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WITH



SEICA
SUCEAVA HIGHWAY – DN2H AND EXPRESS ROAD DN2H
– SIRET BORDER

Beneficiary

**NATIONAL ROAD INFRASTRUCTURE ADMINISTRATION COMPANY
(CNAIR) SA**

IMPACT ASSESSMENT STUDY ON WATER BODIES

Suceava highway – DN2H and Expressway DN2H – Siret border

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LIST OF ABBREVIATIONS

baize	Water Basin Administration
NARW	National Administration of Romanian Waters"
NAFA	National Agency for Fisheries and Aquaculture
CNAIR	National Road Infrastructure Administration Company
DC underscored	Directive 2000/60/EC (Water Framework Directive)
DN	National road
DJ	County Road
MISTER	Local Road
BONE	Site organizations
EMP	Environmental Management Plan
PNMBHD	The updated national management plan related to the national portion of the international river basin of the Danube River
SEICA	Impact Assessment Study on Water Bodies
SH	The Hydrographic Space

1 GENERAL DATE

1.1 PROJECT HOLDER/BENEFICIARY

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R O M Ȃ N I A
MINISTERUL MEDIULUI, APELOR ȘI PĂDURILOR
COMISIA DE ATESTARE

În conformitate cu prevederile Legii apelor nr.107/1996 cu modificările și completările ulterioare, ale Hotărârii Guvernului nr. 43/2020 privind organizarea și funcționarea Ministerului Mediului, Apelor și Pădurilor și ale Ordinului ministrului mediului, apelor și pădurilor nr. 1287/2021 pentru aprobarea *Regulamentului privind organizarea activității de atestare a instituțiilor publice sau private specializate în elaborarea documentațiilor pentru fundamentarea solicitării avizului de gospodărire a apelor și a autorizației de gospodărire a apelor, a studiilor hidrologice, hidrogeologice, de gospodărire a apelor și de evaluare a impactului asupra corpurilor de apă*, emite prezentul

CERTIFICAT DE ATESTARE Nr. 328
pentru

Instituția publică/privată **EPC – CONSULTANȚĂ DE MEDIU S.R.L.** înregistrată la Oficiul Registrului Comerțului al Municipiului București, cu nr. J40/7554/2000, având C.U.I. 13280921, cu sediul în Municipiul București, sector 1, Șos. Nicolae Titulescu, nr. 16, bloc 22, scara A, etaj 7, ap. 25, ce îndeplinește condițiile prevăzute în Regulamentul privind organizarea activității de atestare a instituțiilor publice sau private specializate în elaborarea documentațiilor pentru fundamentarea solicitării avizului de gospodărire a apelor și a autorizației de gospodărire a apelor, a studiilor hidrologice, hidrogeologice, de gospodărire a apelor și de evaluare a impactului asupra corpurilor de apă, aprobat prin Ordinul ministrului mediului, apelor și pădurilor nr. 1287/2021 și are competența tehnică și profesională de a efectua lucrări în următoarele domenii:

D) elaborarea documentațiilor pentru obținerea avizului/autorizației de gospodărire a apelor pentru:

- D1 - construcții și amenajări hidrotehnice, hidroenergetice, hidroameliorații, depozite de deșuri menajere sau industriale (inclusiv lucrări de închidere) și lucrări de traversare cursuri de apă: baraje, acumulări permanente sau nepermanente, derivații hidrotehnice; centrale hidroelectrice, folosințe hidromecanice, amenajări pentru navigație; lucrări de apărare împotriva acțiunii distructive a apei: îndiguiri, apărări și consolidări de maluri și albi, rectificări și reprofilări de albi, lucrări de dirijare a apei, combaterea eroziunii solului, regularizarea scurgerii pe versanți, corectări de torenți, desecări și asanări, alte lucrări de apărare; depozite de deșuri menajere și industriale: iazuri de decantare, halde de steril, zguri și cenuși, șlamuri, nămoluri și altele asemenea; lucrări de închidere a minelor și carierelor, a depozitelor menajere și industriale și de reconstrucție ecologică a zonelor afectate; lucrări, construcții și instalații care se execută pe malul mării (inclusiv lucrări pentru consolidarea falezelor, protecția și reabilitarea plajelor), pe fundul apelor maritime; traversări de cursuri de apă cu lucrările aferente: poduri, conducte, linii electrice etc;
- D2 - sisteme hidroedilitare: alimentări cu apă potabilă, industrială și pentru irigații, amenajări piscicole; lucrări de canalizare și evacuare a apelor uzate, stații și instalații de prelucrare a calității apelor;
- D4 - lucrări de prospecțiuni, de explorare/exploatare prin foraje terestre sau maritime; injectarea apelor de zăcământ de la schelele de extracție;
- D5 - planuri de amenajare a teritoriului, planuri de urbanism general, zonal și de detaliu;
- D7 - alte tipuri de lucrări care se construiesc pe ape sau care au legătură cu apele.

E) elaborarea studiilor de evaluare a impactului asupra corpurilor de apă.

Prezentul certificat a fost emis la data de 04.09.2023 având valabilitatea de 3 (trei) ani până la data de 04.09.2026.
Acesta poate fi retras în condițiile prevăzute la art. 20 și art. 21 din regulament.

PREȘEDINTELE COMISIEI DE ATESTARE
SECRETAR DE STAT
ADRIANA PETCU



Certificatul a fost emis în două exemplare, egal valabile Exemplarul nr. 1 din 2

Figure no.1-Certificate of attestation for the preparation of documentation for obtaining the water management approval/authorization and impact assessment studies on water bodies

2 DATA ABOUT THE PROJECT

2.1 FULL PROJECT NAME

The full name of the project, according to the first phase of the regulatory procedure from the point of view of construction (the phase of obtaining Urban Planning Certificates) is "Autostrada Suceava - DN2H and Express Road DN2H - Siret border".

2.2 PROJECT LOCATION

The Suceava - DN2H highway and the DN2H expressway - the Siret border are included in the Pașcani - Suceava - Siret road project, a component part of the Bucharest - Ukraine corridor, thus ensuring the connection between the south of the country via the A7 highway and the north, respectively the region of Moldova and the country, neighboring Ukraine.

The project will have a total length of approx. 56 km, with a design speed of 120 km/h from km 0+000 to km 10+000 and 140 km/h from km 10+000 to km 56+000.

The Suceava – DN2H highway and the DN2H expressway – the Siret border run on the administrative territory of several territorial administrative units, respectively: Suceava (km 0+000), Mitocul Dragomirnei (km 3+700), Suceava (km 7+200), Pătrăuți (km 9+230), Dărmănești (km 14+520), Grănicești (km 23+715), Calafindești (km 33+925), Bălcăuți (km 39+400), Siret (km 46+240), Mușenița (km 48+210), Siret (km 49+475), Musenița (km 51+150), Siret (km 53+860).

The intersection areas of the project with the UATs are represented in the following figure.

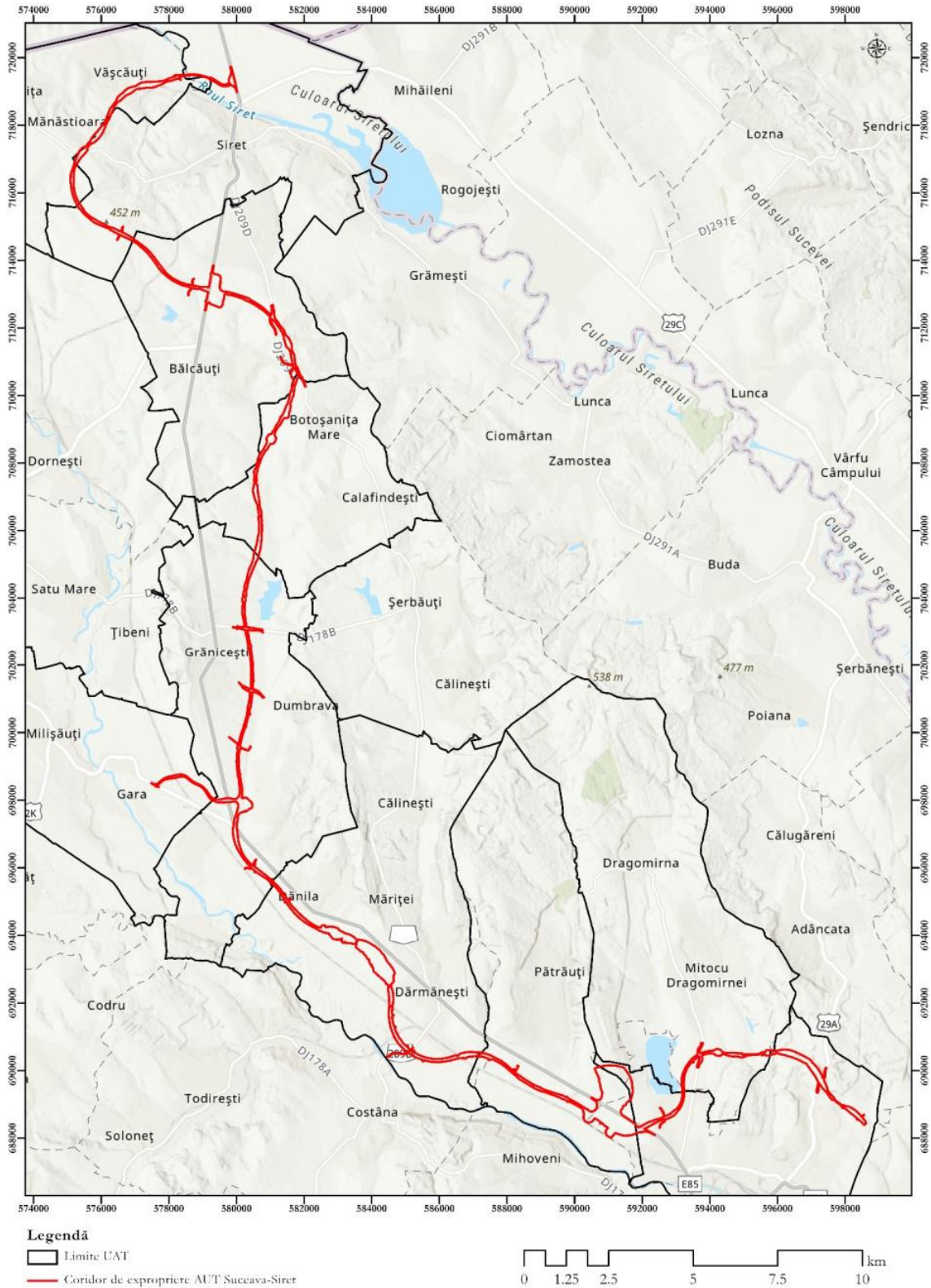


Figure no.2-1 Territorial administrative units intersected by the project

2.3 DESCRIPTION OF THE PROPOSED WORKS

The project provides for the construction of a highway and an express road between the municipality of Suceava and the city of Siret.

In addition to the actual carriageway of the highway and the expressway, the project includes the following components:

- ⚙️ road junctions in intersected areas or branching with other means of communication;
- ⚙️ bridges, passages and viaducts;
- ⚙️ consolidation works;
- ⚙️ hydrotechnical works;
- ⚙️ water drainage works;
- ⚙️ environmental works (e.g.: sound-absorbing panels, anti-collision panels, fencing, wildlife crossing structure);
- ⚙️ road infrastructure specific equipment - parking lots, service areas, maintenance and coordination center (CIC).

The following table summarizes the works on water bodies in the project area

Table no.2-1 Description of the proposed works on each body of surface water intersecting the project

No. Crt.	Water body name	Water body code	Profitable tip	Proposed works
1.	Vătafului Bridge	RORW12-1-17-30B_B1	footbridge (km 3+585 – km 3+595)	Coffered bridge with L = 90 m, l = 5 m and h = 2.6 m.
2.	Mitoc	RORW12-1-17-30A_B1	Viaduct (km 3+900 – 4+610 km)	Viaduct composed of 2 decks with 15 openings, L = 600 m. The viaduct has 4 piles partially projected into the major water body bed.
3.	Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	Bridge (km 7+920 – 8+060 km)	Bridge composed of 2 decks with 1 span, L = 47.02 m. The bridge has the abutments partially projected into the major bed of the water body.
4.			Diversion and bed protection works with gabion mattress (km 7+950 - 8+050)	Bed diversion and protection with gabion mat filled with local material: L = 235.73 m; b = 14 m, B = 20 m.
5.	Square	RORW12-1-17-28_B1	Bridge (km 11+530 – 11+680 km)	Bridge composed of 2 decks with 1 span, L = 44.52 m. The bridge has the abutments partially projected into the major bed of the water body.
6.			Diversion and bed protection works with gabion mattress (km 11+550 - 11+650)	Bed diversion and gabion mat protection filled with local material: L = 206.53 m; b = 11 m, B = 15 m.
7.	Hâtnuța +Bocancea	RORW12-1-17-27_B1	Bridge (km 14+860 – 15+070 km)	Bridge composed of 2 decks with 3 spans, L = 110.50 m. The bridge has 2 piles partially projected into the main bed of the water body.

No. Crt.	Water body name	Water body code	Profitable tip	Proposed works
8.	Snoring	RORW12-1-17-24A_B1	Bridge (km 25+140 – 25+280 km)	Bridge composed of 2 decks with 1 span, L = 47.02 m. The bridge has the abutments partially projected into the major bed of the water body.
			Bridge (km 35+050 – 35+190 km)	Bridge composed of 2 decks with 1 opening, L = 49.52 m. The bridge has 1 abutment designed integrally in the major bed of the water body.
			Bridge (km 35+950 – km 36+090)	Bridge composed of 2 decks with 1 opening, L = 36.05 m. The bridge has 2 abutments designed integrally in the major bed of the water body.
			Bridge (km 36+575 – 36+090 km)	Bridge composed of 2 decks with 1 opening, L = 47.52 m. The bridge has no piers or ailerons projected into the major or minor bed of the water body.
			Diversion and bed protection works with gabion mattress (km 25+100 - 25+300)	Bed diversion and protection with gabion mat filled with local material: L = 323.52 m; b = 12 m, B = 19 m.
9.			Diversion and bed protection works with gabion mattress (km 36+575 - 36+700)	Bed diversion and protection with gabion mat filled with local material: L = 240.46 m; b = 10 m, B = 16 m.
10.	Shop	RORW12-1-3_B1	Bridge (km 42+030 – km 42+170)	Bridge composed of 2 decks with 1 opening, L = 47.52 m. The bridge has no piers or ailerons projected into the major or minor bed of the water body.
11.			Diversion and bed protection works with gabion mattress (km 41+975 - 42+250)	Bed diversion and protection with gabion mat filled with local material: L = 283.5 m; b = 6 m, B = 11 m.
12.	Siret (border - Lake Rogojesti)	RORW12-1_B0	Bridge (km 53+490 – km 54+570)	Bridge composed of 2 decks with 22 spans, L = 960 m. The bridge has 39 piles and 2 ailerons designed integrally in the major bed of the water body.



Figure no.2-3 Bridge designed on the Dragomirna water body (Lake Dragomirna – cf Suceava) – RORW12-1-17-30_B3



Figure no.2-4 Bridge designed on the Pătrăuțeanca water body – RORW12-1-17-28_B1



Figure no.2-5 Bridge designed on the water body Hătuța + Bocancea – RORW12-1-17-27_B1

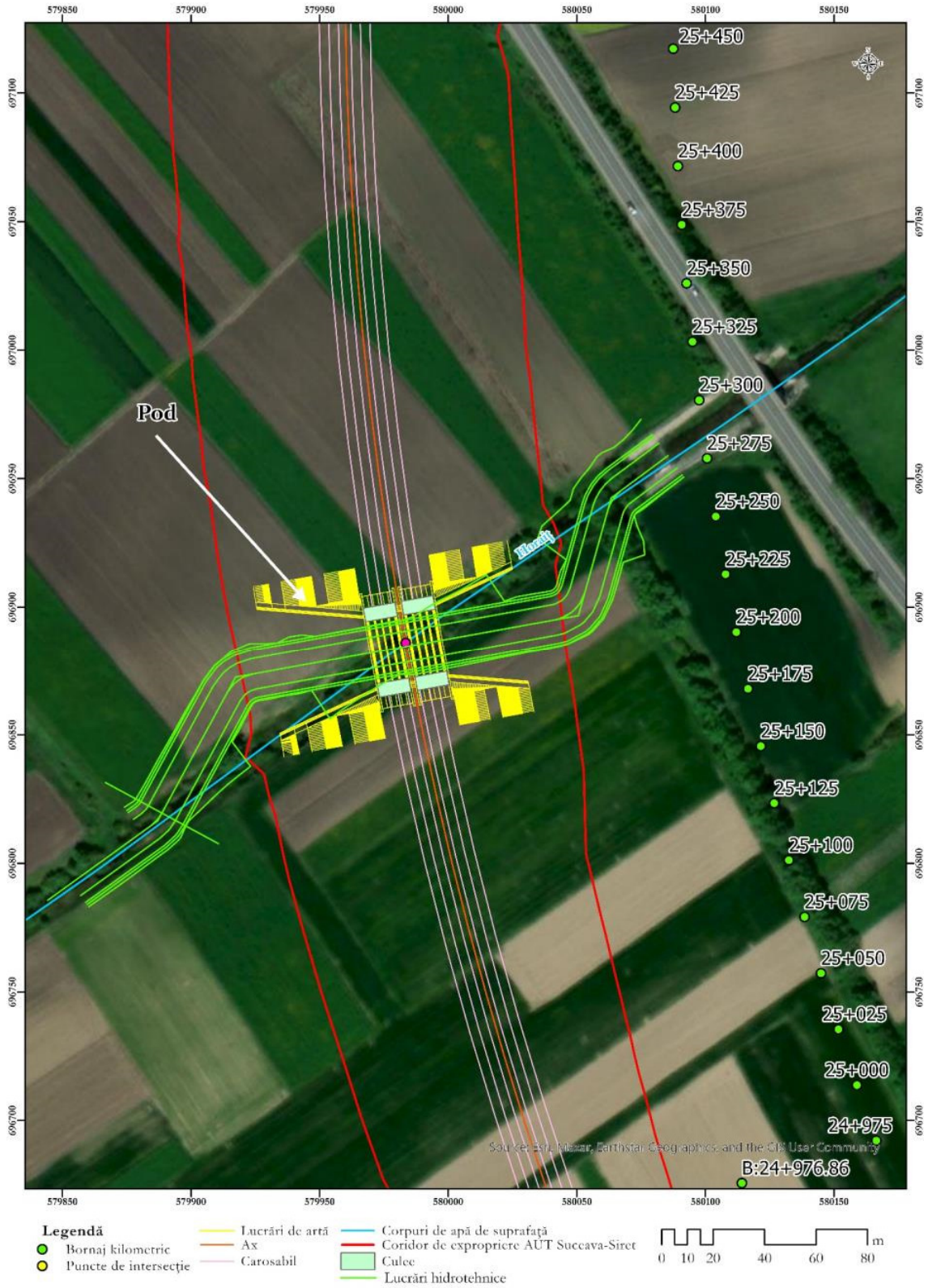


Figure no.2-6 Bridge designed on the Horaiț water body – RORW12-1-17-24A_B1 (km 25+140 – km 25+280)

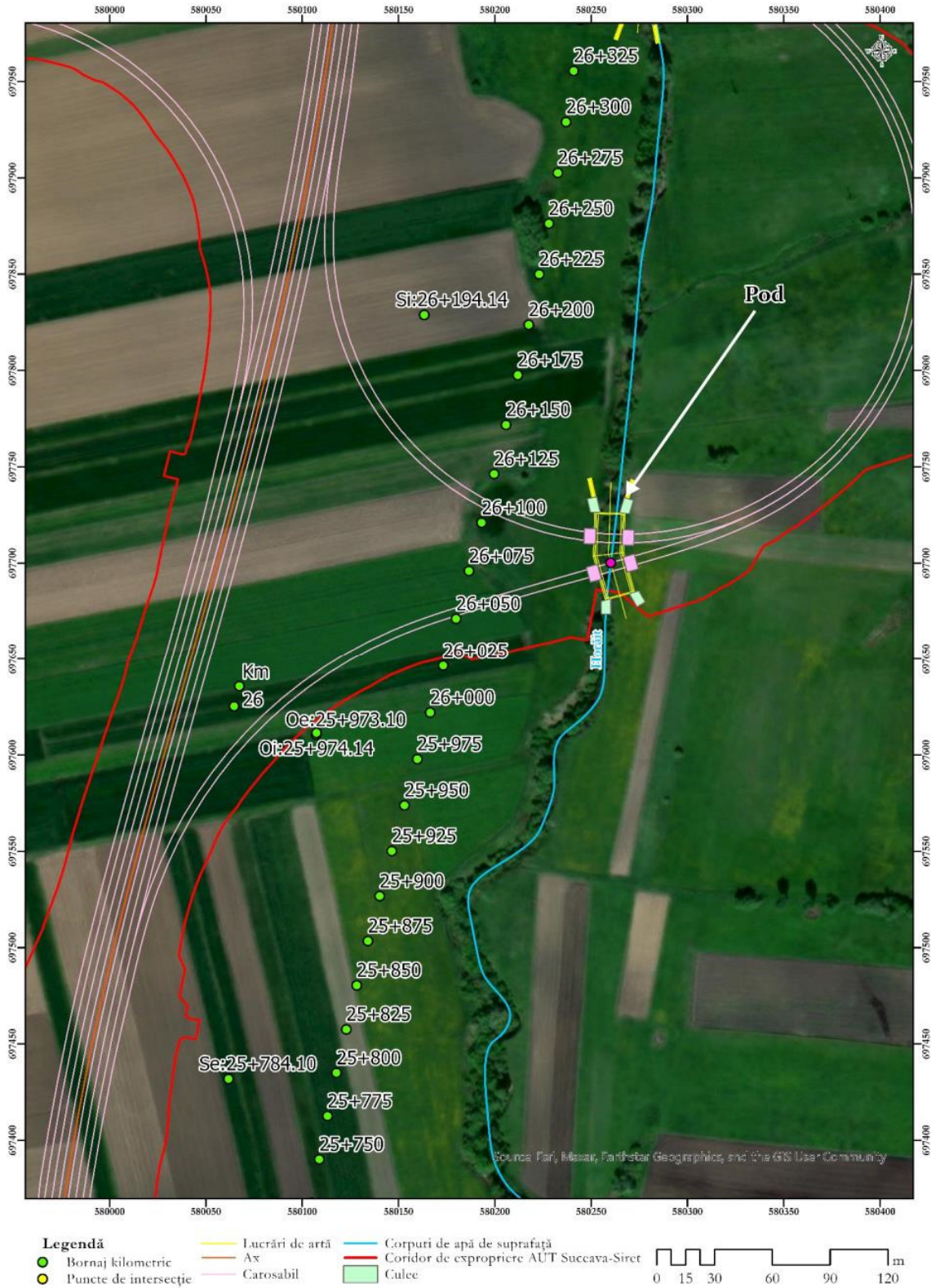


Figure no.2-7 Bridge designed on the Horaiț water body – RORW12-1-17-24A_B1 (km 35+050 – km 35+190)



Figure no.2-8 Bridge designed on the Horaiț water body – RORW12-1-17-24A_B1 (km 35+950 – km 36+090)

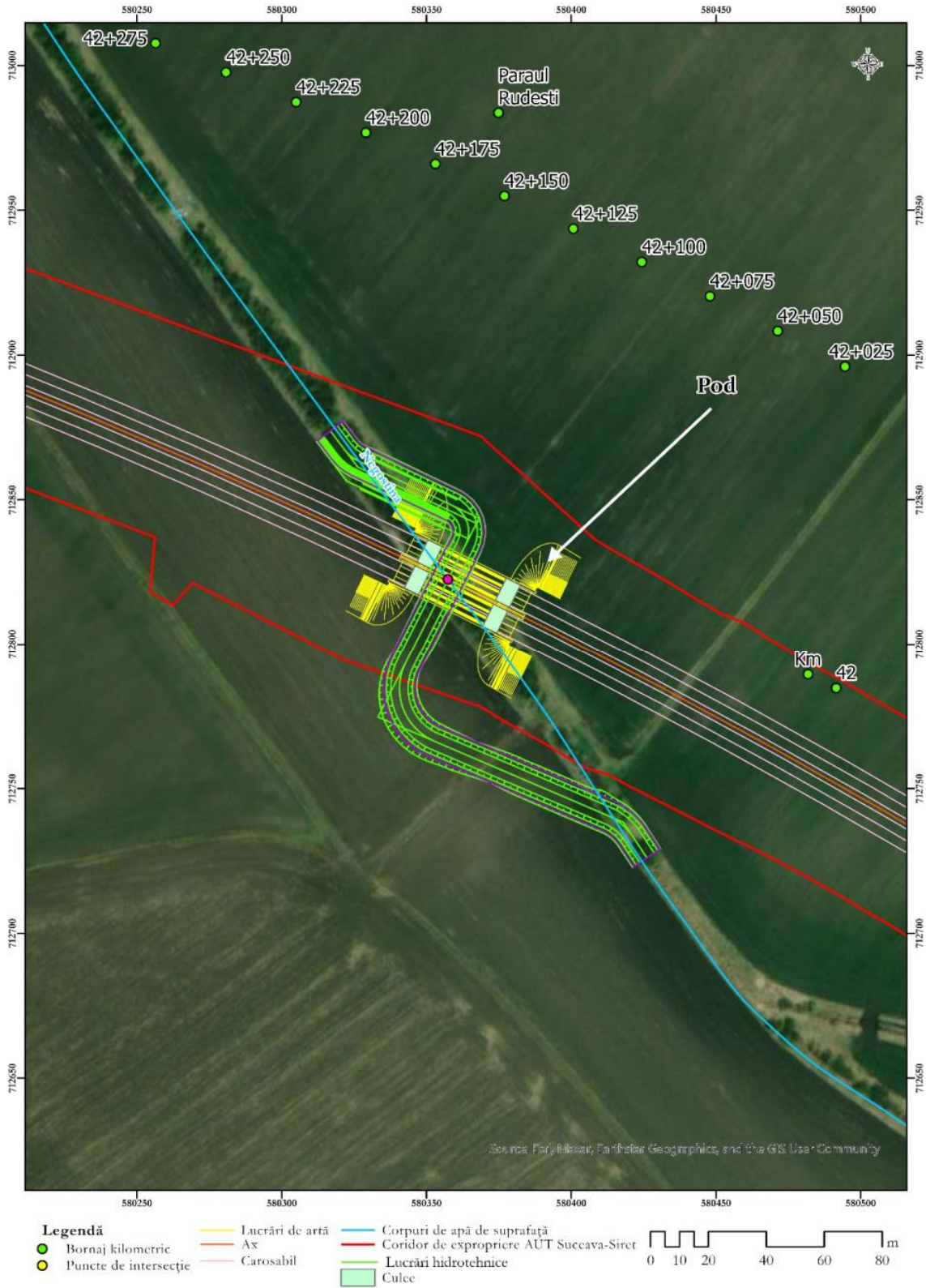


Figure no.2-10 Bridge designed on the Negostina water body – RORW12-1-3-B1

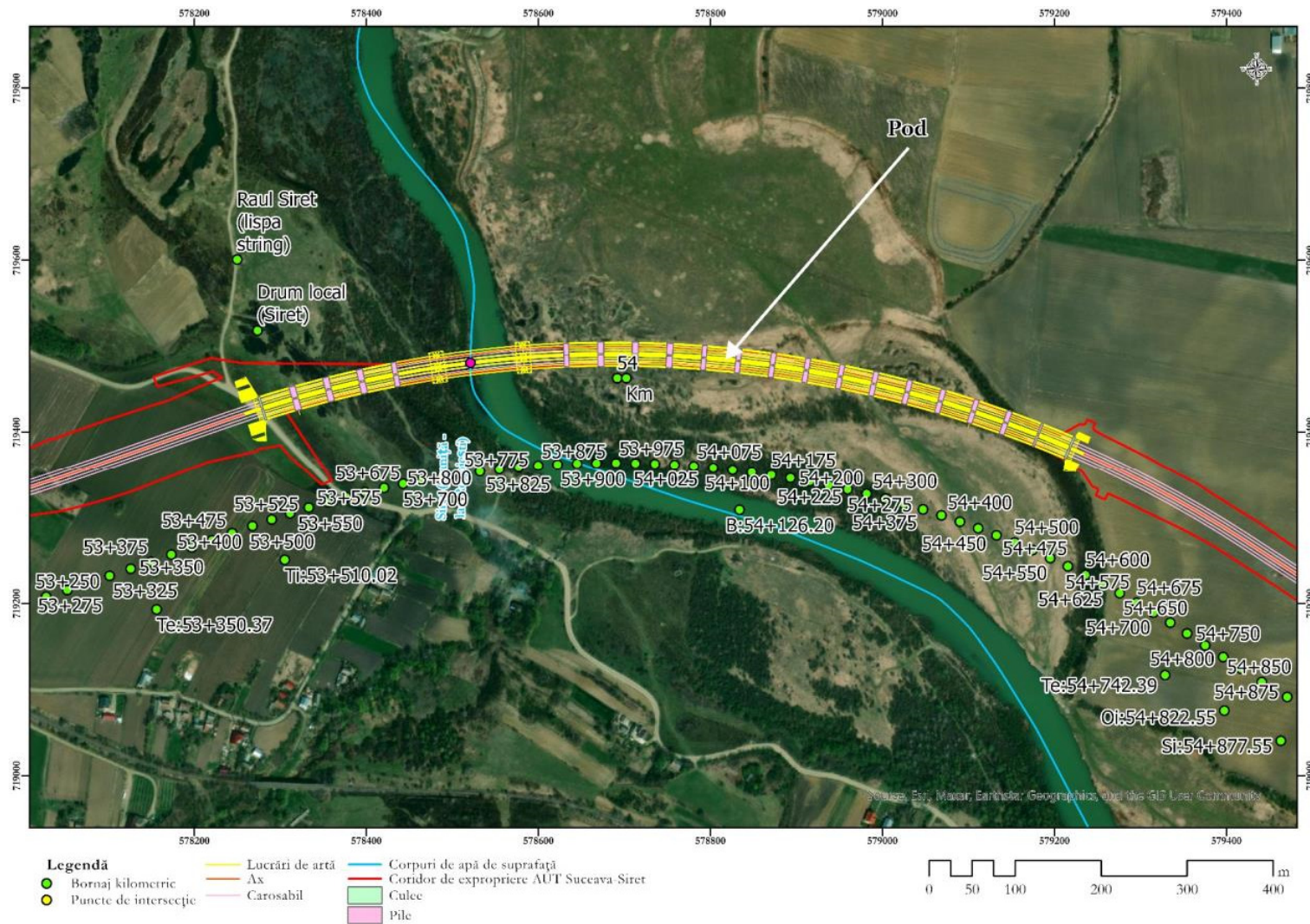


Figure no.2-11 Bridge designed on the Siret water body (border - lake Rogojesti) - RORW12-1_B0

2.3.1 Road embankment

The width of the platform of the Suceava – DN2H highway, in cross section, is 28.00 m, being composed of a carriageway consisting of 2 lanes in each direction, the total width being 15.00 m. The median lane is waterproof and has a width of 3.00 m and the emergency parking lane is located on each direction of traffic and has a total width of 5.00 m. The 2 approaches have a total width of 1.00 m and the 4 guide lanes have a total width of 2.00 m. The 2 parapet spaces are located outside the platform and have a total width of 2.00 m.

