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To the Minister of Environment and Water

Position paper

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Re:

Report on the Appropriate Assessment of the investment proposal for "IMPROVEMENT OF THE ROUTE OF LOT 3.2 OF STRUMA MOTORWAY" on the habitats and species protected and the conservation objectives of NATURA sites SCI BG0000366 "Kresna-Ilindentsi" and SPA BG0002003 " Kresna "

DEAR MINISTER,

We would like to ask you to reject the recommendations based on the conclusions of the submitted Appropriate Assessment report (shortly AAR) of the IP for "IMPROVEMENT OF THE ROUTE OF THE LOT 3.2 OF STRUMA Motorway" on the habitats and species protected and the conservation objectives of NATURA sites SCI BG0000366 "Kresna-Ilindentsi" and SPA BG0002003 " Kresna " which recommend the execution of the "Eastern version G10.50" as this is clear non compliance with environmental acquis and provides false information for the decision-making. Our motives are the following:

1. This Appropriate Assessment procedure has been completely compromised and the independence of the Appropriate Assessment Report has also been compromised which was followed by the “Road Infrastructure” Agency (RIA) decision on 20 April 2017 for selecting an option for detailed pre-design. The contracting authority chooses an alternative - "East Option G10.50" - which is in direct violation of Art. 31-33 of the Bulgarian Biodiversity Act (BBA), transposing Art. 6.3 of Directive 92/43 in accordance with the interpretation of this Article by the Court of Justice of the European Communities. In particular, the contracting authority makes a decision in advance before the procedure had been completed, based entirely on economic and technical criteria, which binds the outcome of the procedure and creates legal uncertainty about the independence, the objectivity and equity of the assessment made in the compatibility assessment report submitted by that contracting entity. We underline that the so-called "independent experts" prepared the environmental report are in

contractual relations with the contracting authority to carry out the follow-up action of the same procedure - preparation of the environmental report. This is a direct and unresolved conflict of interest, a direct result of the apparently obvious violation of the norm of the law.

2. Second, the Minister of Environment and Waters should exclude completely from the procedure and make sure the following alternatives will not be approved: "OPTION G20 - Blue", "Option G20 red" and " G10.50 Eastern".

2.1. The Ministry of Environment and Water (MOEW) issued a letter № EIA-85/13.05.2015 г. in response to letter for Investment Proposal the "Improvement of the route of Lot 3.2 of the Struma Motorway". On page 2 of the letter, the MOEW rightly states that, as regards to the requirements of Art. 31 of the BBA there is a completed Appropriate Assesment procedure with a final Decision EIA N 1-1 / 2008. The MOEW also rightly states that "The present Appropriate Assessment can be considered as a fulfillment of a condition under point 3.2 of the EIA Decision which provides for Subsection Krupnik - Kresna (Kresna Gorge area):1: "In parallel with the design of a purple (tunnel) variant, it needs to be looked upon the opportunities to improve it and reach the best possible - environmentally friendly, technically feasible and economically feasible option." Here, the competent authority rightly ruled that by its nature the procedure of the new EIA and environmental report procedure do not repeal the current EIA Decision N 1-1 / 2008, but represents the next stage of its implementation. Which means that also in relation to substantive law the new procedure should be fully in line with the Appropriate Assessment procedure carried out in 2007 and the EIA Decision N 1-1 / 2008.

2.2. On page 7, point I.3.2, a penultimate bullet of the EIA Decision N 1-1 / 2008 further states: " if possible to continue to the village of Dolna Gradeshnica at the expense of the shortening of section M5, which will not exclude for future research and design options analogous to the "alternatives" presented east of the Kresna Gorge and "Tisata"

2.3 Although the Competent Authority does not notify the Applicant about the full content of a provision of point I.3.2 of the EIA Decision N 1-1 / 2008, the investor is obliged to know and execute it. Since 2008, this decision is the only a legal basis for the construction of the Struma motorway in relation to Chapter 6 of the Environmental Protection Act and Art. 31-33 of the BBA. Condition I.3.2 is a mandatory condition for the construction of a highway starting from the design phase (Chapter I for the design phase) following the issuance of the EIA Decision N 1-1 / 2008.

2.4. First bullet point of point I.3.2 of the EIA Decision N 1-1 / 2008, quoted by the Ministry of Environment and Waters Letter No EIA-85 / 13.05.2015 and penultimate bullet of the same point are directly related and should not be interpreted independently without taking into account the legal effect of their relationship.

2.5. Further on in Letter № EIA-85 / 13.05.2015 after an extensive interpretation of the first bullet point of I.3.2 of EIA Decision N 1-1 / 2008 there is an evident violation of I.3.2 of EIA Decision N 1-1 / 2008, as well as the decree of the decision, which states: "APPROVED ... Subdivision after Krupnik - from km 381 + 000 to km 398 + 644,56 (Kresna gorge area) on purple (tunneling) option ... "

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2.6. Contrary to the clear statements of the EIA Decision N 1-1 / 2008, Letter № EIA-85 / 13.05.2015 MOEW has interpreted all other alternatives presented as a further development of the "purple" variant or "alternatives" east of the Kresna Gorge and Tisata, allowing a clear evasion of the decision made and hence the probability of non-compliance with the norm of the EIA Decision N 1-1 / 2008

2.6. It should be noted that as long as the Appropriate Assessment procedure has not been completed and in the context of the procedure, there are at least 2 alternatives that fully satisfy the EIA Decision N 1-1 / 2008: "**G20 Easterm option**" and "**Long tunnel variant, Kresna Tunnel**", the violation that started in violation of the EIA Decision N 1-1 / 2008 can still be sanctioned and the procedure can be completed within the legal norms.

2.7. Finally, we must conclude that non-compliance with point I.3.2 of EIA Decision N 1-1 / 2008 is not only a violation of substantive law. Point I.3.2 of the EIA Decision N 1-1 / 2008 has its roots from the 2007 Appropriate Assessment Report (AAr)[i] and constitutes a mandatory mitigation measure to ensure the achievement of the objectives of Art. 31-33 of the BBA, in conjunction with Art. 5, 6 and § 1, items 1 and 2 of the BBA, as well as the related norms of Directive 92/43, which they transpose - ie. to ensure the protection from damage /the integrity of the protected areas and the coherence of the NATURA 2000 network. Evading this point would mean a direct violation of the EIA Decision N 1-1 / 2008 and of the Art. 31-33 of the BBA and the related art. 6 (3) of Directive 92/43.

2.8. As stated in full responsibility of the competent authority, the MoEW, is to complete the procedure within the framework of the law and exclude from proceeding the 3 alternatives mentioned above leading to a violation of the material law.

3. Significant violation is the lack of an equivalent and objective assessment in the Appropriate Assessment Report (AAr) of the **"G20 Eastern alternative"** versus "**Variant G20 blue", "Variant G20 red" and "East variant G10.50"**, and the presented conclusions are biased. They deliberately exclude "East variant G20 "as unlawful.

3.1. When reviewing the mapping material and the technical descriptions of the 4 alternatives in Chapter 1, Annotation of the Investment Proposal, Volume I of the AAr, it is established that they are characterized by a completely uneven technical solution leading to incomparable levels of direct impacts. The summary of these data can be seen below.

Alternative	Variant G20 blue	Variant G20 red	East variant G10.50 – ring road of Kresna town – new lane	East variant G10.50 – left east lane (new)	East variant G20
Retainingwalls - m (length)	3 710	8140	245	50	50
Armored walls m (length)	0	2570	0	893	893

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Anchored walls m (length)	0	1230	0	0	0
Road slopes	0	0	0	+ 70% of the lenght, width up to 50 meters	+ 70% of the lenght, width up to 100 meters

3.2. According to the technical descriptions "Variant G20 - Blue", "Variant G20 red" will be implemented with intensive use of retaining walls, armored/reinforced walls, anchored walls - according to the technical description and the attached map, the area impacted by those alternatives is limited to the road lanes – gauge (with) 20 meters including lanes, leading strips and banquet. And these road lanes are likely to exhaust all the direct impacts of these alternatives during the construction phase. There will be no road slopes, there are only different types of retaining walls! We do not want to comment if this could be the real situation taking into account the strong lateral digging of the right new lane in the slope, and the straightening to the left lane (existing road) in many places. And whether it is pure data falsification to mask the direct effects of these alternatives. But this is the assertion of the investors. Similarly, the Kresna town's ring road in the variant "East variant G10.50" - with walls is solved.

3.3. In the case of both eastern alternatives, the solution is radically different – there are almost no supporting walls - 10 times less. But road slopes are present. AAr does not mention neither the length nor their area. Only with a careful view of the maps it can be seen that road slopes are about 70-80% of the length of the rout. And that in the "eastern variant G10.50" their width is 30-50 meters and sharply and disproportionately increases in the "eastern variant G20" to 80-100 meters predominant width. Considering that most of these road slopes are not created because of marginal crossing the slopes, but highway passes across the ridges and road slopes are located on both sides of the roadway, it is completely incomprehensible to what physical laws is subject the increase of the trenches by 50 meters when the with of the road increases with 9 or 12 meters (see pages 28 and 54 of the AAr where the G10.5 East and G20 East with is described).

3.4. A direct damage of more than 1% on the 91EO habitat was found in the assessment of the G10.5 East and G20 East, respectively 1.14% and 3.26% (see page 106 of the AAr). For "G10.5 East", the AAr concludes: "Measures - the width of the route from km 384 + 300 to km 384 + 470 and from km 389 + 130 to km 389 + 280 to be reduced to the limits of the gauge (width of the lanes)". For "G20 East", the AAr concludes:" Due to the large number and large area of the affected polygons, it is impossible to apply mitigation measures such as narrowing down on certain sections or other realizable measures. "

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3.5. The above conclusion is apparently subjective and, in practically identical conditions, puts the "G20 East" variant in an unequal position. This is a direct non-compliance with the requirements of Art. 31-33 of the BBA and Art. 6.3 of Directive 92/43, where the Appropriate Assessment should assess all alternatives to prevent damage to the subject and the protected area objectives, and this basically includes all possible mitigation measures!

3.6. The same approach was applied to all species and habitats for which direct damage was identified as a result of the G20 eastern option, and due to the damage of more than 1% of the area, the experts have also suggested existence of barrier and fragmentation impacts that are not actually assessed with reliable methods, which will be discussed below. With a totally false conclusion about the lack of possible mitigation measures and a final conclusion about "medium" or "significant" impacts - which according to the authors of AAr apparently is equal to not complying with the law (although the whole methodology for assessment of the impact of the AAr is irrelevant to the current legislation and in fact all assessments made in AAr are legally void) - are the following habitats and species: 6220 *, 5210, 91AA *, 91E0 *, Elaphe quatuorlineata, Elaphe situla, Testudo graeca, Testudo hermanni, Eriogaster catax, Lycaena dispar, Erannis ankeraria, Probaticus subrugosus, Actitis hypoleucos, Coracias garrulus, Calandrella brachydactyla, Ciconia nigra, Aquila pomarina.

3.7. In order to fulfill the imperative requirements of an article 31 of the BBA and in connection with Art. 6 (3) of Directive 92/43, it is necessary to make a full assessment of all alternatives that can reduce the impacts to insignificant. In this case, the measure applied to the impact of the G10.5 East on the 91EO habitat should be assessed, namely the reduction of the width of the impacted area along the road by means of engineering solutions, and eradication of road slopes similar to the alternatives "G20 blue "," G20 red "- by different types of support/retaining walls, off-slope travel, small viaducts, etc. After implementing this measure, the impact will be reduced to negligible for all species and habitats and it will be below those what is currently established for “G10.5 East” without these measures being implemented.

