

# Local Monitoring Plan of the Arad-Deva Pilot Area, Romania

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## Foreword

The local monitoring plan represents a first response to the pressure identified in the Arad-Deva pilot-area – the **lack of coherent monitoring and adaptation**. The monitoring plan will be integrated into the CSOP as it uses the same logical framework and by referencing the specific CSOP objectives.

It consists in a selected list of monitoring actions foreseen to be implemented during SaveGREEN project duration by the project partner (Zarand Association) with the support of external experts and local stakeholders.

The approach used in developing the present local monitoring plan aimed for the plan to be:

- **representative:** it will reflect the specifics and the main needs of the pilot area in terms of connectivity;
- **feasible:** it will be tailored to reflect the local capacity for implementation during SaveGREEN duration;
- **compatible** with the other project local monitoring plans (it includes the “minimum requirements” set at project level);
- **complementarity** with other SaveGREEN local monitoring plans, ensuring exchange of know-how;
- **documented in order to have a demonstrative character.**

The **objective** of the local monitoring plan is to facilitate an integrated monitoring programme (procedures, database, indicators, assessment) aiming to collect data relevant data for decision-making at the pilot-area level. The present plan will be updated and developed further during SaveGREEN project and will be the basis for the overall monitoring plan of the pilot area.



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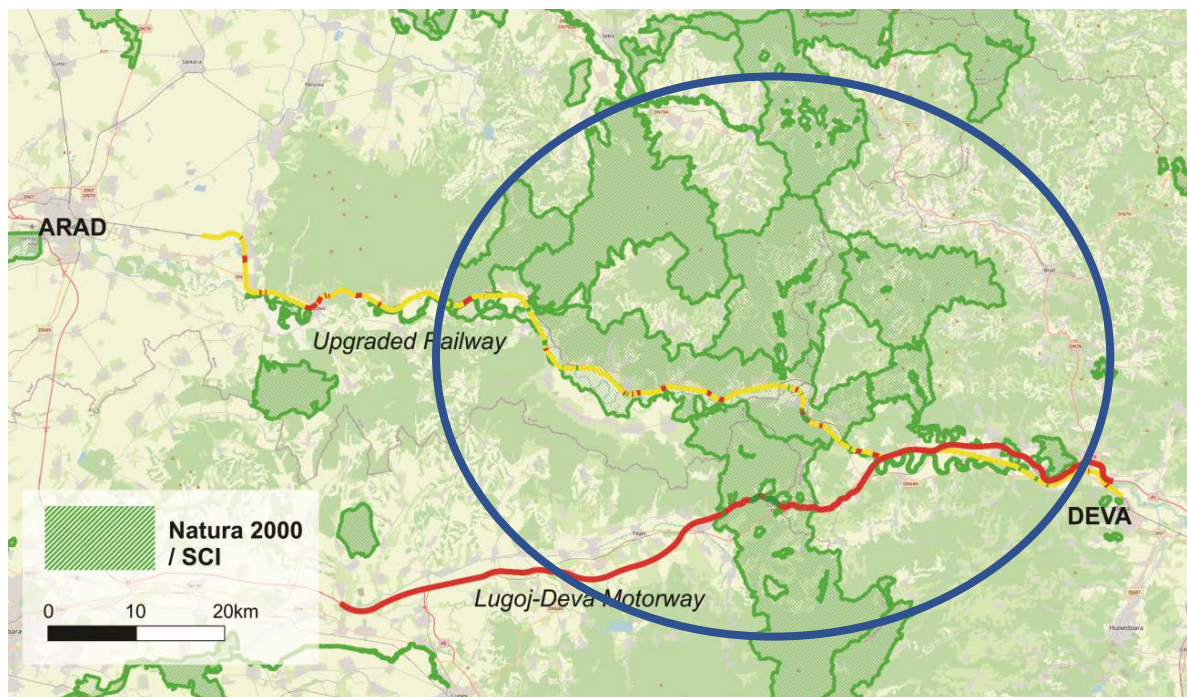
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## 1. Introduction

### 1.1. Specifics of the Arad-Deva Pilot Area

- A critical connectivity area (linkage area) within one of the most important bio-corridor for large carnivores at whole Carpathian range, identified since 2004 and referred to in the European Action plans for large carnivore species, in the Romanian Management plans and regional action plans for bear and wolf;
- Important local biodiversity with a range of protected areas pSCIs (some designated specially to support functionality of the bio-corridor) and SPAs;
- A natural river valley which acts as a green / blue corridor itself;
- Intersected by a major European transport corridor (TEN-T: motorway, railway), national and local roads; first dedicated mitigation solutions for new infrastructure in Romania;
- The Catalogue of measures developed in TRANGREEN and actions from regional and national management plans, Natura 2000 management plans offer great fundament, but needs integration in operational plans to become efficient / functional.



*Fig.1. Border of the pilot area*

## 1.2. The concept of structural and functional monitoring

Structural and functional connectivity focus on different aspects of landscape: *structural connectivity* indicates the part of the landscape that is actually connected through e.g. corridors. In contrast, *functional connectivity* includes species-specific aspects and their interaction with landscape structures. Thus, functional connectivity is the actual connectivity from species' perspective" (see Scaletool n.d.).

Therefore, in a first step, spatially explicit information from different sources that are suitable to describe the structural endowment of an area are used in a GIS-based model to identify areas that can serve as corridors on the one hand, and to assess these corridors in terms of their structural suitability on the other hand. At sites whose suitability as corridors seems to be limited due to structural features, the functional suitability will be checked by monitoring of both the structures found and the presence of wildlife, and compared with sites whose suitability is not limited by structural features. This procedure should enable an evaluation of the corridor with regard to its functional quality and serve as a basis for proposals for measures that can improve the structural suitability of the corridor.

*Note: Additional information is provided in D.T1.1.2. (Grillmayer & Plutzer 2021).*

## 1.3. GIS modelling tool and maps of structural connectivity

The starting point was the consideration to develop a uniform approach for all pilot areas, which is based on homogeneous data sets and identifies the structural corridors with the same methodology. Since there is no distribution data available for most of the pilot areas in order to develop a data-driven bottom-up approach, it was decided, following the meeting of December 7, 2020, to conduct the modelling for structural monitoring using an expert model.