The expressway DN2H – Siret border also consists of a platform with a width of 23.50 m, being composed of the carriageway that includes 2 lanes in each direction, the width of the carriageway is 14.00 m. The median lane it is waterproofed and has a width of 3.00 m, the 2 approaches are 3.00 m wide and the two guide strips are 1.50 m wide. The space for parapets fully corresponds to the direction of travel and is located outside the platform on a width of 2.00 m. In the case of the expressway, no emergency parking lane was designed.

Buckles and braces are unidirectional and bidirectional and have the following cross-profile characteristics:

- ⚙ the one-way loops and braces: the platform is 6.00 m wide, includes 4.00 m carriageway and 2 approaches each 1.00 m wide, of which 0.25 m is the framing lane. Additionally, 2 spaces for parapets with a width of 1.00 m each are added.
- ⚙ the two-way loops and braces: the platform is 10.50 m wide, includes 7.00 m carriageway and 2 approaches each 1.00 m wide, of which 0.25 m is a staging area. Additionally, 2 spaces for parapets with a width of 1.00 m each are added.

The edges of the platform have been arranged by using different solutions that allow the placement of water collection and drainage devices and safety devices.

2.3.2 Road structure

In order to propose the road structures, existing regulations in force were analyzed for road structural dimensions and for hot dimensioned asphalt mixtures. In this memorandum, the materials used in the construction of the various components of the road structures will be listed:

⚙ **The semi-rigid road system of the freeway, the expressway and the braces of road junctions**

- wearing asphaltic concrete;
- screen blinder;
- asphalt mixture;
- natural aggregates stabilized with cement;
- ballast;
- soils stabilized with hydraulic binders.

⚙ **Waterproof middle area**

- wearing asphaltic concrete;
- natural aggregates stabilized with cement;
- ballast;
- form layer of stabilized soil.

⚙️ Platforms and parking lots (CIC and PSD)

- road cement concrete;
- ballast stabilized with cement;
- ballast foundation;
- form layer.

2.3.3 Road junctions

Within the project, 5 road junctions were proposed, designed in accordance with the traffic studies. They ensure the connection between the existing and the project, being presented in the following table.

Table no.2-2Road junctions designed within the project

No. Crt.	Name	Estimated interval for carrying out the works		Remarks	Distance to the nearest protected natural area (km)
1.	North Suceava node	1+450	2+825	It ensures the connection with DN29A and is worth it as a bypass option for Suceava Municipality.	ROSCI0075 Pătrăuți Forest (3.4 km)
2.	Suceava West node	8+750	11+000	It ensures the connection with DN2 (E85) and the access road to Suceava Municipality	ROSCI0075 Pătrăuți Forest (1.5 km)
3.	Nod Radauti	25+825	26+625	It provides the connection with DN2 (E85) and DN2H and the access road to the town of Rădăuți (Suceava county)	ROSCI0379 Suceava River (2.9 km)
4.	South Siret node	42+850	43+275	It ensures the connection with DN2 (E85) and the access road to the town of Siret (Suceava county)	ROSPA0110 Now. Rogojesti - Bucecea (4.8 km)
5.	North Siret node	55+150	55+700	It provides the connection with DN2 (E85) between the town of Siret (Suceava county) and the border with Ukraine	ROSPA0110 Now. matsANDyou - Bucecea (0.5 km)

The location of the 5 road junctions designed within the project is presented in the following figure:

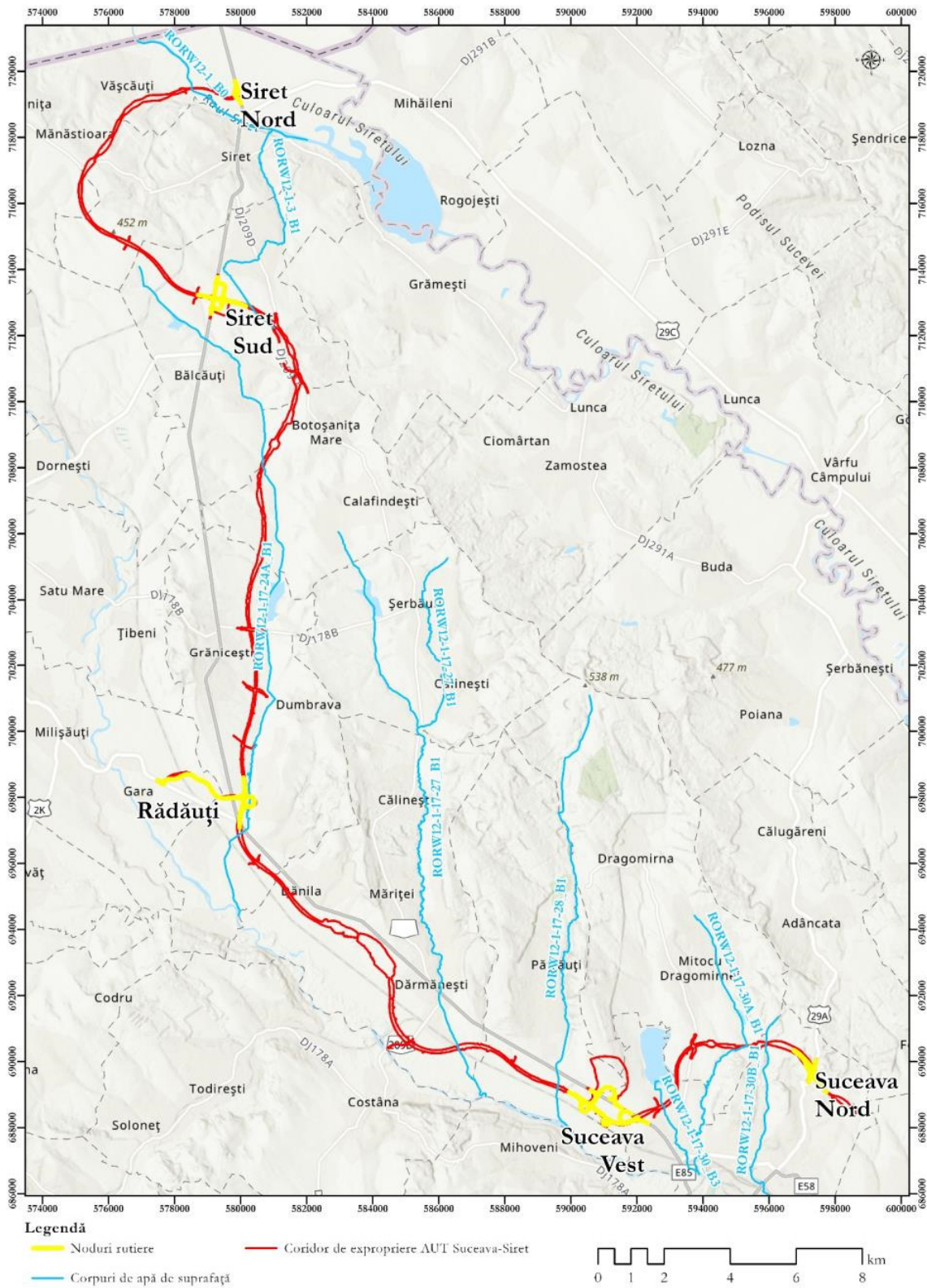


Figure no.2-12 Proposed road junctions for the Suceava highway – DN2H and Drum Expres DN2H – Siret border

2.3.3.1 Road junction Suceava Nord (1+800)/ intersection DN29A

The Suceava Nord road junction will be located at the intersection with DN29A, at the northern exit from Suceava municipality. This node provides access to the municipality of Suceava and the localities of Dorohoi, Darabani and Rădăuți-Prut to the new highway.

Since the Suceava Nord road junction is of the roundabout type, it ensures the connection with the border towns as many times as their return. In the vicinity of the road junction, the highway has a slope of +2.4% (towards Siret) and the embankment, in the area of the red line, has a maximum height of 15 m. Thus, there will be the possibility of lowering the red line of the national road, to ensure access it in the roundabout. For this purpose, local relocations will also be carried out. The roundabout will cross the express road through two passages and will also fulfill the role of bypassing the Suceava municipality. Access to the road will be achieved by means of four one-way ramps related to each individual road, according to the information in the following table.

Table no.2-3 One-way braces within the road junction

Path	Sense	Elements	Slope traversed		Design speed and geometric elements
			ramp	slope	
1.	exit	leg	X		V=60km/h, R=260m, i=4.5%
	ENTRY	leg		X	Alignment
2.	exit	leg	X		V=60km/h, R=260m, i=4.5%
3.	ENTRY	leg		X	V=60km/h, R=450m, i=2.5%

2.3.3.2 Road junction Suceava West (10+600)/ intersection DN2 – DN2P

The road junction Suceava West, proposed at km 10+600 of the highway, in the west of the municipality of Suceava, ensures the connection of the highway with DN2 and DN2P.

And in this case, up to the intersection with DN2P, the highway section will serve as a bypass of Suceava municipality, in the east, northwest, north and west direction.

This road junction is a "trumpet" T-type, found between DN2 and the CFR500 Highway, the loop being approximately 50 m from the highway. The road junction ensures the relations with the connecting road and with the existing road junction, respectively DN2 – DN2P. This is the condition for connecting the connecting road by reconfiguring the existing loop with a shoulder in the direction of the municipality of Suceava - Autostrada.

In the junction area, the longitudinal profile of the highway presents a concave connection, thus ensuring optical comfort. Thus, the slope will be -1.26%, respectively 0.5% at the exit, and the red line will be found in a slope with a maximum height of 2.4 m.

The connecting road that ensures the connection of the highway with the road junction, crosses the highway by means of an overpass, with a length of approximately 1.5 km. The design speed for this sector is 60 km/h.

In this case, the road node is existing, with minimally invasive modernization works being carried out, the existing accesses being square, respectively with DN2 - DN2P (Suceava municipality - DN2P) and DN2P-DN2 (DN2P - Rădăuți). Works will also be carried out to modernize the

passage and change the direction of the existing loop, thus, from circulation in both directions it will change to circulation in one direction, in the area of the municipality of Suceava - DN2P.

Access will be provided by two one-way ramps, with a loop and a sequence of loop-ramps related to each path, the designed speed being 60km/h.

Table no.2-4 One-way braces within the road junction

Path	Sense	Elements	Slope traversed		Design speed and geometric elements
			ramp	slope	
1.	exit	Shoulder road node		X	V=60km/h, R=155m, i=5% (k=2.66)
	ENTRY	Shoulder road node	X		V=60km/h, R=155m, i=5% (k=2.66)
2.	exit	Loop road junction		X	V=60km/h, R=230m, i=5%
	ENTRY	Shoulder road node	X		V=60km/h, R=125m, i=6% (k=2.78)

In addition, in order to avoid decreasing the traffic capacity of the entire node, removing the flows from it and shortening the access distances to the express road, in the case of some connections, 4 direct braces are proposed, shown in the following table.

Table no.2-5 One-way braces within the road junction

Path	Sense	Elements	Link		Design speed and geometric elements
			drum	CITY	
1.	exit	Shoulder road node	DN2	Suceava	V=60km/h, R=155m, i=5% (k=2.66)
	ENTRY	Shoulder road node	DN2	Rada	V=60km/h, R=155m, i=5% (k=2.66)
2.	exit	Loop rad junction	DN2	Suceava	V=60km/h, R=230m, i=5%
	ENTRY	Shoulder road node	DN2P	Suceava	V=50km/h, R=105m, i=5% (k=2.75)

2.3.3.3 Rădăuți road junction (km 33+320)

The Rădăuți road junction is designed in the west of Românești and approximately 12 km from Rădăuți municipality. By means of a connecting road with a length of approximately 2.3 km, this road junction intersects the DN2H.

It is a "trumpet" road junction with the inflow loop, which provides all the connections with the local road network and with the localities in the area.

On the designed link road it is 80 km/h, crossing the motorway, DN2 and a local stream. Afterwards, it continues parallel to the stream, going to under-cross the CFR500 Highway. road is completed via this roundabout, at the junction with DN2H. In the vicinity, a direct shoulder is

proposed, in the direction of Autostrada – DN2H Rădăuți, with a design speed of 60 km/h, to avoid turning.

The passage over DN2 will be made for 4 traffic lanes, in order to connect with the connecting road between the Autostrada and the Rădăuți belt. Access will be achieved by means of a one-way shoulder, a loop and a sequence of loop-shoulders related to each path to take care of the design speed of 60 km/h.

Table no.2-6 One-way braces within the road junction

Path	Sense	Elements	Slope traversed		Design speed and geometric elements
			ramp	slope	
1.	exit	Shoulder road node		X	V=60km/h, R=155m, i=5% (k=2.66)
	ENTRY	Shoulder road node		X	V=60km/h, R=230m, i=5%
2.	exit	Loop rad junction	X		V=60km/h, R=230m, i=5%
	ENTRY	Shoulder road node		X	V=60km/h, R=155m, i=5% (k=2.78)

2.3.3.4 Siret Sud road junction (km 51+215)

The Siret Sud road junction is designed at the intersection of Drumului Expres with DN2, approximately 3 km from the city of Siret and at a distance of 12 km from the municipality of Rădăuți.

This road junction is of the "simple diamond" type and provides the connection to DN2. In the vicinity of the junction, the longitudinal profile of the expressway is found in a concave connection formed by two slopes of -1.2% and 2%. The red line is found in a debleu with a maximum height of about 10 m, causing the descent of the line of the national road, which at the moment is found in a convex connection. The four arms of the road node intersect with DN2 by means of two connecting roads, their intersections with the national road being proposed two roundabouts.

Before the roundabouts, both from the express road and from DN2, four shoulders are proposed with $V = 40$ km/h, $R = 90$ m, $i = 5\%$ and $k = 1.79$. Braces ensure straight direction and increased traffic capacity.

Between DN2 and the connecting road north of the expressway, the location of a Maintenance and Control Center is proposed, with access from the shoulder alignment. By means of two roundabouts, service will be provided to both directions of the expressway and to both directions of the DN2 national road.

By means of four ramps, access to and from the expressway will be ensured and traffic capacity will be increased, in the direction of Rădăuți - expressway (route 2) and Suceava - Autostrada (route 1). In addition, two direct braces with $R = 90$ m are proposed to avoid the penetration of the gyration in these directions.

Table no.2-7 One-way braces within the road junction

Path	Sense	Elements	Slope traversed		Design speed and geometric elements
			ramp	slope	
1.	exit	Shoulder road node		X	V=60km/h, R=155m, i=5% (k=2.66)
	ENTRY	Shoulder road node		X	V=60km/h, R=155m, i=5% (k=2.66)
2.	exit	Loop rad junction		X	V=60km/h, R=155m, i=5% (k=2.66)
	ENTRY	Shoulder road node	X		V=60km/h, R=155m, i=5% (k=2.66)

2.3.3.5 Siret Nord road junction (km 61+125)

The Siret Nord road junction is proposed on km 61+125 with the aim of connecting the express road with the Suceava International Airport and with DN29. The connection is made via a connecting road of approximately 5.2 km.

The road junction will be located northeast of the Suceava municipality, on the connection road designed to ensure the connection with the airport.

Through a turn at level, the connection with DN29 of the connecting road will be ensured. In addition, on the Slacea - Airport direction, for the relationship to the right, there will be a shoulder on the right. This will ensure the unloading of the traffic roundabout coming from Salcea and heading towards the airport. On the Airport – Suceava direction, a shoulder will be set up on the right with the purpose of unloading the roundabout, on the Airport – Suceava direction.

2.3.4 Bridges

On the route of the Suceava highway - DN2H and the expressway DN2H - Siret border, bridges have been designed that cross obstacles such as bodies of surface water and canals. These are represented in the following table.

Table no.2-8 Bridges, passages and viaducts proposed in the project

No. Crt.	Name	Estimated interval for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		Km started	Km over		km	Name
1.	Bridge over the Mitocul river Km 4+940	4+740	5+140	Mitocul River	3.2	ROSCI0075 Pătrăuți Forest
2.	Bridge over the Dragomirna river Km 7+990	7+910	8+070	Dragomirna River	2.5	ROSCI0075 Pătrăuți Forest
3.	Bridge over the river Pătrăuțeanca Km 11+605	11+530	11+680	Pătrăuțeanca River	2	ROSCI0075 Pătrăuți Forest

No. Crt.	Name	Estimated interval for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		Km started	Km over		km	Name
4.	Bridge over the canal Km 12+440	12+360	12+520	Canal and DE relocated	2.1	ROSCI0075 Pătrăuți Forest
5.	Bridge over Hatnuta river tributary Km 14+370	14+300	14+440	Hatnuța river tributary	2.9	ROSCI0075 Pătrăuți Forest
6.	Bridge over the Hatnațiu river and CF 300 Km 14+961	14+850	15+070	Raul Hatnuța and CF300	3,4	ROSCI0075 Pătrăuți Forest
7.	Bridge on DEX over the valley Km 20+315	20+240	20+390	Nameless valley	2.9	ROSCI0075 Pătrăuți Forest
8.	Bridge on DEX over the Sârghiesti river Km 22+193	22+110	22+280	The Sârghiesti River	4.2	ROSCI0075 Pătrăuți Forest
9.	Bridge over the Dănilă stream Km 22+995	22+920	23+070	Dănila Stream	4.6	ROSCI0075 Pătrăuți Forest
10.	Bridge over the river Dănilă Km 23+554	23+480	23+630	Danila River	4.9	ROSCI0075 Pătrăuți Forest
11.	Bridge over Horaiț River (Grănicești) Km 25+212	25+130	25+290	Raul Horaiț (Granicesti)	5,6	ROSCI0379 Suceava River
12.	Bridge over the river Săcari Km 27+920	27+840	28+000	Săcari River	4.3	ROSCI0379 Suceava River
13.	Bridge over the valley Km 28+590	28+510	28+670	Nameless valley	4.4	ROSCI0379 Suceava River
14.	Bridge over the river Văduvul Km 30+375	30+300	30+450	The Widow River	4.5	ROSCI0379 Suceava River
15.	Bridge over the deep stream Km 30+975	30+900	31+050	Deep Stream	4.2	ROSCI0379 Suceava River
16.	Bridge over the stream of Fântânilor Km 32+535	32+460	32+610	Fountain Stream	3.7	ROSCI0379 Suceava River
17.	Bridge over the Calina stream Km 33+520	33+440	33+600	Călina Stream	3.7	ROSCI0379 Suceava River
18.	Bridge over the Horaiț River Km 35+120	35+040	35+200	Horaiț River	3.8	ROSCI0379 Suceava River
19.	Bridge over Horaiț river tributary Km 36+020	35+950	36+090	Horaiț river tributary	3.8	ROSCI0379 Suceava River
20.	Bridge over the Horaiț river Km 36+575	36+500	36+650	Horaiț River	4.2	ROSCI0379 Suceava River
21.	Bridge over the Rudești stream Km 42+100	42+020	42+180	Rudești stream	4.5	ROSPA0110 Accumulations Rogojesti - Bucecea
22.	Bridge over the Balcauti stream Km 43+750	43+610	43+890	Bălcăuți Stream and DL (Negostina village - Dornești commune)	4.8	ROSCI0379 Suceava River
23.	Bridge over the Siret river Km 54+030	53+490	54+570	DL (Văscăuți village - Siret); Siret river	1.2	ROSPA0110 Accumulations Rogojesti - Bucecea
24.	Bridge over the Siret stream Km 55+115	55+040	55+190	Siret stream	0.8	ROSPA0110 Accumulations Rogojesti - Bucecea

No. Crt.	Name	Estimated interval for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		Km started	Km over		km	Name
25.	Bridge on Br.2 Km 2+985 over the river Horoit (Nod3-DN2-DN2H)	2+910	3+060	Horoit River	5.3	ROSCI0379 Suceava River
26.	Bridge on Br.2 Km 3+466 over the river Horoit (Nod3-DN2-DN2H)	3+400	3+540	Horoit River	5.3	ROSCI0379 Suceava River

2.3.5 Viaducts

The viaducts proposed for the Suceava – DN2H highway project and the DN2H – Siret border expressway cross obstacles such as bodies of water, canals, roads and railways. These are shown in the following table.

Table no.2-9 Viaducts proposed within the project

No. Crt.	Name	Estimated interval for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		km start	end km		[km]	Name
1.	Viaduct Km 1+035	0+790	1+280	Deep Valley - Suceava; DJ208T	4.6 km	ROSCI0380 Suceava Lițeni River
2.	Viaduct Km 4+255	3+890	4+620	DE and Mitoc Lake runoff channel 2	3.6 km	ROSCI0075 Pătrăuți Forest
3.	Viaduct Km 38+840	38+720	38+960	Nameless valley	3.2 km	ROSCI0075 Pătrăuți Forest
4.	Viaduct Km 39+790	39+570	40+010	Relocation DJ 209D and Nameless Vale	3.6 km	ROSCI0075 Pătrăuți Forest
5.	Viaduct Km 48+910	48+770	49+050	Nameless valley	2.5 km	ROSCI0379 Suceava River

2.3.6 Passages

The passages designed on the Suceava – DN2H highway and the DN2H expressway – Siret border cross the following obstacles: canals, waterways, roads and railways. They are presented in the following table:

Table no.2-10 The passages proposed in the project

No. crt.	Name	Extended interval provided for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		km start	end km		[km]	Name
1.	Passage over DC57 Km 8+120	8+050	8+190	Relocation Lipoveni Street (DC 57)	2.4 km	ROSCI0075 Pătrăuți Forest
2.	Passage over DL Km 11+700	11+630	11+770	DL relocation (com Pătrăuți)	2 km	ROSCI0075 Pătrăuți Forest
3.	Passage over DE km 14+070	14+000	14+140	Relocation OF	2.6 km	ROSCI0075 Pătrăuți Forest

No. crt.	Name	Extended interval provided for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		km start	end km		[km]	Name
4.	Passage over DJ209D Km 16+495	16+420	16+570	DJ209D	4 km	ROSCI0075 Pătrăuți Forest
5.	Passage over CF 513 Km 17+130	17+050	17+210	DE and CF 513 Darmănești-Gura Humorului	5.2 km	ROSCI0075 Pătrăuți Forest
6.	Passage over DE Km 17+550	17+480	17+620	Exploitation road	3 km	ROSCI0075 Pătrăuți Forest
7.	Passage over CF 500 Km 18+030	17+950	18+110	CF500 bus	4 km	ROSCI0075 Pătrăuți Forest
8.	Passage over DL Km 21+950	21+9880	22+020	DL (Sârghiști village - Măriței village)	4 km	ROSCI0075 Pătrăuți Forest
9.	Passage over DC38C Km 22+770	22+700	22+840	DC38C (Dănila village)	4.6 km	ROSCI0075 Pătrăuți Forest
10.	Passage over DC40B Km 24+200	24+130	24+270	DC 40B (Iacobești village)	5.4 km	ROSCI0075 Pătrăuți Forest
11.	Passage over DN2H and DN2 Km 25+555	25+460	25+650	DN 2H and DN2	6 km	ROSCI0075 Pătrăuți Forest
12.	Passage over DC39 Km 35+063	34+990	35+130	DC 39 (Calafindești commune - DN2)	3.8 km	ROSCI0379 Suceava River
13.	Crossing over CF 518 Siret - Domnești Km 44+817	44+730	44+900	CF 518 (Dornesti - Siret) - closed	5.8 km	ROSCI0379 Suceava River
14.	Passage for wildlife crossing Km 51+000	50+930	51+070	-	3.8 km	ROSPA0110 Accumulations Rogojesti - Bucecea
15.	Passage on DE over Highway Km 0+250	0+190	0+310	Suceava highway – DN2H	4.7 km	ROSCI0380 Suceava Lițeni River
16.	Passage over the Highway Km 3+500	3+450	3+550	To protect the fauna		
17.	Passage on DJ208D over Highway Km 5+810	5+750	5+870	Suceava highway – DN2H	2.3 km	ROSCI0075 Pătrăuți Forest
18.	Passage on DN2 over DEX Km 8+833.20	8+770	8+900	Suceava highway – DN2H	2.4 km	ROSCI0075 Pătrăuți Forest
19.	Passage on DE over Highway Km 13+220	13+160	13+280	Suceava highway – DN2H	3 km	ROSCI0075 Pătrăuți Forest
20.	Passage on the DL over the Highway Km 19+790	19+730	19+850	Suceava highway – DN2H	2.6 km	ROSCI0075 Pătrăuți Forest
21.	Passage on DC 40C over DEX Km 29+650	29+590	29+710	Expressway DN2H - Siret	4.6 km	ROSCI0379 Suceava River
22.	Passage on DJ178B over DEX Km 31+520	31+460	31+580	Expressway DN2H - Siret	3.9 km	ROSCI0379 Suceava River

No. crt.	Name	Extended interval provided for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		km start	end km		[km]	Name
23.	Passage on DC35 over DEX Km 40+473.10	40+410	40+540	Expressway DN2H - Siret	4.3 km	ROSCI0075 Pătrăuți Forest
24.	Passage on DJ209D over DEX Km 41+250.35	41+190	41+320	Expressway DN2H - Siret	4 km	ROSPA0110 Accumulations Rogojesti - Bucecea
25.	Passage on DE over DEX Km 46+530	46+470	46+590	Expressway DN2H - Siret	3.1	ROSCI0379 Suceava River
26.	Passage on DJ 291A over DEX Km 49+813.65	49+750	49+880	Expressway DN2H - Siret	3.1 km	ROSCI0379 Suceava River
27.	Passage on DL over DEX Km 50+325.35	50+260	50+400	Expressway DN2H - Siret	4.2 km	ROSPA0110 Accumulations Rogojesti - Bucecea
28.	Passage on DC 52 over DEX Km 51+878.36	51+810	51+940	Expressway DN2H - Siret	3.3 km	ROSPA0110 Accumulations Rogojesti-Bucecea
29.	Passage on DN29A over Highway km 1+862 (Nod1-DN29A)	1+810	1+920	Node1 - DN 29A	4.2	ROSCI0075 Pătrăuți Forest
30.	Highway passage Km 9+690 over VO 2P (Node 2 - DN2 - DN2P)	9+610	9+770	VO 2P (Suceava Belt)	2.4	ROSCI0075 Pătrăuți Forest
31.	Passage on Br.10 over the Highway Km 10+451.36 (Node 2 - DN2-DN2P)	10+390	10+520	highway	1.7	ROSCI0075 Pătrăuți Forest
32.	Passage on Br.10 Km13+460.37 over DN2 (Node 2 - DN2 - DN2P)	13+390	13+540	DN2	2.2	ROSCI0075 Pătrăuți Forest
33.	Passage on Br.2 over the Highway Km 26+357.65 (Nod3-DN2-DN2H)	26+290	26+420	Express Road	5	ROSCI0379 Suceava River
34.	Passage on Br.2 Km 0+612 over CF 500, (Nod3-DN2-DN2H)	0+540	0+710	CF 500 highway	3.1	ROSCI0379 Suceava River
35.	Passage on Br.2 Km 1+960 over the channel and relocated DL (Nod3-DN2-DN2H)	1+900	2+020	Canal and DL relocated	2.9	ROSCI0379 Suceava River
36.	Passage on Br.2 Km 2+463 over DN2 (Nod3-DN2-DN2H)	2+380	2+540	DN 2 (E85)	2.9	ROSCI0379 Suceava River

No. crt.	Name	Extended interval provided for carrying out the works		Obstacle	The distance from the nearest protected natural area	
		km start	end km		[km]	Name
37.	Passage on DN 2 over DEx Km 43+320 (Nod4-Siret S)	43+260	43+380	Express Road	5.1	ROSCI0379 Suceava River
38.	Passage on DN2 over DEx Km 55+203.22 (Nod5-Siret N)	55+140	55+270	Express Road	0.4	ROSPA0110 Accumulations Rogojești-Bucecea

2.3.7 Culverts

The tables attach the presentation of the footbridges included in the project, their location on the highway and expressway, on road junctions located in local road relocation areas, on local road relocation roads and within the facilities related to the highway and expressway, such as service spaces and coordination maintenance centers.