3.8. In addition, we consider it is important to implement the measures to reduce impacts on those habitats and the Canis lupus species in point 13b of the submitted NGO complaint to the EC in July 2017. [ii]

4. IAR has adequately assessed that the Alternative **Long tunnel variant, Kresna Tunnel**, has the least impact on the Natura 2000 sites BG0000366 and BG0002003 compared to all alternatives. Significant impacts have been identified on only one habitat (92C0) and 4 bird species (Actitis hypoleucos, the Alcedo atthis, the Coracias garrulus and the Calandrella brachydactyla), which, by taking mitigation measures, are reduced to insignificant. The cumulative impacts with other projects is also insignificant. We found that these findings are adequate and appropriate to the factual situation. In this sense, the final conclusions of the AAr are absolutely inadequate and inconsistent with the legal requirements of Art. 31-33 of

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the BBA and in connection with Art. 6.3 of Directive 92/43, which completely contradict both the content of the report itself and the legal framework. These conclusions are also fully consistent with the conclusions of the 2007 Appropriate Assesment procedure and 2008 EIA decision, which also found that this alternative had the least impact on the NATURA 2000 network. **There is sufficient information provided by the current AA report (AAr) for MoEW to implement the legislation properly and to commission the implementation of the project under the alternative Long Tunnel Option, the Kresna tunnel. Here, we should point out the imperative nature of Article 31-33 of the BBA, especially over to economic considerations or other reasons , or over the assessments made in the EIA report and based on scoring and assessing one or another alternative to subjective and unlawful tied criteria.**

5. East option D10.50 should be rejected. AAr makes entirely manipulative conclusions and concludes that this option does not cause adverse impact to the subject of conservation of NATURA site BG0000366 as follows:

5.1. Everywhere and in the technical annotation of the alternative on page 26-35 Volume 1 of the AAr and in the whole AAr for the right lane of the road to km. 393 + 600 indicates the use of the current road in gorge with a width of 10.5 and indicates that rehabilitation will be done on this route. In addition, pages 33-35 provide an inventory of the envisaged rehabilitation activities within the current road, and no extension of the width is foreseen in the list. **However, there is no clear description of the elements of the right lane up to km 393 + 600 with a width of 10.5!** There is only a description of the elements of newly built lanes with this width. According to Art. 7 and 9 and Table 1.1.1. of the Technical Rules for the Maintenance of Roads (Executive Road Agency, 2009), the road with width G10.5 has the following elements - a roadway with a width of 10.5 meters, including two traffic lanes with a width of 3.5 meters, leading strips of 0.25 meters. and banquets of 1.5 m - road lane in any direction 5.25 m or 10.5 m in total.

When acquainting with the technical drawings of wildlife facilities 1 to 3 and 7 to 15 in Appendix 8 of AAr, it is clear that all of them are planned and dimensioned and will be implemented and built for I class road with G12 width - a 12-meter wide roadway including 2 track widths of 3.75 meters, guiding strips 0, 5 meters. and banquets of 1.75 m - road lane in any direction 6.0 m or a total of 12 m.

This is a striking and significant difference in parameters taking into account the species and habitats concerned in the Natura 2000 sites and means that at this moment the next stage in the development of the project foresees an extension of the existing road in the gorge to at least G12 width and this has already been prepared as project design - the technical drawings for the road facilities are fully in line with this next stage. To the extent that this type of width is retained in all the defragmentation facilities, it is clear that this is not a technical mistake, but a technical assignment of the designer with the relevant parameters.

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In case of approval of an **Alternative East G10.50**, these expansions will either be an integral part of the next stage of implementation of this project or part the cumulative impacts arising from the project assuming that the extension is another separate project.

In both cases, however, a full and in-depth assessment of the impacts on the species and habitats protected in the site and objectives of the NATURA 2000 sites from the widening of the existing road during the implementation of an alternative **East option G10.50** is needed, and it is completely absent in AAr! In this case, it is necessary to supplement the AAr or to prepare a new IAR and to conduct a new procedure under Art. 31-33 including an assessment of these impacts.

The Appropriate Assessment report (AAr), reviewed in this opinion, is the document for public discussion officially submitted by the investor. On the basis of the AAr, the Appropriate Assessment procedure is carried out and the decision on it was made and the intentions of the investor are determined. In such a serious shortcoming, the only legitimate decision is to reject an alternative to the Eastern option G10.50 on the grounds that it is likely to have an adverse impact on the habitats and species protected in the NATURA 2000 sites and on conservationobjectives of the NATURA 2000 sites and on the grounds that it has not fully assessed all cumulative impacts within the meaning of Art. 31-33 and in connection with Art. 6.3 of Directive 92/43. Because of this reason, the alternative can not get a positive decision under Art. 32 of the BBA and hence can not be approved.

5.2. The assessment of the impacts on the four most severely affected and significant species of herpetofauna: Elaphe quatuorlineata, Elaphe situla, Testudo graeca, Testudo hermanni does not correspond to the factual situation - it does not reflect actual existing impacts, it does not really take into account the impacts it will cause. This alternative has an adverse impact on these species which can not be reduced by applying defragmentation measures and the alternative should not be approved as compatible with the subject matter and conservation objectives of SCI B0000366.

5.2.1. AAr does not make real assessment of fragmentation. The assessment is totally unprofessional and subjective. In many places, according to the authors of AAr, fragmentation occurs everywhere where there is a direct destruction and resulting barrier effect in otherwise well-connected intact habitats. We quote only one part of the AAr, but the same judgments are present everywhere in the AAr: "In the section from km 396 + 600 to km 399 + 050 in the range of the planned route there are mainly suitable and optimal habitats with a high degree of connectivity, therefore in this section substantial fragmentation is expected. "(Reptilia, 1279 Elaphe quatuorlineata, Impacts, East Option G10.50, Habitat Fragmentation, p. 192). At the same place, it is stated: "*With respect to the right lane (which passes almost exclusively 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 situation but in the long term, according to the general trend it will probably increase gradually, reaching and surpassing its current intensity. This means that four-lined snake*

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will face a complete migration barrier, i. E. the habitats of the species in the greater part of the Kresna gorge will be divided into two parts (east and west). This will probably result in fragmentation of the population, i. there will be two largely isolated subpopulations whose possibilities of long-term existence are questionable." Here, a correct theoretical definition of fragmentation is given. But we see a incorrect description of the species habitat in terms of its important characteristics for species conservation based on the Art. 7, para. 2, item 2 of the Bulgarian Biodiversity Act (BBA) and in connection with § 1, item 1, a) and c) of the BBA. This description is only expert opinion of the AAr authors and basically does not correspond to the known real biological characteristics of this species and its habitats in assessed area. The same finding also applies to the assessments made for all four species.

This incompetence makes it possible to mask and circumvent the real impact of the fragmentation arising from the highway and to claim in the final conclusions of the AAr that this impact can be reduced by relevant mitigation measures! And this does not correspond to the factual situation.

The most important conclusions showing that the AAr does not provide the necessary information for making decision, and, what is more, it provides misleading information regarding **East Option D10.50 are the following:**

- First, nowhere in AAr is expounded clearly which elements of the investment intention have direct impacts (it is necessary here to differentiate the use of the term from the general term "impact", with which we often bundle cause and effect in one), leading to fragmentation, and which are those direct impacts. Fragmentation is not just the direct impact – it is the end result and effect from initial direct impacts, in the case of the motorway, on the natural protection state of the species, as it is written and with other words in Art.7 and § 1 of BBA. It is obvious in the text of the AAr (in the assessments for these 4 species, but in the other sections as well) that the authors do not distinguish between impact leading to fragmentation and its consequent effect – fragmentation as a result.

- Second, with regards to the direct destruction of the habitats of the species is offered some (based on unclear methodology) assessment of the final impact on the area, and it is not clear why that is ignored in the assessment of the fragmentation (and also all other types of final impacts). Is it possible that the requesters and the authors of the AAr are not acquainted with the various methodologies for assessment of fragmentation, and based on real biology and real characteristics of the region? We ought to point out that MRDPW and RIA have been partners with BAS in joint projects applying similar methodologies[iii], and they ought to be acquainted with their application.

With our opinion paper we shall not be doing the work of AAr and make a full analysis of the fragmentation of 4 species – this is not our job, but this is the job of the contracting authority and of the authors of AAr, which is not complete and the corresponding information for making decision is not presented to MOEW. Here we shall point out in brief

some basic methodological issues and conclusions regarding the characteristics of the region and the target species, which are missing in the RIA or are mistakenly presented:

- There is very rich literature regarding fragmentation. EU Commission also provides guiding published in its page[iv]. The direct impacts that lead to fragmentation are all impacts which lead to destruction and adverse impact on areas of habitats and all impacts interrupting the links among the various areas of habitats. The basic key factor is the long-term stability of populations, which is related to their size and their connection with other populations. This size is related with several factors – with the probability the populations to survive in random fluctuations of their number, as well as to be genetically stable. In smaller populations under the threshold of genetic stability, the factor connectivity becomes decisive and relates to the inflow of specimens and the exchange of genes with other populations.
- In all GIS based assessments the impact areas have to be based on real terrains as per the Cadaster, orthophoto maps. Utilizing habitual models is the only known method for assessment of suitable habitats in accordance with various ecological factors – but they are rasterized model of the terrain. In order to make a real assessment of whatever impacts on areas of habitats of reptiles is necessary to conduct reverse analysis of the real terrains (Cadaster, orthophoto), which represent the physical habitats and are characterized with the corresponding use of land, area and boundaries.
- In order to have a real and not subjective assessment of fragmentation, quantitative assessment of impact on the area is necessary not only of the direct destruction of habitats by construction, but also of the damaged and affected habitats. In the case of road project such damage is the mortality of specimen and the driving away of specimen. Such impacts have to be assessed, as areas, and without such an assessment, fragmentation assessment is practically impossible.
- AAr assertion regarding the four species of reptiles, that the main problem, which the traffic on the existing road will pose "the habitats of the species in the greater part along Kresna Gorge will be separated in two parts (East and West)" does not pertain to real facts. At present Struma River is hard to pass a barrier for all 4 types of reptiles and de facto their populations are barred by this barrier. To what extent the populations of these four types, but also of all other species of small non-flying terrestrial vertebrates and invertebrates are able to deal with such a migration barrier only exhaustive research can find out. AAr ought to try and assess to what extent cumulative impact on Struma River (natural fragmentation) and the road infrastructure can cause full cumulative barrier effect and therefore fragmentation – but such an assessment is missing!
- Regarding the four types of reptiles AAr has not described key characteristics of their biology in the sense of Art. 7 § 1 of BBA, without which the impact of the motorway and traffic cannot be assessed – but this is of considerable significance not only for fragmentation but also for mortality on the road and the barrier effect – directly responsible for appearance of fragmentation. A general description of their biology is made, which can be found in any popular scientific journal, but is of no value for the purposes of the law. Key biological characteristics of species, which are of value are: average area of the inhabited territory (home range), average daily movement (mean daily movement distance) and key habitats in

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the life cycle of the species and the connection of these key habitats within the boundaries of the inhabited territory.

- There is a considerable literature on the tortoises Testudo graeca and Testudo hermanni and their biology. In this position paper we will shall not deal in depth with the topic and do the work of AAr, which has not been done. We will draw some basic lines, which describe this biology, the characteristics of Kresna Gorge, and the expected impact, in order to point out which are the main drawbacks of the AAr and what are the expected impacts. A detailed research on the species in the region of Kresna[v] has been done. The basic relevant and available information in this research concerns the issues of key habitats in the life cycle of the two species with the characteristic climate in Petrich-Sandanski field. The two species have seasonal migration. In the spring they are high on the slopes, and with the advancement of the dry and hot season they migrate deep into the valleys. The valley habitats host many of the species during the most part of the summer, with both species inhabiting the bordering habitats between the open and bushy/forested habitats, with the spur-thighed tortoise (or Greek tortoise) (Testudo graeca) preferring the open ones. This research however does not provide precise data about the average area of habitation and of the average daily movement. A full review of these data for Hermann's tortoise (Testudo hermanni) is made in the recently published monography of the species[vi], and the closest research in geographical terms is in Northern Greece (the region of Thessaloniki)[vii] and in the region of The Iron gates, Romania[viii]. According to these sources, the average inhabited territory as well as the average daily movement vary within certain limits. The first indicator varies between 0.3 and 7.4 ha usually higher for females and in forest areas, and the daily movement varies between 30 and 85 meters in various researches and places.