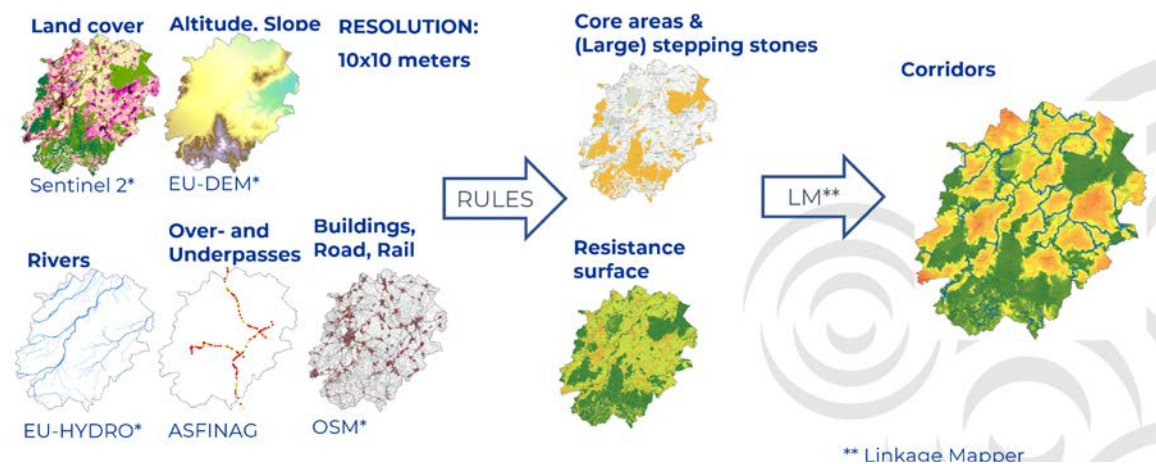
For this purpose, rules for the designation of core areas and for the definition of resistance surfaces – both substantial inputs for the calculation of the



corridors – have to be specified for the selected species-groups based on available information and knowledge.

These calculations should use data sets that are largely available in comparable form for all pilot areas. As an added benefit, data that are periodically updated on an ongoing basis will be preferred. In this way, an established set of rules that is transparent and comprehensible can be applied in an analogous manner to future studies. These considerations result in a top-down GIS model based on data available to the EU level and subsequently complemented and improved by regional and local knowledge and field surveys.

*Note: Fig. 2 shows the workflow of the GIS-model, using the PA Pöttsching as an example. Additional information is provided in D.T1.1.2. (Grillmayer & Plutzar 2021).*



*Fig 2: Schematic workflow of the GIS-model to assess the structural connectivity of corridors. \* indicates data sets available on EU-level. \*\* Linkage Mapper is a widely used modelling framework for the calculation of corridors (see <https://circuitscape.org/linkagemapper/linkage-mapper-tools/>)*

## 1.4. Local criteria for prioritization/selection of monitoring plots

The criteria for selection of **monitoring sites** were as follows:

1. To use the opportunity of “before” monitoring on the last sector of the motorway still need to be built;
2. To include major structural barriers (artificial – transport infrastructure, and natural – the Mures river) and their important connectivity sectors (on transport infrastructure - special mitigation measures and other objects not dedicated for wildlife passages, on the Mures river – beaches, dead arms, riparian vegetation and islands);
3. To include functional barriers (i.e. mortality, sound & light disturbance etc.) for relevant sectors;
4. Target most of the relevant species-groups, habitat types and land-uses within pinch-points, on the adjacent land and on control-areas.

## 1.5. Target Species

The target species groups are presented in the table below:

Group	Species	Notes	Type of relevant ecosystems for monitoring of target species
Invasive plants (IP)	TBD	<i>After the first field overview</i>	All
Terrestrial insects (TI)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, built areas
Fish (F)	TBD	<i>After the first field overview</i>	Aquatic
Amphibians & reptiles (A), (R)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Medium-sized mammals (M)	Wild cat, fox, badger	<i>Other mustelids, Golden jackal?</i>	Forest, grassland, forested grassland, riparian, agriculture
Bats (B)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear		Forest, grassland, forested grassland, riparian, agriculture, aquatic.

## 1.6. Monitoring methodology, guidelines & tools

After the monitoring sites have been identified, SaveGREEN aims to conduct the monitoring in the eight pilot areas in a consistent way. In order to be able to guarantee this aim, a guideline was developed. This guideline – D.T1.1.3 (Grillmayer, Plutzar & Sedy 2021) – includes the development of standard data forms for the fieldwork as well as a decision matrix to specify which parameters/ measurements have to be carried out for which species and which methods shall be used. The monitoring process will be supported by an electronic application toolbox, which is currently developed for SaveGREEN. The toolbox will support the following project activities:

- Consistent and quality-assured storage of all data created within the framework of the project genesis
- fieldwork and monitoring of functional connectivity within the pilot areas
- Consistent data flows between field workers and IT infrastructure
- Publishing the data and exposing them to general public

*Note: Additional information on the toolbox is provided in D.T1.2.1. (Borgwardt, F. & Grillmayer R.).*

## 2. An overview of the monitoring sites

### **Monitoring site #1: “The missing motorway sector”**

#### **i. General description:**

A not-yet built section of about 9 km of the Sector 2 on the Lugoj-Deva motorway, between Nemesesti, Costeiu de Sus and Holdea. Here a series of major mitigation solutions for wildlife will be implemented – bored tunnels, viaducts, underpasses.

The situation may allow monitoring to be conducted before and during constructions, and during the operation phases.

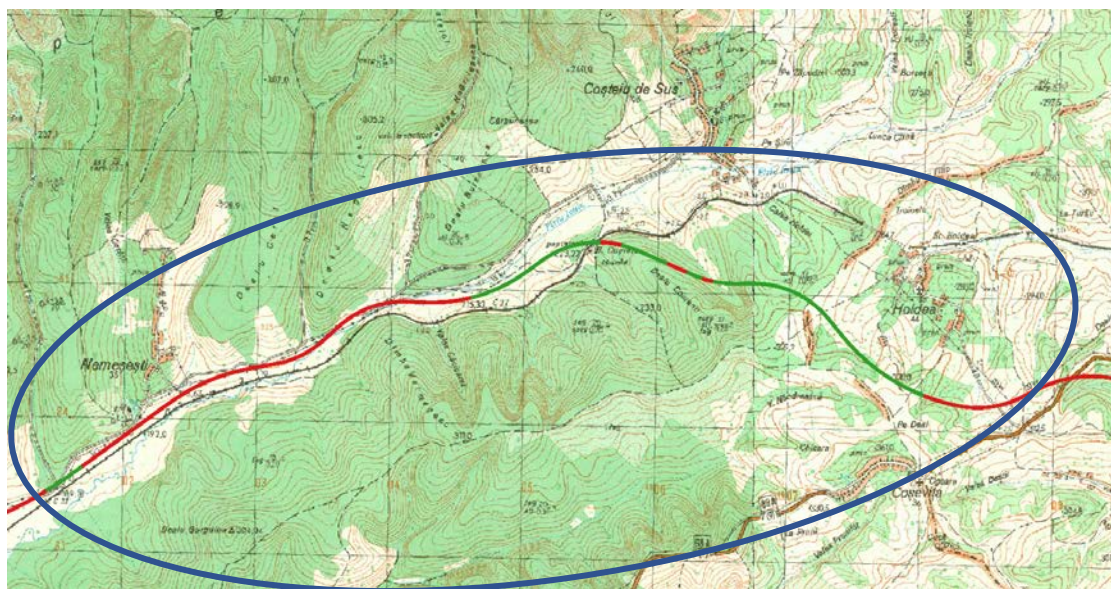


Fig 3: The monitoring site #1

#### **ii. Target species**

Group	Species	Notes	
Invasive plants (IP)	TBD	<i>O monitorizare inițială înainte de construcție</i>	
Terrestrial insects (TI)	TBD	<i>O monitorizare inițială pe lunca p. Icuii, Coșteiu, + zona Holdea, Baștea și Lunca Mureșului.</i>	Colectare probe genetice? (schimb genetic între V. Icuii, V. Coșteiu, V. Baștea + Bega, Mureș)  De investigat dacă lunca/valea p. Icuii + lunca/valea p. Coșteiu este