Table no.2-11 Box culverts on the highway/express road

No. Crt.	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
			km start	end km	[km]	Name
1.	5	2.6	3+585	3+595	3.2	ROSCI0075 Pătrăuți Forest
2.	2	1,2	5+435	5+445	2.1	ROSCI0075 Pătrăuți Forest
3.	2	1,2	6+100	6+110	2.1	ROSCI0075 Pătrăuți Forest
4.	2	1,2	6+605	6+615	2	ROSCI0075 Pătrăuți Forest
5.	2	1,2	7+055	7+065	2.2	ROSCI0075 Pătrăuți Forest
6.	5	2.6	7+822	7+832	2.5	ROSCI0075 Pătrăuți Forest
7.	3	2.6	9+405	9+415	2.5	ROSCI0075 Pătrăuți Forest
8.	2	1,2	9+770	9+780	2,3	ROSCI0075 Pătrăuți Forest
9.	3	2.6	10+185	10+195	2.1	ROSCI0075 Pătrăuți Forest
10.	2	1,2	10+410	10+420	2	ROSCI0075 Pătrăuți Forest
11.	4	1.4	10+522	10+532	2	ROSCI0075 Pătrăuți Forest
12.	5	2.6	12+920	12+930	2.1	ROSCI0075 Pătrăuți Forest
13.	2	1,2	14+020	14+030	2.6	ROSCI0075 Pătrăuți Forest
14.	2	1,2	14+770	14+780	2.9	ROSCI0075 Pătrăuți Forest
15.	5	2.6	15+245	15+255	3.3	ROSCI0075 Pătrăuți Forest
16.	3	2.6	15+809	15+819	3.6	ROSCI0075 Pătrăuți Forest
17.	2	1,2	16+020	16+030	3.7	ROSCI0075 Pătrăuți Forest
18.	3	2.6	16+285	16+295	3.7	ROSCI0075 Pătrăuți Forest
19.	2	1,2	16+395	16+405	3.7	ROSCI0075 Pătrăuți Forest
20.	2	1,2	16+645	16+655	3.7	ROSCI0075 Pătrăuți Forest
21.	5	2.6	16+915	16+925	3.6	ROSCI0075 Pătrăuți Forest
22.	2	1,2	17+370	17+380	3.5	ROSCI0075 Pătrăuți Forest
23.	2	1,2	17+745	17+755	3.2	ROSCI0075 Pătrăuți Forest
24.	4	2.6	18+195	18+205	2.8	ROSCI0075 Pătrăuți Forest
25.	3	2.6	21+445	21+455	3.7	ROSCI0075 Pătrăuți Forest
26.	5	2.6	21+795	21+805	4	ROSCI0075 Pătrăuți Forest
27.	2	1,2	24+045	24+055	5.3	ROSCI0075 Pătrăuți Forest

No. Crt.	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
			km start	end km	[km]	Name
28.	2	1,2	25+645	25+655	5.3	ROSCI0379 Suceava River
29.	2	1,2	27+095	27+105	4.7	ROSCI0379 Suceava River
30.	5	2.6	27+495	27+505	4.4	ROSCI0379 Suceava River
31.	2	1,2	28+945	28+955	4.4	ROSCI0379 Suceava River
32.	3	2.6	29+175	29+185	4.5	ROSCI0379 Suceava River
33.	3	2.6	29+555	29+565	4.5	ROSCI0379 Suceava River
34.	5	2.6	29+920	29+930	4.7	ROSCI0379 Suceava River
35.	4	2.6	31+320	31+330	4	ROSCI0379 Suceava River
36.	3	2.2	31+655	31+665	3.9	ROSCI0379 Suceava River
37.	5	1.4	32+235	32+245	3.7	ROSCI0379 Suceava River
38.	2	1,2	32+955	32+965	3.8	ROSCI0379 Suceava River
39.	2	1,2	35+015	35+025	3.7	ROSCI0379 Suceava River
40.	5	2.2	37+520	37+530	3.3	ROSCI0075 Pătrăuți Forest
41.	5	2.2	37+732	37+742	3.3	ROSCI0075 Pătrăuți Forest
42.	5	2.6	38+570	38+580	3.1	ROSCI0075 Pătrăuți Forest
43.	3	2.6	40+745	40+755	4.2	ROSPA0110 Mat accumulationsANDyou - Bucecea
44.	3	2.6	41+702	41+712	4.2	ROSPA0110 Mat accumulationsANDyou - Bucecea
45.	3	2.6	42+715	42+725	4.3	ROSPA0110 Mat accumulationsANDyou - Bucecea
46.	3	2.6	44+117	44+127	4.1	ROSCI0379 Suceava River
47.	2	1,2	44+970	44+980	3.9	ROSCI0379 Suceava River
48.	3	2.6	45+785	45+795	4	ROSCI0379 Suceava River
49.	3	2.6	47+045	47+055	3	ROSCI0379 Suceava River
50.	3	2.6	47+385	47+395	2.5	ROSCI0379 Suceava River
51.	5	2.6	47+936	47+946	2,3	ROSCI0379 Suceava River
52.	5	2.6	50+070	50+080	3.3	ROSCI0379 Suceava River
53.	5	2.6	51+270	51+280	3.7	ROSPA0110 Mat accumulationsANDyou - Bucecea
54.	5	2.6	51+470	51+480	3.6	ROSPA0110 Mat accumulationsANDyou - Bucecea

Table no.2-12 Box culverts at road junctions

No. Crt.	Section	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
				km start	end km	[km]	Name
Road junction Suceava West							
1.	Strap 4	2	1,2	0+220	0+230	1.3	ROSCI0075 Pătrăuți Forest
2.	Strap 5	2	1,2	0+250	0+260	1.3	ROSCI0075 Pătrăuți Forest
3.	Strap 6	2	1,2	0+315	0+325	1.3	ROSCI0075 Pătrăuți Forest
4.	Strap 6	2	1,2	0+465	0+475	1.3	ROSCI0075 Pătrăuți Forest
5.	Strap 8	2	1,2	0+195	0+205	1.3	ROSCI0075 Pătrăuți Forest
6.	Strap 9	2	1,2	0+265	0+275	1.3	ROSCI0075 Pătrăuți Forest
7.	Strap 10 and DN2P	2	1,2	13+630	13+640	1.3	ROSCI0075 Pătrăuți Forest
8.	Strap 10 and DN2P	2	1,2	14+030	14+040	1.3	ROSCI0075 Pătrăuți Forest

No. Crt.	Section	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
				km start	end km	[km]	Name
9.	Strap 10 and DN2P	2	1,2	14+460	14+470	1.3	ROSCI0075 Pătrăuți Forest
10.	Strap 11	2	1,2	0+170	0+180	1.3	ROSCI0075 Pătrăuți Forest
Rădăuți road junction							
11.	Strap 1	2	1,2	0+295	0+305	2.9	ROSCI0379 Suceava River
12.	connection road	2	1,2	0+145	0+155	3.9	ROSCI0379 Suceava River
13.	connection road	2	1,2	0+845	0+855	3.9	ROSCI0379 Suceava River
14.	connection road	2	1,2	1+470	1+480	3.9	ROSCI0379 Suceava River
15.	Strap 3	2	1,2	0+120	0+130	3.9	ROSCI0379 Suceava River
16.	Strap 4	2	1,2	0+260	0+270	3.9	ROSCI0379 Suceava River
Siret Sud road junction							
17.	Strap 1	2	1,2	0+235	0+245	5.1	ROSCI0379 Suceava River
18.	Strap 1	2	1,2	0+295	0+305	5.1	ROSCI0379 Suceava River
19.	Strap 1	2	1,2	0+585	0+595	5.1	ROSCI0379 Suceava River
20.	Strap 3	2	1,2	0+015	0+025	5.1	ROSCI0379 Suceava River
Siret Nord road junction							
21.	Belt DN2 Km 55+203.22	2	1,2	0+555	0+565	0.4	ROSPA0110 Mat accumulationsANDyou - Bucecea

Table no.2-13 Box culverts ensure local road relocations

No. crt.	Name	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
				km start	end km	[km]	Name
1.	Relocation -DJ 209D km 39+790	2	1,2	0+625	0+635	4.1	ROSCI0379 Suceava River
2.	Relocation -DJ 209D km 41+250.35	2	1,2	0+480	0+490	4.1	ROSPA0110 Mat accumulationsANDyou - Bucecea
3.	Relocation -DJ 209D km 41+250.35	2	1,2	0+754	0+764	4.1	ROSPA0110 Mat accumulationsANDyou - Bucecea
4.	Relocation DN2 km 43+320	2	1,2	473+809	473+819	5	ROSPA0110 Mat accumulationsANDyou - Bucecea

Table no.2-14 Bridges on maintenance roads

No. Crt.	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
			km start	end km	[km]	Name
1.	5	2.6	3+585	3+595	5	ROSCI0075 Pătrăuți Forest
2.	2	1,2	5+435	5+445	2.7	ROSCI0075 Pătrăuți Forest
3.	2	1,2	6+100	6+110	2.1	ROSCI0075 Pătrăuți Forest
4.	2	1,2	6+605	6+615	2	ROSCI0075 Pătrăuți Forest
5.	2	1,2	7+055	7+065	2.2	ROSCI0075 Pătrăuți Forest

No. Crt.	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
			km start	end km	[km]	Name
6.	5	2.6	7+822	7+832	2.2	ROSCI0075 Pătrăuți Forest
7.	3	2.6	9+405	9+415	2.5	ROSCI0075 Pătrăuți Forest
8.	2	1,2	9+770	9+780	2,3	ROSCI0075 Pătrăuți Forest
9.	3	2.6	10+185	10+195	2,3	ROSCI0075 Pătrăuți Forest
10.	2	1,2	10+410	10+420	1.9	ROSCI0075 Pătrăuți Forest
11.	4	1.4	10+522	10+532	1.9	ROSCI0075 Pătrăuți Forest
12.	5	2.6	12+920	12+930	2.1	ROSCI0075 Pătrăuți Forest
13.	2	1,2	14+020	14+030	2.5	ROSCI0075 Pătrăuți Forest
14.	2	1,2	14+770	14+780	3	ROSCI0075 Pătrăuți Forest
15.	5	2.6	15+245	15+255	3.3	ROSCI0075 Pătrăuți Forest
16.	3	2.6	15+809	15+819	3.7	ROSCI0075 Pătrăuți Forest
17.	2	1.2	16+020	16+030	3.7	ROSCI0075 Pătrăuți Forest
18.	3	2.6	16+285	16+295	3.8	ROSCI0075 Pătrăuți Forest
19.	2	1,2	16+395	16+405	3.8	ROSCI0075 Pătrăuți Forest
20.	2	1,2	16+645	16+655	3.7	ROSCI0075 Pătrăuți Forest
21.	5	2.6	16+915	16+925	3.6	ROSCI0075 Pătrăuți Forest
22.	2	1,2	17+370	17+380	3.5	ROSCI0075 Pătrăuți Forest
23.	2	1,2	17+745	17+755	3.5	ROSCI0075 Pătrăuți Forest
24.	4	2.6	18+195	18+205	2.9	ROSCI0075 Pătrăuți Forest
25.	3	2.6	21+445	21+455	3.7	ROSCI0075 Pătrăuți Forest
26.	5	2.6	21+795	21+805	4	ROSCI0075 Pătrăuți Forest
27.	2	1,2	24+045	24+055	5.3	ROSCI0075 Pătrăuți Forest
28.	2	1,2	25+645	25+655	4.3	ROSCI0379 Suceava River
29.	2	1,2	27+095	27+105	4.7	ROSCI0379 Suceava River
30.	5	2.6	27+495	27+505	4.4	ROSCI0379 Suceava River
31.	2	1,2	28+945	28+955	4.5	ROSCI0379 Suceava River
32.	3	2.6	29+175	29+185	4.5	ROSCI0379 Suceava River
33.	3	2.6	29+555	29+565	4.5	ROSCI0379 Suceava River
34.	5	2.6	29+920	29+930	4.7	ROSCI0379 Suceava River
35.	4	2.6	31+320	31+330	4	ROSCI0379 Suceava River
36.	3	2.2	31+655	31+665	3.8	ROSCI0379 Suceava River
37.	5	1.4	32+235	32+245	3.7	ROSCI0379 Suceava River
38.	2	1,2	32+955	32+965	3.6	ROSCI0379 Suceava River
39.	2	1,2	35+015	35+025	3.8	ROSCI0379 Suceava River
40.	5	2.2	37+520	37+530	3.3	ROSCI0075 Pătrăuți Forest
41.	5	2.2	37+732	37+742	3.3	ROSCI0075 Pătrăuți Forest
42.	5	2.6	38+570	38+580	3.1	ROSCI0075 Pătrăuți Forest
43.	3	2.6	40+745	40+755	4.3	ROSPA0110 Mat accumulationsANDyou - Bucecea
44.	3	2.6	41+702	41+712	4.3	ROSPA0110 Mat accumulationsANDyou - Bucecea
45.	3	2.6	42+715	42+725	4.8	ROSPA0110 Mat accumulationsANDyou - Bucecea
46.	3	2.6	44+117	44+127	4.5	ROSCI0379 Suceava River
47.	2	1,2	44+970	44+980	3.9	ROSCI0379 Suceava River
48.	3	2.6	45+785	45+795	3.6	ROSCI0379 Suceava River
49.	3	2.6	47+045	47+055	2.9	ROSCI0379 Suceava River
50.	3	2.6	47+385	47+395	2.6	ROSCI0379 Suceava River
51.	5	2.6	47+936	47+946	2,3	ROSCI0379 Suceava River
52.	5	2.6	50+070	50+080	3.3	ROSCI0379 Suceava River

No. Crt.	Width (m)	Height (m)	Estimated interval for carrying out the works		Distance to the nearest protected natural area (km)	
			km start	end km	[km]	Name
53.	5	2.6	51+270	51+280	3.8	ROSPA0110 Mat accumulationsANDyou - Bucecea
54.	5	2.6	51+470	51+480	3.5	ROSPA0110 Mat accumulationsANDyou - Bucecea

2.3.8 Motorway and expres road facilities

The facilities designed within the project "Suceava-DN2H highway and DN2H expres road-Siret border" will be carried out in accordance with the Normative Regarding the Design of Extraurban Highways - PD 162-2002, correlated with the TEM document 2001 - TEM Standards and Recommended Practices, Third Edition -a -a, December 4-6, 2001. In the process of their placement, the water supply and sewerage networks, electrical networks, telephone networks, ordinary road networks were taken into account.

The following facilities were proposed on the Suceava-DN2H highway and the DN2H-Siret border expres road:

- ⚙ Maintenance and Coordination Center (CIC);
- ⚙ Short-term parking (PSD);
- ⚙ Service spaces type S1.

Table no.2-15 The locations of the proposed facilities

No. Crt.	Name	Location	Position km	Distance to the nearest protected natural area (km)
1.	Short term parking	Left Right	km 5+100 – km 5+400	ROSCI0075 Pătrăuți Forest (approx. 2.7 km)
2.	Service Space Type S1	Left	km 20+730– km 21+250	ROSCI0075 Pătrăuți Forest (approx. 3.2 km)
3.	Service Space Type S1	right	km 21+800 – km 21+250	ROSCI0075 Pătrăuți Forest (approx. 3.2 km)
4.	Short term parking	Left Right	km 37+150 – km 37+500	ROSCI0075 Pătrăuți Forest (approx. 3.3 km)
5.	Maintenance and coordination center	right	km 43+050 – km 43+310	ROSPA0110 Rogojești-Bucecea reservoirs (approx. 5 km)

The locations of the facilities are shown in the following figure.

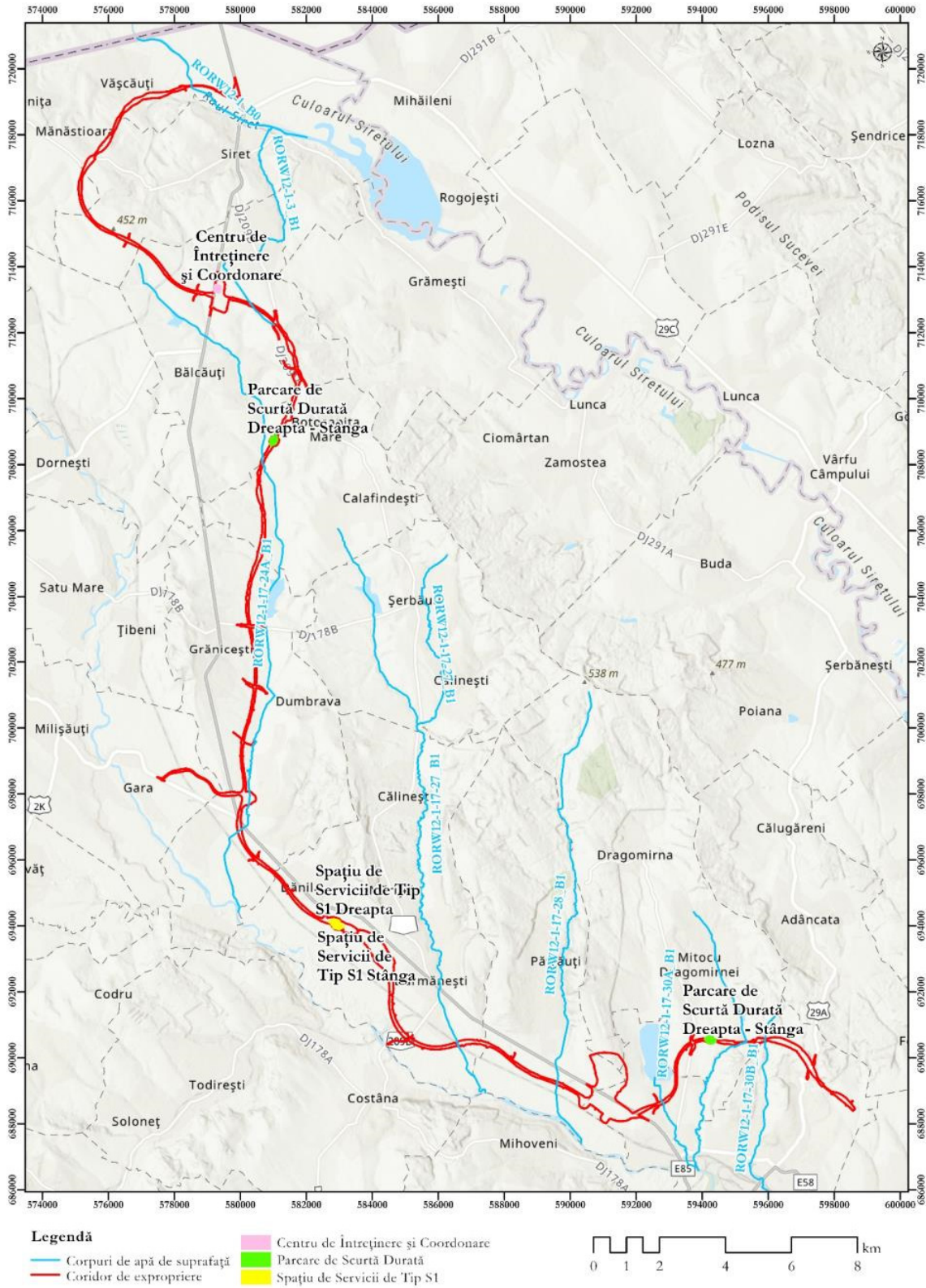


Figure no.2-13 The facilities proposed for the Suceava – DN2H highway and Drum Expres DN2H – Siret border

2.3.8.1 Maintenance and Coordination Centers

The role of the Maintenance and Coordination Centers is to maintain the road in optimal condition and to ensure the safety of road traffic in the district, by supporting and repairing the equipment. This type of endowment also has the functions of coordinating the activities of the support points and of permanent supervision of the inclusion of the highway and the expressway in the stability performance criteria of "Regulation for the maintenance of highway performance criteria" ind. SI 596/2009. The maintenance and coordination centers are equipped with specific measurement and control equipment.

They have a series of tasks grouped as follows:

- ⚙ traffic surveillance and the influence of meteorological factors on traffic;
- ⚙ providing first aid in case of accidents;
- ⚙ maintenance of the highway and expressway in the related sector, service areas, markings, lighting installations and telecommunications installations;
- ⚙ restorations and remedies in case of accidents or natural calamities;
- ⚙ collection of tax and fines;
- ⚙ fuel supply and maintenance of maintenance equipment

The Maintenance and Coordination Centers include constructions with different functions, designed to carry out the previously described tasks.

- ⚙ Operational building P+1E;
- ⚙ Car garage;
- ⚙ Above ground fuel tanks;
- ⚙ Fencing sanitary protection area;
- ⚙ Water tank with pumping group;
- ⚙ Drilled well;
- ⚙ Washing ramp;
- ⚙ Cabin gate;
- ⚙ Drainable sealed basin;
- ⚙ Purified water collection tank;
- ⚙ Sludge and hydrocarbon separators;
- ⚙ Pumping station for rainwater;
- ⚙ CaCl prepared installation (silo, tank, mixing basin);
- ⚙ Outdoor platforms for material storage;
- ⚙ Fuel tank for fire engines;
- ⚙ Metallic gates;
- ⚙ Wire mesh fences;
- ⚙ Substation and electrical connection;
- ⚙ Platform for waste storage;
- ⚙ Generator set;
- ⚙ Covered parking for cars with a capacity of 12 places;
- ⚙ Covered electric car parking for 4 electric car charging positions with two charging equipment to which two electric cars can be connected simultaneously.

2.3.8.2 Short-term parking

Short-term parking is important because it allows users to stop when they need rest and relaxation. These facilities will provide a change from the appearance of the highway/expressway, in viewpoints.

The parking platform has a protection zone with a width of 10 m, which extends from the edge of the roadway. The parking platforms will be arranged to support both heavy vehicles and cars.

For the safe re-entry of vehicles into traffic, the access to and from the platform will be through specially arranged ramps.

These facilities are located along the highway/expressway, on one side and the other of it, symmetrically with respect to the axis of the road.

The collection of rainwater from the highway and expressway premises will be done through drains with siphon and storage. The water thus collected will be gravity channeled through simple concrete pipes to the two separators for sludge and mineral oil. The rainwater from the parking areas will be purified in the hydrocarbon separator, being later sent to the caissons of the waste water pumping spaces.

The thermal source of the parking lot will be located in the WC building, being equipped with a boiler that works widely on the basis of electricity, with a closed expansion tank and a line pump for the circulation of the thermal agent.

In addition, by means of the transit grills mounted on the lower part of the access doors, the exhaust air will be compensated.

Each short-term parking lot includes the following buildings:

- ⚙ Public health group;
- ⚙ Water connection pipe/drilled well;
- ⚙ Drainable sealed basin;
- ⚙ Rainwater pumping station and buffer tank;
- ⚙ Weighing platform;
- ⚙ Exterior fencing made of wire mesh panels;
- ⚙ Covered tables;
- ⚙ Protection spaces;
- ⚙ Substation transformer;
- ⚙ Fencing drilled well;
- ⚙ Water tank with pumping group;
- ⚙ Waste storage platform;

- ⚙ Car parking - 29 places;
- ⚙ Covered electric car parking for 6 electric car charging positions with three charging equipment to which two electric cars can be connected simultaneously.
- ⚙ Bus parking - 2 places;
- ⚙ Heavy vehicle parking - 15 places;
- ⚙ Parking for disabled people - 4 places.

2.3.8.3 Service spaces (type S1)

The purpose of S1 service spaces is the parking and long-term parking of vehicles, compared to short-term parking. This type of facility includes, in addition to short-term parking, a fuel station and a commercial space with public catering. The space will be concessioned for the location of the following facilities:

- ⚙ Public health group;
- ⚙ Home water connection/Bore well;
- ⚙ Drainable sealed basin;
- ⚙ Pumping station for rainwater and buffer tank;
- ⚙ External fencing;
- ⚙ Covered tables;
- ⚙ Protection spaces;
- ⚙ Substation transformer;
- ⚙ Fencing drilled well;
- ⚙ Water tank with pumping group;
- ⚙ Ecological container platform;
- ⚙ Car parking - 87 spaces + 7 spaces in the gas station;
- ⚙ Covered parking for electric cars for 6 electric car charging positions with three charging equipment to which two electric cars can be connected simultaneously;
- ⚙ Bus parking - 6 places;
- ⚙ Heavy vehicle parking - 33 places;
- ⚙ Parking for disabled people - 6 places;
- ⚙ Space reserved for gas station;
- ⚙ Space reserved for trade + catering;
- ⚙ Alveolus maintenance equipment.

2.3.9 Hydrotechnical works

Hydraulic works are necessary when the project is crossed by surface water bodies, as it ensures or optimal hydraulic drainage of water under bridges and protects the road embankment.

In the case of the Suceava-DN2H highway and the DN2H-Siret border expressway, the hydrotechnical works were designed in such a way as to comply with the provisions of the standard STAS 4273-83 "Classification of importance" - point 2.11, which concerns the hydrotechnical constructions related to the roads . of public traffic in the area of crossing water bodies. Thus, according to STAS 4273-83¹, as a result of the duration of operation (definitive) and the functional role (main), the designed hydrotechnical works fall into importance class III.

Also, the hydrotechnical works analyzed have a probability of exceeding 2%, in accordance with the STAS 4068/2-87 standard.²"Annual probabilities of maximum flows and volumes under normal and special operating conditions" - point 2.1.

The hydraulic dimensioning of bridges and walkways is done by observing the conditions of free passage, included in the normative PD 95-2002³, tables 6.III and 7.I.

Therefore, if the flow rate of the intersected surface water bodies is less than 1000 m³/s with floats, the minimum free passage height under the bridge will be 1.00 m.

The determination of the types of hydrotechnical works, within this project, was carried out according to the Eurocode norms and through the studies of optimal solutions from a technical - economic point of view.

The main hydrotechnical works designed within this project are:

- ⚙ Slope protection
- ⚙ Recalibration of earth channels
- ⚙ Relocation of earth channels
- ⚙ Construction of concrete channels
- ⚙ Bed recalibrations in the bridge area

2.3.9.1 Slope protection with concrete slab wall

Hydrotechnical work Type - 1 it is represented by a wall made of cast-in-place concrete slabs, with the aim of protecting the road embankment at level, with the calculation insurance of 2%, in the case of roads located in the major river bed. The concrete wall will be reinforced with 15 cm thick Buzău mesh and rests on concrete beams.

Hydrotechnical work Tip 2 it is made of a cast-in-place concrete slab wall and a gabion wall. This type of work is applied in areas where the route of the projected road is at a small distance from

¹National Council for Science and Technology; Romanian Institute of Standardization. (1983, 06 15). Classification in classes of importance - Hydrotechnical constructions. STAS 4273-83. Bucharest, Romania: Technical Publishing House.

²National Committee for Science and Technology; Romanian Institute of Standardization;. (1987, 05 08). Annual probabilities of maximum flows and volumes under normal and special operating conditions - Maximum water flows and volumes. STAS 4068/2-87. Bucharest, Romania: Technical Publishing House.

³SC IPTANA SA (2002, 01 09). Regulations on the hydraulic design of bridges and decks. PD 95-2002. Bucharest, Romania: National Road Administration.

the minor bed of the water body. It is a defense solution consisting of a wall of gabions designed to protect the bank of the minor bed and a wall used to protect the road embankment, being located in the major bed of the water body. The designed gabion wall will have a variable height, between 1.5 and 3.0 m. It is placed on a 5.0 m long gabion mattress. The protection of the backfill will be done by means of a wall made of cast-in-place concrete slabs, supported on a concrete beam. The thickness of the wall will be 15 cm and it will be reinforced with a Buzau net.

The location of the works is indicated in the following table:

Table no.2-16 Areas of works with slope protection (hydraulic) road – flood risk

ROAD SLOPE PROTECTION WITH CONCRETE WALL										
No · Crt.	The Left Side			The distance to the nearest protected area	Name of protected natural area	The Right Side			The distance to the nearest protected area	Name of protected natural area
	pK	Pkf	L (m)	km		pK	Pkf	L (m)	km	
1.	7+850	7+975	125	2.54	ROSCI0075 Pătrăuți Forest	7+845	7+975	130	2.42	ROSCI0075 Pătrăuți Forest
2.	8+000	8+150	150	2.44	ROSCI0075 Pătrăuți Forest	8+000	8+150	150	2.45	ROSCI0075 Pătrăuți Forest
3.	9+225	9+275	50	2.60	ROSCI0075 Pătrăuți Forest	-	-	-	-	-
4.	-	-	-	-	ROSCI0075 Pătrăuți Forest	9+400	9+500	100	2.10	ROSCI0075 Pătrăuți Forest
5.	9+690	10+350	660	2.50	ROSCI0075 Pătrăuți Forest	-	-	-	-	-
6.	11+400	11+590	190	1.96	ROSCI0075 Pătrăuți Forest	11+400	11+590	190	1.86	ROSCI0075 Pătrăuți Forest
7.	11+610	11+685	75	2.06	ROSCI0075 Pătrăuți Forest	11+610	11+685	75	1.98	ROSCI0075 Pătrăuți Forest
8.	11+710	11+900	190	2.11	ROSCI0075 Pătrăuți Forest	11+710	11+900	190	2.05	ROSCI0075 Pătrăuți Forest
9.	14+380	14+515	135	2.66	ROSCI0075 Pătrăuți Forest	14+285	14+360	75	2.61	ROSCI0075 Pătrăuți Forest
10.	14+715	14+910	195	3.00	ROSCI0075 Pătrăuți Forest	14+380	14+525	145	2.84	ROSCI0075 Pătrăuți Forest
11.	15+000	15+200	two hundred	3.19	ROSCI0075 Pătrăuți Forest	14+740	14+920	180	3.12	ROSCI0075 Pătrăuți Forest
12.	17+150	17+550	400	3.63	ROSCI0075 Pătrăuți Forest	17+150	17+550	400	3.54	ROSCI0075 Pătrăuți Forest
13.	17+725	17+875	150	3.19	ROSCI0075 Pătrăuți Forest	17+725	17+875	150	3.11	ROSCI0075 Pătrăuți Forest
14.	22+090	22+175	85	4.16	ROSCI0075 Pătrăuți Forest	15+000	15+190	190	4.08	ROSCI0075 Pătrăuți Forest
15.	22+210	22+290	80	4.31	ROSCI0075 Pătrăuți Forest	22+100	22+175	75	4.24	ROSCI0075 Pătrăuți Forest
16.	25+025	25+200	175	5.50	ROSCI0379 Suceava River	22+215	22+280	65	4.25	ROSCI0075 Pătrăuți Forest

ROAD SLOPE PROTECTION WITH CONCRETE WALL										
No · Crt.	The Left Side			The distance to the nearest protected area	Name of protected natural area	The Right Side			The distance to the nearest protected area	Name of protected natural area
	pK	Pkf	L (m)	km		pK	Pkf	L (m)	km	
17.	25+250	25+500	250	5.53	ROSCI0379 Suceava River	25+025	25+200	175	5.65	ROSCI0379 Suceava River
18.	30+930	30+970	40	4.83	ROSCI0379 Suceava River	25+250	25+500	250	5.39	ROSCI0379 Suceava River
19.	30+950	30+970	20	4.84	ROSCI0379 Suceava River	30+930	30+970	40	4.91	ROSCI0379 Suceava River
20.	32+545	32+590	45	3.65	ROSCI0379 Suceava River	30+985	31+030	45	4.92	ROSCI0379 Suceava River
21.	35+160	35+200	40	3.73	ROSCI0379 Suceava River	55+128	55+283	155	-	ROSCI0379 Suceava River
22.	36+030	36+050	20	3.85	ROSCI0379 Suceava River	-	-	-	-	-
23.	36+425	36+560	135	3.84	ROSCI0379 Suceava River	36+425	36+560	135	3.75	ROSCI0075 Pătrăuți Forest
24.	36+590	36+850	260	3.77	ROSCI0075 Pătrăuți Forest	36+590	36+850	260	3.71	ROSCI0075 Pătrăuți Forest
25.	54+960	55+105	145	0.82	ROSPA0110 Accumulations Rogojesti - Bucecea	-	-	-	-	ROSPA0110 Accumulations Rogojesti - Bucecea
26.	55+128	55+283	155	0.80	ROSPA0110 Accumulations Rogojesti - Bucecea	-	-	-	-	ROSPA0110 Accumulations Rogojesti - Bucecea

2.3.9.2 Diverting and bed protection with gabion mattress

Within the project there are 14 diversion and bed protection works with gabion mats of which only 5 are good on surface water bodies. Water body diversion works are designed in the crossing areas with bridges or viaducts and are carried out in order to avoid the placement of infrastructure elements (piles and piles) directly in the minor bed.

The protection of the bed with the gabion mattress is applied and it is necessary to stabilize the bank, thus ensuring its protection against erosion induced by water bodies.

The gabion mattresses are placed on a geosynthetic material that acts as a filter. Bioness are superimposed on them, a geotextile filter will be placed behind them.

The advantages of works made of gabions are elasticity, quick execution and the possibility of immediate exploitation.