Regarding the spur-thighed tortoise (Testudo graeca), one of the latest researches of the ecology of movement and utilization of the habitats is the one in Algeria, in which a thorough analysis of available literature has been made[ix], and additional information can be found in the researches in South-East Spain[x] and Israel[xi]. Despite this the data in this and other researches for North Africa cannot be used probably on account of the different climatic and geographical conditions (arid climate and habitation of small in area, but suitable places rich in food) – in these conditions this is only 0.2-0.3 ha individually inhabited territory and average daily movement between 2 and 4 meters. The conditions in Spain and similar to Kresna Gorge, where in an older research[xii] the daily movement is around 50 meters. For the further northern populations in Spain and Israel the average area of inhabited area varies between 1.15 and 3 ha.
In all places with similar climate (excluding those with very hot climate and summer aestivation) the two species are active mainly in spring months till the end of July, after which their activity goes down.

The data in literature is confirmed also by the conducted in the years 2003 and 2004 monitoring of the mortality of vertebrates in Kresna Gorge with the participation of Boyan Petrov, specialist in bats, amphibians, reptiles and cave fauna, zoologist at the National Museum of Natural History, Bulgarian Academy of Sciences, and experts from NGO

(Wildlife Society BALKANI, Tetida Society and others). Here is a summarizing table with the number of run over tortoises in 2003 by months.

Month	4	5	6	7	8	9	10
Number of tortoises	2	10	12	18	9	6	2

The table clearly shows the decrease of activity of tortoises in the autumn, as well as their going down from the slopes into the valley in the summer months during the period of high activity.

- There are not any scientific publications about the four-lined snake (Elaphe quatuorlineata) and the leopard snake (Elaphe situla) regarding the average area of the habitations and their daily movement. There are scientific publications about a number of close types of the Elaphe species[xiii]. The average daily movement is lower in snakes than in tortoises, and in various seasons and species vary between 10 and 45 meters during the day. On the other hand, the average area of inhabited territory is considerable higher and varies between 3 and 27 ha – this means that these species probably use a considerably greater territory than tortoises.

Regarding the life cycle and usage of habitats there isn't sufficient literature either, but there have been collected data from many years of observations in the region of Kresna Gorge. Both types of snakes are linked more or less with habitats in river valleys, while inhabiting suitable for them xerophilous and dry habitats on the slopes, but obviously do periodic migrations to valley habitats. Most likely reasons for that are: search for sources of water (flowing water, dew) in the driest period of the year, search for food because of movement of their prey (rodents and others) to valleys in the cold season, probably for spawning in wetter habitats nearer or in river vegetation, situating in the slopes in proximity to the valley of their winter quarters.

- Based on the information above, with all the four types of reptiles the individual territories are situated vertically on the slopes of Kresna Gorge, but in their lower parts they reach the area of the valley. The boundary between the valley wet habitats and the warmer slopes is a key linear habitat, in which in certain periods of their life cycle the four species are active there, and which in the concrete conditions of the region is an important structural characteristics of their habitats without which these species would not have vibrant populations.
- With the two snake species the populations and optimum habitats in two thirds of the north section of Kresna Gorge are restricted climatically to the lowest altitudes, which are situated immediately by the valley of the Struma River and along the big side valley. This climatic influence is included in the maps in the mapping of the two species in the protected zone conducted in 2010-2011[xiv], although the details in these habitats can't be presented on them.
- Based on all of the above, as significant biological characteristics of the four species, the following negative impacts on the existing road can be concluded. The elements on the

road, which provoke these impacts, are the engineering facilities on the road itself and on the road slopes, including the road slopes, which become inaccessible for free natural daily movement of these species. The second impact is mortality of species on the road due to vehicles traffic, which alone leads to barrier effect, as long as it bars species from crossing the roadway. And the third influence again resulting from the traffic on the existing road is the damaging of the populations of neighboring habitats (see Art. 7 and § 1 of BBA) – which is damaging the corresponding habitats. Thus there are two impacts resulting from the existing road – barrier effect and damaging neighboring habitats.

- Barrier effect, which results from the combined effect of engineering road facilities and road slopes and of the traffic. The strength of each of these 2 prime impacts ought to be assessed separately and then the strength of the barrier effect as a combination of these two impacts has to be determined. **In AAr this is missing! There is no such an assessment, and the data from the monitoring from 2003 – 2004, that was used as the base for the decision on EIA 1-1/2008, were not used.** The opposite in the AAr from 2007[xv] in the chapter for assessment of the impact of present road though in short such an assessment was made. The barrier effect of the traffic is assessed based on the data from monitoring mortality in 2003 and 2004 by the spots where run over dead animals were discovered in relation to the slope and the lay-by (a factor accounted for in the monitoring). The conclusion is for almost 100% mortality at the traffic intensity of that time. In the AAr from 2007 a very short assessment of the barrier effect and of the engineering facilities was made, again based on the monitoring from 2003 – 2004, and it is pointed out that around 30% of the length of Kresna Gorge around the present road is turned into effective barrier to the movement of small animals on account of artificial barriers. In appendix 1 is presented detailed information of the character of the road sections based on the monitoring of mortality in 2003 – 2004. The final conclusion of the AAr from 2007 is for presence of 100% barrier effect from the present road as a result of the combined impact from the pointed above factors – moreover, this is an impact that cannot be reduced. **As we have pointed out such an assessment is altogether missing from AAr from 2017!**

- **The damage to neighboring habitats, as a result of mortality caused by traffic has not been assessed at all in AAr 2017 either!** In order to reach a quantitative assessment it is necessary to assess the perimeter of the impact. In this case we do not have fragmentation of the valley and separation of the population in the East and the West half, as stated in AAr for all four species in a copy-paste fashion - a phenomenon which already exists in nature. And it follows only to be assessed whether the road will not increase this genetic isolation and make it absolute or too big. In this case we have an impact of quite a different sort, and namely interruption of the access of the four species to key habitats within the limits of their habitats and interruption of their life cycle. And namely interruption of the borderline between habitats in the valley and neighboring habitats on the dry slopes – a borderline, which in certain periods of their life cycle turns into a basic key habitat (for each of the species with varying functionality), and they perform their daily movements in that habitat. In this situation will be affected directly all populations falling into the area of the

road, and whose individual territories fall in the area of the road – that is, the species situating their territories between the valley of Struma River and neighboring territories. Those species whose individual territories are situated in side networks of valleys will not be affected – as for tortoises, they reach high on the slopes and are not climatically restricted. As for the two species Elaphe sp., they are climatically restricted to the lowest parts of the valley in the northern 2/3rds of the valley and only in the region of Oshtavska and Vlahinska River the optimum habitats already reach higher altitudes.

Thus the perimeter of the impact of the road for each species individually is determined by the size of the Individual territory. Given that their shape is not known, a conditional circumference with a lower section in the valley and upper border of impact the upper part of the diameter of the circumference has to be accepted. In view of this that the size of the individual territories varies, in this case it follows that the principle of caution should be applied and should be assessed the possible impact in the presence of the maximum expected for the geographical conditions and the species individual territory.

Based on the above described conditions and available mappings of the habitats of the four species made in the period 2010-2011, after the analyses that we made for the real inhabited terrains and utilizing of corresponding published methodologies for analysis of fragmentation – a full quantitative assessment of the fragmentation impact of the present traffic can be made. Such an assessment is missing in AAr, but according to our estimates it affects between 1 and 5 % of the habitats of the Tesudo sp. species and between 5 and 30 % of the habitats of the two Elaphe sp. species in zone BG0000366.

- Regarding the possibilities of alleviating that impact see the point of impact of the traffic on mortality below.
- Due to lack of mapping of the habitats of the four species in 2007 in the AAr, the impact of fragmentation is assessed by indirect biological data – by the data from the conducted monitoring of mortality from 2003. **But even that, as an analysis is missing altogether in the AAr from 2017, despite available information for comparative analysis with monitoring from 2013 and 2014!** Appendix 1 offers a short comparative analysis of mortality. The conclusion of the environmental report from 2007 – based quite clearly on the expert opinion and on the principle of caution accounting for the available data was that there was a probable fragmentation of populations of the two species snakes Elaphe sp. at the traffic level of that time, while for Testudo sp. populations were still not fragmented. But that increase in traffic might lead to an even worse impact without possibilities for effective defragmentation. Unfortunately, on acquaintance with the analysis in appendix 1 it is seen that the prognoses in the environmental report from 2007 are already a fact and probably there is serious fragmentation with the two species of the Testudo sp. genus, increased impact on Elaphe situla, and probably local extinction with Elaphe quatorlineata. **None of these available factual conclusions has been made in AAr 2017! Probably because they will put East Option G10.50 at a disadvantage in comparison with other alternatives!**

5.2.2 AAr does not assess adequately the impact on the bio-corridor in Kresna Gorge. First, in volume 1 for each of the four species and in volume 2 in the chapter for the

alternative the report states that "effective defragmentation measures, giving guarantees for unimpeded crossing of the roadway by amphibians and reptiles." There is no way to apply effective measures for defragmentation along the existing road – this is the conclusion of our research of the mortality of run-over animals in 2003-2004, but also of the AA report from 2007. We shall review the issue in more detail in next section. But regarding the bio-corridor there ought to be pointed out that this is an issue directly connected with preserving the integrity of the whole NATURA 2000 network (see Art. 31 of BBA, but in relation to the definition of Art. 34) – there is no assessment of the weight of this negative impact in relation to other impacts. And namely, that the damage of spreading and the northern border of spreading of the two species Elaphe sp. directly affected the coherence of the whole of NATURA 2000 network and an impact which can be neither compensated nor reduced. **Facts, which are covered or avoided in AAr 2017 – they would lead straight to rejection of East Option G10.50 on account of failure to apply imperative legal norms of the law for preserving the integrity of NATURA 2000 as an inseparable part legally determined objective (Art. 6 in relation to Art. 7 of BBA transposing Art. 4.1 of Directive 92/43 and the scientific criteria to it) of the protected zone!** There is a detailed analysis regarding this impact and its role in the coherence of the network in a publicly available complaint sent to the EC[xvi].

5.2.3 AAr from 2017 admits that there is a serious threat of mortality on the existing road, but does not even make a real analysis of the data from the monitoring conducted by road authorities in 2013[xvii] and 2014[xviii]! In the same manner the monitoring from 2003 is ignored. The AAr from 2007, which is currently in force and is legally binding, is also thoroughly ignored. Without any analysis of data, conclusions are put forward for undertaking "effective measures for defragmentation". Without any proofs for their effectiveness, 10 types of facilities – underpasses are listed in appendix 8.

First of all in appendix 1, a short analysis of mortality is presented based on data from all researches. Secondly, an analysis of the effectiveness of measures based on objective and verified on terrain methodology is presented in the appendix. The results are:

- 78 % of the length of the present road does not allow for undertaking defragmentation facilities as underpasses. **This confirms the conclusions of the environmental report from 2007 that it is not possible to undertake defragmentation measures for "East Option G10.50".**
- 72 % of the planned underpasses in appendix 8 are situated in unsuitable for defragmentation sections (see appendix 1)
- Of all engineering facilities only facilities types 5 and 6 do not have constructive problems (given that they are built on suitable terrain and are well connected with the surrounding habitat) (see appendix 2)
- As a measure for reducing the impact, construction of protection nets is planned, which in fact will increase the barrier effect. Construction of such nets is only admissible at a distance of 10 meters (see the point for Elaphe sp. the minimum daily average movement distance) from the entrance of the functional facilities – such ones in sections E and G (see

appendix 1) and existing facilities (sections G), types of facilities 5, 6 and as an exception types 3, 7, 9, 12, 13, 14 if it can be proved that a good connection has been established with surrounding habitats without impediments for movement in sections E.

As a conclusion – we keep our right to add to the present position paper during the discussions on the EIA report on the investment proposal.

