area of a potential hunting habitat, we estimate the impact to a **insignificant - Rate (1).**
- *Fragmentation of habitats:* The construction activities will completely destroy the vegetation within the road track, which will lead to the corresponding proportional reduction of the insect abundance in the hunting habitats. **No** additional fragmentation is expected during operation. The expected intensive road transport will lead to an increase in air pollution levels, which is an additional factor in reducing insect abundance and enhancing the functional fragmentation effect in the affected hunting territory of the species occurring during construction. The small affected area of 0.42% of the total habitat area in **the Protected Zone** will cause minor changes in its functional characteristics - **an insignificant rate of impact (1).**
- *Mortality:* Construction activities will have no direct impact on individual representatives of the species. The road route falls into a potential hunting habitat, with mortality of hunting representatives of the species, as a result of collision with moving vehicles during the operation of the highway. We would define the impact **as insignificant (1).**
- *Disturbance:* We would **not** expect disturbance of individual representatives of the species in **the shelters,** for there are no such shelters in the immediate vicinity of the Motorway route and in the neighbouring territories.
- *Disruption of bio-corridors* **No** impact is expected for the species population, as all structural components of the highway and vehicle traffic do not appear to be a permanent insurmountable barrier for the hunting and migrating representatives of the species.

• BG 0002003 Protected zone for birds 'Kresna'