Table no.2-17 Diversion of the riverbed in the area of bridges and gabion mat protection

No. Crt.	Profitable tip	Estimated interval for carrying out the works				Body of water	Length (m)
		Left		Right			
		km start	end km	km start	end km		
1	Recalibration of the riverbed in the area of the bridges - the gabion mattress	7+950	8+050	7+950	8+050	RORW12-1-17-30_B3 Dragomirna (Lake Dragomirna - cf Suceava)	235.73
2	Recalibration of the riverbed in the area of the bridges - the gabion mattress	11+550	11+650	11+550	11+650	RORW12-1-17-28_B1 Patrăuțeanca	206.53
3	Recalibration of the riverbed in the area of the bridges - the gabion mattress	14+350	14+450	14+250	14+400	-	193.33
4	Recalibration of the riverbed in the area of the bridges - the gabion mattress	22+900	23+025	22+950	23+100	-	260.44
5	Recalibration of the riverbed in the area of the bridges - the gabion mattress	23+450	23+550	23+450	23+550	-	220.43
6	Recalibration of the riverbed in the area of the bridges - the gabion mattress	25+100	25+250	22+150	25+300	RORW12-1-17-24A_B1 Horaț	323.52
7	Recalibration of the riverbed in the area of the bridges - the gabion mattress	27+850	27+950	27+875	27+925	-	160.06
8	Recalibration of the riverbed in the area of the bridges - the gabion mattress	30+375	30+400	30+325	30+375	-	185.4
9	Recalibration of the riverbed in the area of the bridges - the gabion mattress	30+950	31+000	30+950	31+000	-	134.82
10	Recalibration of the riverbed in the area of the bridges - the gabion mattress	33+450	33+600	33+400	33+550	-	230.62
11	Recalibration of the riverbed in the area of the bridges - the gabion mattress	35+100	35+250	33+050	35+150	-	215.37
12	Recalibration of the riverbed in the area of the bridges - the gabion mattress	36+575	36+700	36+500	36+575	RORW12-1-17-24A_B1 Horaț	240.46

No. Crt.	Profitable tip	Estimated interval for carrying out the works				Body of water	Length (m)
		Left		Right			
		km start	end km	km start	end km		
13	Recalibration of the riverbed in the area of the bridges - the gabion mattress	41+975	42+150	42+050	42+250	RORW12-1-3_B1 Shop	283.5
14	Recalibration of the riverbed in the area of the bridges - the gabion mattress	55+050	55+150	55+050	55+150	-	368.54

No. Crt.	Distance km		Body of water	Length (m)	The distance from the nearest protected natural area (km)	Name of protected natural area
1.	km 36+400	km 36+800	RORW12-1-17-24A_B1 Horait	280.46	3.74	ROSCI0075 Pătrăuți Forest
2.	km 41+950	km 42+250	RORW12-1-3_B1 Shop	230	4.40	ROSPA0110 Accumulations Rogojesti – Bucecea

2.3.10 Rainwater collection and drainage works

In order to evacuate rainwater, there were two categories of devices in the project, depending on their role, namely works that ensure the flow of meteoric waters to the emissary and works to depollute the water before evacuating the paths in the emissary or on natural valleys.

- ⚙ In the first category, that of the works that ensure the flow of meteoric waters to the emitter, are included:
 - ditches with the walled section at the edge of the embankment;
 - 2 m and 5 m span decks;
 - approach ditches made of prefabricated elements;
 - cases for discharging water from the surface of the highway/expressway in the case of high embankments, ramps, bridges and passages;
 - walled ditches in the median area of the highway/expressway in the case of landscaped curves.
- ⚙ another category is the one that includes works for depollution of water before discharge into the emissary or on natural valleys, such as:

- decanter/separator chambers for hydrocarbons, devices placed before the discharge of trenches on floors or in natural water courses;
- decanter chambers/hydrocarbon separators associated with water dispersion basins which are good in areas where the water collected in the trenches will discharge on the natural land, in depression areas and aims for laminar drainage of water to avoid land erosion;
- retention basins.

The works to drain and evacuate the water from the road system consists of extending the granular layer to the edge of the platform to allow the water infiltrated into the foundation to discharge on the slopes or in the drainage devices along the highway / expressway.

At the base of the embankment slopes, concrete trapezoidal trenches will be constructed to collect rainwater from the highway/expressway area, along their entire length (left and right).

Water from the highway/expressway platform will be collected through concrete side ditches and discharged on the slope, in trenches, through boxes located according to the hydraulic capacity calculation of the ditch.

2.3.11 Consolidation works

For the "Suceava-DN2H highway and the DN2H-Siret border expressway" project, the consolidation works are represented by terrace works. These will be carried out in backfill (filling) with a maximum height of 12 m and in debleu (excavations) with a maximum depth of 30 m. The measurements were made in the designed axis.

In choosing the materials that will be used to make the backfill fillings, the specifications included in the STAS 2914-84 standard were taken into account. These materials fall into the "very good", "good" and "mediocre" categories.

Backfill fillings will be made on land with a slope of more than 10%, being executed in twin steps after removing the topsoil. The width of the twinning steps will be at least 3 m and the height at least 50 cm. The base of each step will be executed with a slope of 2% - 4%, in the direction of inclination of the natural terrain.

The slopes of the embankment slopes will be 1:2 and the benches will have a width of 5 m, at intervals of 6 m vertically. Intermediate benches are good with concrete gutters designed to collect and direct rainwater. The slopes of the slopes were stability as an example of the calculation of the general stability, thus, it can be seen that the cohesive filling material in the backfill body will have the following characteristics of the physical-mechanical parameters:

- ⚙ angle of internal friction of the material $\phi = 15^\circ$;
- ⚙ cohesion $c = 25$ Kpa;
- ⚙ volumetric weight $\gamma = 19$ KN/m³.

To determine the foundation characteristics, the recommendations of the Geotechnical Study were taken into account, for each horizon identified in the geotechnical drillings correlated with the geological survey according to the depths at which they are located.

In the case of debleu areas that had a slope of 1:2, intermediate benches with a width of 5 m, provided at intervals of 6 m vertically and where the general stability is not satisfied, the following individual consolidation solutions were provided, by using one or more solutions in the respective case.

- ⚙ reshaping at the base of the embankment by means of reshaping geogrids and/or woven textiles, of high unidirectional resistance;
- ⚙ improving the foundation land with filling piles made of granular material or wick-type drains;
- ⚙ the support structure made of reinforced concrete with an indirect foundation on drilled piles of large diameter.

For this project, according to the specifications of AND 515/93, the fillings of the reinforced concrete bridges, passages and walkways will be made of granular material of type 1a, 1b, 2a (very good) or 2b (good). Their characterization was carried out in accordance with STAS 2914/84. The embankment length will be made of granular material, being a minimum of 30 m for bridges and passages and a minimum of 5 m for reinforced concrete floors. The transition from the granular filling to the cohesive material filling will be done in steps of one meter in width and one meter in height.

To establish the slopes of the slopes adjacent to the bridges and passages, general stability calculations were made, thus, you see that the non-cohesive filling material in the body of the embankment will have the following characteristic values for the physical-mechanical parameters.

- ⚙ angle of internal friction of the material $\phi = 33^\circ$;
- ⚙ cohesion $c = 2 \text{ Kpa}$;
- ⚙ volumetric weight $\gamma = 19 \text{ KN/m}^3$.

The slopes of the debleu slopes were adopted according to the stratification identified as a result of the geotechnical investigations, so as to ensure their local and general stability. The slopes of the debleu slopes were adopted as follows:

- ⚙ slopes of 1:2 – 1:4 and banks of 5 m width at intervals of 6 m vertically;
- ⚙ slopes of 1:5 – 1:10 without intermediate benches in areas where the stratification of the land indicates material for the execution of embankment fillings and the configuration of the land allows excavations to be carried out with reduced slopes.

As a basis for determining the characteristics of the stratification, each horizon identified in the geotechnical drillings, correlated with the geological load according to the depth at which each horizon is located, were adopted for recommendations to the Geotechnical Study.

In the case of debleu areas where the reduction of the slopes ensures the general stability was not allowed as a result of the local constraints of the site, respectively accentuated inclinations of the

natural terrain in transverse profile, limitations of the expropriation corridor, support structures made of drilled diameter columns were good. Mare.

The benches at the level of the crowns of the backfill and embankment supporting walls will have a width of 3 m. Concrete gutters will also be good for collecting and directing surface water along the supporting structures. The unloading will be done through the cases of the prefabricated elements provided at their minimum point, located at one of the ends of the supporting walls.

2.3.12 Works for environmental protection

2.3.12.1 Sound-absorbing panels

Sound-absorbing panels will be installed in order to reduce the level of noise generated by construction works and road traffic. Their installation is planned in the area of towns and in sensitive areas for fauna.

For the construction stage, the use of mobile panels that will be installed at the level of the work fronts is foreseen, especially in areas with high sensitivity such as protected natural areas, connectivity/permeability areas for fauna protected species and inhabited areas.

The locations of the sound-absorbing panels, both in the zones and in the zone of the protected areas, are presented in the following table:

Table no.2-18The locations of the sound-absorbing panels proposed in the area of natural protected areas

No. crt.	km start	end km	The side on which it is installed	Length (m)	The distance from the nearest protected natural area
1.	0+975	1+600	Right	629	ROSCI0075 Pătrăuți Forest (4.5 km)
2.	3+475	3+650	Left	175	ROSCI0075 Pătrăuți Forest (3.2 km)
3.	3+475	3+650	Right	170	ROSCI0075 Pătrăuți Forest (3.2 km)
4.	3+850	4+750	Left	896	ROSCI0075 Pătrăuți Forest (3.4 km)
5.	3+850	3+950	Right	101	ROSCI0075 Pătrăuți Forest (3.3 km)
6.	7+325	7+550	Left	231	ROSCI0075 Pătrăuți Forest (2.4 km)
7.	7+050	8+025	Right	957	ROSCI0075 Pătrăuți Forest (2.5 km)
8.	14+075	15+000	Right	912	ROSCI0075 Pătrăuți Forest (2.6 km)
9.	38+625	39+075	Left	434	ROSCI0075 Pătrăuți Forest (3.2 km)
10.	38+625	39+075	Right	445	ROSCI0075 Pătrăuți Forest (3.2 km)
11.	39+575	40+075	Left	503	ROSCI0075 Pătrăuți Forest (4 km)
12.	39+575	40+075	Right	512	ROSCI0075 Pătrăuți Forest (4 km)
13.	43+550	44+075	Left	516	ROSCI0379 Suceava River (4.5 km)
14.	43+550	44+075	Right	521	ROSCI0379 Suceava River (4.5 km)
15.	48+725	49+125	Left	398	ROSCI0379 Suceava River (2.4 km)
16.	48+725	49+125	Right	393	ROSCI0379 Suceava River (2.4 km)
17.	53+100	54+950	Right	1854	ROSPA0110 Accumulations Rogojești – Bucecea (0.8 km)
18.	53+025	54+950	Left	1953	ROSPA0110 Accumulations Rogojești – Bucecea (0.8 km)
19.	54+950	55+475	Left	500	ROSPA0110 Accumulations Rogojești – Bucecea (0.8 km)

Table no.2-19The locations of the sound-absorbing panels proposed in the area of the towns

No. crt.	km start	end km	The side on which it is installed	Length (m)	The city served	The distance from the nearest protected natural area
1.	0+675	1+400	Left	720	Municipality of Suceava (0.2 km)	ROSCI0075 Pătrăuți Forest (4.5 km)
2.	3+950	4+575	Right	639	Mitocu Dragomirnei (1.5 km)	ROSCI0075 Pătrăuți Forest (3.3 km)
3.	5+450	6+075	Right	639	Mitocu Dragomirnei (0.9 km)	ROSCI0075 Pătrăuți Forest (2.2 km)
4.	5+425	7+325	Left	1875	Municipality of Suceava (intersected)	ROSCI0075 Pătrăuți Forest (2 km)
5.	7+550	8+250	Left	718	Municipality of Suceava (0.1 km)	ROSCI0075 Pătrăuți Forest (2.5 km)
6.	9+025	9+825	Left	805	Mun Suceava (0.3 km)	ROSCI0075 Patrăuti Forest (2.3 km)
7.	11+725	12+375	Right	659	Square (0.5 km)	ROSCI0075 Pătrăuți Forest (2.1 km)
8.	12+850	13+875	Right	1017	Square (0.5 km)	ROSCI0075 Pătrăuți Forest (2.1 km)
9.	15+000	17+175	Right	2163	Darmanesti (0.1 km)	ROSCI0075 Pătrăuți Forest (3.1 km)
10.	17+800	18+700	Right	884	Darmanesti (0.3 km)	ROSCI0075 Pătrăuți Forest (2.6 km)
11.	21+450	23+600	Right	2151	Little Grandmother Danila (0.3 km)	ROSCI0075 Pătrăuți Forest (3.7 km)
12.	20+850	21+200	Right (SS type S1)	391	Little Marice (0.3 km)	ROSCI0075 Pătrăuți Forest (3.2 km)
13.	24+175	24+975	Right	807	Iacobesti (0.2 km)	ROSCI0075 Pătrăuți Forest (5.4 km)
14.	24+975	26+350	Left	1496	Slobozia Sucevei (crossed)	ROSCI0379 Suceava River (5.1 km)
15.	26+425	27+900	Right	1460	Romanesti (0.3 km)	ROSCI0379 Suceava River (4.4 km)
16.	26+350	27+450	Left	1185	Slobozia Suceva (0.2 km)	ROSCI0379 Suceava River (4.5 km)
17.	30+800	31+350	Left	550	Granicesti (0.3 km)	ROSCI0379 Suceava River (4 km)
18.	40+625	40+975	Left	330	Pits (0.03 km)	ROSPA0110 Rogojești - Bucecea reservoirs (4.2 km)
19.	43+050	43+275	Right	295	Negostina (0.3 km)	ROSPA0110 Rogojești - Bucecea reservoirs (4.8 km)
20.	49+900	50+125	Right	220	Monastery (0.04 km)	ROSPA0110 Rogojești - Bucecea reservoirs (4.4 km)
21.	49+900	50+125	Left	232	Bancesti (0.03 km)	ROSCI0379 Suceava River (3.2 km)

No. crt.	km start	end km	The side on which it is installed	Length (m)	The city served	The distance from the nearest protected natural area
22.	54+975	55+425	Right	471	Siret (intersected)	ROSPA0110 Accumulations Rogojești – Bucecea (0.8 km)
23.	55+450	55+700	Right	264	Siret (intersected)	ROSPA0110 Accumulations Rogojești – Bucecea (1 km)

2.3.12.2 Anti-collision panels

Anti-collision panels are intended to avoid the collision of fauna with car traffic during the operating period, they being mounted in sensitive areas from the point of view of biodiversity, respectively in intersection areas or in the vicinity of Special Areas of Bird Protection or Sites of Community Importance.

Table no.2-20The locations of the proposed anti-collision panels

No. crt.	km start	end km	The side on which it is installed	Length (m)	The distance from the nearest protected natural area
1.	1+400	1+550	Left	163	ROSCI0075 Pătrăuți Forest (4.6 km)
2.	6+075	7+050	Right	985	ROSCI0075 Pătrăuți Forest (2 km)
3.	11+100	11+700	Left	588	ROSCI0075 Pătrăuți Forest (1.9 km)
4.	14+075	17+550	Left	3493	ROSCI0075 Pătrăuți Forest (2.6 km)
5.	22+125	23+625	Left	1495	ROSCI0075 Pătrăuți Forest (4.3 km)
6.	24+075	24+975	Left	909	ROSCI0075 Pătrăuți Forest (5.5 km)
7.	25+000	25+900	Right	893	ROSCI0379 Suceava River (5.2 km)
8.	28+500	28+700	Left	199	ROSCI0379 Suceava River (4.4 km)
9.	28+500	28+700	Right	204	ROSCI0379 Suceava River (4.4 km)
10.	29+000	29+875	Right	881	ROSCI0379 Suceava River (4.5 km)
11.	29+000	29+875	Left	873	ROSCI0379 Suceava River (4.5 km)
12.	30+900	31+050	Right	152	ROSCI0379 Suceava River (4.6 km)
13.	32+450	32+700	Left	237	ROSCI0379 Suceava River (3.7 km)
14.	32+450	32+700	Right	240	ROSCI0379 Suceava River (3.7 km)
15.	33+425	33+625	Left	207	ROSCI0379 Suceava River (3.7 km)
16.	33+425	33+625	Right	205	ROSCI0379 Suceava River (3.7 km)
17.	34+950	35+300	Left	349	ROSCI0379 Suceava River (3.8 km)
18.	34+900	35+300	Right	409	ROSCI0379 Suceava River (3.8 km)
19.	35+875	36+175	Left	290	ROSCI0379 Suceava River (3.8 km)
20.	35+875	36+175	Right	297	ROSCI0379 Suceava River (3.8 km)
21.	42+000	42+225	Left	209	ROSPA0110 Rogojești - Bucecea reservoirs (4.4 km)
22.	42+000	42+225	Right	211	ROSPA0110 Rogojești - Bucecea reservoirs (4.4 km)

2.3.12.3 Landscaping works

Among the designed landscaping works, the greening and protective forest curtains stand out. The vegetation is intended to cover the roadway for soil stabilization. These constitute the background on which the shrub vegetation will be created.

Forest curtains are considered the most effective solution for protecting roadways against snow, as they act as biological parapets. The choice of the species to be used must take into account the following criteria:

- ⚙ the trees must grow as fast as possible, so that the curtain becomes functional in the shortest period of time;
- ⚙ longevity and ensuring good natural regeneration;
- ⚙ must not harbor pests of agricultural crops from the surfaces they protect;
- ⚙ they will offer adjacent advantages from an economic point of view.

Thus, for the same stationary conditions, under equal conditions of growth and development, long-lived species will be planted, in order to provide protection for as long a period as possible.

In the case of chernozemous soils and other categories, preference will be given to:

- ⚙ Trees: brumaria oak, sky, silver linden, forest hair, jugaster.
- ⚙ Shrubs: elder, Tatar maple, hawthorn.

For the edge rows, the following species are planned to be planted: dogwood, red sea buckthorn, cherry, scumpie, lilac, etc.

For landscaping to perform the following operations:

- ⚙ removal and storage of vegetation;
- ⚙ covering all unexposed plants of embankments and embankments with earth and planting grasses and shrubs;
- ⚙ restoring the areas affected by the works, namely service roads, storage and stacking areas, by covering with earth and planting appropriate grasses and shrubs;
- ⚙ the planting of shrubs, chosen in such a way as to correspond to the height of the embankment of the adjacent road;
- ⚙ to prevent the penetration of snow, suitable shrubs will be planted in the upper part of the debles;
- ⚙ the plants for the purpose of landscaping will be characteristic of the area;
- ⚙ the stripped soil will be stored with the purpose of re-use to cover the embankments and embankments and for the redevelopment of the areas affected by the works.

2.3.12.4 *Constructions for water pretreatment*

In the case of the project, in order to protect the quality of the soil and water, the following constructions were designed for water purification, the number of these constructions being determined according to the hydrographic basins of the area.

The project provides construction services for water pretreatment:

- ⚙ hydrocarbon decanter/separator chambers 256 pcs. - for the main route of the highway sector and the expressway sector;
- ⚙ hydrocarbon decanter/separator chambers 42 pcs. - the products on the shoulder straps of road junctions;

⚙️ retention basins 16 pcs.

Table no.2-21 Locations of oil separators and retention basins on the main route of the motorway sector and the expres road sector

No. crt.	Name	KM	Position	Description
1.	SH849d	0+849	right	hydrocarbon separator
2.	SH850s	0+850	Left	hydrocarbon separator
3.	SH1213d	1+213	right	hydrocarbon separator
4.	SH1215s	1+215	Left	hydrocarbon separator
5.	SH3571d	3+571	right	hydrocarbon separator
6.	SH3574s	3+574	Left	hydrocarbon separator
7.	SH3606d	3+606	right	hydrocarbon separator
8.	SH3602s	3+602	Left	hydrocarbon separator
9.	SH3951d	3+951	right	hydrocarbon separator
10.	SH3949s	3+949	Left	hydrocarbon separator
11.	SH4553d	4+553	right	hydrocarbon separator
12.	SH4554s	4+554	Left	hydrocarbon separator
13.	SH4802d	4+802	right	hydrocarbon separator
14.	SH4799s	4+799	Left	hydrocarbon separator
15.	SH5035s	5+035	Left	hydrocarbon separator
16.	SH5428s	5+428	Left	hydrocarbon separator
17.	SH5430d	5+430	right	hydrocarbon separator
18.	SH6085d	6+085	right	hydrocarbon separator
19.	SH6088s	6+088	Left	hydrocarbon separator
20.	BSH6105s	6+105	Left	retention basin + hydrocarbon separator
21.	SH6117d	6+117	right	hydrocarbon separator
22.	SH6117s	6+117	Left	hydrocarbon separator
23.	SH6594s	6+594	Left	hydrocarbon separator
24.	SH6595d	6+595	right	hydrocarbon separator
25.	SH7044d	7+044	right	hydrocarbon separator
26.	SH7044s	7+044	Left	hydrocarbon separator
27.	SH7809d	7+809	right	hydrocarbon separator
28.	SH7819s	7+819	Left	hydrocarbon separator
29.	SH7829d	7+829	right	hydrocarbon separator
30.	SH7960d	7+960	right	hydrocarbon separator
31.	SH7963s	7+963	Left	hydrocarbon separator
32.	SH8013d	8+013	right	hydrocarbon separator
33.	SH8009s	8+009	Left	hydrocarbon separator
34.	SH9399s	9+399	Left	hydrocarbon separator
35.	SH9413s	9+413	Left	hydrocarbon separator
36.	SH9418d	9+418	right	hydrocarbon separator
37.	SH10069s	10+069	Left	hydrocarbon separator
38.	SH10081s	10+081	Left	hydrocarbon separator
39.	SH10182d	10+182	right	hydrocarbon separator
40.	SH10192d	10+192	right	hydrocarbon separator
41.	SH10193s	10+193	Left	hydrocarbon separator
42.	SH10519s	10+519	Left	hydrocarbon separator
43.	SH10530s	10+530	Left	hydrocarbon separator
44.	SH10539d	10+539	right	hydrocarbon separator
45.	SH11576d	11+576	right	hydrocarbon separator
46.	SH11576s	11+576	Left	hydrocarbon separator
47.	SH11616d	11+616	right	hydrocarbon separator
48.	SH11616s	11+616	Left	hydrocarbon separator

No. crt.	Name	KM	Position	Description
49.	SH12414d	12+414	right	hydrocarbon separator
50.	SH12415s	12+415	Left	hydrocarbon separator
51.	SH12453s	12+453	Left	hydrocarbon separator
52.	SH12486d	12+486	right	hydrocarbon separator
53.	SH12916s	12+916	Left	hydrocarbon separator
54.	SH12916d	12+916	right	hydrocarbon separator
55.	SH12936d	12+936	right	hydrocarbon separator
56.	SH12937s	12+937	Left	hydrocarbon separator
57.	BSH14024s	14+024	Left	retention basin + hydrocarbon separator
58.	SH14342s	14+342	Left	hydrocarbon separator
59.	SH14345d	14+345	right	hydrocarbon separator
60.	BSH14774s	14+774	Left	retention basin + hydrocarbon separator
61.	SH14989s	14+989	Left	hydrocarbon separator
62.	SH15231s	15+231	Left	hydrocarbon separator
63.	SH15240d	15+240	right	hydrocarbon separator
64.	SH15251d	15+251	right	hydrocarbon separator
65.	SH15252s	15+252	Left	hydrocarbon separator
66.	SH15796s	15+796	Left	hydrocarbon separator
67.	SH15804d	15+804	right	hydrocarbon separator
68.	SH15815s	15+815	Left	hydrocarbon separator
69.	BSH16024s	16+024	Left	retention basin + hydrocarbon separator
70.	SH16292d	16+292	right	hydrocarbon separator
71.	BSH16393d	16+393	right	retention basin + hydrocarbon separator
72.	BSH16643d	16+643	right	retention basin + hydrocarbon separator
73.	SH16917s	16+917	Left	hydrocarbon separator
74.	SH16917d	16+917	right	hydrocarbon separator
75.	SH16927s	16+927	Left	hydrocarbon separator
76.	SH16928d	16+928	right	hydrocarbon separator
77.	BSH17369d	17+369	right	retention basin + hydrocarbon separator
78.	BSH17746d	17+746	right	retention basin + hydrocarbon separator
79.	SH18194s	18+194	Left	hydrocarbon separator
80.	SH18195d	18+195	right	hydrocarbon separator
81.	SH18204d	18+204	right	hydrocarbon separator
82.	SH18205s	18+205	Left	hydrocarbon separator
83.	SH20288s	20+288	Left	hydrocarbon separator
84.	SH20294d	20+294	right	hydrocarbon separator
85.	SH20967s	20+967	Left	hydrocarbon separator
86.	SH21119s	21+119	Left	hydrocarbon separator
87.	SH21441s	21+441	Left	hydrocarbon separator
88.	SH21441d	21+441	right	hydrocarbon separator
89.	SH21452s	21+452	Left	hydrocarbon separator
90.	SH21453d	21+453	right	hydrocarbon separator
91.	SH22154s	22+154	Left	hydrocarbon separator
92.	SH22159d	22+159	right	hydrocarbon separator
93.	SH22211d	22+211	right	hydrocarbon separator
94.	SH22221s	22+221	Left	hydrocarbon separator
95.	SH22999d	22+999	right	hydrocarbon separator
96.	SH22999s	22+999	Left	hydrocarbon separator
97.	SH23530d	23+530	right	hydrocarbon separator
98.	SH23530s	23+530	Left	hydrocarbon separator
99.	BSH24053s	24+053	Left	retention basin + hydrocarbon separator
100.	SH25161s	25+161	Left	hydrocarbon separator

No. crt.	Name	KM	Position	Description
101.	SH25185d	25+185	right	hydrocarbon separator
102.	SH25235s	25+235	Left	hydrocarbon separator
103.	SH25266d	25+266	right	hydrocarbon separator
104.	SH25664s	25+664	Left	hydrocarbon separator
105.	SH25664d	25+664	right	hydrocarbon separator
106.	SH27083s	27+083	Left	hydrocarbon separator
107.	SH27084d	27+084	right	hydrocarbon separator
108.	SH27113d	27+113	right	hydrocarbon separator
109.	SH27115s	27+115	Left	hydrocarbon separator
110.	SH27483d	27+483	right	hydrocarbon separator
111.	SH27486s	27+486	Left	hydrocarbon separator
112.	SH27515d	27+515	right	hydrocarbon separator
113.	SH27515s	27+515	Left	hydrocarbon separator
114.	SH27894d	27+894	right	hydrocarbon separator
115.	SH27895s	27+895	Left	hydrocarbon separator
116.	SH27946s	27+946	Left	hydrocarbon separator
117.	SH27948d	27+948	right	hydrocarbon separator
118.	SH28565d	28+565	right	hydrocarbon separator
119.	SH28566s	28+566	Left	hydrocarbon separator
120.	SH28617d	28+617	right	hydrocarbon separator
121.	SH28617s	28+617	Left	hydrocarbon separator
122.	BSH28945d	28+945	right	retention basin + hydrocarbon separator
123.	SH29165s	29+165	Left	hydrocarbon separator
124.	SH29166d	29+166	right	hydrocarbon separator
125.	SH29192s	29+192	Left	hydrocarbon separator
126.	SH29193d	29+193	right	hydrocarbon separator
127.	SH29544s	29+544	Left	hydrocarbon separator
128.	SH29572s	29+572	Left	hydrocarbon separator
129.	SH29574d	29+574	right	hydrocarbon separator
130.	SH29908d	29+908	right	hydrocarbon separator
131.	SH29909s	29+909	Left	hydrocarbon separator
132.	SH29939d	29+939	right	hydrocarbon separator
133.	SH29940s	29+940	Left	hydrocarbon separator
134.	SH30393s	30+393	Left	hydrocarbon separator
135.	SH30394d	30+394	right	hydrocarbon separator
136.	SH30954s	30+954	Left	hydrocarbon separator
137.	SH30954d	30+954	right	hydrocarbon separator
138.	SH30993s	30+993	Left	hydrocarbon separator
139.	SH30994d	30+994	right	hydrocarbon separator
140.	SH31320d	31+320	right	hydrocarbon separator
141.	SH31328s	31+328	Left	hydrocarbon separator
142.	SH31328d	31+328	right	hydrocarbon separator
143.	SH31642d	31+642	right	hydrocarbon separator
144.	SH31643s	31+643	Left	hydrocarbon separator
145.	SH31664s	31+664	Left	hydrocarbon separator
146.	SH31665d	31+665	right	hydrocarbon separator
147.	SH32236s	32+236	Left	hydrocarbon separator
148.	SH32236d	32+236	right	hydrocarbon separator
149.	SH32245s	32+245	Left	hydrocarbon separator
150.	SH32245d	32+245	right	hydrocarbon separator
151.	SH32512d	32+512	right	hydrocarbon separator
152.	SH32515s	32+515	Left	hydrocarbon separator

No. crt.	Name	KM	Position	Description
153.	SH32555s	32+555	Left	hydrocarbon separator
154.	SH32558d	32+558	right	hydrocarbon separator
155.	SH32948d	32+948	right	hydrocarbon separator
156.	SH32973s	32+973	Left	hydrocarbon separator
157.	SH32973d	32+973	right	hydrocarbon separator
158.	SH33487d	33+487	right	hydrocarbon separator
159.	SH33489s	33+489	Left	hydrocarbon separator
160.	SH33551d	33+551	right	hydrocarbon separator
161.	SH33552s	33+552	Left	hydrocarbon separator
162.	SH35014s	35+014	Left	hydrocarbon separator
163.	SH35016d	35+016	right	hydrocarbon separator
164.	SH35032d	35+032	right	hydrocarbon separator
165.	SH35093s	35+093	Left	hydrocarbon separator
166.	SH35143d	35+143	right	hydrocarbon separator
167.	SH35144s	35+144	Left	hydrocarbon separator
168.	SH35997d	35+997	right	hydrocarbon separator
169.	SH36000s	36+000	Left	hydrocarbon separator
170.	SH36045s	36+045	Left	hydrocarbon separator
171.	SH36046d	36+046	right	hydrocarbon separator
172.	SH36522d	36+522	right	hydrocarbon separator
173.	SH36552s	36+552	Left	hydrocarbon separator
174.	SH36602d	36+602	right	hydrocarbon separator
175.	SH36600s	36+600	Left	hydrocarbon separator
176.	SH37229s	37+229	Left	hydrocarbon separator
177.	SH37511s	37+511	Left	hydrocarbon separator
178.	SH37541s	37+541	Left	hydrocarbon separator
179.	SH37542d	37+542	right	hydrocarbon separator
180.	SH37751s	37+751	Left	hydrocarbon separator
181.	SH37753d	37+753	right	hydrocarbon separator
182.	SH38571d	38+571	right	hydrocarbon separator
183.	SH38572s	38+572	Left	hydrocarbon separator
184.	SH38589d	38+589	right	hydrocarbon separator
185.	SH38589d	38+589	right	hydrocarbon separator
186.	SH38767d	38+767	right	hydrocarbon separator
187.	SH38771s	38+771	Left	hydrocarbon separator
188.	SH38912d	38+912	right	hydrocarbon separator
189.	SH38912s	38+912	Left	hydrocarbon separator
190.	SH39618s	39+618	Left	hydrocarbon separator
191.	SH39613d	39+613	right	hydrocarbon separator
192.	SH39949s	39+949	Left	hydrocarbon separator
193.	SH39958d	39+958	right	hydrocarbon separator
194.	SH40733s	40+733	Left	hydrocarbon separator
195.	SH40736d	40+736	right	hydrocarbon separator
196.	SH40761d	40+761	right	hydrocarbon separator
197.	SH40762s	40+762	Left	hydrocarbon separator
198.	SH41690s	41+690	Left	hydrocarbon separator
199.	SH41690d	41+690	right	hydrocarbon separator
200.	SH42068d	42+068	right	hydrocarbon separator
201.	SH42070s	42+070	Left	hydrocarbon separator
202.	SH42111d	42+111	right	hydrocarbon separator
203.	SH42123s	42+123	Left	hydrocarbon separator
204.	SH42702s	42+702	Left	hydrocarbon separator