Date: 24.08.2017

Respectfully,

Andrey Kovatchev

Member of the Management Board (MB)

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Processed data from monitoring of the road deaths- of vertebrates 2003-2004

Presented here is some data with regards to assessment of the quality of Appropriate Assessment report (AAr) of investment proposal for "IMPROVEMENT OF THE ROUTE OF LOT 3.2 OF STRUMA MOTORWAY" on the habitats and species protected and the conservation objectives of NATURA sites SCI BG0000366 "Kresna-Ilindentsi" and SPA BG0002003 " Kresna " AAR

1. As a part of the research at the start of the monitoring in 2003, 117 road sections were marked and described, as well as the existing drainage and other road facilities and their potential to be used by migrating animals. In the description of the road sections are described the slopes under and above the road, the roadside slopes, availability of widenings, etc. The accounting and marking of the road sections and facilities in 2003 was done without GPS devise on geographic maps in scale 1:10,000.

The field descriptions of the road sections are processed under methodology allowing for them to be classified in two criteria – 1. Extent of interruption of migration on account of the barrier effect of road facilities and slopes of the gorge and 2. Suitability for the construction of functional multi-species underpasses for migration of reptiles and amphibians (according the manual of EC and the manual from Ontario, see appendix 2). The utilised criteria here are: availability of additional distance of 4 meters aside of the banquet (together with the banquet 5.5 meters from the roadway) for construction of functional multi-species underpass for migration of amphibians and reptiles lying as a base on level 2.5 meters under the level of the roadway, thus ensuring 1 meter height of the facility itself and not more than 30-degree slope at the entrance of the facility without additional digging of the contact zone at the exit in the terrain and creating difficult to pass slopes on the side of the surrounding terrain. Last but not least, absence of valuable natural habitats in the terrains of the road widening and possibility for construction activities without affecting such habitats.

According to these criteria, the road sections were classified in 6 categories:

A. Fragmented road sections with considerable barrier effect – there, mainly for natural reasons, but partly on account of digging in the roadways in the slopes of the gorge, there are impassable for animals steep slopes of more than 80 degrees. These are predominantly rocky sections, somewhere terrains with very steep landslides. In addition to that in practically all cases the roadway (the roadways and the banquet) touches on the slopes and nowhere between the roadway and the slope is there the necessary additional distance of 4

meters (together with the banquet 5.5 meters from the roadways) for construction of functional multispecies underpass for migration of amphibians and reptiles.

B. Road sections with walls above and/or under the roadway – at many places the walls are built even without leaving space for the banquet. Utterly impassable sections, in both directions. These sections also are characterized with steep digged-in slopes without horizontal space for constructing functional underpasses for animals.

C. Non-fragmented (C1) or partly fragmented (C2) steep slopes with slope of 30 to 80 degrees touching on the roadway without sufficient horizontal spaces for functional animal underpasses – on the maps below the two categories are separated, but here for simplicity we present them together. The partly fragmented sections are usually short – up to 10-15 meters long sections (minimum 50% of the average length of daily movement distance covered by least mobile species – snakes, lizards) with impassable slopes (rocks, created steep roadside batters) surrounded by habitats accessible by animals within the distance of their daily movements within their habitats.

D. Sections in which the slope has a very small gradient under 30 degrees, and the road does not cut into with road slopes or despite the steep slopes there are serious widenings between the banquet and the slope with a width of more than 4 meters (together with banquet 5.5 meters) – but habitats in these sections does not allow for entering of construction machines and building underpasses because of presence of key natural habitats of species and direct impacts on them.

E. Sections in which the slope is with very small gradient, under 30 degrees, and the road does not cut in it with batters or despite the steep slopes there are considerable widenings between the banquet and the slope with more than 4 meters width (together with the banquet 5.5 meters) – the sections do not allow for conducting construction and installation activities for building functioning underpasses.

F. Sections with culverts or bridges, which are suitable for the present time. The width of the road section suitable for defragmentation - that is to say for installing barriers for the movement of animals, which will not turn into barriers for the migration of animals is set based on the least mobile key species – 50% of the average daily distance of movement of the two species Elaphe sp. and is calculated as maximum 15 meters in both directions of the underpass or total of 30 meters together with the underpass itself. But there should be remarked that these distances are probably not sufficient to guarantee favorable conservation status of the two species Elaphe sp. (E. situla and E. quatorlineta) from appendix 2 of the Biodiversity Act and do not respect the precautionary principle. They are calculated based on the close to maximum for this species daily distances of movement – 30-45 meters. In juvenile phases of all species there may be much smaller daily movements, as well as for adult species at least in considerable periods of their life cycle or in periods of not so great activity. This means that in building of new facilities the maximum cannot be taken, but the minimum distance should be applied in accordance with the precautionary principle.

In the table below are summarized data for these sections in Kresna Gorge. We ought to remark that since these data were collected in 2003 on topographic maps, they ought to be verified on field with GPS devise, and some corrections might follow. During such an attempt however, a year ago an expert from Bulgarian Academy of Sciences and his colleague from another institution got serious injuries in a road accident for which they were not culpable, owing to the highly intensified and dangerous traffic and the absence of measures (traffic cameras and others) in the area of Kresna

Gorge. In the data presented below an attempt is made for correction of the locations of 8 facilities (see maps below) according to data and distances in kilometers given in the AAr – but this data - not based on GPS coordinates, are also not sufficient precise for processing. In this sense, the competent authorities should make necessary steps and establish a commission and with the help of this methodology and with the participation of experts from stakeholder scientific and public organizations to conduct secured field verification of these data.

Type of the road section	**A**	**B**	**C**	**D**	**E**	**F**
Number of road sections on the map	18	16	27	15	18	23
Total length in meters	2 833	2 535	4 899	1 894	2 310	1 200
%	18.1	16.2	31.3	12.1	14.7	7.7

Total length of the sections, which are not suitable for facilities, is 12,161 m (78%).

2. Summarized data for the road deaths of Elaphe quatuorlineata, Elaphe situla, Testudo graeca, Testudo hermanni

Below are presented summarized data from monitoring of the species from appendix 2 of Bulgarian Biodiversity Act (BBA) Elaphe quatuorlineata, Elaphe situla, Testudo graeca, Testudo hermanni for the year 2003 vs. 2013 and 2014. Here is made comparison between these years, because only for the year 2003 there is available a full range of data (weekly observations for the period April-October) and the results are comparable. The data for 2004 is incomplete. The data compared with official monitoring data of NCSIP for 2013[1] и 2014[2]

	04.04.2003-08.12.2003	15.03.2013-31.01.2014	15.03.2014-31.01.2015	Average number (за 2014-2015)	Decrease (2003 - 2013/2014)
Elaphe quatuorlineata	5	0	0	0	**Possibly extinct - 100% decrease**
Zamenis situla	12	0	10	5	**58 % decrease**
Testudo graeca и *Testudo*	60	12	24	18	**70% decrease**

[1] March 2014 "Monitoring, analysis and assessment of the death-rate of species in the section of road E-79 (I-1), passing through protected zones "Kresna" and "Krasna-Ulindentsi" – Final repord, period March 2013-February 2014, National company strategic infrastructure projects, 86 p + 7 appendix.

[2] March 2015. "Monitoring, analysis and assessment of the death-rate of species in the section of road E-79 (I-1), passing through protected zones "Kresna" and "Krasna-Ulindentsi" – Final repord, period March 2014-February 2015, National company strategic infrastructure projects118 p. + 3 appendix.

hermanni (together)					
Testudo sp. (неопределени)	42	9	16	13	**69 % decrease**
Testudo graeca	16	2	4	3	**81% decrease**
Testudo hermanni	2	1	4	3	**-50%**
***Chiroptera* (all species)**	195	6	23	15	**92% decrease**
Total number of established vertebrates	3345 (3055)	213	874	544	**84% decrease**

3, Planned in the AAr existing (modified) and new underpasses for animals and their situation relative to the mapped in 2003 road sections.
Here is presented an analysis of the situation of planned in AAr underpasses for animals in suitable or unsuitable for the purpose road sections. The underpasses have the following symbols: X(Y)_Z – where X is number of the facility according to the table in Appendix in the AAr; Y is number of the existing facility according to the data base from the monitoring from year 2003; Z – kind or type of the facility as per the technical scheme in Appendix 8 of AAr. The facilities are grouped in road sections (see item 1) as follows:

A. Fragmented road sections with strong barrier effect – total of 15 facilities; 60-3; 61-1; 62-4; 63-1; 64-4; 67-7; 75-1; 95-1; 130-3; 131-1; 132-3; 163-8; 181-9; 182-4; 183-1.

B. Road sections with walls above and/or under the roadway – total of 25 facilities; 46(1)-9; 47-4; 48-1; 49-4; 77-1; 82-4; 83-4; 123-3; 145-4; 164-4; 166-8; 167-11; 168-10; 169-10; 170-1; 178-8; 193-3; 194-1; 195-3; 196-4; 206-10; 208-4; 209-2; 210-10; 211-2.

C1. Non-fragmented and steep slopes – total of 19 facilities; 65-1; 66-3; 78-7; 79-1; 80-8; 81-8; 114-1; 115-3; 116-1; 147-1; 148-4; 158-13; 159-11; 161-1; 165-4; 176-3; 177-1; 180-1; 207-9.

C2. Only partly fragmented and steep slopes – total of 37 facilities; 50-1; 51-4; 52-1; 53-3; 68-1; 69-3; 71-7; 72-7; 73-1; 76-4; 90-4; 91-1; 92-3; 96-8; 97-8; 98-11; 99-1; 100-4; 101-1; 102-3; 103-12; 104-12; 105-1; 109-1; 110-4; 111-1; 112-8; 113-4; 140-4; 141-1; 142-8; 143-12; 144-4; 149-8; 150-8; 175-1; 179-4.

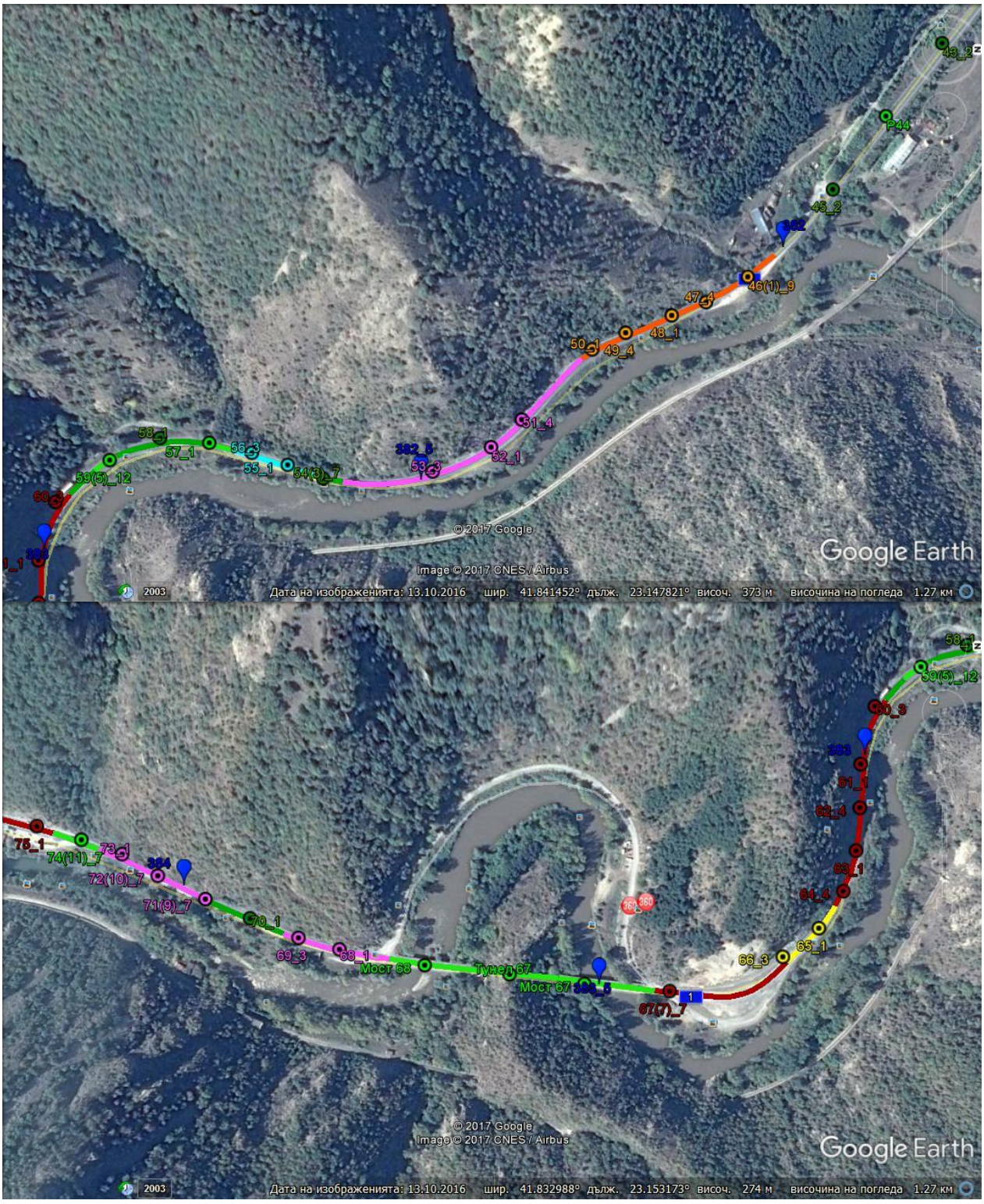
D. Sections with small gradient or widening and natural habitats – total of 24 facilities; 55-1; 56-3; 85-1; 86-3; 87-1; 88-3; 89-1; 106-3; 108-3; 117-3; 119-1; 120-3; 121-3; 126-1; 127-4; 134-1; 137-1; 155-12; 156-1; 172-1; 174-4; 202-3; 203-4; 205-4.