		<i>+ ploturi sau transecte pe liziere</i>	un culuar de migrație/dispersie pentru speciile de pajiște între Bazinul Begăi și Bazinul Mureșului.
Fish (F)	TBD	<i>Pescuit electric pe P. Icuu înainte de construcție / în timpul, după</i>	De amplasat ploturi și înafara viitorului șantier, pentru acces.  De discutat o alternativă la regularizarea integral a sectorului de pârâu.
Amphibians & reptiles (AR)	TBD	<i>Ploturi în zona viitoarelor treceri (specii de interes) + ploturi de control</i>  <i>Pt reptile – ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic între V. Icuu, V. Coșteiu, V. Baștea + Bega, Mureș)
Medium-sized mammals (M)	Wild cat, fox, badger	<i>De urmărit treceri peste viitorul traseu (densitate/frecvență)</i>	<i>Other mustelids, Golden jackal? Ploturi peste viitoarele obiecte + control.</i>
Bats (B)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear	De urmărit treceri peste viitorul traseu (densitate/frecvență) + Transecte pe culmi + camere	Colectare probe genetice pt lup, râs, urs?  De cartat zonele cu semnal GSM

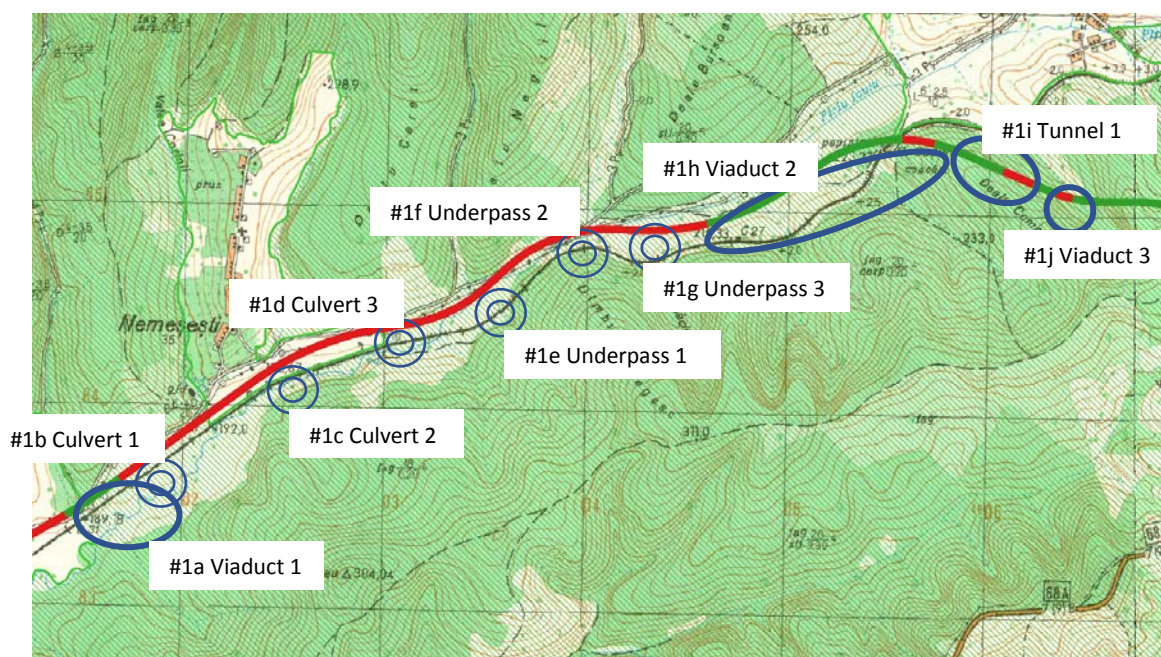
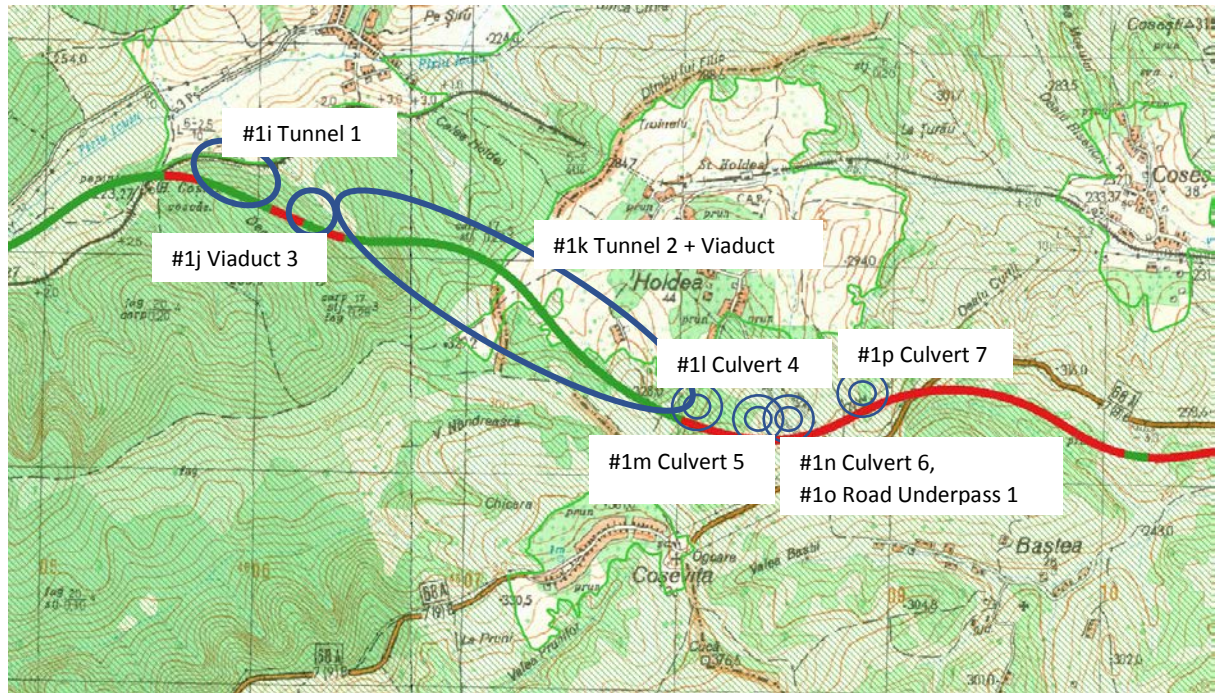