No. crt.	Name	KM	Position	Description
205.	SH42704d	42+704	right	hydrocarbon separator
206.	SH42729s	42+729	Left	hydrocarbon separator
207.	SH42731d	42+731	right	hydrocarbon separator
208.	BSH43040s	43+040	Left	retention basin + hydrocarbon separator
209.	SH43650s	43+650	Left	hydrocarbon separator
210.	SH43650d	43+650	right	hydrocarbon separator
211.	SH43836s	43+836	Left	hydrocarbon separator
212.	SH43838d	43+838	right	hydrocarbon separator
213.	SH44133s	44+133	Left	hydrocarbon separator
214.	SH44133d	44+133	right	hydrocarbon separator
215.	SH44958s	44+958	Left	hydrocarbon separator
216.	SH44958d	44+958	right	hydrocarbon separator
217.	SH44987s	44+987	Left	hydrocarbon separator
218.	SH44987d	44+987	right	hydrocarbon separator
219.	SH45801d	45+801	right	hydrocarbon separator
220.	SH45802s	45+802	Left	hydrocarbon separator
221.	SH47032s	47+032	Left	hydrocarbon separator
222.	SH47032d	47+032	right	hydrocarbon separator
223.	SH47373d	47+373	right	hydrocarbon separator
224.	SH47373s	47+373	Left	hydrocarbon separator
225.	SH47401d	47+401	right	hydrocarbon separator
226.	SH47401s	47+401	Left	hydrocarbon separator
227.	SH47924d	47+924	right	hydrocarbon separator
228.	SH47925s	47+925	Left	hydrocarbon separator
229.	SH47953d	47+953	right	hydrocarbon separator
230.	SH47953s	47+953	Left	hydrocarbon separator
231.	SH48819d	48+819	right	hydrocarbon separator
232.	SH48820s	48+820	Left	hydrocarbon separator
233.	SH49000s	49+000	Left	hydrocarbon separator
234.	SH49001d	49+001	right	hydrocarbon separator
235.	SH50060s	50+060	Left	hydrocarbon separator
236.	SH50064d	50+064	right	hydrocarbon separator
237.	SH50093s	50+093	Left	hydrocarbon separator
238.	SH50093d	50+093	right	hydrocarbon separator
239.	SH50979s	50+979	Left	hydrocarbon separator
240.	SH50981d	50+981	right	hydrocarbon separator
241.	SH51262d	51+262	right	hydrocarbon separator
242.	SH51264s	51+264	Left	hydrocarbon separator
243.	SH51292s	51+292	Left	hydrocarbon separator
244.	SH51293d	51+293	right	hydrocarbon separator
245.	SH51462s	51+462	Left	hydrocarbon separator
246.	SH51466d	51+466	right	hydrocarbon separator
247.	SH51490s	51+490	Left	hydrocarbon separator
248.	SH51493d	51+493	right	hydrocarbon separator
249.	SH53528s	53+528	Left	hydrocarbon separator
250.	SH53542d	53+542	right	hydrocarbon separator
251.	SH54513s	54+513	Left	hydrocarbon separator
252.	SH54550d	54+550	right	hydrocarbon separator
253.	SH55098s	55+098	Left	hydrocarbon separator
254.	SH55098d	55+098	right	hydrocarbon separator
255.	SH55132d	55+132	right	hydrocarbon separator
256.	SH55138s	55+138	Left	hydrocarbon separator

Table no.2-22 Locations of oil separators and road junction retention basins

No. crt.	Object	Name	KM	Position	Description
Node 1-DN29A					
1.	Strap 3	SH243s	0+243	Left	hydrocarbon separator
2.		SH243d	0+243	right	hydrocarbon separator
Node 2-DN2P					
3.	Strap 4	SH216d	0+216	right	hydrocarbon separator
4.		SH233d	0+233	right	hydrocarbon separator
5.	Strap 11	B102d	0+102	right	retention basin
6.	Strap 10	BSH13252s	13+252	Left	retention basin + hydrocarbon separator
7.		SH13612d	13+612	right	hydrocarbon separator
8.		SH13612s	13+612	Left	hydrocarbon separator
9.		SH14030d	14+030	right	hydrocarbon separator
10.		SH14029s	14+029	Left	hydrocarbon separator
11.		SH14040d	14+040	right	hydrocarbon separator
12.		SH14039s	14+039	Left	hydrocarbon separator
13.		SH14247s	14+247	Left	hydrocarbon separator
14.		SH14460s	14+460	Left	hydrocarbon separator
15.		SH14460d	14+460	right	hydrocarbon separator
16.		SH14470s	14+470	Left	hydrocarbon separator
17.	SH14472d	14+472	right	hydrocarbon separator	
18.	Strap 9	SH265s	0+265	Left	hydrocarbon separator
19.		SH265d	0+265	right	hydrocarbon separator
20.		SH274s	0+274	Left	hydrocarbon separator
21.		SH275d	0+275	right	hydrocarbon separator
22.	Strap 7	SH220s	0+220	Left	hydrocarbon separator
Node 3-DN2-DN2H					
23.	Strap 1	SH333d	0+333	right	hydrocarbon separator
24.		SH384d	0+384	right	hydrocarbon separator
25.	Connection road DN2H-A7	BSH154s	0+154	Left	retention basin + hydrocarbon separator
26.		BSH844d	0+844	right	retention basin + hydrocarbon separator
27.		BSH1470d	1+470	right	retention basin + hydrocarbon separator
28.		SH1935s	1+935	Left	hydrocarbon separator
29.		SH1938d	1+938	right	hydrocarbon separator
30.		SH1977d	1+977	right	hydrocarbon separator
31.		SH1978s	1+978	Left	hydrocarbon separator
32.	Strap 2	SH2965d	2+965	right	hydrocarbon separator
33.		SH2968s	2+968	Left	hydrocarbon separator
34.		SH3001s	3+001	Left	hydrocarbon separator
35.		SH3005d	3+005	right	hydrocarbon separator
36.		SH3439d	3+439	right	hydrocarbon separator
37.		SH3484d	3+484	right	hydrocarbon separator
Node 4 - DN2 (South Siret)					
38.	Strap 3	SH497s	0+497	Left	hydrocarbon separator
39.	Strap4	SH175s	0+175	Left	hydrocarbon separator
Node 5 – DN2 (Siret Nord)					
40.	Strap DN2	SH344d	0+344	right	hydrocarbon separator
41.		SH545d	0+545	right	hydrocarbon separator
42.		SH566d	0+566	right	hydrocarbon separator

2.3.12.5 Animal crossings

To ensure the permeability of species for fauna, undercrossing structures (undercrossings for fauna) and overcrossing will be included in the project. The structures are shown in the following table.

Table no.2-23 The undercrossing and overcrossing structures proposed in the project

No. crt.	Structure type	km start	end km	Width (m)	Height (m)	The distance from the nearest protected natural area
1.	overpass	3+450	3+550	100	-	3 km - ROSCI0075 Pătrăuți Forest
2.	Crossing	11+150	11 + 15	2	2	1.7 km - ROSCI0075 Pătrăuți Forest
3.	Crossing	50+930	51+070	17	5	3.8 km - ROSPA0110 Accumulations Rogojesti - Bucecea

2.3.13 Other types of work

The project also provides for works that are not directly related to water, such as:

- ⚙ Relocation works of utility networks and roads;
- ⚙ Works for traffic safety;
- ⚙ Highway/expressway lighting system.

2.3.14 Works necessary for site organization

For the "Suceava-DN2H highway and DN2H expressway - Frontiera Siret" project, there were 4 locations of construction sites, related to both the highway sector and the expressway sector. The positioning of the site works will be done in approximately equidistant areas along the project, in order to cover as large access areas as possible and to allow the easy execution of the execution works.

Table no.2-24 Location of proposed site organizations

No. crt.	The km interval provided for the execution of the works	part	The distance from the nearest protected natural area	The distance from the inner city of the nearest locality	The distance to the nearest water course
1.	9+700-10+250	right	1.9 km – ROSCI0075 Pătrăuți Forest	0.8 km – Municipality of Suceava	1.3 km - Pătrăuțeanca
2.	27+300-27+800	Left	6.5 km – ROSCI0075 Pătrăuți Forest	0.03 km – Slobozia Suceva	1.7 km - Horaiț
3.	43+050-43+300	right	5 km - ROSPA0110 Accumulations Rogojesti - Bucecea	0.4 km – Negostina	0.3 km - Negostina
4.	54+800-55+100	Left	0.8 km - ROSPA0110 Accumulations Rogojesti - Bucecea	0.01 km - Siret	0.4 km - Siret

The endowments related to site organizations consist of:

- ⚙ Cabin gate;
- ⚙ Infirmary;
- ⚙ Laboratory;
- ⚙ Offices;
- ⚙ Canteen;
- ⚙ Covered work platform;
- ⚙ Mechanical workshop;
- ⚙ Washing ramp;
- ⚙ Stores;
- ⚙ Concrete station;
- ⚙ Aggregates for concrete plant;
- ⚙ Asphalt station;
- ⚙ Aggregates for asphalt station;
- ⚙ Hydrocarbon separator;
- ⚙ Water management;
- ⚙ Fuel station;
- ⚙ Electricity supply generator;
- ⚙ Scale;
- ⚙ Car parking;
- ⚙ Equipment parking;
- ⚙ Material warehouses;
- ⚙ PSI

Organizations of construction sites and production bases will be good with sewage systems, purification and evacuation of domestic and rainwater. If necessary, a system with drainable basins can be adopted, connected to the nearby sewage networks or installation of pre-treatment/purification and discharge facilities. The technological waste water resulting from the processes of preparation of construction materials and the skins resulting from the washing of construction means and equipment will be collected and pre-purified in decanters and oil product separators before unloading.

2.4 LIST OF PROTECTED AREAS RELATED TO EACH BODY OF WATER ON WHICH THE PROJECT WILL BE LOCATED

The water bodies related to the project intersect with the protection area for habitats and species where water is an important factor. These are shown in the following table.

Table no.2-25 Habitat and species protection areas where water is an important factor intersected by surface water bodies analyzed within the project

No. Crt.	Water body name	Water body code	Protected area
1.	Vătafului Bridge	RORW2-1-17-30B_B1	Protection areas for habitats and species where water is an important factor - ROSCI0380 – Suceava Liteni River
2.	Mitoc	RORW12-1-17-30A_B1	No protected areas are designated
3.	Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	No protected areas are designated
4.	Square	RORW12-1-17-28_B1	Protection areas for habitats and species where water is an important factor: <ul style="list-style-type: none"> • ROSCI0075 – Pătrăuți Forest • RONPA0738 Crujana Forest
5.	Hâtnuța + Bocancea	RORW12-1-17-27_B1	Protection areas for habitats and species where water is an important factor - ROSCI0075 – Pătrăuți Forest
6.	Snoring	RORW12-1-17-24A_B1	No protected areas are designated
7.	Shop	RORW12-1-3_B1	Protection areas for habitats and species where water is an important factor - ROSPA0110 - Rogojești Accumulations - Bucecea
8.	Siret (border - Lake Rogojești)	RORW12-1_B0	Protection areas for habitats and species where water is an important factor - ROSPA0110 - Rogojești Accumulations - Bucecea
			Siret city water catchment – left bank drain and Austrian well

Regarding the protected areas related to underground water bodies, in the project area all the locations of underground water catchments were analyzed (according to the data received from ABA Siret) and the natural protected areas for habitats and species where water is an important factor, the analysis being shown graphically in the figure below.

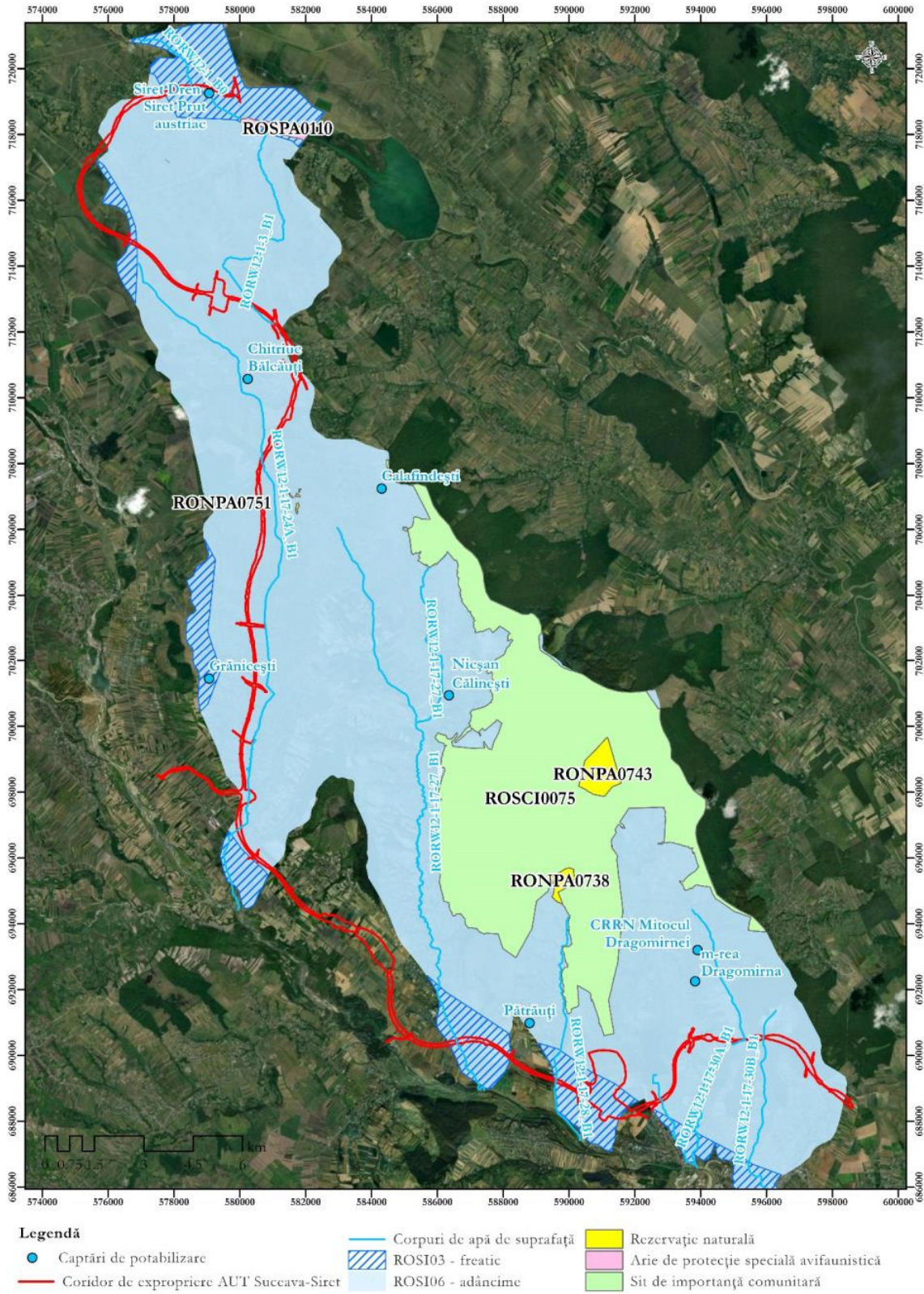


Figure no.2-14 The location of habitat protection areas and where the species is an important factor intersected by the surface water bodies analyzed within the project.

3 APLICATION DOMAIN

3.1 IDENTIFICATION OF WATER BODIES POTENTIALLY AFFECTED BY THE PROJECT

3.1.1 Surface water bodies

Through the GIS spatial analysis in relation to the works proposed in the project, 8 bodies of surface water potentially affected by the project were identified.

Table no.3-1 Locations of points of intersection of the highway route with water bodies

No. Crt.	Hydrographic basin	Name of surface water body	Surface water body code	Crossed objective	Intersection coordinates (Stereo 70)	
					X	Y
1.	Ialomița	Vătafului Bridge	RORW12-1-17-30B_B1	Ampriza motorway - crossing area with footbridge	595901.986	690536.706
2.		Mitoc	RORW12-1-17-30A_B1	Ampriza motorway - crossing area with viaduct	595340.814	690474.530
3.		Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	Ampriza motorway - bridge crossing area	592789.084	688646.642
4.		Square	RORW12-1-17-28_B1	Ampriza motorway - bridge crossing area	589599274	689227814
5.		Hâtnuța +Bocancea	RORW12-1-17-27_B1	Ampriza motorway - bridge crossing area	586588.622	690421.068
6.		Snoring	RORW12-1-17-24A_B1	Ampriza motorway - bridge crossing area	579983.454	696886.061
				Ampriza expressway - bridge crossing area	580260.211	697700.168
	Ampriza expressway - bridge crossing area			580278403	698024.552	
	Ampriza expressway - bridge crossing area			580665.053	708059.088	
7.	Shop	RORW12-1-3_B1	Ampriza expressway -	580357392	712822.469	

No. Crt.	Hydrographic basin	Name of surface water body	Surface water body code	Crossed objective	Intersection coordinates (Stereo 70)	
					X	Y
				bridge crossing area		
8.		Siret (border - Lake Rogojesti)	RORW12-1_B0	Ampriza expressway - bridge crossing area	578520.943	719480.705

As can be seen from the table above, bodies of water are crossed 11 times by the highway/express road (Horaiț RORW12-1-17-24A_B1 being crossed 4 times), at these points different crossing solutions are proposed. (bridges, viaducts or footbridge - in the case of the Vătafului water body).

The route of the future road runs near 4 bodies of water, shown in the following table.

Table no.3-2 Bodies of water adjacent to the highway/expressway route

No. Crt.	Water body name	Water body code	Distance from the water body to the project area (m)	Adjacent to
1.	Ilișești (Ilișășca) + Bălăceana	RORW12-1-17-26_B1	1200	The intensity of the road
2.	Great Stream	RORW12-1-5_B1	280	The intensity of the road
3.	Gavan	RORW12-1-2_B1	120	The intensity of the road
4.	Suceava (Mihoveni)	RORW12-1-17_B2	65	Bratea nods

The following figures illustrate the intersection areas of the highway/expressway route with surface water bodies.

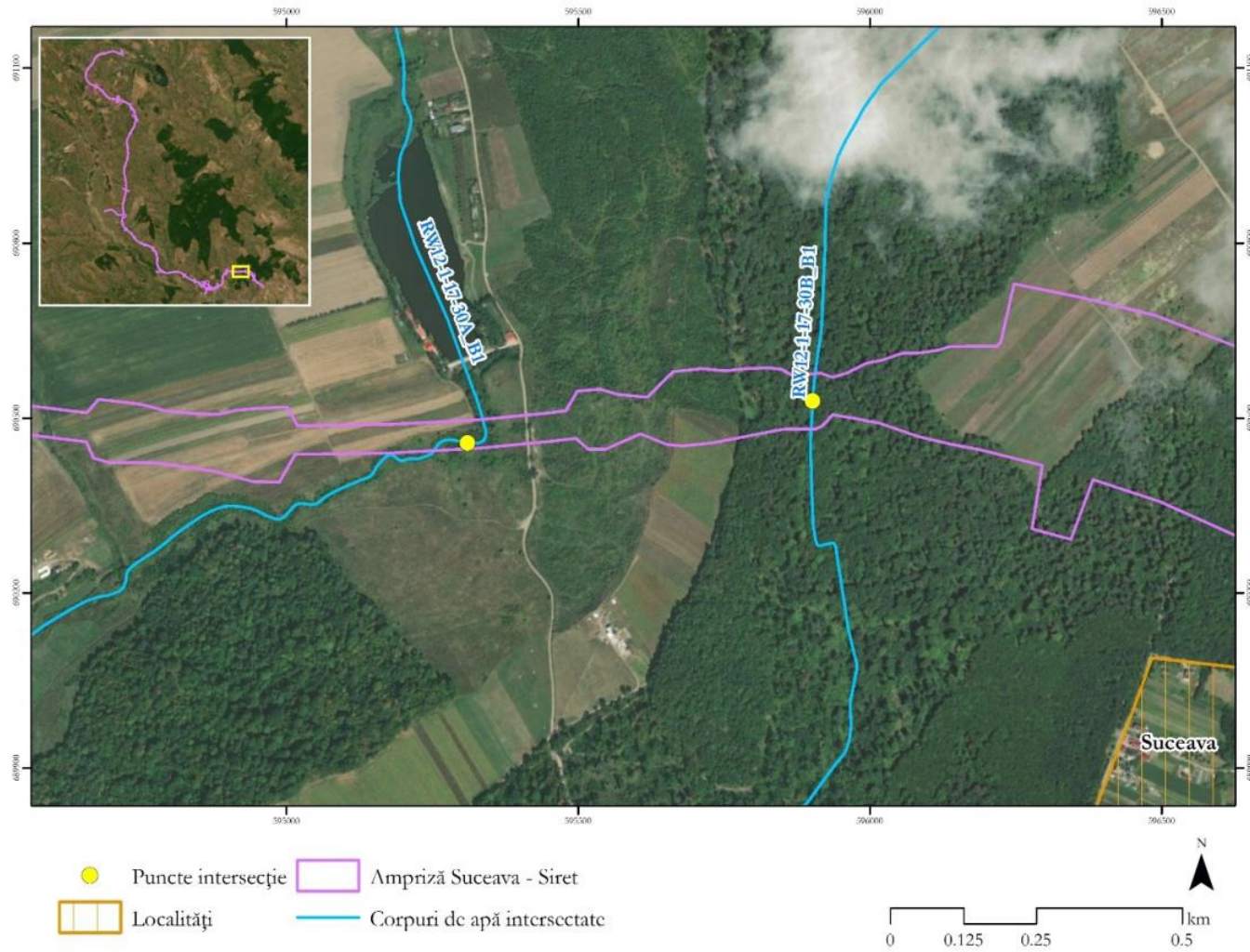


Figure no.3-1 Intersections with water bodies Suceava – Mitocu Dragomirnei area

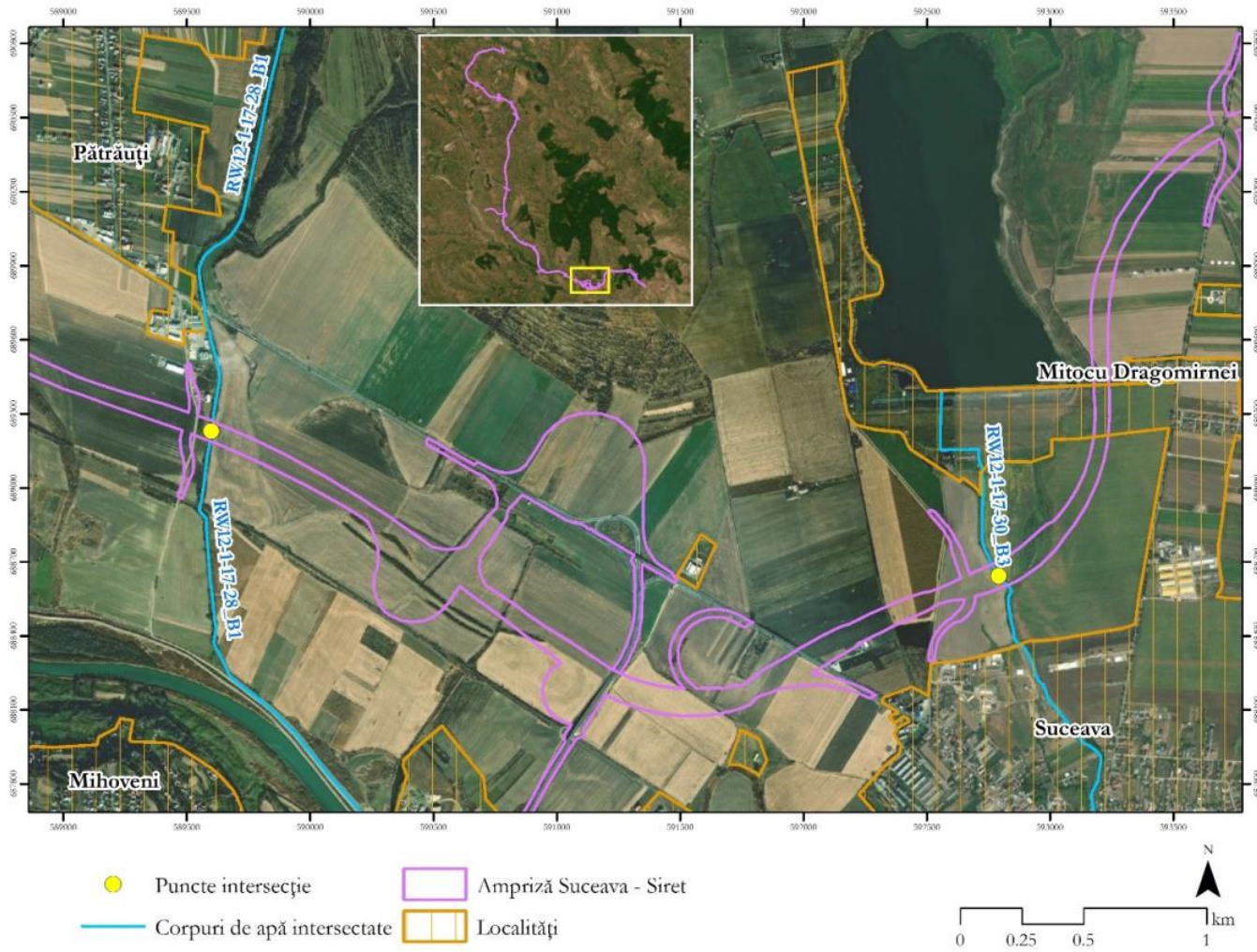


Figure no.3-2 Intersections with bodies of water in the Dărmanesti area

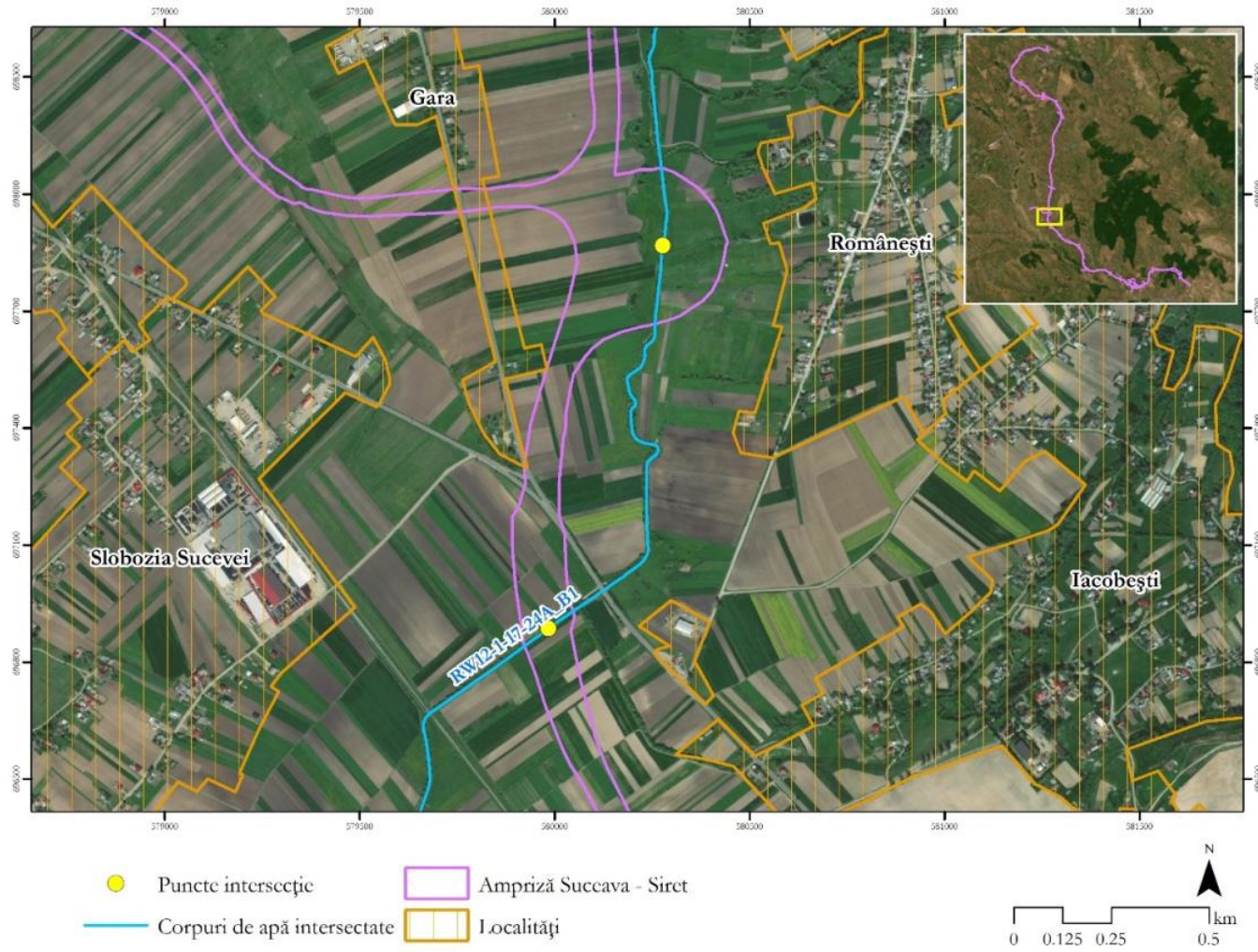


Figure no.3-3 Intersections with water bodies in the Iacobești - Slobozia Sucevei area



Figure no.3-4 Intersections with water bodies in the area. Intersections with water bodies in the area



Figure no.3-5 Intersections with water bodies in the Gropeni - Negostina area

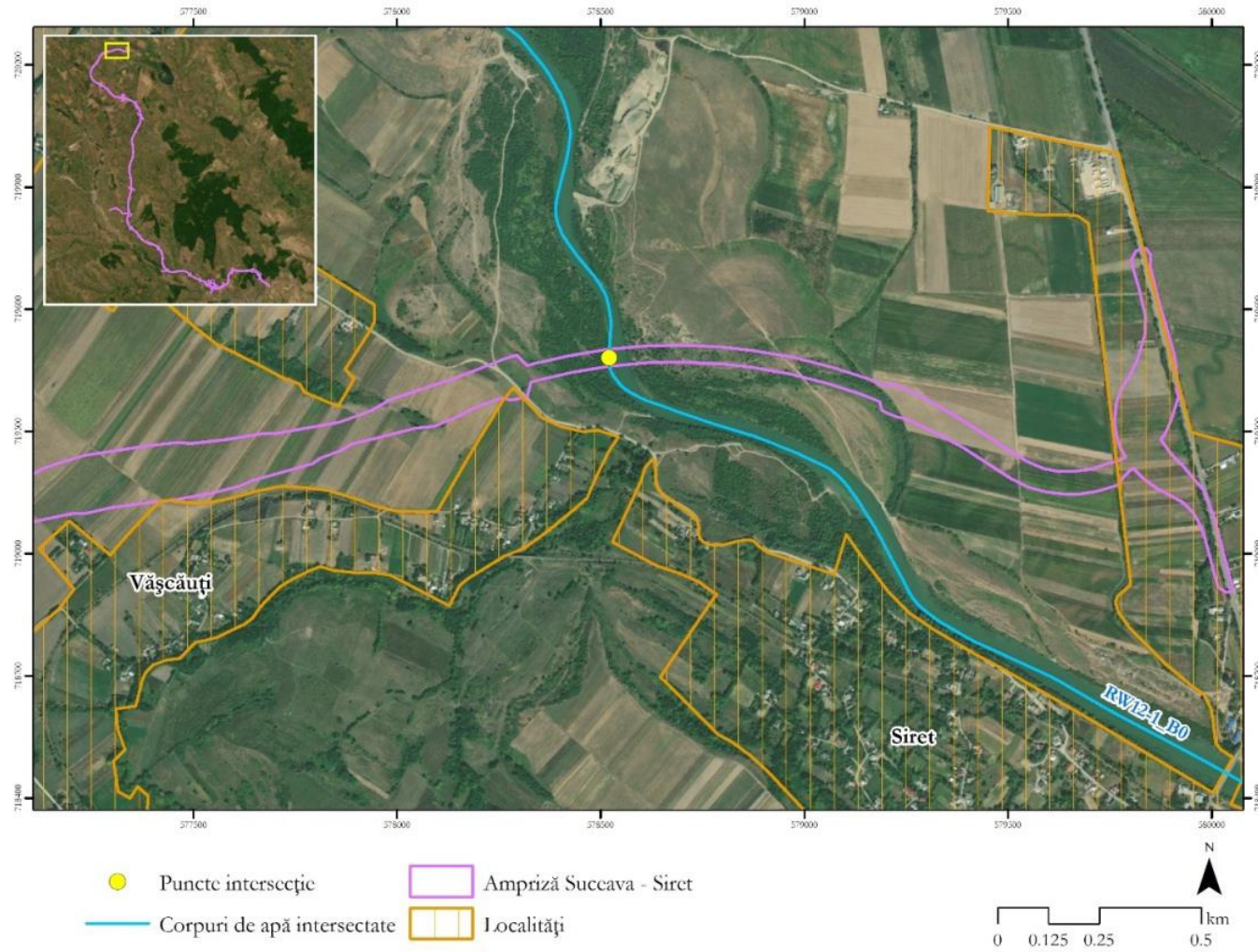


Figure no.3-6 Intersections with water bodies in the Vășcăuți - Siret area

The appearance of surface water bodies in the area of intersection with the project is presented in the following figures.