E. Sections with small gradient or widening and possibilities for construction of functional facilities – total of 29 facilities; 43-2; 45-2; 54-7; 58-1; 70-1; 93-1; 94-8; 128-1; 133-8; 136-8; 138-4; 139-1; 151-11; 152-11; 153-4; 154-8; 184-4; 185-3; 186-1; 188-1; 189-4; 190-1; 191-3; 192-1; 197-4; 198-4; 199-4.

F. Sections with already functioning facilities (here is added also a small section north of the gorge outside of the monitored in 2003 but in the zone) – total of 18 facilities; 57-1; 59(5)-12; 74(11)-7; 84(15)-8; 107(22)-14; 118(25)-8; 122(26)-8; 124(27)-8; 125(28)-8; 129(29)-8; 135(31)-9; 146(35)-15; 157(42)-13; 171(53)-13; 173(54)-14; 187-4; 200(57a)-10; 201(58)-13;

From a total of 167 facilities in NATURA site BG0000366 and the section of Kresna Gorge, 120 (72%) are planned in unsuitable sections and will not be effective and functional – or will lead to additional fragmentation and steep inaccessible for the animals batters or in other 24 (14.4%) of them will damage valuable natural habitats.

Below are presented maps of these facilities according the kilometers given in appendix 8 of the AAr. The colors of the road sections and their respective facilities are designated as follows: A – dark red; B – orange; C1 – yellow; C2 – lilac; D- light blue; E – dark green; F – light green. The kilometers are presented in dark blue arrows.


43_2
P44
46_2
382
46(1)_9
47_4
48_1
50
49_4
51_4
52_1
382_5
53_3
58
57_1
56_3
55_1
54(3)_7
59(5)_12
60
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 13.10.2016 шир. 41.841452° дълж. 23.147821° височ. 373 м височина на погледа 1.27 км
58
59(5)_12
56_3
383
61_1
62_4
63_1
64_4
65_1
66_3
76_1
74(11)_7
73
384
72(10)_7
71(9)_7
70_1
69_3
68_1
Мост 68
Тунел 67
Мост 67
67(7)_7
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
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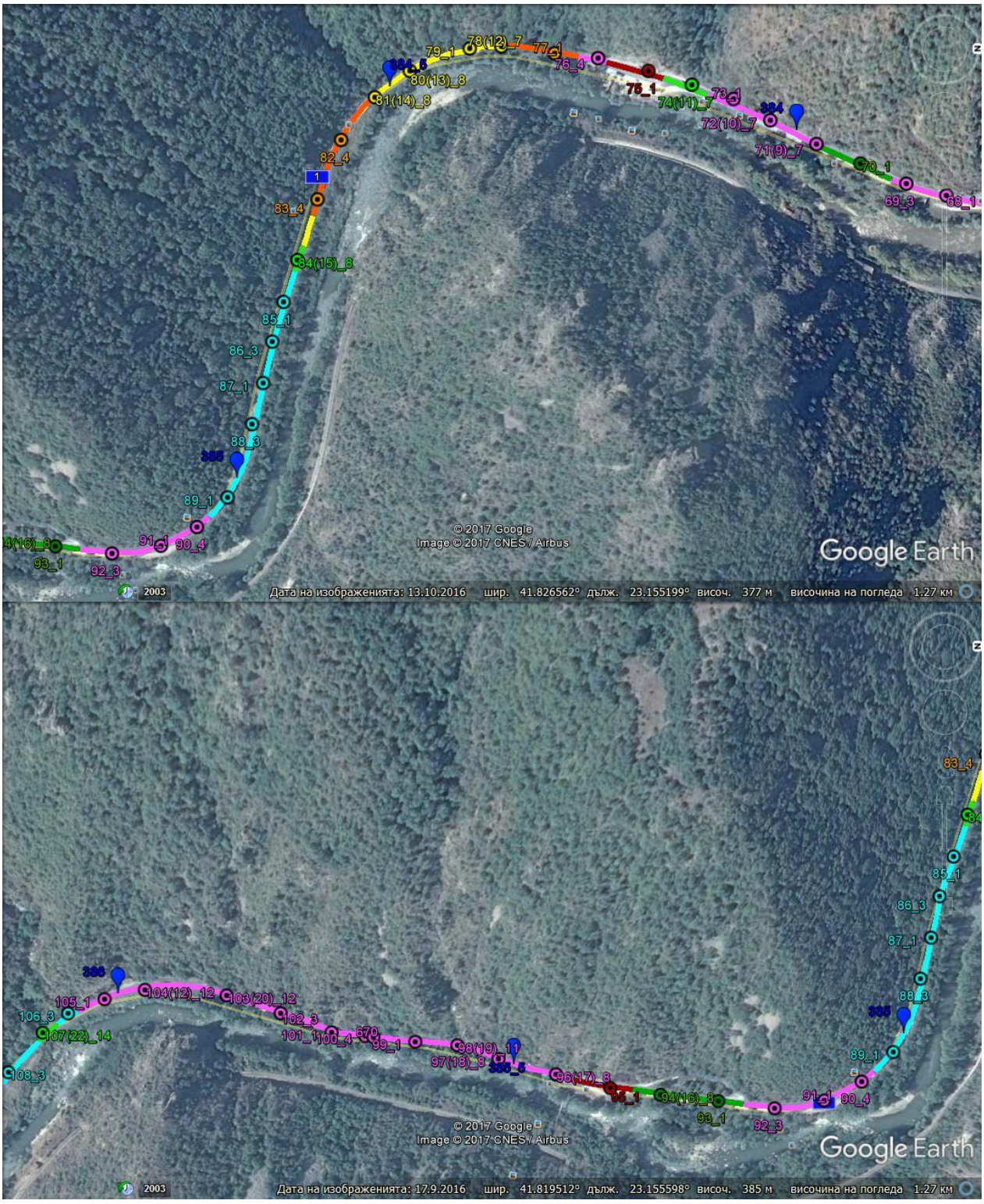
79_1
78(12)_7
77_1
76_4
75_1
74(11)_7
73_1
72(10)_7
71(9)_7
70_1
69_3
68_1
80(13)_8
81(14)_8
82_4
83_4
84(15)_8
85_1
86_3
87_1
88_3
89_1
90_4
91_1
92_3
93_1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 13.10.2016 шир. 41.826562° дълж. 23.155199° височ. 377 м височина на погледа 1.27 км
104(12)_12
105_1
106_3
107(22)_14
108_3
109(20)_12
102_3
101_1
100_4
99_1
98(19)_11
97(18)_8
96(17)_8
95_1
94(16)_8
93_1
92_3
91_1
90_4
89_1
88_3
87_1
86_3
85_1
83_4
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.819512° дълж. 23.155598° височ. 385 м височина на погледа 1.27 км