Fig. 3a: Important passageways in the monitoring site #1

**iii. Important areas/sectors/locations for monitoring:**

<b>Monitoring site #1a:</b>	<b>Viaduct 1</b>
<b>Monitoring site #1b:</b>	<b>Culvert 1</b>
<b>Monitoring site #1c:</b>	<b>Culvert 2</b>
<b>Monitoring site #1d:</b>	<b>Culvert 3</b>
<b>Monitoring site #1e:</b>	<b>Underpass 1 (3*6m)</b>
<b>Monitoring site #1f:</b>	<b>Underpass 2 (3*6m)</b>
<b>Monitoring site #1g:</b>	<b>Underpass 3 (4*6m)</b>
<b>Monitoring site #1h:</b>	<b>Viaduct 2, over railway</b>
<b>Monitoring site #1i:</b>	<b>Tunnel 1</b>
<b>Monitoring site #1j:</b>	<b>Viaduct 3</b>
<b>Monitoring site #1k:</b>	<b>Tunnel 2 + Viaduct</b>
<b>Monitoring site #1l:</b>	<b>Culvert 4 (2,2*2,2m)</b>
<b>Monitoring site #1m:</b>	<b>Culvert 5 (2,2*2,9m)</b>
<b>Monitoring site #1n:</b>	<b>Culvert 6 (2,2*2,2m)</b>
<b>Monitoring site #1o:</b>	<b>Road underpass (5*12m)</b>
<b>Monitoring site #1p:</b>	<b>Culvert 7 (1,5*2,0m)</b>
<b>Monitoring site #1q:</b>	<b>E68A</b>
<b>Monitoring site #1r:</b>	<b>DC Margina-Costeiu-Holdea</b>
<b>Monitoring site #1s:</b>	<b>Railway Margina-Costeiu-Holdea</b>
<b>Monitoring site #1t:</b>	<b>Icuiu Creek</b>



*Fig. 3b: Important passageways in the monitoring site #1*

**Monitoring site #2**      **“The built section of the sector 3 on the Lugoj-Deva Motorway, within the Natura 2000 site Coridorul Dealurile Lipovei – Poiana Rusca“**

**i. General description:**

The built sections within the Natura 2000 site Coridorul Dealurile Lipovei – Poiana Rusca includes two greenbridges and a series of culverts. The motorway runs in close vicinity of the E68A European Road.

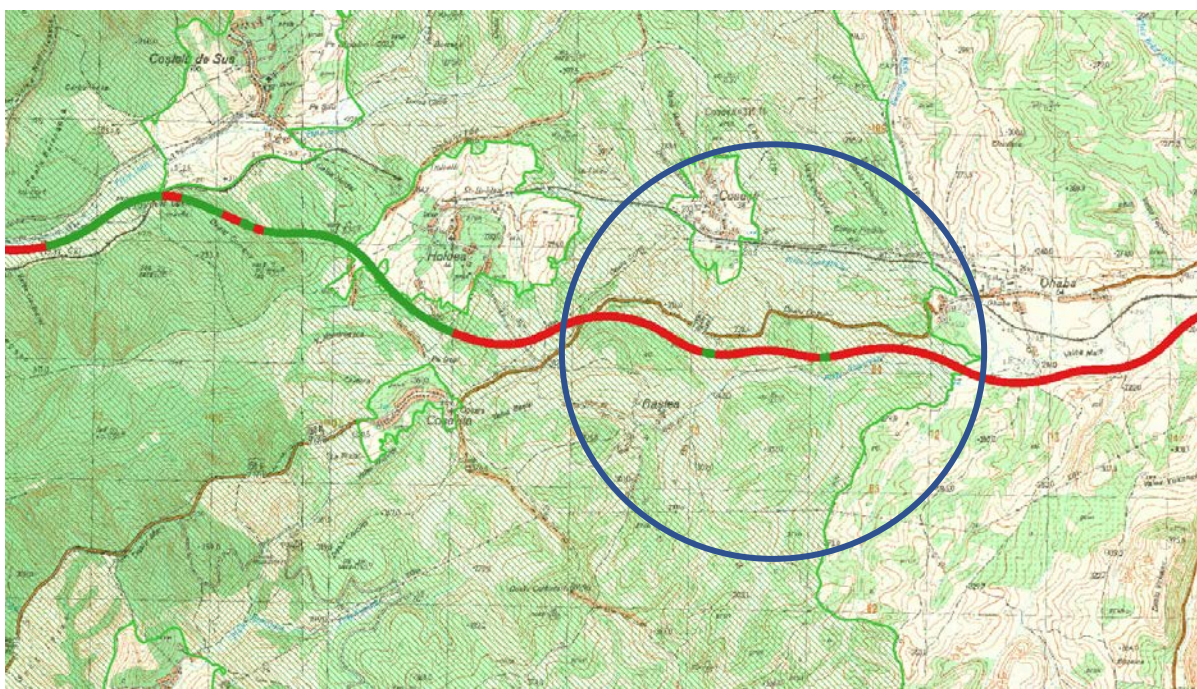


Fig. 4. The monitoring site #2

**ii. Target species:**

Group	Species	Notes	
Invasive plants (IP)	TBD	<i>O monitorizare a fostelor depozite de material, depozitarile de pe lunca p. Ungurean</i>	
		<i>În dreptul ecoductelor, pe ecoducte și pe marginea E68A.</i>	
Terrestrial insects (TI)	TBD	<i>Zona ecoductelor</i>	Marcare-recapturare
		<i>+ ploturi sau transecte pe liziere</i>	



Amphibians & reptiles (AR)	TBD	<i>Pt reptile - Ecoducte, inclusiv marginile exterioare lelate de noile microhabitate de pe taluzuri</i>  <i>Pt amfibieni - subtraversabile</i>	Colectare probe genetice?
Medium-sized mammals (M)	Wild cat, fox, badger	<i>Ecoducte + subtraversari</i>	<i>Other mustelids, Golden jackal? Ploturi peste viitoarele obiecte + control.</i>
Bats (B)	TBD	<i>Ecoducte si liziere</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear	<i>Ecoducte (densitate/frecvență) + Transecte pe culmi + camere</i>	Colectare probe genetice pt lup, răs, urs?

### iii. Important areas/sectors/locations for monitoring:

- Monitoring site #2a: Culvert 1 (1,5\*2,1m)**
- Monitoring site #2b: Culvert 2 (1,5\*2,0m)**
- Monitoring site #2c: Greenbridge #1 on motorway**
- Monitoring site #2d: Culvert 3 (1,5\*2,1m)**
- Monitoring site #2e: Culvert 4 (1,5\*2,3m)**
- Monitoring site #2f: Culvert 5 (1,5\*2,1m)**
- Monitoring site #2g: Greenbridge #2 on motorway**
- Monitoring site #2h: Culvert 6 (1,5\*2,1m)**
- Monitoring site #2i: E68A**
- Monitoring site #2j: DC Holdea - Cosesti**
- Monitoring site #2k: DC Bastea**
- Monitoring site #2l: Railway Holdea - Cosesti**