Figure no.3-7 The Mitoc water body in the area of intersection with the project



Figure no.3-8 The Dragomirna water body (Lake Dragomirna – cf Suceava) in the area of intersection with the project



Figure no.3-9Hătnuța + Bocancea water body in the area of intersection with the project



Figure no.3-10The Horaiț water body in the area of intersection with the project



Figure no.3-11Siret water body (border - Lake Rogojesti) in the area of intersection with the project

3.1.2 Underground water bodies

The development area of a project partially overlaps with 2 bodies of underground water, respectively:

- The meadow and terraces of the Siret river and its tributaries - ROSI03 – phreatic water body;
- Suceava (Sarmațian) – ROSI06 - deep water body.

Their location in relation to the project development area is shown in the following figure.

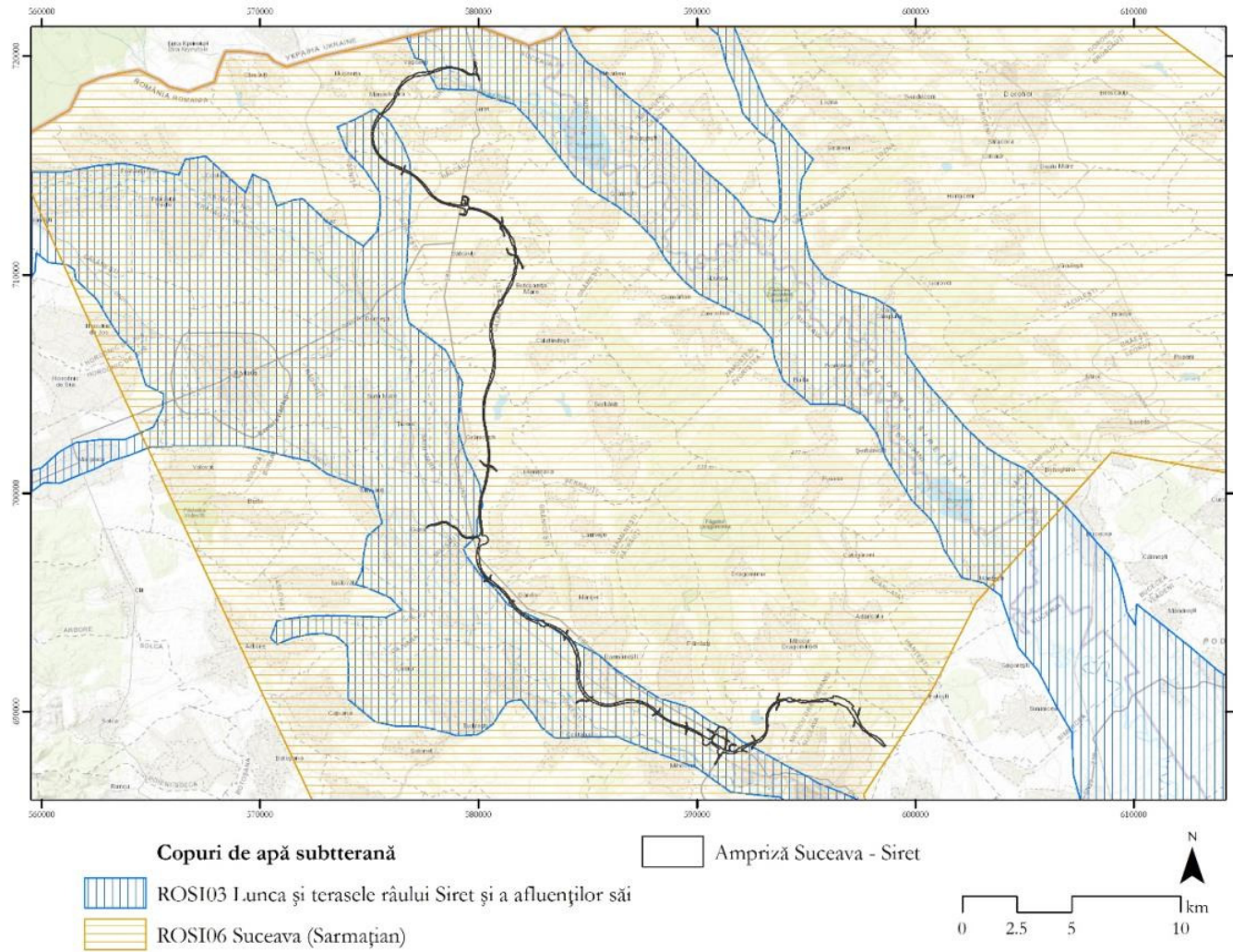


Figure no.3-12 Groundwater bodies identified in the study area

3.2 LENGTH / SURFACE OF BODIES OF WATER

3.2.1 Surface water bodies

The lengths of surface water bodies in the highway/expressway project area vary from a few kilometers to over 190 km. The longest body of water potentially affected by the project is Hatnuța Bocancea 27.80 km long, and the smallest in size is Dragomirna (Lac Dragomirna - CF Suceava) (3.72 km long).

Table no.3-3The length of surface water bodies in the project area

No. Crt.	Water body name	code	River length (km)
1.	Vătafului Bridge	RORW12-1-17-30B_B1	8.45
2.	Mitoc	RORW12-1-17-30A_B1	9.79
3.	Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	3.72
4.	Square	RORW12-1-17-28_B1	15.39
5.	Hâtnuța +Bocancea	RORW12-1-17-27_B1	27.8
6.	Snoring	RORW12-1-17-24A_B1	23,27
7.	Shop	RORW12-1-3_B1	8.81
8.	Siret (border - Lake Rogojesti)	RORW12-1_B0	6.48

3.2.2 Underground water bodies

The underground water bodies had large areas, at the level of thousands of km². The following table shows the surfaces of the subterranean water bodies intersected by the project.

Table no.3-4The surface of underground water bodies in the project area

No. crt.	Water body name	Water body code	Surface
1.	The meadow and the terraces of the Siret river and its tributaries	RED03	4542.21
2.	Suceava (Sarmatian)	RED06	3933.32

3.3 CATEGORY, TYPE AND STATE OF WATER BODIES

3.3.1 Surface water bodies

The surface water bodies crossed by the highway/express road project route are of a natural type, with the mention that Siret (border - Rogojesti lake), Dragomirna (Dragomirna lake - cf Suceava) and Horaiț are strongly modified water bodies. Of the 8 water bodies analyzed, 5 presented a Good

ecological status/pot, and 3 presented a moderate ecological status/potential. From the point of view of chemical status, all surface water bodies showed a Good status.

The following table presents the category in a synthetic way, typology, ecological status/potential and chemical status for the bodies of water crossed by the highway/expressway route. The data related to the surface water bodies presented in the following table are extracted from the updated Siret Watershed Management Plan.

Table no.3-5 Category, typology and state/potential of water bodies crossed by the highway/expressway route

No. crt.	Water body name	code	Water body category	Typology	Status / Ecological Potential	Chemical state
1.	Vătafului Bridge	RORW12-1-17-30B_B1	RW	RO04	Moderate condition	Hi
2.	Mitoc	RORW12-1-17-30A_B1	RW	RO04	Moderate condition	Hi
3.	Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	RW	RO04	Good condition	Hi
4.	Square	RORW12-1-17-28_B1	RW	RO04	Good condition	Hi
5.	Hâtnuța +Bocancea	RORW12-1-17-27_B1	RW	RO04	Good condition	Hi
6.	Snoring	RORW12-1-17-24A_B1	RW	RO01	Good condition	Hi
7.	Shop	RORW12-1-3_B1	RW	RO04	Good condition	Hi
8.	Siret (border - Lake Rogojesti)	RORW12-1_B0	RW	RO05	Moderate condition	Hi

HMWB = Highly Modified Water Bodies; AWB = Artificial water body; RW = Natural river; LW = natural varnish/ accumulation varnish/ highly modified natural varnish/ artificial varnish

3.3.2 Underground water bodies

The qualitative and quantitative status of the groundwater bodies intersected by the project was assessed as good. The following table summarizes the state of the underground water bodies in the area of the route.

Table no.3-6 Quantitative and chemical state of water bodies in the route area

Water body name	code	Tip	Quantitative status	Chemical state	Reasons that led to the non-attainment of the environmental objectives
Meadow and the terraces of the Siret river and its tributaries	RED03	ground	Hi	Hi	-

Water body name	code	Tip	Quantitative status	Chemical state	Reasons that led to the non-attainment of the environmental objectives
Suceava (Sarmatian)	RED06	Depth	Hi	Hi	-

3.4 ENVIRONMENTAL OBJECTIVES OF IDENTIFIED WATER BODIES

3.4.1 Surface water bodies

The following table presented in a synthetic way the environmental objective and the deadlines for achieving them for each body of water, as well as exceptions in the updated Siret Hydrographic Space Management Plan.

Table no.3-7The environmental objectives and related deadlines in the updated Siret Watershed Management Plan

No . crt.	Name of the body of water	Water body code	Assessed status of the water body		Achieving the environmental objective		Exception type
			Ecological status/potential	Chemical state	Ecological status/ good ecological potential	Good chemical condition	
1.	Vătafului Bridge	RORW12-1-17-30B_B1	Moderate condition	Hi	NO – it is established as the deadline for achieving the environmental objective for the period 2022-2027	YES – it was achieved in the year 2021 and has been maintained until now	Article 4(4) - Technical feasibility
2.	Mitoc	RORW12-1-17-30A_B1	Moderate condition	Hi	NO – it is established as the deadline for achieving the environmental objective for the period 2022-2027	YES – it was achieved in 2016 and has been maintained until now	Article 4(4) - Technical feasibility
3.	Dragomirna (Lake Dragomirna - cf. Suceava)	RORW12-1-17-30_B3	Good condition	Hi	YES – it was achieved in the year 2021 and has been	YES – it was achieved in the year 2021 and has been	-

No . crt.	Name of the body of water	Water body code	Assessed status of the water body		Achieving the environmental objective		Exception type
			Ecological status/poten tial	Chemical state	Ecological status/ good ecological potential	Good chemical condition	
					maintained until now	maintained until now	
4.	Square	RORW12-1- 17-28_B1	Good condition	Hi	YES – it was achieved in the year 2021 and has been maintained until now	YES – it was achieved in the year 2021 and has been maintained until now	-
5.	Hâtnuța +Bocancea	RORW12-1- 17-27_B1	Good condition	Hi	YES – it was achieved in the year 2021 and has been maintained until now	YES – it was achieved in the year 2021 and has been maintained until now	-
6.	Snoring	RORW12-1- 17-24A_B1	Good condition	Hi	YES – it was achieved in the year 2021 and has been maintained until now	YES – it was achieved in the year 2021 and has been maintained until now	-
7.	Shop	RORW12-1- 3_B1	Good condition	Hi	YES – it was achieved in the year 2021 and has been maintained until now	YES – it was achieved in the year 2021 and has been maintained until now	-
8.	Siret (border - Lake Rogojesti)	RORW12- 1_B0	Moderate condition	Hi	NO – it is established as the deadline for achieving the environmental objective for	YES – it was achieved in the year 2021 and has been maintained until now	Article 4(4) - Technical feasibility

No . crt.	Name of the body of water	Water body code	Assessed status of the water body		Achieving the environmental objective		Exception type
			Ecological status/poten tial	Chemical state	Ecological status/ good ecological potential	Good chemical condition	
					the period 2022-2027		

3.4.2 Underground water bodies

The underground water bodies in the project area had an estimated deadline for meeting the environmental objectives of 2015. The following table summarizes the environmental objectives and related deadlines for each underground water body in the project area.

Table no.3-8 Environmental objectives of groundwater bodies

Water body name	code	Environmental objective		Deadline to reach the objective	
		Quantitative status	Chemical state	Quantitative status	Chemical state
Meadow and the terraces of the Siret river and a its tributaries	RED03	Hi	Hi	2020	2020
Suceava (Sarmatian)	RED06	Hi	Hi	2020	2020

3.5 PRESENT PRESSURES WITHIN IDENTIFIED WATER BODIES

3.5.1 Surface water bodies

The pressures on existing surface water bodies in the project area, identified in the updated Siret Watershed Management Plan, consist of:

- Industrial point sources, located mainly in the area of UAT Suceava and UAT Siret;
- Agriculture;
- Human agglomerations;
- Waste;
- Existing hydrotechnical works on water bodies that exert hydromorphological pressures.

At the level of the Siret water body (border - Rogojești lake) - RORW12-1_B0, intersected by the highway/express road project, according to the updated Siret Watershed Management Plan, the following significant pressures were identified:

- Point sources - urban wastewater;
- Diffuse sources - Discharges not connected to the collection system, etc.

The following figure is the spatial finding of the pressures identified in the updated Siret Watershed Management Plan.

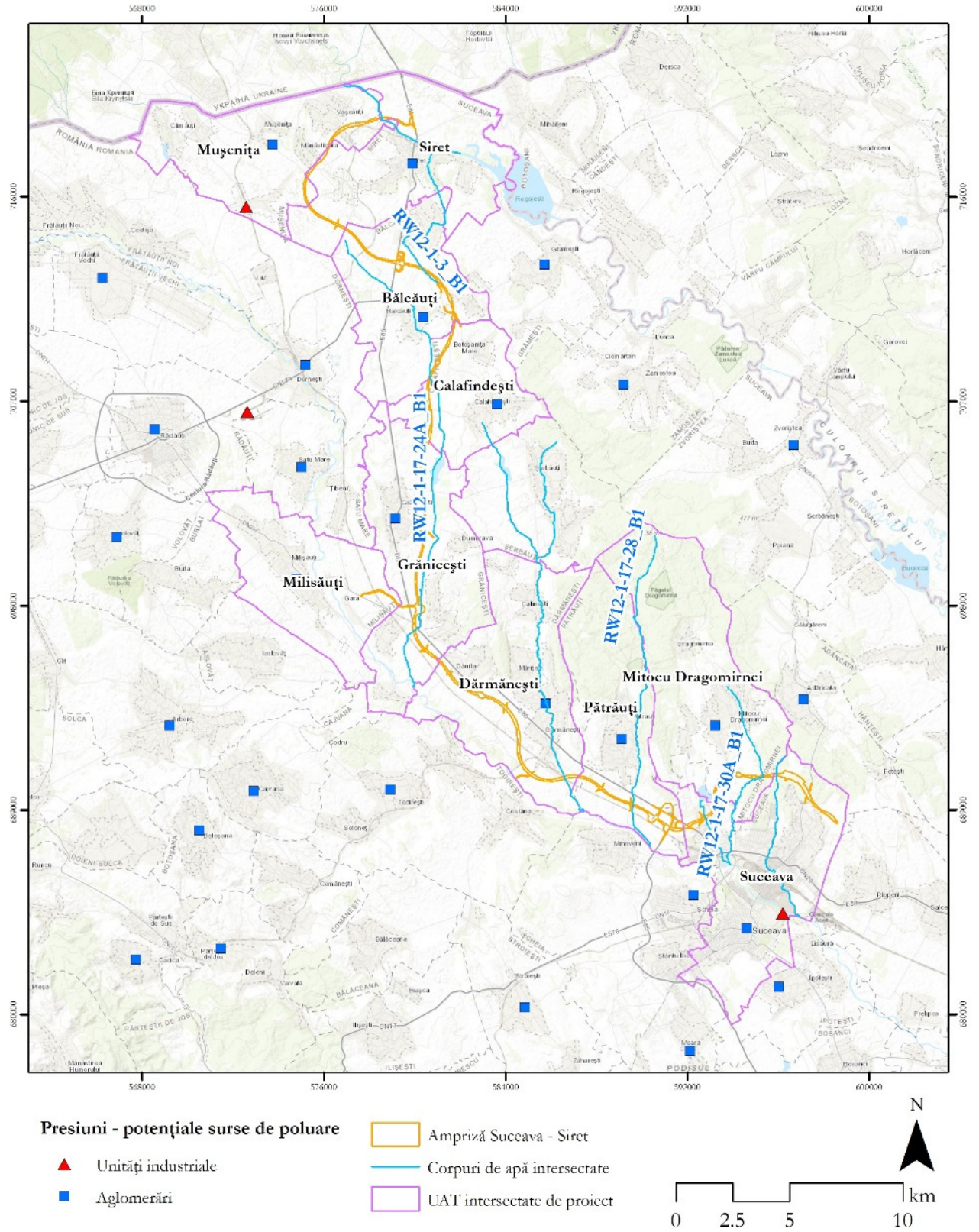


Figure no.3-13 The existing pressures presented in the updated Siret Watershed Management Plan

As can be seen in the figure above, the main existing pressures on the water bodies intersected by the project are related to human settlements.

3.5.2 Underground water bodies

At the level of the Siret basins/watershed, the following types of pressures were identified for each groundwater body:

- human agglomerations due to the lack of domestic or industrial wastewater collection and purification systems;
- agricultural activities (animal breeding, excessive cultivation of agricultural land, agro-zootechnical farms that do not have appropriate manure storage systems, units that use pesticides, etc.);
- industrial activities (including landfills);
- significant water withdrawals, which may exceed the natural recharge rate of the aquifer.

In the following, the existing pressures identified on each body of groundwater intersected by the project are presented.

⚙ Existing pressures on the water body ROSI03

- oil industry: Leghin;
- food industry: Grămești, Horodnic de Jos, Roman, Liteni, Onești, etc.
- wood processing: Leghin, Pipirig Stâncă, Pâtâlâgeni, Poiana Largului, Bistricioara Tulgheș, Onești, Târgu Ocna, Rădăuți;
- metallurgical: Roman;
- chemical processing: Borzești, Onești, Roznov;
- non-compliant waste depots: Rădăuți, Gura Humor, Girov;
- animal breeding: Bistricioara;
- textile production: Pâtâlâgeni;
- groundwater capture (population: 57194 thousand m³/year, industry: 25331 thousand m³/year, agriculture: 1979 thousand m³/year).
- 135 localities without a domestic water collection network (eg: Racova, Balotești);
- localities where the collection network is not connected to treatment plants (eg: Zvoriștea, Horia).

⚙ Existing pressures on the water body ROSI06

It should be noted that a very small volume of water is captured from this body of water (0.02% of the total captured from underground sources in the Siret hydrographic basin). The ROSI06 (Suceava) underground water body, although under pressure, being stored in Sarmatian deposits, has a lower economic importance.

In the case of the ROSI06 underground water body, the fact that it is a deep water body, with good surface protection, does not indicate the existence of any source of pollution, which would affect the qualitative state of this water body.

3.6 IMPLEMENTATION MEASURES AND DEADLINES FOR ACHIEVING THE ENVIRONMENTAL OBJECTIVES

For most surface water bodies, measures have been identified in the updated Siret Watershed Management Plan. The basic measures for the surface water bodies potentially affected by the execution of the works of this project are measures regarding water supply, as well as measures regarding the collection and purification of waste water.

In the updated Management Plan of the Siret hydrographic space, the above-mentioned measures are either implemented or planned to be implemented in the period 2022-2027 or after 2027.

Of the 8 bodies of surface water of interest, 2 have basic measures within the Management Plan, these being presented in the following.

1. Hatnuța + Bocancea - RORW12-1-17-27_B1:
 - Sewer network construction/rehabilitation;
 - Construction/modernization of sewage treatment plant;
 - Rehabilitation/modernization of the water network
2. Horaiț -RORW12-1-17-24A_B1:
 - Control measures and authorization of diffuse pollution sources (IAS);
 - Rehabilitation/modernization of the water network.

3.7 PLANNED / AUTHORIZED PROJECTS IN THE AREA

In order to identify the existing or planned projects in the project area that could generate cumulative effects on the quality elements of the analyzed water bodies, studies were publicly available in:

- The Flood Risk Management Plan (PMRI) related to the Siret basin/watershed;
- The list of projects from the UATs of interest subject to regulation from the point of view of environmental protection available on the APM Suceava websites;
- List of projects planned under the various funding programs (POIM, PNDL, PNDR).

The analysis of these projects focused in particular on investments to modernize/build roads that cross the same bodies of water intersected by the analyzed project, as well as investments in the water and wastewater infrastructure that propose the collection of some flows or the return of purified wastewater in the water bodies intersected by project. The table below presents the projects identified in the area as well as the possible cause-effect mechanisms identified in the context of the cumulative impact.

Table no.3-9 Existing or planned investments in the project area

failed	Name of existing objective/proposed project	Possible cumulative cause-effect mechanism
Suceava	Strategic road axis 1: Iasi - Suceava	NO – there are no railway infrastructure intersection areas that could potentially create a cumulative effect on water bodies.
Suceava	Trans Regio Project: Connectivity Road, C52D	NO – there are no railway infrastructure intersection areas that could potentially create a cumulative effect on water bodies.
Suceava, Patrăuți, Darmanesti	CF modernization: Pașcani – Darmănești	YES – in the intersection areas of the railway infrastructure with the bodies Vătafului Bridge - RORW12-1-17-30B_B1, Mitoc - RORW12-1-17-30A_B1, Dragomirna (Lake Dragomirna - cf Suceava) - RORW12-1-17-30_B3, Pătrăuțeanca - RORW12-1-17-28_B1
Granicesti, Milișauți	CF modernization: Darmănești - Vicșani	YES – in the intersection areas of the railway infrastructure with the Hătnu water bodies șa + Bocancea - RORW12-1-17-27_B1, Horaiț - RORW12-1-17-24A_B
Iace	CF modernization: Vicșani – Vicșani Frontiera	NO – there are no railway infrastructure intersection areas that could potentially create a cumulative effect on water bodies.
Suceava	Modernization of the railway line Apahida – Suceava, subsection 2: Ilva Mică – Pojorâta	NO – there are no railway infrastructure intersection areas that could potentially create a cumulative effect on water bodies.
Squares	establishment of the infrastructure of a water purification plant in Patrăuți commune	YES – in the intersection areas of the road infrastructure with the Pătrău water body șa - RORW12-1-17-28_B1

Table no.3-10 Existing works in the project area

failed	Body of water	Project	Existing work	Length (m)	Area (m2)	Material	Remarks
Squares	Square	Regularization of Pătrăuțeanca stream in the Mihoveni Mobile Dam accumulation area, Suceava county	Bed regularization	117	9955.02	Concrete	restoration of concrete channel

Following the analyzes available for the projects mentioned in the previous table, possible cause-effect mechanisms were identified that can be combined with the cause-effect mechanisms associated with the project, on the water bodies Podul Vătafului - RORW12-1-17-30B_B1, Mitoc - RORW12-1-17-30A_B1, Dragomirna (Lake Dragomirna - cf Suceava) - RORW12-1-17-30_B3, Pătrăuțeanca - RORW12-1-17-28_B1, Hătnuța + Bocancea - RORW12-1-17-27_B1, Horaiț - RORW12-1-17-24A_B.

3.8 CAUSE-EFFECT MECHANISM FOR EACH BODY OF WATER IDENTIFIED AS POTENTIALLY AFFECTED BY THE PROJECT

3.8.1 Surface water bodies

3.8.1.1 Vătafului Bridge – RORW12-1-1-17-30B_B1

A box bridge with L = 90 m, l = 5 m and h = 2.6 m is designed over this body of water.

Table no.3-11 Cause-effect mechanisms identified on the water body Vătafului Bridge - RORW12-1-1-17-30B_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	It does not propose works that could have effects on the quality parameters regarding the connectivity of the surface water body with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	No works are proposed on this body of water that could affect this parameter.	NOT	-
<i>The lateral continuity of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	YES	The works intended for the realization of the foundation for the location of the footbridge will directly influence this parameter in the long term, along the entire designed length.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	YES	Along the entire length of the bridge, the project proposes concreting works of the bed, works that have a direct effect on the structures and substrate of the bed.	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The bridge development works will have direct effects on riparian structures throughout the development area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04) ⁴	NOT	
<i>Phytobenthos</i>	YES	The phytobenthos will be affected as a result of the works in the bed of the water body for the foundation of the footbridge. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>macro</i>	YES	Macrophytes will be affected as a result of the works in the bed of the water body for the foundation of the bridge. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The benthic invertebrate fauna will be affected as a result of the works in the bed of the water body for the foundation of the bridge. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>Fish fauna</i>	YES	The fish fauna will be affected as a result of the works in the bed of the water body for the foundation of the bridge. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-

⁴ The planNationalof managementupdated related to the National portion abasinIU International of the RiverDanube2021- ANNEX 6.1 The classification and assessment system of the state of surface water bodies in accordance with the Water Framework Directive

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> • ROSCI0380 – Suceava Liteni River	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, more than 35 km downstream.	NOT	-

3.8.1.2 Mitoc – RORW12-1-17-30A_B1

A viaduct with a length of 600 m, consisting of 2 decks and 15 openings, is designed on this body of water. The viaduct has 4 piles partially projected into the main bed.

Table no.3-12 Cause-effect mechanisms identified on the water body Mitoc-RORW12-1-17-30A_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	The project does not propose bed protection works, which may have negative effects on the quality parameters regarding the connectivity of the surface water body with the underground water.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	The project does not propose works with an impact on the depth and width of the river.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Morphological conditions: the bed structure and substrate</i>	NOT	The project does not involve changes to the bed's structures and substrate	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The construction of the infrastructure elements of the bridge (4 piles) in the area of the banks will have a direct effect on the structures of the riparian area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The project does not provide for works that may affect the phytoplankton and its optimal habitat.	NOT	-
<i>Phytobenthos</i>	NOT	The project does not provide for works that may affect the phytobenthos and its optimal habitat.	NOT	-
<i>macro</i>	NOT	The project does not provide for works that may affect macrophytes and their optimal habitat	NOT	-
<i>Benthic invertebrate fauna</i>	NOT	The project does not foresee works that may affect the benthic invertebrate fauna and its optimal habitat.	NOT	-
<i>Fish fauna</i>	NOT	The project does not provide for works that may affect the fish fauna and the optimal habitat.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		concentrations of priority substances.		
<i>Priority dangerous substances</i>	NOT	The project does not include works with effects on concentrations of priority hazardous substances.	NOT	-
Protected area				
<i>They are not protected on this body of water</i>	NOT	-	NOT	-

3.8.1.3 Dragomirna (Lake Dragomirna – cf Suceava) – RORW12-1-17-30_B3

A 47.02 m long bridge consisting of 2 decks and 1 span is designed over this body of water. The bridge has the abutments projected into the main bed.

In order to avoid the infrastructure elements of the bridge from km 7+920 – km 8+060 there are diversion works and protection of the bed with the gabion mattress on a total length of 235.73 m.

Table no.3-13 Cause-effect mechanisms identified on the Dragomirna water body (Lake Dragomirna - cf. Suceava) - RORW12-1-17-30_B3

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	The project does not propose bed protection works, which may have negative effects on the quality parameters regarding the connectivity of the surface water body with the underground water.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	The bed diversion works will not influence this parameter, the designed width of the bed in the laid-out regime in the area of the works being maintained at the current (natural) size of 20 m.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Morphological conditions</i> :the bed structure and substrate	YES	Diversion worksANDand protection of the bed with the gabion mattress will influence the structure and substrate of the bed of the bed throughout the landscaped area.	NOT	-
<i>Morphological conditions</i> :the structure of the riparian zone	YES	The construction of the infrastructure elements of the bridge (2 piers) in the area of the banks will have a direct effect on the structures of the riparian area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The project does not provide for works that may affect the phytoplankton and its optimal habitat.	NOT	-
<i>Phytobenthos</i>	YES	The effects on the phytobenthos will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>macro</i>	YES	The effects on the macrophytes will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The effects on the benthic invertebrate fauna will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Fish fauna</i>	YES	The riverbed diversion works will have direct effects on the optimal habitats for fish fauna.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	The project does not include works with effects on concentrations of priority hazardous substances.	NOT	-
Protected area				
<i>They are not protected on this body of water</i>	NOT	-	NOT	-

3.8.1.4 Patrăuțeanca – RORW12-1-17-28_B1

A 44.52 m long bridge consisting of 2 decks and 1 span is designed over this body of water. The bridge has the abutments projected into the main bed.

In order to avoid the infrastructure elements of the bridge from km 11+530 – km 11+680 there are diversion works and protection of the gabion mattress bed for a total length of 206.53 m.