388
105_1
106_3
107(22)_14
108_3
109_1
110_4
111_1
112(24)_8
388_5
113_4
114_1
115_3
116_1
117_3
118(25)_8
119_1
120_3
121_3
122(26)_8
123_3
124(27)_8
125(28)_8
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.811762° дълж. 23.159776° височ. 325 м височина на погледа 1.27 км
143(34)_12
142(33)_8
141_1
140_4
139_1
138_4
137_1
136(32)_8
135(31)_9
134_1
133(30)_8
387_5
132_5
131_1
130_3
129_1
129(29)_8
127_1
126_1
125(28)_8
124(27)_8
123_3
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
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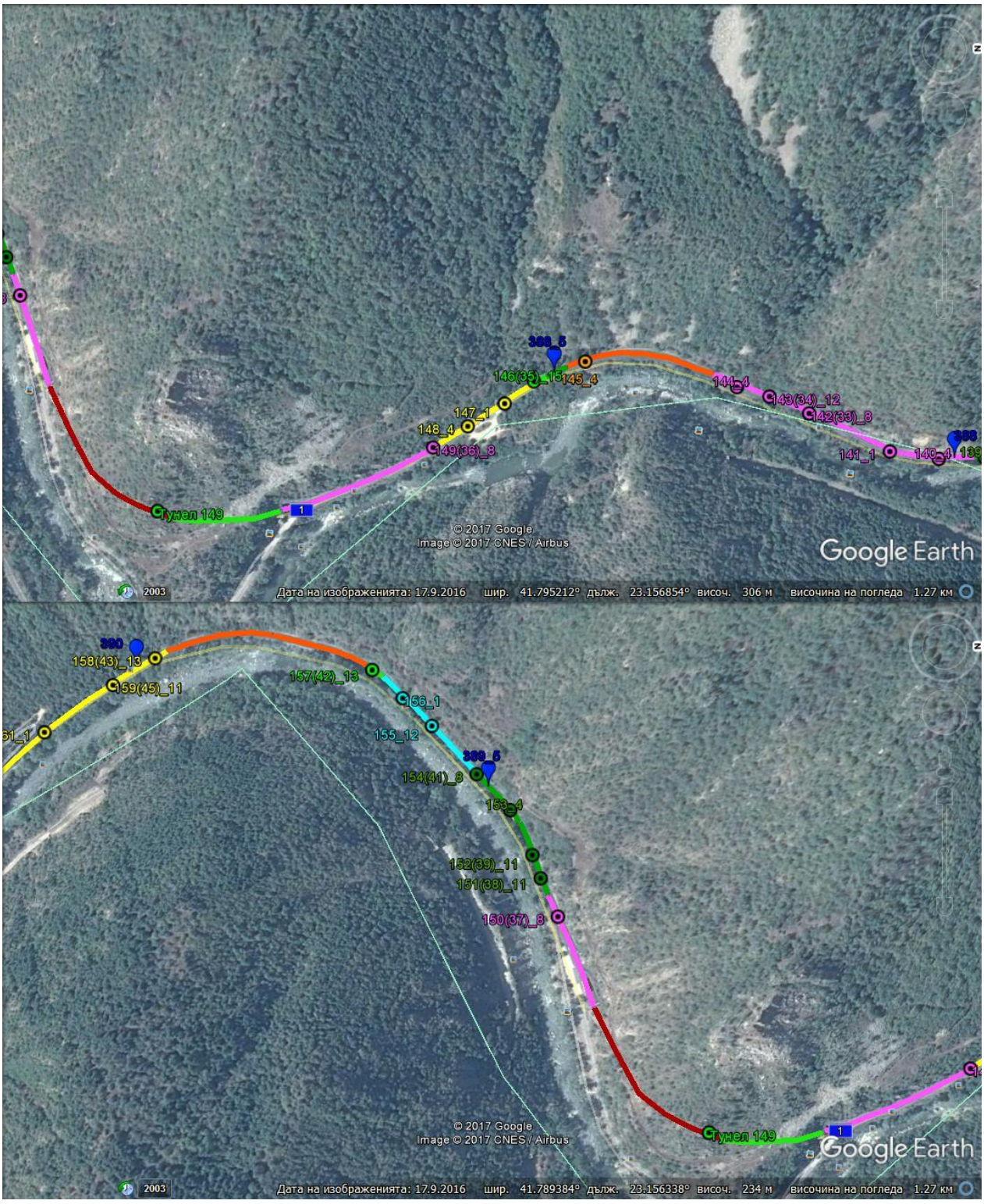
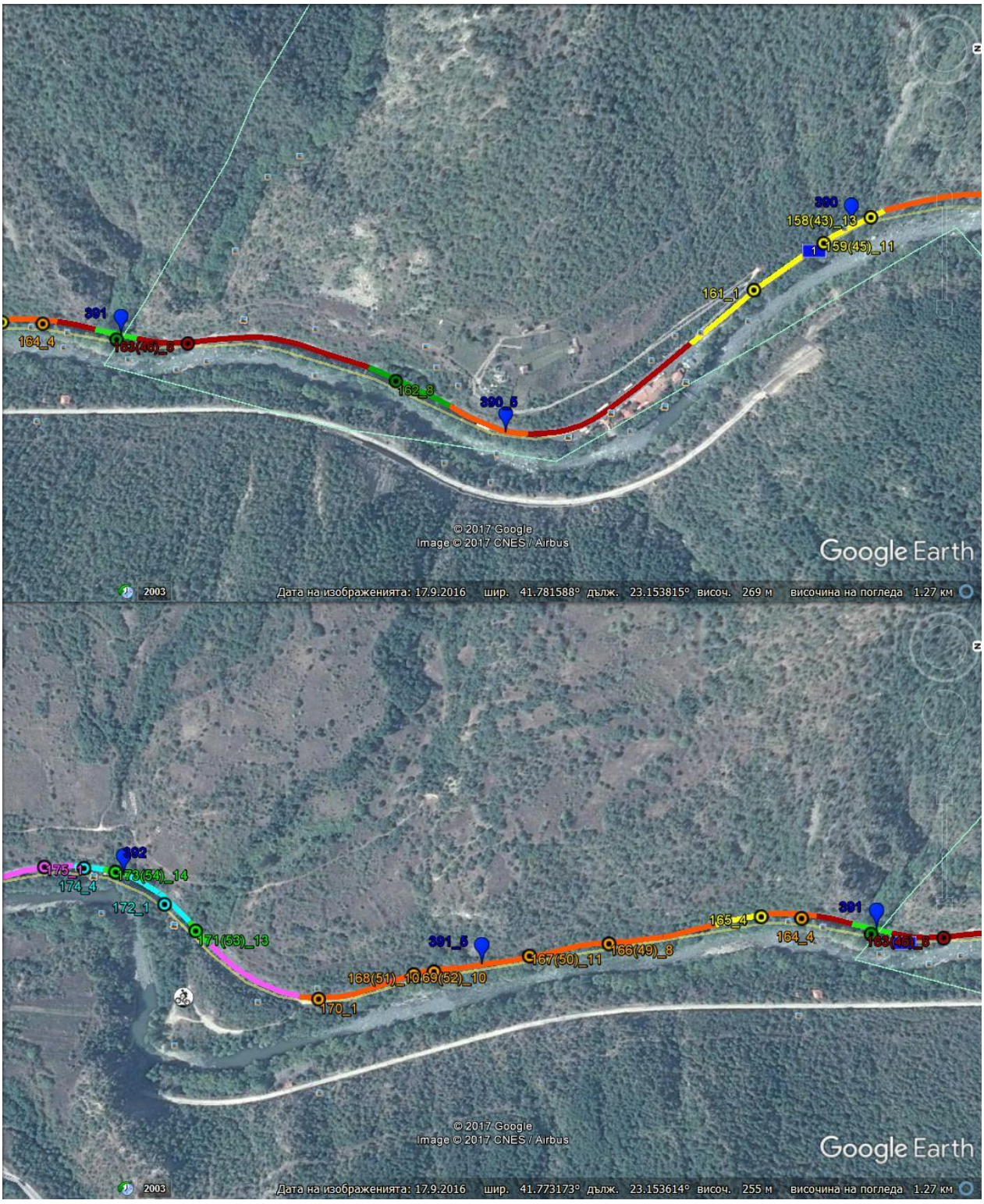
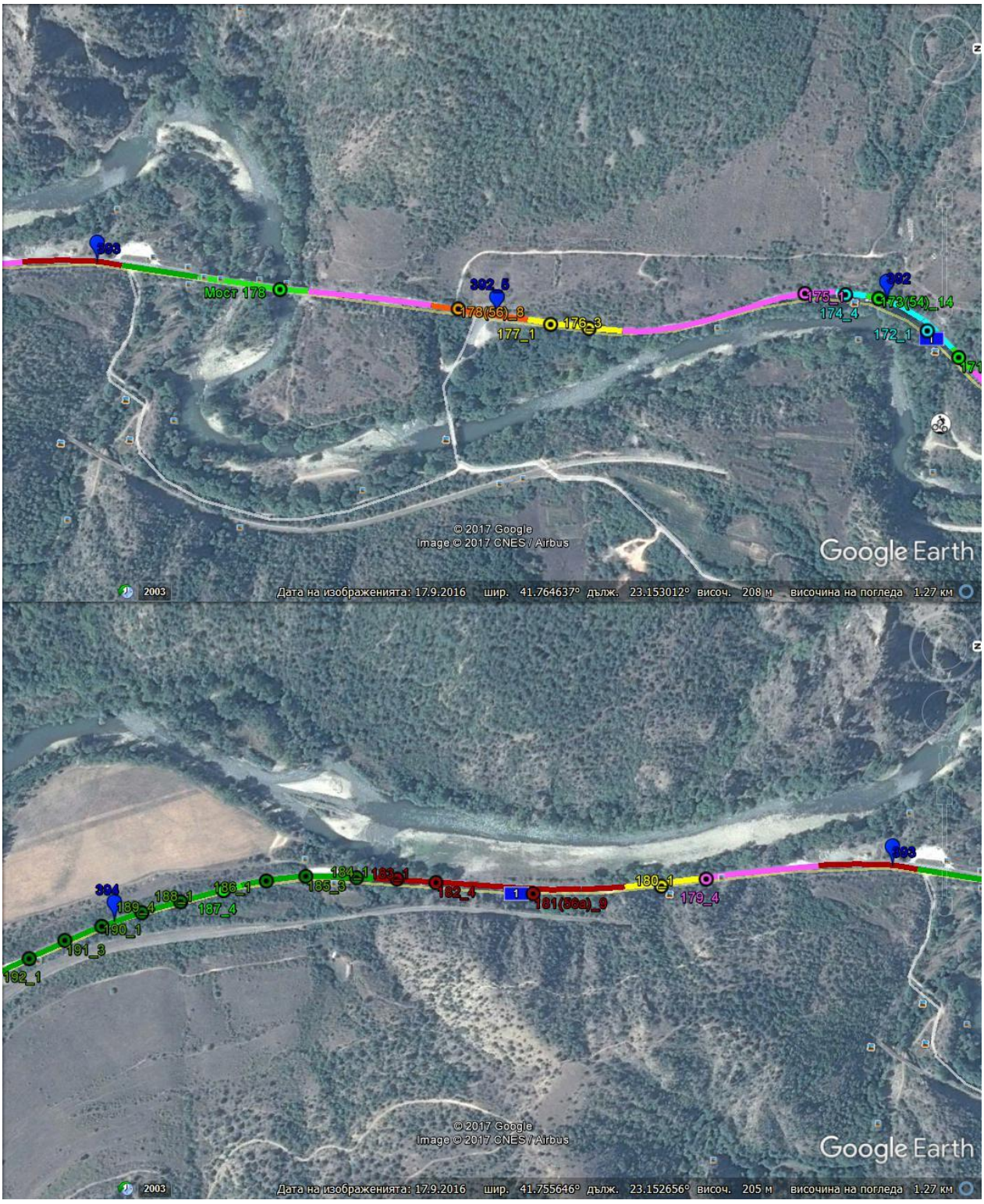

146(35)_15
145_4
144_4
143(34)_12
142(33)_8
147_1
148_4
149(36)_8
141_1
Тунел 149
1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.795212° дълж. 23.156854° височ. 306 м височина на погледа 1.27 км
158(43)_13
159(45)_11
157(42)_13
156_1
155_12
154(41)_8
153_4
152(39)_11
151(38)_11
150(37)_8
Тунел 149
1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.789384° дълж. 23.156338° височ. 234 м височина на погледа 1.27 км


390
158(43)_13
159(45)_11
161_1
391
164_4
162_8
390_5
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.781588° дълж. 23.153815° височ. 269 м височина на погледа 1.27 км
392
173_1
174_4
173(54)_14
172_1
171(53)_13
391_5
168(51)_10
169(52)_10
170_1
167(50)_11
166(49)_8
165_4
164_4
391
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.773173° дълж. 23.153614° височ. 255 м височина на погледа 1.27 км


Мост 178
178(56)_3
177_1
176_3
175_1
174_4
173(54)_14
172_1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.764637° дълж. 23.153012° височ. 208 м височина на погледа 1.27 км
189_4
188_1
187_4
186_1
185_3
184_1
183_1
182_4
181(56a)_9
180_1
179_4
190_1
191_3
192_1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
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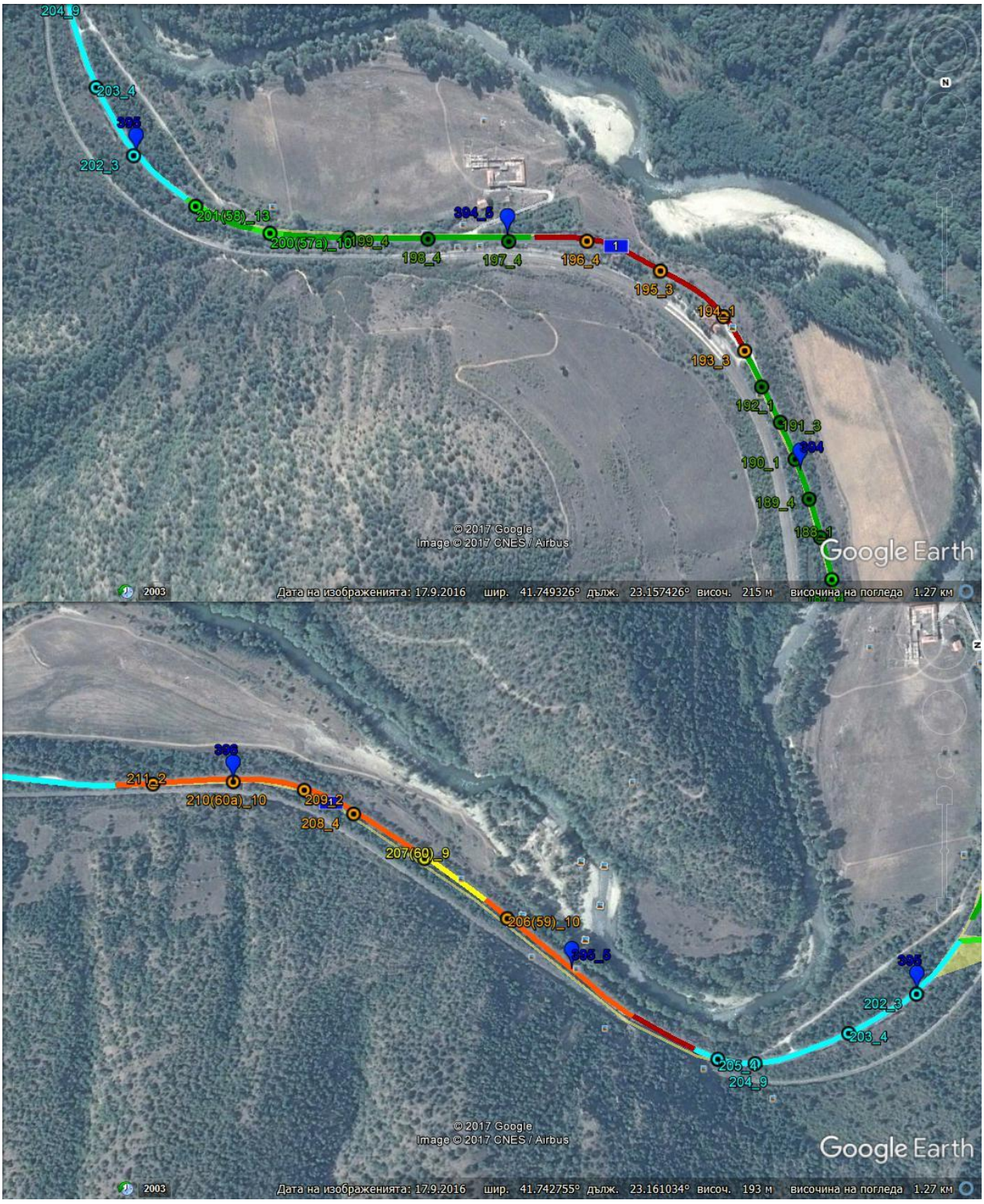
204_9
203_4
202_3
201(58)_13
200(57a)_10
199_4
198_4
197_4
196_4
195_3
194_1
193_3
192_1
191_3
190_1
189_4
188_1
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.749326° дълж. 23.157426° височ. 215 м височина на погледа 1.27 км
211_2
210(60a)_10
209_2
208_4
207(60)_9
206(59)_10
205_4
204_9
202_3
203_4
© 2017 Google
Image © 2017 CNES / Airbus
Google Earth
2003
Дата на изображенията: 17.9.2016 шир. 41.742755° дълж. 23.161034° височ. 193 м височина на погледа 1.27 км