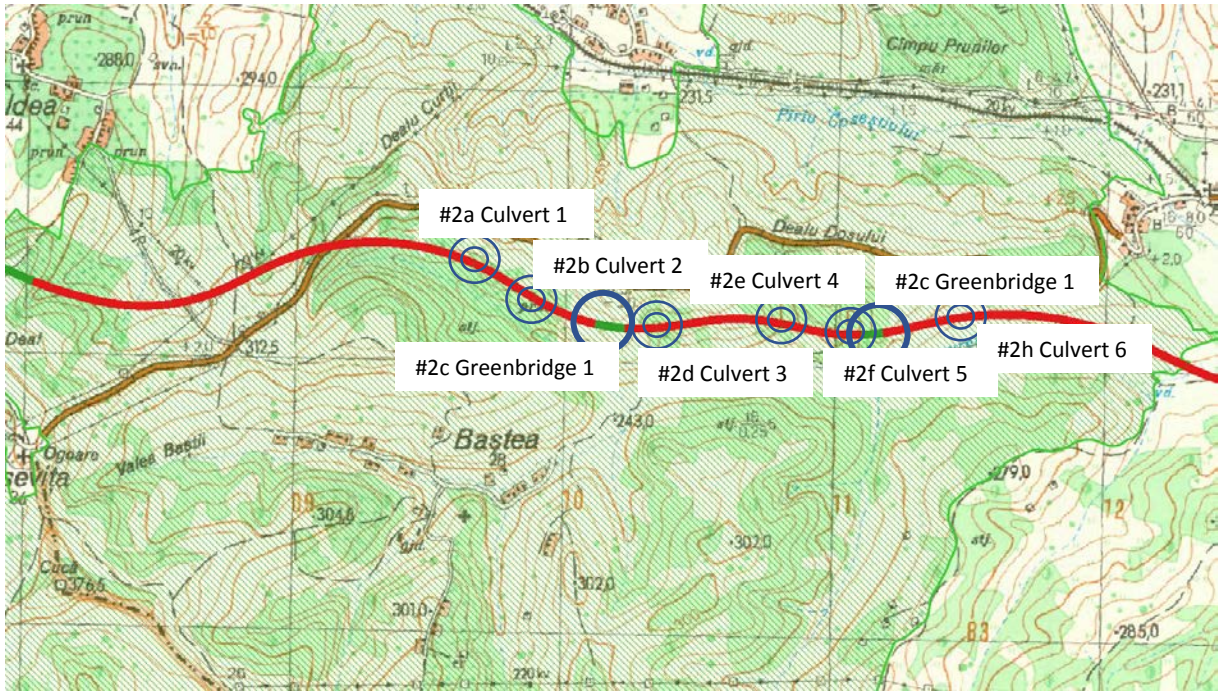


Fig. 5: Important passageways in the monitoring site #2

**Monitoring site #3: “Grind – Dobra – Câmpuri-Surduc”**

**i. General description:**

The Mures valley section where the riparian vegetations acts as an important corridor itself, the bridge on the motorway over Mures being an crucial passageway for large terrestrial fauna.

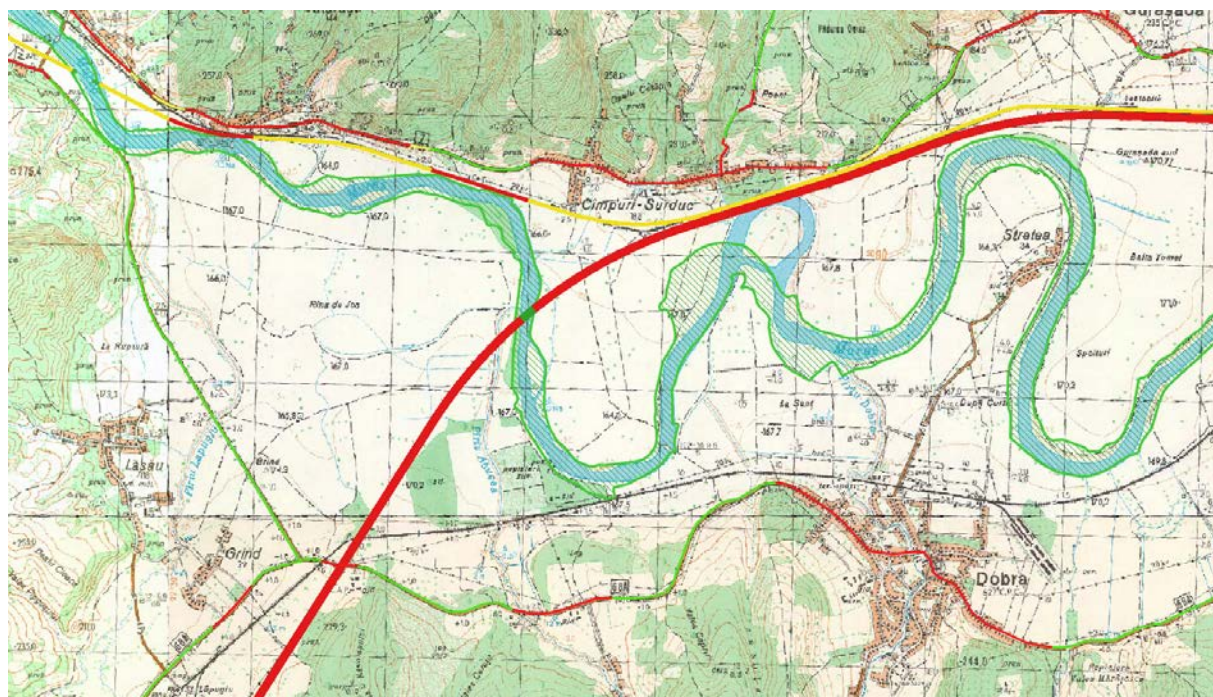


Fig. 5: The monitoring site #3

**ii. Target species:**

Group	Species	Notes	
Invasive plants (IP)	TBD	<i>O monitorizare inițială pe traseul infrastructurii de transport + lunca Muresului.</i>	
Terrestrial insects (TI)	TBD	<i>O monitorizare inițială in Lunca Mureșului + dealuri Dobra / Terrasol .</i>  <i>Pod Mures + ploturi sau transecte pe liziere</i>  <i>Abucea pt C.V.?</i>	Colectare probe genetice? (schimb genetic între V. Icuu, V. Coșteiu, V. Baștea + Bega, Mureș)  De investigat dacă lunca/valea p. Icuu + lunca/valea p. Coșteiu este un culuar de migrație/dispersie pentru speciile de pajiște între Bazinul Begăi și Bazinul Mureșului.

Fish (F)	TBD	<i>Pescuit electric pe P. Abucea – de verificat bariere</i>	
Amphibians & reptiles (AR)	TBD	<i>O monitorizare inițială în Lunca Mureșului + dealuri Dobra / Terrasol .  Pod Mures + ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic între V. Icuu, V. Coșteiu, V. Baștea + Bega, Mureș)
Medium-sized mammals (M)	Wild cat, fox, badger	<i>Pod Mures (densitate/frecvență), Verificare sectoare verzi + galbene pe infrastructura</i>	<i>Other mustelids, Golden jackal?</i>
Bats (B)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear	<i>Pod Mures (densitate/frecvență), Verificare sectoare verzi + galbene pe infrastructura</i>	Colectare probe genetice pt lup, râs, urs?

### iii. Important areas/sectors/locations for monitoring:

**Monitoring site #3a: Bridge on motorway over Mures, Câmpuri-Surduc**

**Monitoring site #3b: E 68**

**Monitoring site #3c: E 68A**

**Monitoring site #3d: Upgraded Railway Arad – Deva**

**Monitoring site #3e: Railway Grind – Dobra**

**Monitoring site #3f: Abucea Creek**

**Monitoring site #4: “Bretea Muresana – Branisca – Lesnic”**

**i. General description:**

The Eastern limit of Defileul Muresului where a multitude of transport infrastructure runs in close vicinity with the Mures River.