Table no.3-14 Cause-effect mechanisms identified on the Patrăuțeanca water body - RORW12-1-17-28_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	The project does not propose bed protection works, which may have negative effects on the quality parameters regarding the connectivity of the surface water body with the underground water.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth</i>	YES	The bed diversion works will directly influence this parameter in	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
and width of the river		the long term, along the entire landscaped length.		
<i>Morphological conditions:</i> the bed structure and substrate	YES	Diversion worksANDand protection of the bed with the gabion mattress will influence the structure and substrate of the bed of the bed throughout the landscaped area.	NOT	-
<i>Morphological conditions:</i> the structure of the riparian zone	YES	The construction of the infrastructure elements of the bridge (2 piers) in the area of the banks will have a direct effect on the structures of the riparian area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The project does not provide for works that may affect the phytoplankton and its optimal habitat.	NOT	-
<i>Phytobenthos</i>	YES	The effects on the phytobenthos will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>macro</i>	YES	The effects on the macrophytes will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The effects on the benthic invertebrate fauna will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Fish fauna</i>	YES	The riverbed diversion works will have direct effects on the optimal habitats for fish fauna.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	The project does not include works with effects on concentrations of priority hazardous substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> <ul style="list-style-type: none"> • ROSCI0075 – Pătrăuți Forest • RONPA0738 Crujana Forest 	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 6 km upstream.	NOT	-

3.8.1.5 Hătnuța + Bocancea – RORW12-1-17-27_B1

A 110.50 m long bridge consisting of 2 decks and 3 spans is designed over this body of water. The bridge has 2 piles designed in the main bed.

Table no.3-15 Cause-effect mechanisms identified on the Hătnuța + Bocancea water body - RORW12-1-17-27_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	The project does not propose bed protection works, which may have negative effects on the quality parameters regarding the connectivity of the surface water body with the underground water.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	The project does not propose works with an impact on the depth and width of the river.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	NOT	The project does not involve changes to the bed's structures and substrate	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The construction of the infrastructure elements of the bridge (2 piles) in the area of the banks will have a direct effect on the structures of the riparian area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The project does not provide for works that may affect the phytoplankton and its optimal habitat.	NOT	-
<i>Phytobenthos</i>	NOT	The project does not provide for works that may affect the phytobenthos and its optimal habitat.	NOT	-
<i>macro</i>	NOT	The project does not provide for works that may affect macrophytes and their optimal habitat	NOT	-
<i>Benthic invertebrate fauna</i>	NOT	The project does not foresee works that may affect the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		benthic invertebrate fauna and its optimal habitat.		
<i>Fish fauna</i>	NOT	The project does not provide for works that may affect the fish fauna and the optimal habitat.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	The project does not include works with effects on concentrations of priority hazardous substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> • ROSCI0075 – Pătrăuți Forest	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 20 km upstream.	NOT	-

3.8.1.6 Horaiț RORW12-1-17-24A_B1

4 structures are designed on this body of water, as follows:

- bridge (km 25+140 – 25+280 km) with a length of 47.02 m, consisting of 2 decks and 1 opening;
- bridge (km 35+050 – km 35+190) with a length of 49.52 m, consisting of 2 decks and 1 opening;
- bridge (km 35+950 – km 36+090) with a length of 36.05 m, consisting of 2 decks and 1 opening;
- bridge (km 36+575 – km 36+090) with a length of 47.52 m, consisting of 2 decks and 1 opening;

Among the bridge infrastructure elements, the bridge abutments from km 25+140 – km 25+280, 1 bridge abutment from km 35+050 – km 35+190 and 2 bridge abutments from km 35+950 – km 36+090 are located in the major bed of the water body. In these areas, the project does not propose works to protect the banks or the bed of the water body.

In order to avoid the infrastructure elements of the bridges from km 36+575 – 36+090 km and km 25+140 – 25+280 km, there are works to divert and protect the bed with the gabion mattress over a total length of approx. 564 m.

Table no.3-16 Cause-effect mechanisms identified on the Horaiț water body - RORW12-1-17-24A_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	No works are proposed in the project that will restrict connectivity with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	YES	The bed diversion works will directly influence this parameter in the long term, along the entire landscaped length.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	YES	Diversion works AND protection of the bed with the gabion mattress will influence the structure and substrate of the bed of the bed throughout the landscaped area.	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The diversion of the bed will be carried out entirely in the riparian area of the water body, this being permanently affected on the entire development area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04) ⁴	NOT	-
<i>Phytobenthos</i>	YES	The effects on the phytobenthos will be felt throughout the diversion area of the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		current bed from the execution stage. The quality element will be affected by habitat degradation.		
<i>macro</i>	YES	The effects on the macrophytes will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The effects on the benthic invertebrate fauna will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Fish fauna</i>	YES	The riverbed diversion works will have direct effects on the optimal habitats for fish fauna.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>They are not protected on this body of water</i>	NOT	-	NOT	-

3.8.1.7 Negostina – RORW12-1-3_B1

A 47.52 m long bridge consisting of 2 decks and 1 span is designed over this body of water. In order to avoid the infrastructure elements of the bridge (culees), a diversion and bed protection work with a gabion mattress is planned for a total length of 283.5 m.

Table no.3-17 Cause-effect mechanisms identified on the Negostina water body - RORW12-1-3_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	No works are proposed in the project that will restrict connectivity with groundwater.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	The bed diversion works will not influence this parameter, the designed width of the bed in the laid-out regime in the area of the works being maintained at the current (natural) size of 11 m.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	YES	Diversion works AND and protection of the bed with the gabion mattress will influence the structure and substrate of the bed of the bed throughout the landscaped area.	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The diversion of the bed will be carried out entirely in the riparian area of the water body, this being permanently affected on the entire development area.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04) ⁴	NOT	-
<i>Phytobenthos</i>	YES	The effects on the phytobenthos will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>macro</i>	YES	The effects on the macrophytes will be felt throughout the diversion area of the current bed from the execution stage. The quality element will be affected by habitat degradation.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The effects on the benthic invertebrate fauna will be felt throughout the diversion area of the current bed from the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		execution stage. The quality element will be affected by habitat degradation.		
<i>Fish fauna</i>	YES	The riverbed diversion works will have direct effects on the optimal habitats for fish fauna.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> • ROSPA0110 – Accumulations Rogojesti – Bucecea	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 8 km upstream.	NOT	-

3.8.1.8 Siret (border – Lake Rogojesti) – RORW12-1_B0

A 960 m long bridge consisting of 2 decks and 22 spans is designed over this body of water. The bridge has 39 piles and 2 ailerons designed in the main bed.

Table no.3-18 Cause-effect mechanisms identified on the Siret water body (border - lake Rogojesti) - RORW12-1_B0

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	The project does not propose bed protection works, which may have negative effects on the quality parameters regarding the connectivity of the surface water body with the underground water.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	The project does not propose the creation of obstacles in the minor bed of the water body.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>The lateral continuity of the river</i>	NOT	The project does not provide for the placement of obstacles in the lateral continuity of the river.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	The project does not propose works with an impact on the depth and width of the river.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	NOT	The project does not involve changes to the bed's structures and substrate	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	Realization of the infrastructure elements of the bridge (39 piles AND 2 scoops) in the area of the banks they will have a direct effect on the structures of the riparian zone.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The project does not provide for works that may affect the phytoplankton and its optimal habitat.	NOT	-
<i>Phytobenthos</i>	NOT	The project does not provide for works that may affect the phytobenthos and its optimal habitat.	NOT	-
<i>macro</i>	NOT	The project does not provide for works that may affect macrophytes and their optimal habitat	NOT	-
<i>Benthic invertebrate fauna</i>	NOT	The project does not foresee works that may affect the benthic invertebrate fauna and its optimal habitat.	NOT	-
<i>Fish fauna</i>	NOT	The project does not provide for works that may affect the fish fauna and the optimal habitat.	NOT	-
Chemical state				

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	The project does not include works with effects on concentrations of priority hazardous substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> • ROSPA0110 – Accumulations Rogojesti - Bucecea	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 4 km upstream.	NOT	-

3.8.2 Underground water bodies

3.8.2.1 The meadow and terraces of the Siret river and its tributaries - ROSI03

Table no.3-19 Cause-effect mechanisms identified on the Lunca water body and the terraces of the Siret River and its tributaries - ROSI03

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Quantitative parameters				
<i>Groundwater level</i>	YES	During the construction stage of the drilled piles for the foundations of the piles of bridges and viaducts, it is possible to see changes in the dynamics of the underground water in the immediate vicinity of the work front.	NOT	-
Qualitative parameters				
<i>chloride</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of chlorides in the underground water.	NOT	-
<i>Tone</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of sulfates in the groundwater.	NOT	-
<i>Dissolved by oxygen</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		dissolved oxygen in the groundwater.		
<i>pH</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the pH of the groundwater.	NOT	-
<i>nitrate</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence nitrate concentrations in groundwater.	NOT	-
<i>Ammonium</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the ammonium concentrations in the groundwater.	NOT	-
<i>Pesticide (individual and total)</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of pesticides in the groundwater.	NOT	-
<i>Groundwater pollutants and pollution indicators*</i>	NOT	The works included in the project do not foresee direct discharges of water through infiltration into the underground water.	NOT	-
Protected area				
<i>Sanitary protection zones related to drinking water intakes</i>	YES	In the project area there is a water catchment front to supply the city of Siret. It consists of a drain and a borehole (Austriac Well) that captures the infiltrated water from the Siret River in the ROSI03 phreatic aquifer. The project does not directly intersect this front nor the related sanitary protection zone. The construction of the bridge over the Siret river from km 53+490 – km 54+570 this having all the infrastructure elements designed outside the minor river bed. The designed bridge is located approx. 570 m upstream of the catchment front (measured	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		along the route of the minor bed).		

3.8.2.2 Suceava (Sarmatian) – ROSI06

Table no.3-20 Cause-effect mechanisms identified on the Suceava (Sarmatian) water body - ROSI0

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Quantitative parameters				
<i>Groundwater level</i>	NOT	During the construction stage of the drilled piles for the foundations of the piles of bridges and viaducts, it is possible to see changes in the dynamics of the underground water in the immediate vicinity of the work front.	NOT	-
Qualitative parameters				
<i>chloride</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of chlorides in the underground water.	NOT	-
<i>Tone</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of sulfates in the groundwater.	NOT	-
<i>Dissolved by oxygen</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		concentrations of dissolved oxygen in the groundwater.		
<i>pH</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the pH of the groundwater.	NOT	-
<i>nitrate</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence nitrate concentrations in groundwater.	NOT	-
<i>Ammonium</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the ammonium concentrations in the groundwater.	NOT	-
<i>Pesticide (individual and total)</i>	NOT	The works included in the project do not foresee water discharges through infiltrations that could influence the concentrations of pesticides in the groundwater.	NOT	-
<i>Groundwater pollutants and pollution indicators*</i>	NOT	The works included in the project do not foresee direct discharges of water through infiltration into the underground water.	NOT	-
Protected area				
<i>Sanitary protection zones related to drinking water intakes</i>	NOT	In the project area, no sanitary protection zones for drinking water intakes have been identified. The nearest groundwater capture front in the ROSI06 water body is located over 960 m from the project boundary, in the area of Pătrăuți.	NOT	-

3.9 MECHANISM CAUSE – EFFECT OF THE PROPOSED PROJECT CUMULATED WITH THE AUTHORIZED/ IN PROGRESS OF AUTHORIZATION/ APPROVED/ IN PROGRESS OF APPROVAL/ PLANNED PROJECTS ON WATER BODIES

3.9.1 Surface water bodies

From the analysis of publicly available data, projects in progress were identified:

- "Rehabilitation of the Pașcani - Dărmănești railway line" with the potential to generate cumulative effects with the works carried out in the analyzed project, on 3 bodies of surface water, respectively: Podul Vătafului - RORW12-1-17-30B_B1, Dragomirna (Lake Dragomirna - cf Suceava) – RORW12-1-17-30_B3 and Pătrăuțeanca - RORW12-1-17-28_B1;
- "Rehabilitation of the Dărmănești - Vicșani railway line" with the potential to generate cumulative effects with the works carried out in the analyzed project, on the Horaiț water body - RORW12-1-17-24A_B

On the Pătrăuțeanca water body - RORW12-1-17-28_B1, works to regularize the existing bed were also identified, which can generate cumulative effects with the analyzed project.

3.9.1.1 Vătafului Bridge – RORW12-1-17-30B_B1

The "Rehabilitation of the Pașcani - Dărmănești railway line" project was identified on this body of water. According to available public information, the project provides for the reconstruction of a bridge on the site of the current bridge, which will be demolished, and the construction of a 20 cm concrete wall, upstream and downstream of the bridge, over a length of 45.40 m. The project can determine the cause mechanisms - cumulative effect with the Suceava highway - DN2H and the expressway DN2H - Siret border, by carrying out the works in the bed of the Vătafului water body - RORW12-1-17-30B_B1. At the time of SEICA's implementation, the works for this project were in the procurement process, and it was not very clear when the works would start. Also, no data is available regarding the area and width of the concrete wall, which reduces the accuracy of the impact analysis. It is specified, however, that in this project the works in the riverbed related to the construction of the concrete wall can generate cumulative effects with the foundation of the bridge planned on the Suceava highway - DN2H and the expressway DN2H - Siret border, being considered similar works.

Table no.3-21 Cumulative cause-effect mechanisms identified on the water body Podul Vătafului – RORW12-1-1-17-30B_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	It does not propose works that could have effects on the quality parameters regarding the connectivity of the surface water body with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	No works are proposed on this body of water that could affect this parameter.	NOT	-
<i>The lateral continuity of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	YES	The "Rehabilitation of the Pașcani - Dărmănești railway line" project includes reconstruction works of the existing bridge over the water body and construction of a concrete wall upstream and downstream of the bridge location, these works can be combined with the works of construction of the footbridge foundation within the current project. The works may have direct effects on the River Depth and Width parameter.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	YES	The "Rehabilitation of the Pașcani - Dărmănești railway line" project includes reconstruction works of the existing bridge over the water body and construction of a concrete wall upstream and downstream of the bridge location, these works can be combined with the works of construction of the footbridge foundation within	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		the current project. The works may have direct effects on the parameter Structure and substrate of the bed bed.		
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The "Rehabilitation of the Pașcani - Dărmănești railway line" project includes reconstruction works of the existing bridge over the water body and construction of a concrete wall upstream and downstream of the bridge location, these works can be combined with the works of construction of the footbridge foundation within the current project. The works may have direct effects on the structure of the riparian zone.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04)	NOT	
<i>Phytobenthos</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		construction of the bridge foundation in the current project, can cause direct effects on the Fitobentos. The works may lead to the alteration of the habitat throughout the work area.		
<i>macro</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with the construction of the bridge foundation in the current project, can cause direct effects on Macrophytes. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>Benthic invertebrate fauna</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with the construction of the bridge foundation in the current project, can cause direct effects on the benthic invertebrate fauna. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>Fish fauna</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with the construction of the bridge foundation in the current project, can cause direct effects on the fish fauna. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
Chemical state				

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor: ROSCI0380 – Suceava Liteni River</i>	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, more than 35 km downstream.	NOT	-

3.9.1.2 Dragomirna (Lake Dragomirna – cf Suceava) – RORW12-1-17-30_B3

The "Rehabilitation of the Pașcani - Dărmănești railway line" project was identified on this body of water. According to available public information, the project provides for the reconstruction of a bridge on the site of the current bridge that will be demolished and the construction of a 20 cm concrete wall, upstream and downstream of the bridge, over a length of 51 m. The project can determine cause-effect mechanisms combined with the Suceava - DN2H highway and the DN2H - Siret border expressway, by carrying out protective works in the Dragomirna water body bed. At the time of SEICA's implementation, the works for this project were in the procurement process, and it was not very clear when the works would start. Also, no data is available regarding the area and width of the concrete wall, which reduces the accuracy of the impact analysis.

Table no.3-22 Cumulative cause-effect mechanisms identified on the Dragomirna water body – RORW12-1-17-30_B3

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Hydrological regime: connectivity with groundwater</i>	NOT	It does not propose works that could have effects on the quality parameters regarding the connectivity of the surface water body with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	No works are proposed on this body of water that could affect this parameter.	NOT	-
<i>The lateral continuity of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	YES	No works are proposed on this body of water that could affect this parameter. The bed diversion works will be carried out maintaining the current size of the bed (20m)	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	YES	The "Rehabilitation of the Pașcani - Dărmănești railway line" project includes reconstruction works of the existing bridge over the body of water and construction of a concrete wall upstream and downstream of the bridge location, these works can be combined with the works of diversion and bed protection from the current project. The works may have direct effects on the parameter Structure and substrate of the bed bed.	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The reconstruction works of the existing bridge over the water body and the creation of a concrete wall upstream and downstream of the bridge location carried out within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works to regularize the Pătrăușeanca stream in the accumulation area . Mihoveni Mobile Dam, Suceava county, are a measure to be added to the construction of the bridge foundation within the current project, "Suceava Motorway - DN2H and Expressway DN2H - Siret border".The works may have direct effects	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		on the structure of the riparian zone.		
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04)	NOT	
<i>Phytobenthos</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with diversion and protection works on the beds in the current project, can cause direct effects on the Phytobenthos. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>macro</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with diversion and protection works on the beds in the	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
		current project, can cause direct effects on Macrophytes. The works may lead to the alteration of the habitat throughout the work area.		
<i>Benthic invertebrate fauna</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" combined with diversion and protection works of the beds in the current project, can cause direct effects on the benthic invertebrate fauna. . The works may lead to the alteration of the habitat throughout the work area.	NOT	-
<i>Fish fauna</i>	YES	The works designed in the bed of the water body, determined by the construction of the concrete wall in the framework of the "Rehabilitation of the Pașcani - Dărmănești railway line" project, combined with the diversion and protection works of the beds in the current project, can cause direct effects on the fish fauna. The works may lead to the alteration of the habitat throughout the work area.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>They are not protected on this body of water</i>	NOT	-	NOT	-

3.9.1.3 Patrăuțeanca – RORW12-1-17-28_B1

The "Rehabilitation of the Pașcani - Dărmănești railway line" project was identified on this body of water. According to available public information, the project provides for the reconstruction of a bridge on the site of the current bridge, which will be demolished, and the construction of a 20 cm concrete wall, upstream and downstream of the bridge, over a length of 45.40 m. The project can determine the cause mechanisms - cumulative effect with the Suceava highway - DN2H and the expressway DN2H - Siret border, by carrying out the works in the bed of the Patrăuțeanca water body - RORW12-1-17-28_B1. At the time of SEICA's implementation, the works for this project were in the procurement process, and it was not very clear when the works would start. Also, no data is available regarding the area and width of the concrete wall, which reduces the accuracy of the impact analysis. It is specified, however, that in this project the work in the river bed related to the construction of the concrete wall can generate cumulative effects with the bridge abutments provided on the Suceava highway - DN2H and the expressway DN2H - Siret border, being considered works with effects on the structures of the riparian zone.

At the same time, in the Mihoveni Mobil Dam accumulation area, Suceava county, there are works to regularize the bed of the water body, over a length of 117 m, which are able to generate cumulative cause-effect mechanisms on the riparian area with the works designed on the Suceava highway - DN2H and the DN2H express road - the Siret border, respectively the construction of a bridge, designed in the kilometer interval km 11+530 - 11+680 km, which involves the permanent occupation of the major bed with 2 culverts and implicitly the fragmentation of the riparian zone.

Table no.3-23 Cumulative cause-effect mechanisms identified on the Patrăuțeanca water body – RORW12-1-17-28_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	It does not propose works that could have effects on the quality parameters regarding the connectivity of the surface water body with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	No works are proposed on this body of water that could affect this parameter.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>The lateral continuity of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions:the depth and width of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions:the bed structure and substrate</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions:the structure of the riparian zone</i>	YES	The reconstruction works of the existing bridge on the water body and the construction of a concrete wall upstream and downstream of the bridge location carried out within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works to regularize the Pătrăușeanca stream in the accumulation area . Mihoveni Mobile Dam, Suceava county are measures to be added to the construction works of the bridge foundation within the current project, "Suceava Motorway - DN2H and Expressway DN2H - Siret border". The works may have direct effects on the structure of the riparian zone.	NOT	-
Physical - chemical elements				
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04)	NOT	
<i>Phytobenthos</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>macro</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Benthic invertebrate fauna</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Fish fauna</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				
<i>Protected area for habitat and species where it is an important factor:</i> • ROSCI0075 – Pătrăuți Forest • RONPA0738 Crujana Forest	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 6 km upstream.	NOT	-

3.9.1.4 Horaiț – RORW12-1-17-24A_B1

The project "Rehabilitation of the railway line Dărmănești - Vicșani" was identified on this body of water. According to available public information, the project provides for the reconstruction of a bridge on the site of the current bridge, which will be demolished beforehand. At the time of

SEICA's implementation, the works for this project were in the procurement process, and it was not very clear when the works would start. Also, no data is available regarding the technical solution adopted for the construction of the bridge. It is specified, however, that in this project only the embankment works can generate cumulative effects with the bridge abutments provided on the Suceava - DN2H highway and the DN2H expressway - Siret border, being considered works with the effects of the structure of the riparian area.

Table no.3-24 Cumulative cause-effect mechanisms identified on the water body Hatnuța + Bocancea – RORW12-1-17-27_B1

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Hydromorphological elements				
<i>Hydrological regime: quantity and flow dynamics</i>	NOT	Although the project envisages the collection of rainwater from the embankment of the highway/expressway and its discharge in specially designed points, the process does not influence the quantity and dynamics of the flow of the water body.	NOT	-
<i>Hydrological regime: connectivity with groundwater</i>	NOT	It does not propose works that could have effects on the quality parameters regarding the connectivity of the surface water body with groundwater.	NOT	-
<i>Longitudinal continuity of the river</i>	NOT	No works are proposed on this body of water that could affect this parameter.	NOT	-
<i>The lateral continuity of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the depth and width of the river</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the bed structure and substrate</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Morphological conditions: the structure of the riparian zone</i>	YES	The reconstruction works of the existing bridge over the body of water carried out in the framework of the project "Rehabilitation of the railway line Dărmanesti - Vicșani - Frontieră" are to be combined with the construction of the bridge piles carried out in the framework of the current project, "Autostrada Suceava - DN2H and DN2H express road - Siret border". The works may have direct effects on the structure of the riparian zone.	NOT	-
Physical - chemical elements				

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Thermal conditions</i>	NOT	Thermally polluted waters will not be discharged into the water body.	NOT	-
<i>Oxygenation conditions</i>	NOT	No work will be carried out that may affect dissolved oxygen concentrations.	NOT	-
<i>Salinity</i>	NOT	No work will be carried out that may affect the salinity conditions.	NOT	-
<i>acidified</i>	NOT	No works with water acidification effects are proposed.	NOT	-
<i>Nutrient conditions</i>	NOT	No works are proposed with an impact on the concentrations of nutrients in the water.	NOT	-
<i>Specific synthetic pollutants - organic micropollutants</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
<i>Specific non-synthetic pollutants – metals</i>	NOT	There are no works with effects on pollutant concentrations.	NOT	-
Quality biological elements				
<i>Phytoplankton</i>	NOT	The element is not representative for the type of water body (RO04)	NOT	
<i>Phytobenthos</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>macro</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Benthic invertebrate fauna</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
<i>Fish fauna</i>	NOT	There are no damming works proposed on this body of water that could affect this parameter.	NOT	-
Chemical state				
<i>Priority substances</i>	NOT	The project does not include works with effects on the concentrations of priority substances.	NOT	-
<i>Priority dangerous substances</i>	NOT	In the project there are no works with effects on the concentrations of dangerous priority substances.	NOT	-
Protected area				

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
<i>Protected area for habitat and species where it is an important factor:</i> <ul style="list-style-type: none"> • ROSCI0075 – Pătrăuți Forest • RONPA0738 Crișana Forest 	NOT	Although the water body crosses natural protected areas, the point of intersection of the project with the water body is outside them, at a distance of more than 6 km upstream.	NOT	-

3.9.2 Groundwater bodies

In the context of groundwater, the "Pașcani-Suceava" highway project was identified as having the potential to accumulate effects on the body of underground water ground RED03, intersect both the analyzed project and the Pașcani-Suceava highway project.

In the case of the ROSI06 deep underground water body, no potential mechanism cause effect.

3.9.2.1 The meadow and terraces of the Siret river and its tributaries - ROSI03

Table no.3-25 Cause-effect mechanisms identified on the Lunca water body and the terraces of the Siret River and its tributaries - ROSI03

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Quantitative parameters				
<i>Groundwater level</i>	NOT	In the stage of making the drilled piles for the foundations of the piles of bridges and viaducts changes in groundwater dynamics are likely to occur ground in close proximity to the work front. effects will be local, manifested in a small radius from the drilling area of the pilots. The project "Autostrada Pașcani-Suceava" envisages similar works of drilling piles for the structural foundation, but they are over 1.1 km away compared to the nearest similar work front within the project analyzed.	NOT	-

Quality elements and quality indicators (parameters).	There is a causal mechanism for a direct effect	Justification for a direct effect	There is a causal mechanism for an indirect effect	Justification for an indirect effect
Qualitative parameters				
<i>chloride</i>	NOT	The analyzed project does not haveect this parameter.	NOT	-
<i>Tone</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>Dissolved by oxygen</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>pH</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>nitrate</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>Ammonium</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>Pesticide (individual and total)</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
<i>Groundwater pollutants and pollution indicators*</i>	NOT	The analyzed project does not affect this parameter.	NOT	-
Protected area				
<i>Sanitary protection zones related to drinking water intakes</i>	NOT	The "Pașcani-Suceava Motorway" project is at a considerable distance, over 35 kmin relation to the sanitary protection area related to the water catchment of the city of Siret.	NOT	-

3.10 CONCLUSIONS

Within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" potential cause-effect mechanisms were identified for all 8 bodies of surface water intersected by the project.

For the surface water bodies, cause-effect mechanisms were identified, as a result of the works that will be carried out both in the major water bodies and in the minor water bodies (only in the case of the Horaiț water bodies - RORW12-1- 17- 24A_B1 and Negostina RORW12-1-3_B1).

In the case of water bodies Mitoc - RORW12-1-17-30A_B1, Dragomirna (Lake Dragomirna - cf Suceava) - RORW12-1-17-30_B3, Pătrăuțeanca - RORW12-1-17-28_B1, Hătnuța +Bocancea - RORW12-1- 17-27_B1 and Siret (border - Lake Rogojești) - RORW12-1_B0 the effects can be recorded on the Structure of the riparian zone due to the location in the main bed of the support structures (piles and abutments) related to bridges and viaducts.

The works designed in the minor bed, respectively the diversions and the bed protections designed on the Dragomirna water bodies (Lake Dragomirna - cf Suceava) - RORW12-1-17-30_B3, Pătrăuțeanca - RORW12-1-17-28_B1, Horaiț - RORW12-1- 17-24A_B1 and Negostina - RORW12-1-3_B1 and the foundation elements of the bridge designed on the water body Vătafului

Bridge - RORW12-1-17-30B_B1, can generate potential cause-effect mechanisms on the following quality elements: Depth and width of the river, Bed structure and substrate, Riparian zone structure, Phytobenthos, Macrophytes, Benthic Invertebrate Fauna and Fish Fauna.

Although 5 of the water bodies studied, namely Podul Vătafului – RORW2-1-17-30B_B1, Pătrăuțeanca – RORW12-1-17-28_B1, Hătnuța +Bocancea - RORW12-1-17-27_B1, Negostina - RORW12-1 and-3_B1 -1 Siret (border - Lake Rogojești) - RORW12-1_B0, crosses protected areas for habitats and species where it is an important factor, no mechanisms have been identified - effect induced by the project on these protected areas, limited to protected areas being located at distances considerable. against the area of intersection of a project with water bodies.

All these quality elements for which possible effects were identified were analyzed in section 3.7 and in the context of the possibility of cumulative effects generated by the planned projects in the areas presented in section 3.9.

In the case of the projects planned in the study area, cumulative cause-effect mechanisms were identified in the case of 4 bodies of surface water: Podul Vătafului - RORW12-1-17-30B_B1, Dragomirna (lake Dragomirna - of Suceava) - RORW12-1-17-30_B3, Pătrăuțeanca - RORW12-1-17-28_B1 and Horaiț - RORW12-1-17-24A_B.

Regarding the groundwater body, potential cause-effect mechanisms were identified only on the ground water body ROSI03 Lunca and the terraces of the Siret River and its tributaries. They appear on the Underground water level indicator, as a result of the construction of drilled piles for the foundation of piles and piles. "Pașcani - Suceava Highway" highway project was considered initial with potential cumulative effects as a result of the works to realize the drilled piles for the structure, encroachments intercepting the same groundwater body (ROSI03). After the analyses space of the areas of expansion of the effects in these works they do not have been identified cause-effect mechanism with cumulation potential.

In the area related to the project, hydrogeological protection zones designated for drinking water intakes for the city of Siret have been identified, consisting of a drain and a borehole that captures the infiltrated water from the left bank of the Siret River. The project does not intersect the hydrogeological protection zone and the sanitary protection zone with a severe regime related to this catchment front. The bridge designed over the Siret river is located approx. 570 m upstream of the catchment front (measured along the route of the minor bed).

No cause-effect mechanisms were identified on the qualitative state of underground water bodies.

No projects that could generate cumulative effects were identified on any of the intersected underground water bodies.

In the following section, impact assessments for 8 surface water bodies and 1 groundwater body are presented, only on the elements for which possible cause-effect mechanisms have been identified.