Position paper of Balkani Wildlife Society and NGOs, Appropriate Assessment Report (AAr) on IP "Improvement of the route of Lot 3.2 of Struma Motorway on BG0000366 „Kresna–Ilindentsi" and BG0002003 „Kresna"

Appendix 2

Description of small underpasses for defragmentation of the roads

This appendix is also prepared in connection with the request from Road Infrastructure Agency to "Save Kresna Gorge" Coalition, made at Session No19 from March 9th, 2017 of the Committee for monitoring and construction of Struma Motorway (CMCSM) for preparation of report about defragmentation of the existing road in Kresna Gorge. According to the protocol from Session No19 the task includes preparation of a technically feasible and justified decision for most suitable measures for defragmentation of habitats in Kresna Gorge, with the decision being accompanied by a detailed opinion with the respective biological, legal ground and technical justification and graphic materials, as per the manual for defragmentation of the EU Commission.

1. Description of planned facilities in AAr

As we have established in appendix 8 of AAr, save for the quite general notes, any clear descriptions of the planned facilities for defragmentation are missing. We are trying to fill this void with short notes and descriptions of every type of underpass for small animals planned in appendix 8.

1.1New facilities (all of them are planned and described with elements on the road for width 12 meters)

- Facility type 1 – round tube, diameter 50cm, bottom – concrete tube. Entrance from the slope: 1.3meters level under the roadway at the entrance (down part of the tube), funnel shaped entrance with open ends sideways to the side gutters and with width of the contact zone with the slope 4 meters, 24degrees (45%) gradient at the entrance after the tube in all directions, 2.9 meters horizontal distance necessary for reaching the level of the roadway with the slope, surface not natural of large stone and cement solution. Contact zone with the natural habitat wide arch shaped end of the funnel entering the slope and connected with sideways gutters on the roadway.
- Facility type 2 – round tube, diameter 100 cm, bottom – concrete tube. Entrance from the slope: 1.9 meters level under the roadway at the entrance (down part of the tube), funnel shaped entrance with closed ends sideways to the side gutters, open end at the very end in an stripe of 30cm and with width of the contact zone with the slope 4meters, 36degrees (73%) gradient at the entrance after the tube, 2.6 meters horizontal distance are necessary for reaching the level of the road, surface not natural of stones and concrete. Contact zone with the natural habitat lineal at the end of the funnel entering the slope with width 4meters and connected with side gutters of the roadway at the upper end of the funnel with stripes of 30cm.

- Facility type 3 – round tube, diameter 100cm, bottom – concrete tube. Entrance from the slope: 1.9meters level under the roadway at the entrance (down part of the tube), 24degrees (45%) gradient at the entrance after the tube along a two meters wide stripe, 40% gradient towards the entrance of 44cm narrow stripes on the side of the gutters, 4.2 meters horizontal distance necessary for reaching the level of the roadway along the entrance stripe, surface not natural of stones and concrete. Contact zone with the natural habitat is lineal along the whole length of the cut into the slope entrance stripe and at its end, which is 2 meters wide, as well as at the connected with the entrance gutters entering the base of the entrance stripe.
- Facility type 4 – round tube, diameter 100cm, bottom – concrete tube. Entrance from the slope: 1.63meters level under the roadway at the entrance (down part of the tube), vertical wall at the entrance after the tube, entrance sideway from the gutters of 60cm stripes with gradient 27degrees (50%) and length 3.25meters sideways, surface not natural of stones and concrete. There isn't direct contact zone with the natural habitat on the side of the entrance, the contact is wholly through the connected with the entrance gutters entering the base of the entrance.

1.2 Modified facilities (all are planned and described with elements on the road for dimensions 12)

- Facility type 7 – round tube, diameter 80cm, bottom – concrete tube. Entrance from the slope: 1.4meters level under the roadway (down part of the tube), 14degrees (25%) gradient at the entrance after the tube along a 2meters wide stripe, 40% gradient towards the entrance of 50cm narrow stripes on the side of the gutters, 5.5 meters horizontal distance necessary for reaching the level of the road along the horizontal entrance stripe, surface not natural of stones and concrete. Contact zone with natural habitat is lineal along the whole length and the cut into the entrance stripe and in its end, which is 2meters wide, as well as at the connected with the entrance gutters entering the base of the entrance stripe.
- Facility type 8 – round tube, diameter 80cm, bottom – concrete tube. Entrance from the slope: 1.4meters level under the roadway at the entrance (down part of the tube), vertical wall at the entrance after the tube, entrance sideways on the side of the gutters of 60cm narrow stripes with gradient 19degrees (35%) and length 4.0meters sideways, surface not natural of stones and concrete. There isn't direct contact zone with natural habitat on the side of the entrance, the contact is wholly through the connected with the entrance gutters entering the base of the entrance.
- Facility type 9 – round tube, diameter 100cm, bottom – concrete tube. Entrance from the slope: 1.6meters level under the level of the entrance (down part of the tube), 25degrees (45%) gradient at the entrance of the tube along a 2-meter wide stripe, 40% gradient towards the entrance of 50cm narrow stripes on the side of the gutters, 3.5 meters horizontal distance necessary for reaching the level of the roadway along the horizontal entrance stripe, surface not natural of stones and concrete. Contact zone with natural habitat is lineal along the whole length of the cut into the slope entrance stripe and at its end, which is 2 meters wide, as well as at the connected with the entrance gutters entering the base of the entrance stripe.

- Facility type 10 – round tube, diameter 100cm, bottom – concrete tube. Entrance from the slope: 1.6meters under the level of the roadway at the entrance (down part of the tube), vertical wall at the entrance after the tube, entrance from the gutters of 60 cm narrow stripes with gradient 22degrees (40%) and length 4.0 meters sideways, surface not natural of stones and concrete. There isn't direct contact zone with natural habitat from the entrance, contact is wholly through connected with the entrance gutters entering the base of the entrance.
- Facility type 11 – rectangular culvert, 200 by 200 cm., bottom – of stones and concrete. Entrance from the slope: 3.6 meters under the level of the roadway (down part of the tube), funnel shaped entrance with open ends and leading 50cm. narrow stripes sideways to the side gutters 62% gradient to the entrance, frontally there is a straight contact zone around 2 meters and another 80cm – 1meter long – 60-70 cm wide access ramp – totally perpendicularly to the entrance the facility has a gradient of 52 degrees (129%), the surface is not natural of stones and concrete. The contact zone with the natural habitat is through the two directing ramps from the side and one ramp in the middle.
- Facility type 12 – rectangular culvert, with height 200cm and width 300cm, bottom of stones and concrete. Entrance from the slope: 2.5 meters under the level of the roadway (down part of the culvert). The plans do not contain the gradient at the entrance 3-meter stripe/ramp – but it is around 35 degrees (72%) gradient to the entrance of 50cm narrow stripes on the side of the gutters, with approximate parameters 3.5 meters horizontal distance necessary for reaching the level of the roadway along the horizontal entrance stripe, surface not natural of stones and concrete. Contact zone with the natural habitat is lineal along the cut into the slope entrance stripe and at its end, which 2 meters wide, as well as at the connected with the entrance gutters entering the base of the entrance stripe.
- Facility type 13 – rectangular culvert, height 200 cm. and width 400 cm., bottom – of stones and concrete. Entrance from the slope: 2.5 meters level under the roadway at the entrance (the down part of the culvert). The plans do not contain the gradient of the entrance 4-meter stripe/ramp – but it is around 35 degrees (72%), 40% gradient at the entrance of 50cm. narrow stripes on the side of the gutters, with approximate parameters 3.5 meters horizontal distance necessary for reaching the level of the roadway along a horizontal entrance stripe, surface not natural of stones and concrete. Contact zone with natural habitat is lineal along the whole length of the cut into the slope entrance stripe and at its end, which 2 meters wide, as well as at the connected with the entrance gutters entering the base of the entrance stripe.
- Facility type 14 – rectangular culvert, height 200cm and width 500cm, bottom – of stones and concrete. Entrance from the slope: 2.5 meters under the level of the roadway at the entrance (down part of the culvert). The plans do not contain the gradient of the entrance 5-meter stripe/ramp – but it is around 35 degrees (72%), 40% gradient at the entrance of 50cm. narrow stripes on the side of the gutters, with parameters 3.5 meters horizontal distance necessary for reaching the level of the roadway along the horizontal entrance stripe, surface not natural of stones and concrete. Contact zone with the natural habitat is lineal along the whole length of the cut into slope entrance stripe entering the base of the entrance stripe.

2. Requirements for construction of underpasses for passing of reptiles and amphibians (key species the four species of turtles and grass-snakes from appendix 2 of Biodiversity Act) according to officially approved manuals for defragmentation.

   In the present work are reviewed 2 manuals

- Manual for defragmentation of transport infrastructure of EU Commission on project COST341[3] (named hereafter "EC's manual")
- Special manual for best practices for reduction of the impact of roads on amphibians and reptiles at risk in the state of Ontario[4] (named hereafter Ontario manual

The reasons for selection of these two manuals as reference over the many other similar manuals are the following:

The first manual contains the available information regarding defragmentation of European fauna and is official scientific document on a project of the EU Commission and is requested as a reference during the monitoring committee of Struma Motorway.

The second manual is a contemporary specialized – the only such official state specialized manual for defragmentation of roads relating to fauna and contains the best scientific knowledge on the topic regarding the types of amphibians and reptiles.