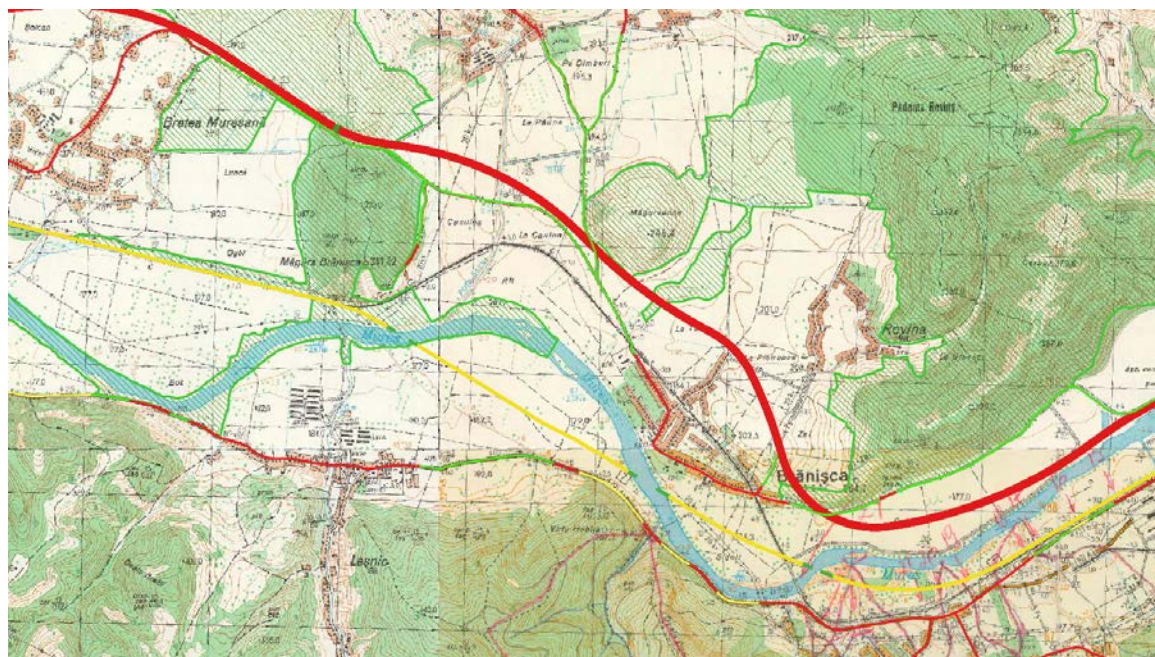


Fig. 6: The monitoring site #4

**ii. Target species, important areas/sectors:**

Group	Species	Notes	
Invasive plants (IP)	TBD	<i>O monitorizare inițială pe calea ferată în construcție</i>	
Terrestrial insects (TI)	TBD	<i>Pe marginile ecoductului Branisca + ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic peste Mureș) Ploturi în t. agricol
Fish (F)	TBD	<i>Vezi semnalare Transgreen pt noua bariera</i>	
Amphibians & reptiles (AR)	TBD	<i>Amfibieni - subtraversari</i>  <i>Pt reptile – ecoduct, pod + ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic peste Mureș) Ploturi în t. agricol
Medium-sized	Wild cat, fox,	<i>De urmărit treceri</i>	<i>Other mustelids, Golden jackal?</i>

mammals (M)	badger	<i>peste infrastructura (densitate/frecvență)</i>	<i>Ploturi peste viitoarele obiecte + control.</i>
Bats (B)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear	<i>De urmărit treceri peste infrastructura (densitate/frecvență)</i> + Transecte pe culmi + camere	Colectare probe genetice pt lup, râs, urs?  Camere Branisca? / zona iernare urs?

### iii. Important areas/sectors/locations for monitoring:

- Monitoring site #4a:** Culvert 1 (2.3\*2.1m) Mtw.
- Monitoring site #4b:** Greenbridge #3/ Branisca on motorway
- Monitoring site #4c:** Road underpass (5\*6m) Mtw.
- Monitoring site #4d:** Culvert 2 (2.3\*2.1m) Mtw.
- Monitoring site #4e:** Bridge, Bozu Creek (20\*3m) Mtw.
- Monitoring site #4f:** Upgared railway Bridge over Mures – Magura
- Monitoring site #4g:** Upgared railway Bridge over Mures – Branisca
- Monitoring site #4h:** Upgared railway Bretea Muresana – Branisca
- Monitoring site #4i:** E68 European road

**Monitoring site #5: “Mures Valley between Zam and Ilteu”**

**i. General description:**

The Mures valley where a series of tunnels and bridges will be built on the new alignment of the Arad – Deva railway.

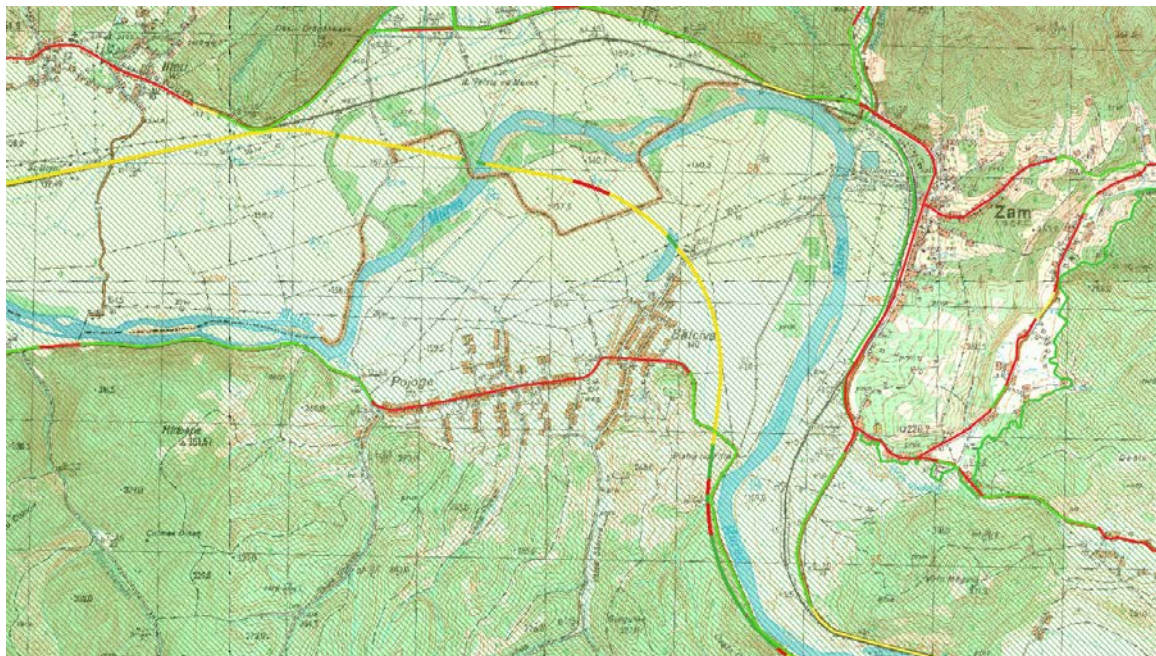


Fig. 7: The monitoring site #5

**ii. Target species:**

Group	Species	Notes	
Invasive plants (IP)	TBD	<i>O monitorizare inițială pe santier CF și în lunca Muresului.</i>	
Terrestrial insects (TI)	TBD	<i>Peste CF, E68? + ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic peste Mureș)  Ploturi în t. agricol
Semi-aquatic insects (SAI)	TBD – <i>Carabus variolosus?</i>	<i>Afluenți Mures</i>	Impact podete?
Fish (F)	TBD	<i>Pescuit electric pe P. Petris și pe afluenți Sudici ai Muresului</i>	Impact podete?
Amphibians & reptiles (AR)	TBD	<i>Amfibieni - subtraversari</i>  <i>Pt reptile – poduri, noi habitate pe CF? + ploturi sau transecte pe liziere</i>	Colectare probe genetice? (schimb genetic peste Mureș)  Ploturi în t. agricol

Medium-sized mammals (M)	Wild cat, fox, badger	<i>De urmărit treceri peste infrastructura (densitate/frecvență)</i>	<i>Other mustelids, Golden jackal? Ploturi peste viitoarele obiecte + control.</i>
Bats (B)	TBD	<i>After the first field overview</i>	Forest, grassland, forested grassland, riparian, agriculture, aquatic, built areas
Large-sized mammals (LM)	Wild boar, red deer, lynx, wolf, bear	<i>De urmărit treceri peste infrastructura (densitate/frecvență)</i> + Transecte pe culmi + camere	Colectare probe genetice pt lup, râs, urs?  Camere poduri, tunel?

### iii. Important areas/sectors/locations for monitoring:

- Monitoring site #5a: Culverts on upgraded railway**
- Monitoring site #5b: Tunnels on upgraded railway, Salciva**
- Monitoring site #5c: Bridge on upgraded railway, Salciva**
- Monitoring site #5d: Bridge on upgraded railway over Mures, Petriș**
- Monitoring site #5e: Bridge on upgraded railway, Petriș**
- Monitoring site #5f: Upgraded railway, Ilteu - Salciva**
- Monitoring site #5g: E68 European Road**
- Monitoring site #5h: County road**



### 3. Monitoring plan – the logical framework

Where?		What?	How?	When?	Who?	Notes	CSOP - objectives
Code	Description – role for connectivity, why it was selected?	Target species, other factors	Methods-codes	Calendar	Responsible		
<b>Site 1</b>	<b>Viaduct 1</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
		TI	A, Ha	April-July 22	II + AZ	Before and control phases	
		A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	
		M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
		B	Ad	TBD	TBD + AZ	Before and control phases	
		LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	<b>Culverts 1-7</b>	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	1-01, 1-1, 1-2.
		M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	

<b>Underpass 1 -3</b>	B	Ad	TBD	TBD + AZ	Before and control phases	1-01, 1-1, 1-2.
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	A, R	A, Ha	March - May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
<b>Viaduct 2</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	TI	A, Ha	April-July 22	II + AZ	Before and control phases	
	A, R	A, Ha	March - May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
<b>Tunnel 2 + Viaduct</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	TI	A, Ha	April-July 22	II + AZ	Before and control phases	

	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
<b>Road underpass</b>	TBD					1-1
<b>E68A</b>	IP	A	Spring 22	AZ		3-10
	M	A, F, Si, T	August 21 – July 22	AZ		
	LM	A, F, Si, T	August 21 – July 22	AZ		
<b>DC Margina-Costeiu-Holdea</b>	IP	A	Spring 22	AZ		3-10
	M	A, F, Si, T	August 21 – July 22	AZ		
	LM	A, F, Si, T	August 21 – July 22	AZ		
<b>Railway Margina-Costeiu-Holdea</b>	IP	A	Spring 22	AZ	IP	3-10
	M	A, F, Si, T	August 21 – July 22	AZ	M	
	LM	A, F, Si, T	August 21 – July 22	AZ	LM	

	<b>Icuiu Creek</b>	SAI	Ba	Spring – Summer 22	AZ - II		5b-3
		F	Ef	Summer 21, 22	AZ -L		
<b>Site 2</b>	<b>Culverts 1-6</b>	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	1-01, 1-1
		M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
		B	Ad	TBD	TBD + AZ	Before and control phases	
		LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	<b>Greenbridge 1 - 2</b>	IP	A	Spring 22	AZ		1.2.
		TI	A, Ha	April-July 22	II + AZ		
		A, R	A, Ha	March – May 22	IG + AZ		
		M	A, F, Si, T	August 21 – July 22	AZ		
		B	Ad	TBD	TBD + AZ		
	<b>E68A</b>	LM	A, F, Si, T	August 21 – July 22	AZ		3-10
		IP	A	Spring 22	AZ		

		M	A, F, Si, T	August 21 – July 22	AZ			
		LM	A, F, Si, T	August 21 – July 22	AZ			
	<b>DC Holdea - Cosesti</b>	IP	A	Spring 22	AZ			3-10
		M	A, F, Si, T	August 21 – July 22	AZ			
		LM	A, F, Si, T	August 21 – July 22	AZ			
	<b>DC Bastea</b>	IP	A	Spring 22	AZ			3-10
		M	A, F, Si, T	August 21 – July 22	AZ			
		LM	A, F, Si, T	August 21 – July 22	AZ			
	<b>Railway Holdea - Cosesti</b>	IP	A	Spring 22	AZ		IP	3-10
		M	A, F, Si, T	August 21 – July 22	AZ		M	
		LM	A, F, Si, T	August 21 – July 22	AZ		LM	
	<b>Site 3</b>	<b>“Bridge on motorway over Mures, Câmpuri-Surduc”</b>	IP	A	Spring 22	AZ		Before and control phases
TI			A, Ha	April-July 22	II + AZ		Before and control phases	
A, R			A, Ha	March – May 22	IG + AZ		Before and control phases	

	M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
<b>E68</b>	IP	A	Spring 22	AZ		3-10
	M	A, F, Si, T	August 21 - July 22	AZ		
	LM	A, F, Si, T	August 21 - July 22	AZ		
<b>E68A</b>	IP	A	Spring 22	AZ		3-10
	M	A, F, Si, T	August 21 - July 22	AZ		
	LM	A, F, Si, T	August 21 - July 22	AZ		
<b>“Upgraded Railway Arad – Deva”</b>	IP	A	Spring 22	AZ		3-10
	A, R	A	Spring 22	AZ - IG		
	M	A, F, Si, T	August 21 - July 22	AZ		
	LM	A, F, Si, T	August 21 - July 22	AZ		
<b>Railway Grind –</b>	IP	A	Spring 22	AZ		3-10