2.1. Requirements for construction of underpasses for small animals according to EC's manual

This manual is an official document developed on an EC Commission's project, where all the scientific information is summarized and especially that relating to European fauna. According to the manual underpasses for small animals have an unclear effectiveness with regard to key species – pointed out as unsuitable for snakes and with unknown effectiveness for turtles (p. 8)

We will point out the maximum parameters in order to guarantee as much as possible effective work of these facilities:

- Integration in surrounding habitats is a key characteristics – ensuring access to the facility without barriers to the movement of the animals and leading the animals in the direction of the facility;
- Providing natural hiding places of target species around the entrance and of directing habitats and stripes;
- Admissible gradients at the entrance is maximum 30 degrees, but not more than 45 degrees, especially in modification of existing culverts;

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[3] Iuell, B., Bekker, G.J., Cuperus, R., Dufek, J., Fry, G., Hicks, C., Hlavác, V., Keller, V., B., Rosell, C., Sangwine, T., Tørsløv, N., Wandall, B. le Maire, (Eds.) 2003. Wildlife and Traffic: A European Handbook for Identifying Conflicts and Designing Solutions. COST 341 Habitat Fragmentation due to Transportation Infrastructure. European Co-operation in the Field of Scientific and Technical Research. 172 pp. http://www.iene.info/wp-content/uploads/COST341_Handbook.pdf

[4] Ontario Ministry of Natural Resources and Forestry. April 2016. Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptile Species at Risk in Ontario. Queen's Printer for Ontario. 112 pp. http://www.ail.ca/site/media/ail/MNRF%20Herp%20Road%20Mitigation%20BMP%202016.pdf

- The minimal size of the facility – for rectangular tunnels width and height minimum 1.5 meters, for semi-round width and height from the ground minimum 1.5 meters;
- The spread surface of the entrance and in the facility for passing (the tube) has to be of natural substrate (not concrete), and the bottom surface for passing has to be even and horizontal (not bending in the shape of a tube);
- The surface of the underpass should not be covered with water;

Here we apply 7.64 from page 38 of the Manual

Figure 7.64 - Stepped exits of drains are traps for small animals (top). The two exits in Spain (centre, bottom) have been adapted so that animals passing through the drainage culverts do not get trapped. (Photos by C. Rosell)

1.3. . Requirements for the construction of small underpasses ("box tunnels") according to Ontario manual

This manual summarizes the most contemporary literature on roads with regards to the kinds of amphibians and reptiles. In view of the specifics of the region of Kresna Gorge, here we shall review the requirements for construction of functioning small underpasses ("box tunnels"). We shall not review the requirements for construction of overpasses, since we shall engage ourselves with the requirements for the target species terrestrial turtles and snakes, but we shall take into account also the needs for migration of other species terrestrial amphibians and reptiles, in order the underpasses to be capable of servicing various species. Below in

short we summarize all requirements regarding the construction of such underpasses and the fencing of the roadway, as pointed out in the manual:

- Box tunnels are those, which are constructed specially for the purposes of defragmentation usually with width up to 3 meters and can be constructed from pre-fabricated elements of standard design;
- The maximum effective length of such underpasses is 25 meters – when the length is bigger, it is necessary to make a intermediary opening with natural habitats or bigger facilities with individual design – bridges, overpasses;
- Standard material from pre-fabricated elements is concrete, but it can be another;
- The standard form may be rectangular, but it can also be semi round (see copied photo "Photo 4" of the manual below);
- The surface at the entrance and in the facility for passing (the tunnel) has to be of natural substrate (not concrete) resembling that of the surrounding terrain (see copied photo "Photo 13" of the manual below) – the ground substrate (construction without bottom or 30 cm spread soil layer);
- It is necessary, especially for increasing the percentage of passing turtles, the upper side to have light openings allowing for lighting of the interior of the tunnel (see copied photos "Photo 2" and "Photo 3" of the manual below);
- The minimum size of the facility depends on the length, type of cross-section and the target species and it ought to be (for target in the Kresna gorge we accept terrestrial turtles and snakes): with length up to 15 meters – for rectangular tunnels width minimum 1.5 meters and height from the ground to the lower edge of the tunnel minimum 1 meter, for semi round width minimum 1.8 meters and height from the ground to the lower edge of the tunnel minimum 0.9 meters; with length 15 to 25 meters – for rectangular tunnels width minimum 1.8 meters and height from the ground to the lower edge of the tunnel minimum 1 meter, for semi round width minimum 2.0 meters and height from the ground to the lower edge of the tunnel minimum 1.0 meters;
- The surface of the entrances and the exits of the tunnels should be on the level of the tube – so that animals do not have to climb or go down steeply to the entrances (see copied photos "Photo 4" and "Photo 30" of the manual below);
- Towards to the entrances of the tube there should be installed leading vertical walls – to connect the tube with fencing facilities, in order not to allow passing to the roadway and the opposite to be possible to go down from the road to the facility (see copied photo "Photo 11" and figure "Figure 3" of the manual below). Additionally, there may be installed small heaps of stones, left shrubs, etc, in order to serve as hiding places for animals;
- From the facility along the roadway is constructed a wall – for the species in Kresna Gorge and in view of its maintenance most suitable is small concrete wall set outside of the road with height minimum 40 cm. (see copied photo "Photo 41" of the manual below). Such a wall may be built also from pre-fabricated road gutters with vertical wall to the road and oblique wall outside of the road (in order animals to leave freely the area of the road) with gradient at the most 40-45 degrees;
- When existing waterspouts and their entrances answer these requirements or may be reconstructed in order to answer them – they may be used, as effective small underpasses (see copied photo "Photo 30" from the manual below);

- While observing the same requirements existing bigger facilities may be reconstructed – bridges, etc., while securing minimum 1 meter wide dry stripe for passing of terrestrial species and with access to it from dry land in observance of the requirements above (see copied figure (Figure 2" of the manual below).

  Below are listed examples of photos/plans of facilities from the manual described above

Photo 4. Open-bottom tunnel along highway 69, Ontario. © K. Gunson

Photo 13. Soil and branches inside tunnel bottom, Ucluelet, B.C. ©Barb Beasley

Photo 3. Open-grate tunnel at Killbear Provincial Park, Ontario. © K. Gunson

Photo 2. Open-top tunnel in Waterton Lakes National Park, Alberta. © K. Gunson

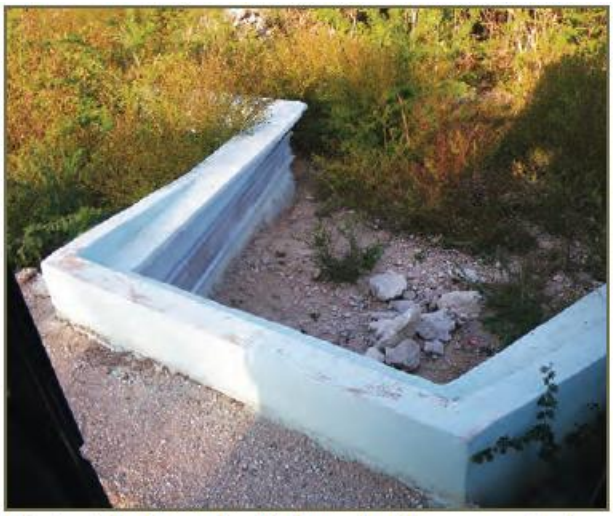

Photo 11. Tunnel with headwalls connected to concrete guide fencing in Cuba. © G. Barrett

Photo 30. Earth excavated to allow at grade entrance to tunnel. © D. Filip

Photo 41. Concrete wall in Aurora, Ontario © K. Gunson

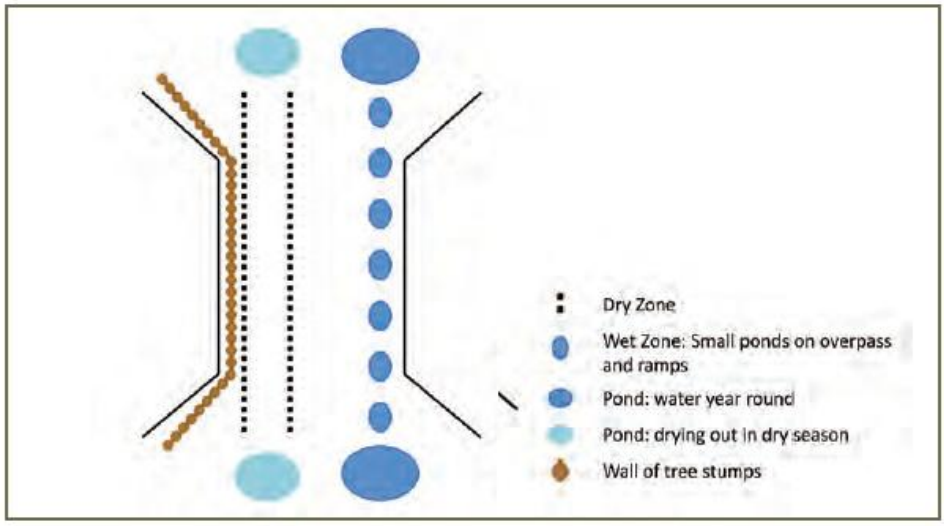

Figure 2: Example of a series of pools created along one side of an overpass (50 m long x 65 m wide). Amphibian passage was at least 1.5 times higher through the wetland zone than the dry zone. Adapted from van der Grift et al. 2009

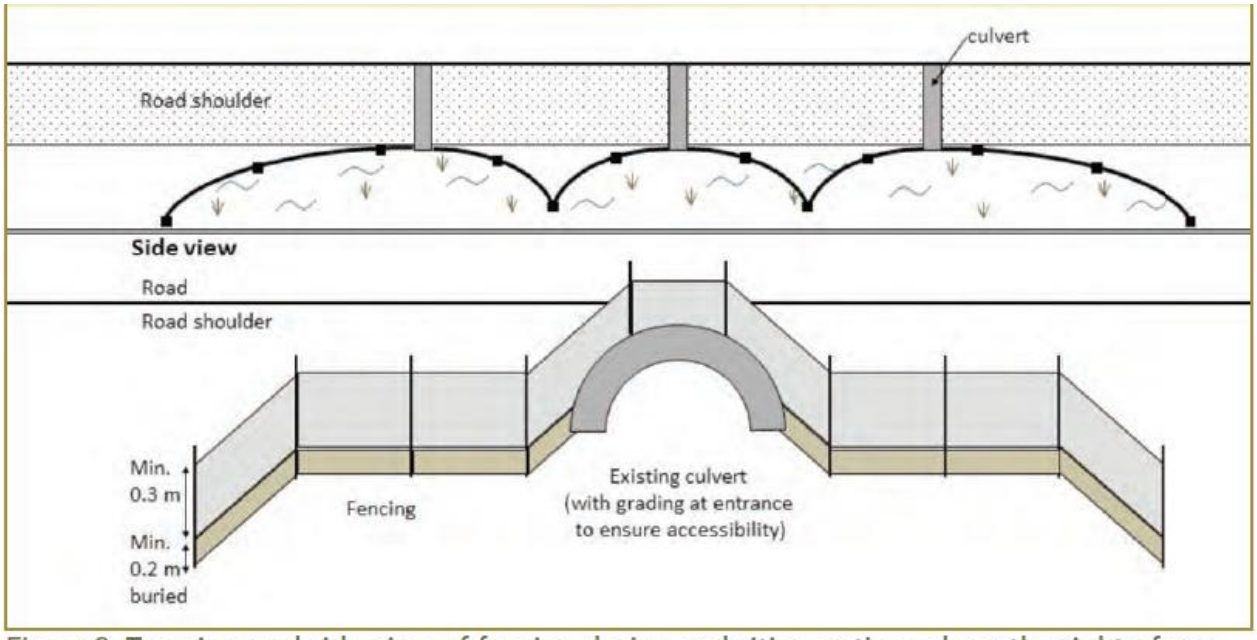

Figure 3. **Top view and side view of fencing design and siting options along the right-of-way. Figure adapted from Nature Conservancy Canada schematic.**

2.3. Short analysis of the compatibility of the facilities pointed in AAr requirements for functionality according to the above manuals

All 96 facilities planned in unsuitable for underpasses sections (A, B, C) are completely unsuited on account of the fact that they pose impassable barriers between the entrance of the facility and surrounding habitats. Instead of having defragmentation effect, these facilities will have clearly harmful impact and will enhance the barrier effect of the motorway.

Constructively not functional facilities:

- All tube facilities with artificial bottom round concrete bottom and diameter 80 or 100 cm (half diameter 40 or 50 cm) do not answer the requirements – to have a round semi tunnel with minimum size 1.5 meters (EC manual) or 0.9 meters (Ontario manual) and flat bottom with natural substrate for passing (underpasses types 1,2,3,7,8,9,10)
- All facilities, which do not provide open free access to surrounding habitats with small gradient (up to 30 degrees for new and to 45 degrees for modified) do not answer the requirements (underpasses type 4, 10, 11).
- Problematic and badly executed with cutting into the slope can be all with longitudinal contact stripe (underpasses type 3, 7, 9, 12, 13, 14) – regardless of the situation, due to the bad connection with surrounding habitat.