	<b>Dobra</b>	M	A, F, Si, T	August 21 - July 22	AZ		5b-3
		LM	A, F, Si, T	August 21 - July 22	AZ		
	<b>Abucea Creek</b>	SAI	Ba	Spring - Summer 22	AZ - II		
		F	Ef	Summer 21, 22	AZ -L		
<b>Site 4</b>	<b>Culverts 1-2</b>	A, R	A, Ha	March - May 22	IG + AZ	Before and control phases	1-01, 1-1
		M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
		B	Ad	TBD	TBD + AZ	Before and control phases	
		LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	<b>Greenbridge 3</b>	IP	A	Spring 22	AZ		1.2.
		TI	A, Ha	April-July 22	II + AZ		
		A, R	A, Ha	March - May 22	IG + AZ		
		M	A, F, Si, T	August 21 - July 22	AZ		
		B	Ad	TBD	TBD + AZ		

	LM	A, F, Si, T	August 21 - July 22	AZ		
<b>Road underpass</b>	TBD					1-1
<b>Bridge, Bozu Creek</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	TI	A, Ha	April-July 22	II + AZ	Before and control phases	
	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
<b>Upgraded railway Bridge over Mures – Magura</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	TI	A, Ha	April-July 22	II + AZ	Before and control phases	
	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 - July 22	AZ	Before and control phases	



	<b>Upgraded railway Bridge over Mures – Branisca</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.	
		TI	A, Ha	April-July 22	II + AZ	Before and control phases		
		A, R	A, Ha	March – May 22	IG + AZ	Before and control phases		
		M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
		B	Ad	TBD	TBD + AZ	Before and control phases		
		LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
	<b>Upgraded railway Bretea Muresana – Branisca</b>	IP	A	Spring 22	AZ		3-10	
		A, R	A	Spring 22	AZ - IG			
		M	A, F, Si, T	August 21 – July 22	AZ			
		LM	A, F, Si, T	August 21 – July 22	AZ			
	<b>E68</b>	IP	A	Spring 22	AZ		3-10	
		M	A, F, Si, T	August 21 – July 22	AZ			
		LM	A, F, Si, T	August 21 – July 22	AZ			
	<b>Site 5</b>	<b>Culverts</b>	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	1-01, 1-1

	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
<b>Tunnels on upgraded railway, Salciva</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
<b>Bridge on upgraded railway, Sălciva</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.
	TI	A, Ha	April-July 22	II + AZ	Before and control phases	
	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases	
	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
	B	Ad	TBD	TBD + AZ	Before and control phases	
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases	
<b>Bridge on upgraded</b>	IP	A	Spring 22	AZ	Before and control phases	1-01, 1-1, 1-2.

<b>railway over Mures, Petriș</b>	TI	A, Ha	April-July 22	II + AZ	Before and control phases	1-01, 1-1, 1-2.	
	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases		
	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
	B	Ad	TBD	TBD + AZ	Before and control phases		
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
<b>Bridge on upgraded railway, Petriș</b>	IP	A	Spring 22	AZ	Before and control phases		
	TI	A, Ha	April-July 22	II + AZ	Before and control phases		
	A, R	A, Ha	March – May 22	IG + AZ	Before and control phases		
	M	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
	B	Ad	TBD	TBD + AZ	Before and control phases		
	LM	A, F, Si, T	August 21 – July 22	AZ	Before and control phases		
<b>Upgraded railway, Ilteu - Salciva</b>	IP	A	Spring 22	AZ			3-10
	A, R	A	Spring 22	AZ - IG			
	M	A, F, Si, T	August 21 – July 22	AZ			

		LM	A, F, Si, T	August 21 - July 22	AZ		
	<b>E68</b>	IP	A	Spring 22	AZ		3-10
		M	A, F, Si, T	August 21 - July 22	AZ		
		LM	A, F, Si, T	August 21 - July 22	AZ		
		IP	A	Spring 22	AZ		
	<b>DJ County road</b>	M	A, F, Si, T	August 21 - July 22	AZ		3-10
		LM	A, F, Si, T	August 21 - July 22	AZ		

### Legend:

#### **Monitoring methods / codes:** A = personal observation

Ad = acoustic detector

Ba = Barber traps

Bc = Batcorder

D = detector

Ef = electrofishing

F = photo trap

Ha = collection by hand

Hn = handling net

Kv = artificial hiding place

Lf = live trap

N = net

Rk = collecting of road killed individuals

S = track collector

Si = signs

T = animal tracks in snow, mud, sand,...

Zk = fence-bucket method

#### **CSOP objectives – selection:**

1-01. Ensure support-data for new infrastructure projects

1-1. Ensure functionality of underpasses

1-2. Ensure functionality of overpasses

3-10. Collect and process data to understand incidents/accidents with wildlife / critical sectors

3-12. Develop and use an integrated database as decision-supporting tool to address traffic incidents (to implement / adjust measures to prevent wildlife traffic-kills, damages, human casualties)

5b-2. Support adequate management of natural features / marginal habitats

5b-3. Support and promote development of good-practice examples of connectivity-sensible agriculture, water management and forestry practices

## 4. Monitoring results, feedback & data base

Data and information collected will be implemented in a dedicated database as mentioned in 1.6. This database will be based on the open source database technology PostgreSQL<sup>1</sup> with the extension PostGIS<sup>2</sup> for the backend to implement a uniform SaveGREEN database schema. The PostGIS extension also enables the storage and analysis of geographic data. This is a proper way to ensure the reuse of the developed tools in other projects without additional licensing costs.

As described in D.T1.2.1. (Borgwardt, F. & Grillmayer R. 2021), the open source software QField will be used for the first monitoring season. The intension of the first monitoring season is to gather experience and to adjust the monitoring concepts if necessary in the second season. Based on the users experience of the first monitoring season, all parameters from the functional monitoring set up, which have great potential for a citizen science monitoring approach, will be implemented on mobile devices which are based on Android. Therefore, the existing mobile application “Roadkill” will be extended with these features.

Hence, all relevant feedback from the first period will be used for further development and refinement of methodology, guidelines and tools.

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1 <https://www.postgresql.org/>

2 <https://postgis.net/>

## 5. Communicating the monitoring results

Monitoring results are critical for data-based decisions, therefore will be used to facilitate the engagement of relevant stakeholders for decision-making or of those engaged in different monitoring within the pilot area (and not only). In this respect, monitoring data are crucial for further development of the local Cross-Sectoral Operational Plans.

Part of data will be relevant for the general public also (a special attention should be given to sensitive data – i.e. rare or protected species important sites: crossings, breeding sites etc. – and should be kept confidential), hence the communication section of the Cross-Sectoral Operational Plans will be further informed by the monitoring results.

## 6. References

Borgwardt, F. & Grillmayer R. (2021): Documentation for specifications for the development of the electronic application toolbox - Deliverable D.T1.2.1. Report for the INTERREG-project SaveGREEN. Environment Agency Austria, 44pp.

Grillmayer, R. & Plutzar, C. (2021): Draft Guidelines for standardised monitoring of structural connectivity - Deliverable D.T1.1.2. Report for the INTERREG-project SaveGREEN. Environment Agency Austria, 21pp.

Grillmayer, R., Plutzar, C. & Sedy, K. (2021): Draft Guidelines for standardised monitoring of functional connectivity - Deliverable D.T1.1.3. Report for the INTERREG-project SaveGREEN. Environment Agency Austria, 23pp.

Scaletool (n.d.): Differences between structural and functional connectivity.  
<http://scales.ckff.si/scaletool/?menu=4&submenu=0>