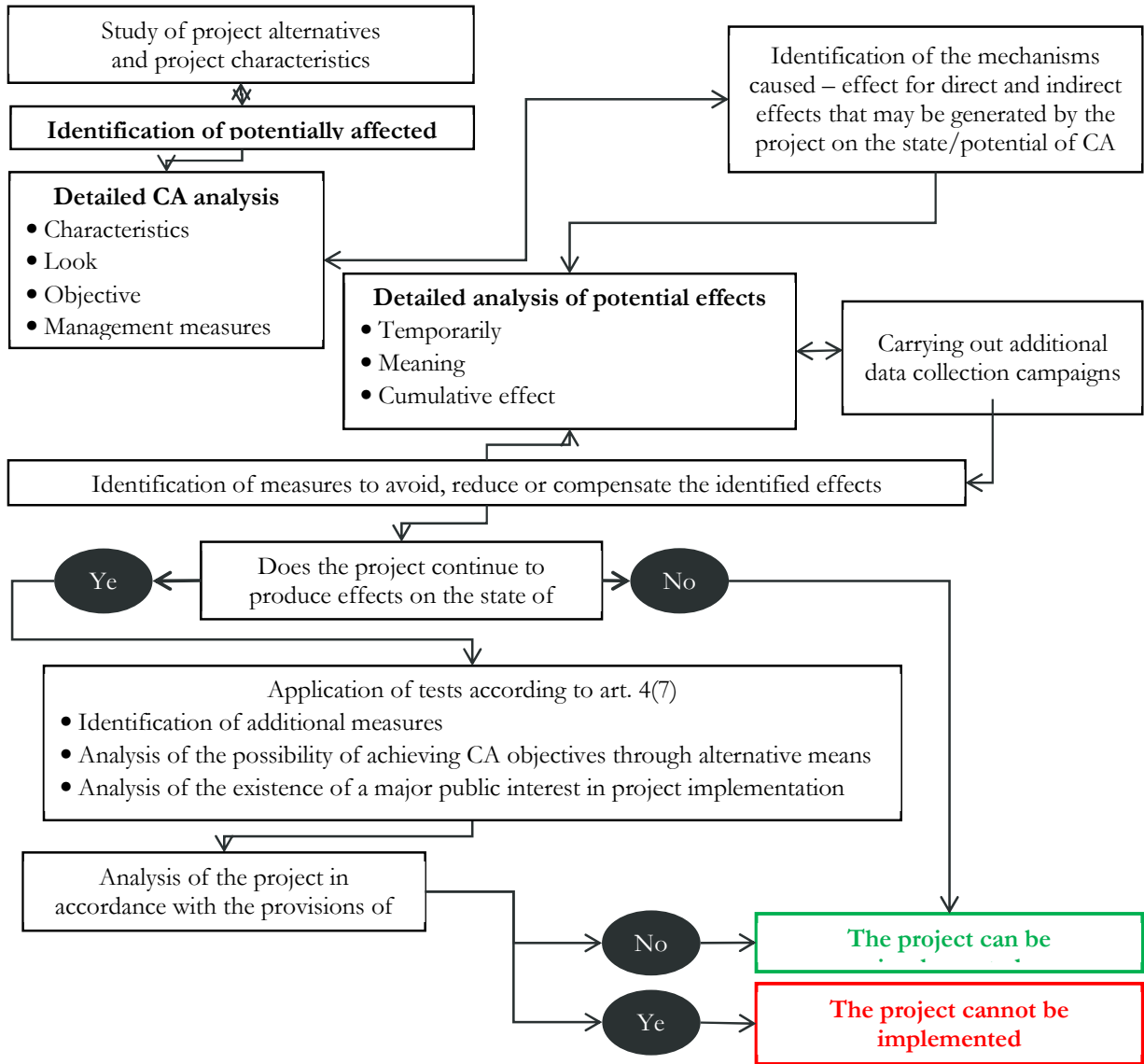
4 DEFINITION OF THE FIELD OF APPLICATION. ANALYSIS OF THE IMPACT OF THE PROJECT ON THE BODY OF WATER AND PROTECTED AREAS AND ANALYSIS OF THE IMPACT OF THE CUMULUS

4.1 IMPACT ASSESSMENT METHODOLOGY

4.1.1.1 *The conceptual framework*

For the development of the Impact Assessment Study on Water Bodies for the project "Suceava highway – DN2H and Expressway DN2H – Siret border", based on existing national and international data and information (including the JASPERS Guide, developed in 2022⁵) the work methodology was established, presented in the following figure, which are the purpose of facilitating the analysis process.

⁵Updated JASPERS checklist tool for project compliance with the Water Framework Directive



4.2 DEFINITION OF THE FIELD OF APPLICATION OF THE ASSESSMENT OF COMPLIANCE WITH THE REQUIREMENTS OF THE WATER LAW

4.2.1 Surface water bodies

4.2.1.1 Vătafului Bridge – RORW12-1-17-30B_B1

Table no.4-1 The impact identified on the water body Vătafului Bridge – RORW12-1-17-30B_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	The bridge foundation works are permanent works that will reduce the surface of the riparian area on the affected area, generating its discontinuity.	YES	The width resulting from the construction of the bridge will be modified compared to natural conditions. The change in the natural width of the bed induced by the project is approx. 21.55%higher, but the length on which the works are carried out 1.07% of the total length of the water body.The changes are small, which is why an insignificant impact on this indicator is appreciated.
<i>Morphological conditions:</i> the bed structure and substrate	NOT	Bridge foundation works are permanent constructions, which affect the structure and substratum of the bed.	YES	The foundation works of the bridge in the minor bed of the water body will be carried out over a length of approx. 90 m, regarding the modification of the bed structure and substrate in that area of approx. 1.07 % of the total length of the water body. Considering the short length of the works, an insignificant impact on this indicator is estimated.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The bridge foundation works are permanent constructions that will reduce the width of the riparian zone on the built-up areas.	YES	Projected works will occupy0.058%from the total surface of the riparian zone of this body of water. The project will not reduce the area of the riparian zone below the 41% threshold for maintaining the current quality class.on this indicator (class 2).
Quality biological elements				
<i>Phytobenthos</i>	NOT	Bridge foundation works are permanent works carried out in the bed.	YES	The foundation works of the bridge in the minor bed of the water body will be carried out over a length of approx. 90 m, regarding the modification of the structure and substrate of the bed and implicitly

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
				the habitat for Phytobenthos on approx. 1.07 % of the total length of the water body.
<i>macro</i>	NOT	Bridge foundation works are permanent works carried out in the bed.	YES	The foundation works of the bridge in the minor bed of the water body will be carried out over a length of approx. 90 m, which applies a modification of the structureANDand the substrate of the bedANDand implicitly of the habitat for Macrophytes on approx. 1.07 % of the total length of the water body.
<i>Benthic invertebrate fauna</i>	NOT	Bridge foundation works are permanent works carried out in the bed.	YES	The foundation works of the bridge in the minor bed of the water body will be carried out over a length of approx. 90 m, which applies a modification of the structureANDand the substrate of the bedANDand implicitly of the habitat for benthic invertebrate fauna on approx. 1.07% of the total length of the water body.
<i>Fish fauna</i>	YES	The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.	YES	According to the information available in the specialized literature ⁶ , significant effects on fish species can occur from a concentration of solid suspensions in water of 25 mg/l. The works carried out in the minor bed of water bodies can generate downstream of the work front or concentration with lethal values of solid suspensions (≥ 25 mg/l) which can manifest up to a distance of up to 100 m. Relative to the length total of the water body, the area of expansion of the impact compared to the expropriation corridor limit will be relatively reduced.(1.18%).

⁶Wenger, Amelia S., Euan Harvey, Shaun Wilson, Chris Rawson, Stephen J. Newman, Douglas Clarke, Benjamin J. Saunders et al. "A critical review of the direct effects of dredging on fish". *Fish and Fishing* 18, no. 5 (2017): 967-985

4.2.1.2 Mitoc – RORW12-1-17-30A_B1

Table no.4-2 Impact identified on the water body Mitoc – RORW12-1-17-30A_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The viaduct piles are permanent works that will reduce the surface of the riparian zone on the affected area, generating its discontinuity.	YES	The constructive elements of the bridge will occupy 0.21% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).

4.2.1.3 Dragomirna (Lake Dragomirna - cf Suceava) – RORW12-1-17-30_B3

Table no.4-3 The identified impact on the Dragomirna water body (Lake Dragomirna – cf Suceava) – RORW12-1-17-30_B3

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the bed structure and substrate	NOT	Diversion and protection works with gabion mattresses are permanent constructions.	YES	The works will influence sediment dynamics downstream, acting as a sediment barrier. The water body diversion works will be carried out over a length of approx. 23573 m, which applies, a modification of the structures and bed in that area of approx. 6.34 % of the total length of the water body. Considering the short length of the works, an insignificant impact on this indicator is estimated.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The projected works will occupy 1.3% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).
Quality biological elements				

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
<i>Phytobenthos</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 23573 m, which applies, a modification of the structure of the bed and implicitly of the habitat for Phytobenthos on approx. 6.34 % of the total length of the water body.
<i>macro</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 23573 m, which applies, a modification of the structure of the bed and implicitly of the habitat for Macrophytes on approx. 6.34 % of the total length of the water body.
<i>Benthic invertebrate fauna</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 23573 m, which is, a modification of the structure AND and the substrate of the bed AND and implicitly of the habitat for benthic invertebrate fauna on approx. 6.34 % of the total length of the water body.
<i>Fish fauna</i>	YES	The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.	YES	According to the information available in the specialized literature ⁶ , significant effects on fish species can occur within a concentration of solid suspensions in water of 25 mg/l. The works carried out in the minor bed of water bodies can generate downstream of the work front or concentration with lethal values of solid suspensions (≥ 25 mg/l) which can manifest up to a distance of up to 100 m. Relative to the length of the total body of water, the area of impact expansion compared to the expropriation corridor limit will be relatively small (2.7%).

4.2.1.4 Patrăuțeanca – RORW12-1-17-28_B1

Table no.4-4 The identified impact on the Patrăuțeanca water body – RORW12-1-17-28_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	Diversion and bed protection works are permanent constructions.	YES	The resulting width in the following diversion works will be modified from natural conditions. The change in the natural width of the bed induced by the project is approx. 17 % lower, but the length on which the works are carried out 1.34% of the total length of the water body. Gabion mat protection works will influence the water level in the bed during low water periods.
<i>Morphological conditions:</i> the bed structure and substrate	NOT	Diversion and protection works with gabion mattresses are permanent constructions.	YES	The works will influence sediment dynamics downstream, acting as a sediment barrier. The water body diversion works will be carried out over a length of approx. 20653 m, which applies, a modification of the structure and bed in that area of approx. 1.34 % of the total length of the water body. Considering the short length of the works, an insignificant impact on this indicator is estimated.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The projected works will occupy 0.18% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).
Quality biological elements				
<i>Phytobenthos</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 20653 m, which applies, a modification of the structure of the bed and implicitly of the habitat for Phytobenthos on approx. 1.34 % of the total length of the water body.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
<i>macro</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 20653 m, which applies, a change in the structure of the bed and implicitly in the habitat for Macrophytes on approx. 1.34 % of the total length of the water body.
<i>Benthic invertebrate fauna</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 20653 m, which is, a modification of the structureANDand the substrate of the bedANDand implicitly of the habitat for benthic invertebrate fauna on approx. 1.34 % of the total length of the water body.
<i>Fish fauna</i>	YES	The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.	YES	According to the information available in the specialized literature ⁶ , significant effects on fish species can occur within a concentration of solid suspensions in water of 25 mg/l. The works carried out in the minor bed of water bodies can generate downstream of the work front or concentration with lethal values of solid suspensions (≥ 25 mg/l) which can manifest up to a distance of up to 100 m. Relative to the length of the total body of water, the area of expansion of the impact compared to the limit of the expropriation corridor will be relatively reduced (0.65%).

4.2.1.5 Hâtnuța +Bocancea – RORW12-1-17-27_B1

Table no.4-5The identified impact on the water body Hâtnuța + Bocancea – RORW12-1-17-27_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	Bridge piles are permanent works that will reduce the surface of the riparian zone on the affected area, generating a discontinuity of it.	YES	The constructive elements of the bridge will occupy 0.010% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).

4.2.1.6 Horaiț – RORW12-1-17-24A_B1

Table no.4-6The impact identified on the Horaiț water body – RORW12-1-17-24A_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	Diversion and bed protection works are permanent constructions.	YES	The resulting width in the following diversion works will be modified from natural conditions. The change in the natural width of the bed induced by the project is approx. 14% lower, but the length on which the works are carried out is 2.60% of the total length of the water body. Gabion mat protection works will influence the water level in the bed during low water periods.
<i>Morphological conditions:</i> the bed structure and substrate	NOT	Diversion and protection works with gabion mattresses are permanent constructions.	YES	The works will influence sediment dynamics downstream, acting as a sediment barrier. The water body diversion works will be carried out over a total length of approx. 604 m, which shows a change in the bed's structures and substrate in that area of approx. 2.60 % of the total length of the water body. Considering the short length of the works, an insignificant impact on this indicator is estimated.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that	YES	The projected works will occupy 0.47% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		will reduce the width of the riparian zone.		
Quality biological elements				
<i>Phytobenthos</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 604 m, which is a change in the structures and substrate of the bed and implicitly in the habitat for Phytobenthos on approx. 2.60 % of the total length of the water body.
<i>macro</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 604 m, which is a change in the structures and substrate of the bed and implicitly in the habitat for Macrophytes on approx. 2.60 % of the total length of the water body.
<i>Benthic invertebrate fauna</i>	NOT	The diversion and protection works as well as the infrastructure elements of the bridges are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 604 m, which is a modification of the structure AND the substrate of the bed AND implicitly of the habitat for benthic invertebrate fauna on approx. 2.60 % of the total length of the water body.
<i>Fish fauna</i>	YES	The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.	YES	According to the information available in the specialized literature ⁶ , significant effects on fish species can occur within a concentration of solid suspensions in water of 25 mg/l. The works carried out in the minor bed of water bodies can generate downstream of the work front or concentration with lethal values of solid suspensions (≥ 25 mg/l) which can manifest up to a distance of up to 100 m. Relative to the length of the total body of water, the area of impact expansion compared to the expropriation

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
				corridor limit will be relatively small (0.43%).

4.2.1.7 Negostina – RORW12-1-3_B1

Table no.4-7 The identified impact on the Negostina water body – RORW12-1-3_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the bed structure and substrate	NOT	Diversion and protection works with gabion mattresses are permanent constructions.	YES	The works will influence sediment dynamics downstream, acting as a sediment barrier. The water body diversion works will be carried out over a length of approx. 283.5 m, which shows a change in the bed structure and substrate in that area of approx. 3.22% of the total length of the water body. Considering the short length of the works, an insignificant impact on this indicator is estimated.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	Diversion and protection works are permanent constructions that will reduce the width of the riparian zone.	YES	The projected works will occupy 0.37% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian area below the 41% threshold for maintaining the current quality class on this indicator (class 2).
Quality biological elements				
<i>Phytobenthos</i>	NOT	Diversion and protection works are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 283.5 m, which is an area of modification of the structure and substrate of the bed and implicitly of the habitat for Phytobenthos on approx. 3.22% of the total length of the water body.
<i>macro</i>	NOT	Diversion and protection works are permanent constructions that will reduce the	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 283.5 m, which means the modification of the structure and substrate of the bed

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		width of the riparian zone.		and implicitly the habitat for Macrophytes for approx. 3.22% of the total length of the water body.
<i>Benthic invertebrate fauna</i>	NOT	Diversion and protection works are permanent constructions that will reduce the width of the riparian zone.	YES	The works of diversion and protection of the bed of the water body will be carried out over a length of approx. 283.5 m, which is an area of modification of the structure and substrate of the bed and implicitly of the habitat for benthic invertebrate fauna on approx. 3.22% of the total length of the water body.
<i>Fish fauna</i>	YES	The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.	YES	According to the information available in the specialized literature ⁶ , significant effects on fish species can occur within a concentration of solid suspensions in water of 25 mg/l. The works carried out in the minor bed of water bodies can generate downstream of the work front or concentration with lethal values of solid suspensions (≥ 25 mg/l) which can manifest up to a distance of up to 100 m. Relative to the length of the total body of water, the area of impact expansion compared to the expropriation corridor limit will be relatively small (1.1%).

4.2.1.8 Siret (border - lake Rogojesti) – RORW12-1_B0

Table no.4-8 The identified impact on the Siret water body (border - Lake Rogojesti) - RORW12-1_B0

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions: the structure of the riparian zone</i>	NOT	The piles and abutments of the bridge are permanent works that will reduce the surface of the	YES	The constructive elements of the viaduct will occupy 0.59% of the total area of the riparian zone of this water body. The project will not reduce the area of the riparian zone below the 41% threshold for

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		riparian zone on the affected area, generating its discontinuity.		maintaining the current quality class on this indicator (class 3).

4.2.2 Underground water bodies

4.2.2.1 The meadow and terraces of the Siret river and its tributaries - ROSI03

Table no.4-9 The impact identified on the Lunca water body and the terraces of the Siret River and its tributaries – ROSI03

Identification of the quality indicator (parameter) that could be affected by the project	The effect will be temporary at the level of the water body??	Justification	Will the effect be insignificant at the level of the water body?	Justification
Quantitative parameters				
<i>Groundwater level</i>	YES	The effects will be manifested only during the construction of the drilled piles necessary for the foundation of the bridge piles.	YES	As is mentioned in specialized literature ⁷ , local changes will occur in the dynamics of underground water, over a radius that does not exceed 10 m from the drilling area, so the changes will not be significant.
Protected area				
<i>Sanitary protection zones related to drinking water intakes</i>	YES	The construction works of the bridge over the Siret river provided in the interval km 53+490 – km 54+570 have a potential impact only in the execution stage of the works carried out in the area of the water body.	YES	The works will be carried out at a distance of approx. 570 m upstream from the catchment front (measured along the route of the minor bed), which can generate pressure on the water quality in the river only in situations of accidental pollution. The bridge works will not be carried out directly in the minor water body bed. At the same time, during the operation stage, the project does not provide for the evacuation of rainwater collected from the road embankment directly into the river, but is directed to other canals in the area that flow into Siret downstream of the catchment front.

⁷Opus International Consultants, 2013, Technical Report 20: Assessment of Groundwater Effects, Basin Bridge Project.

4.3 DEFINING THE SCOPE OF THE ASSESSMENT OF COMPLIANCE WITH THE REQUIREMENTS OF THE WATER LAW - CUMULATIVE IMPACT

4.3.1 Vătafului Bridge – RORW12-1-17-30B_B1

The evaluation of the cumulative impact was carried out taking into account both the projects proposed in the area of the highway route and the expressway, as well as the existing level of affecting the quality elements. The list of projects identified in the implementation area was presented in Chapter 3.7.

Table no.4-10The cumulative impact identified on the water body Vătafului Bridge – RORW12-1-17-30B_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	The construction works of the "Rehabilitation of the Pașcani - Dărmănești railway line" project, which involves the concrete lining of the bed for a length of 5 m upstream and downstream of the bridge and the recalibration of the bed for 20 m upstream and 40 m downstream and foundation works . of the bridge within the "Suceava Motorway - DN2H and DN2H expressway - Siret border" project, are permanent works that will have a cumulative impact on the depth and width of the river.	YES	The permanent works carried out in the minor bed will reduce the width of the water body in the crossing area by 21.55% compared to the current situation, ultimately resulting in a bed width of approx. 5 m. Relative to the total length of the water body, the landscaped area where it will change the bed width 1.07 %. By cumulating the effects with the analyzed project, this indicator will be affected by 1.78% of the total length. At the same time, the works will be carried out in an area where there are currently facilities in the bed, the body of water being crossed at this railway point, by a bridge with a single opening.
<i>Morphological conditions:</i> the bed structure and substrate	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works	YES	Works likely to affect this quality parameter 1.07 % of the total length of the water body. By cumulating the effects with the analyzed project, this indicator will be affected by 1.78% of the total length. It should be noted that the works will be carried out in an area

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		of the bridge foundation within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will had a cumulative impact on the bed structure and substrate.		where there are currently facilities in the bed, the body of water being crossed at this railway point, by a bridge with a single opening.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works of the bridge foundation within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will had a cumulative impact on the structure of the riparian zone.	YES	The realization of the project "Rehabilitation of the Pașcani - Dărmănești railway line" involves the demolition of the existing bridge and the construction of a new bridge in the same location and with the same dimensions and technical characteristics. Considering that the pressure given by the railway bridge exists, the emergence of a significant cumulative impact with the works carried out in the "Suceava Motorway - DN2H and Express Road DN2H - Siret border" project was not taken into account
Quality biological elements				
<i>Phytobenthos</i>	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works of the bridge foundation within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will had a cumulative impact through the loss of	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		Phytobenthos habitats.		
<i>macro</i>	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works of the bridge foundation within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will had a cumulative impact through the loss of Macrophyte habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>Benthic invertebrate fauna</i>	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works of the bridge foundation within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will the loss of benthic invertebrate fauna had a cumulative impact.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>Fish fauna</i>	NOT	The construction works of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the construction works of the bridge foundation within	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works that will had a cumulative impact on the fish fauna. The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of important habitats for food or for laying eggs.		

4.3.2 Dragomirna (Lake Dragomirna – cf Suceava) – RORW12-1-17-30_B3

Table no.4-11 The cumulative impact identified on the Dragomirna water body – RORW12-1-17-30_B3

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the bed structure and substrate	NOT	The construction works of the "Rehabilitation of the Pașcani - Dărmănești railway line" project, which involves concrete scouring of the bed for a length of 8 m upstream and 32.47 downstream of the bridge and recalibration of the bed for 10 m upstream and diversion and protection works bed within the project "Suceava	YES	Works likely to affect this quality parameter 6.34% of the total length of the water body. By cumulating the effects with the analyzed project, this indicator will be affected on 7.71% of the total length. It should be noted that the works will be carried out in an area where there are currently facilities in the bed, the body of water being crossed at this railway point, by a bridge with a single opening.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		Motorway - DN2H and Expressway DN2H - Siret border", are permanent works that will have a cumulative impact on the structures and substrate of the bed of the bed.		
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact on the Structure of the riparian zone.	YES	The realization of the project "Rehabilitation of the Pașcani - Dărmănești railway line" involves the demolition of the existing bridge and the construction of a new bridge in the same location and with the same dimensions and technical characteristics. Considering that the pressure given by the railway bridge exists, the emergence of a significant cumulative impact with the works carried out in the "Suceava Motorway - DN2H and Express Road DN2H - Siret border" project was not taken into account
Quality biological elements				
<i>Phytobenthos</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Phytobenthos habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>macro</i>	NOT	The construction of a concrete wall	YES	By carrying out the bed protection works provided for in the

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Macrophyte habitats.		"Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>Benthic invertebrate fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact on the loss of benthic invertebrate fauna habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>Fish fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		which will have a cumulative impact on the fish fauna. The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of some important habitats for food or for laying eggs.		

4.3.3 Patrăuțeanca – RORW12-1-17-28_B1

Table no.4-12 The cumulative impact identified on the Patrăuțeanca water body – RORW12-1-17-28_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	The construction works of the "Rehabilitation of the Pașcani - Dărmănești railway line" project, which involves the concrete brushing of the bed for a length of 10 m upstream and downstream of the bridge and the recalibration of the bed for 5.50 m upstream and downstream, respectively, and diversion and protection works . of the bed within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border", are permanent works	YES	The permanent works carried out in the minor bed will reduce the width of the water body in the crossing area by 17% compared to the current situation, resulting in the end in this area in a width of the bed of approx. 15 m. Relative to the total length of the water body, the landscaped area where it will change the bed width 1.34 %. By cumulating the effects with the analyzed project, this indicator will be affected by 1.52% of the total length. At the same time, the works will be carried out in an area where there are currently facilities in the bed, the body of water being crossed at this railway point, by a bridge with a single opening.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		that will have a cumulative impact on the depth and width of the river.		
<i>Morphological conditions:</i> the bed structure and substrate	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact on the structure and substrate of the river bed.	YES	Works likely to affect this quality parameter 1.34% of the total length of the water body. By cumulating the effects with the analyzed project, this indicator will be affected by 1.52% of the total length. It should be noted that the works will be carried out in an area where there are currently facilities in the bed, the body of water being crossed at this railway point, by a bridge with a single opening.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact on the Structure of the riparian zone.	YES	The realization of the project "Rehabilitation of the Pașcani - Dărmănești railway line" involves the demolition of the existing bridge and the construction of a new bridge in the same location and with the same dimensions and technical characteristics. Considering that the pressure given by the railway bridge exists, the emergence of a significant cumulative impact with the works carried out in the "Suceava Motorway - DN2H and Express Road DN2H - Siret border" project was not taken into account
Quality biological elements				
<i>Phytobenthos</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Phytobenthos habitats.		where currently there are bed protection works.
<i>macro</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Macrophyte habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.
<i>Benthic invertebrate fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works. which will have a cumulative impact on the loss of benthic invertebrate fauna habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
<i>Fish fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the Pașcani - Dărmănești railway line" and the works of diverting and protecting the riverbeds within the project "Suceava Motorway - DN2H and Express Road DN2H - Siret border" are permanent works, which will have a cumulative impact on the fish fauna. The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of some important habitats for food or for laying eggs.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Pașcani - Dărmănești railway line" project, the landscaped area of the water body will not be extended, the works being proposed in an area where currently there are bed protection works.

4.3.4 Horaiț – RORW12-1-17-24A_B1

Table no.4-13 The cumulative impact identified on the Horaiț water body – RORW12-1-17-24A_B1

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
Hydromorphological elements				
<i>Morphological conditions:</i> the depth and width of the river	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection works of the riverbeds within the project "Suceava	YES	At the time of the completion of SEICA, there are no detailed data available regarding the solutions proposed in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, as it is not possible to quantify the cumulative impact. However, it is specified that all the works will be carried out in an area where there are currently developments in the riverbed, the

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact on the depth and width of the river.		body of water being crossed at this railway point, by a bridge, and there is no risk of recording a significant cumulative negative impact.
<i>Morphological conditions:</i> the bed structure and substrate	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection works of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact on the structure and substrate of the river bed.	YES	At the time of the completion of SEICA, there are no detailed data available regarding the solutions proposed in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, as it is not possible to quantify the cumulative impact. However, it is specified that all the works will be carried out in an area where there are currently developments in the riverbed, the body of water being crossed at this railway point, by a bridge, and there is no risk of recording a significant cumulative negative impact.
<i>Morphological conditions:</i> the structure of the riparian zone	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact on the Structure of the riparian zone.	YES	The realization of the project "Rehabilitation of the Pașcani - Dărmănești railway line" involves the demolition of the existing bridge and the construction of a new bridge in the same location and with the same dimensions and technical characteristics. Considering that the pressure given by the railway bridge exists, the emergence of a significant cumulative impact with the works carried out in the "Suceava Motorway - DN2H and Express Road DN2H - Siret border" project was not taken into account
Quality biological elements				
<i>Phytobenthos</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, the

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		the railway line Dărmănești - Vicșani" and the diversion and protection of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Phytobenthos habitats.		landscaped area of the water body will not be expanded, the works being proposed in an area where currently there are bed protection works.
<i>macro</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact through the loss of Macrophyte habitats.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, the landscaped area of the water body will not be expanded, the works being proposed in an area where currently there are bed protection works.
<i>Benthic invertebrate fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, the landscaped area of the water body will not be expanded, the works being proposed in an area where currently there are bed protection works.

Identification of the quality indicator (parameter) that could be affected by the project	Will the effect be temporary in the water body?	Justification	Will the effect be insignificant at the level of the water body?	Justification
		on the loss of benthic invertebrate fauna habitats.		
<i>Fish fauna</i>	NOT	The construction of a concrete wall within the project "Rehabilitation of the railway line Dărmănești - Vicșani" and the diversion and protection works of the riverbeds within the project "Suceava Motorway - DN2H and Expressway DN2H - Siret border" are permanent works. which will have a cumulative impact on the fish fauna. The impact will be manifested during the execution stage by increasing the turbidity of the water, but also possibilities by the loss of some important habitats for food or for laying eggs.	YES	By carrying out the bed protection works provided for in the "Rehabilitation of the Dărmănești - Vicșani railway line" project, the landscaped area of the water body will not be expanded, the works being proposed in an area where currently there are bed protection works.

4.4 FORMULATION OF CONCLUSIONS

The present study analyzed the potential impacts on the state/ecological potential and chemical state of the surface water bodies, respectively the quantitative and qualitative state of the underground water bodies, as a result of the implementation of the project. This study was developed based on the provisions of the Water Framework Directive (2000/60/EC), transposed into Romanian legislation by Law no. 107/1996 with subsequent amendments and additions and the provisions of Order 828/2019 regarding the approval of the content – framework of the Impact Assessment Study on water bodies.

The expropriation corridor related to the project intersects 8 bodies of surface water and 2 bodies of underground water.

In terms of current status/ potential of surface water bodies, 5 surface water bodies in the project area have good ecological status and 3 surface water bodies have moderate ecological status.

Both groundwater bodies have good quantitative and chemical status.

All 8 surface water bodies for which potential impacts have been identified are crossed by the project with bridges, viaducts and a footbridge. In this case, the works are reduced, consisting in most cases in the partial placement of the piles in the main with little impact on the riparian areas. Only one body of water (Podul Vătafului - RORW12-1-17-30B_B1) is planned to be crossed by the project by means of a footbridge. In the case of this body of water, the project provides for the concreting of the bed in order to create the foundation for the location of the designed bridge, along its entire length. These works will have direct effects on the hydromorphological quality indicators: River depth and width, Bed bed structure and substrate and Riparian zone structure and biological quality indicators: Phytobenthos, Macrophytes and Benthic Invertebrate Fauna and Fish Fauna.

The project does not involve cross barrage works leading to the interruption of the longitudinal connectivity of the water bodies.

The project interventions generate a series of effects on the quality elements associated with the surface water bodies, which start with the project execution stage and are manifested throughout the operation stage.

Bed correction (diversion) works are proposed on 4 bodies of surface water, the largest work among them, totaling a length of approx. 564 m, being planned on the Horaiț water body - RORW12-1-17-24A_B1 in 2 crossing areas. These works will have direct effects on the hydromorphological quality indicators: River depth and width, Bed bed structure and substrate and Riparian zone structure and biological quality indicators: Phytobenthos, Macrophytes, Benthic invertebrate fauna and Fish fauna.

At the same time, another quality element generally affected by the project is the Structure of the riparian zone as a result of the permanent works in the main riverbed, especially the area of the banks (piles and piles). The effects on these components were considered on all 8 bodies of water, with a reduced spatial extension, relative to the length of each body of water, with an estimated maximum of 0.59% in the body of water Siret (border - Lake Rogojesti) – RORW12-1_B0. In the case of the other bodies of surface water, the affected percentage of the surface of riparian areas was estimated below the maximum value, respectively 0.59%. In none of the cases did the project lead to exceeding the specific thresholds of the class in which they were placed on the riparian zone indicator.

The effects on the relevant biological indicators, according to the typology of the water bodies, in the works carried out in the bed (diversion and protection of the bed and works related to the creation of the foundation for the location of the bridge), are considered minimal because they have a small spatial extension compared to the main length of the water body . . Relative to the entire length of the water bodies, the largest potentially affected area for Phytobenthos, Macrophytes and Benthic Invertebrate Fauna habitats is estimated on the Negostina water body (2.61%).

Regarding the designated protected areas on the water bodies intersected by the project, it is considered that the impact is minimal for the works carried out within the project do not affect the habitats in the Natura 2000 sites dependent on the intersected water bodies. However, the project is taking place near the underground catchment front of the city of Siret, proposing the construction of a bridge located at approx. 570 m upstream from it (measured along the route of the minor bed), avoiding the related sanitary protection zone. And in this case, no significant negative impacts on the protection areas of the catchment front were assessed, the works provided in the project for the construction of the bridge avoiding the minor bed of the water body. At the same time, during the operation stage, the project does not provide for the evacuation of rainwater collected from the road embankment directly into the river, but is directed to other canals in the area that flow into Siret downstream of the catchment front.

The potential impacts generated by the project on the biological elements of quality (the most important component, according to Annex V of the Water Framework Directive) are associated with the loss of reduced areas of habitat as a result of some works (eg: diversion works and bed protection with the). gabions and works related to the realization of the foundation for the location of the footbridge).

In the case of none of the hydromorphological quality indicators analyzed, there were no violations of the stability thresholds for each class, the project not being able to generate changes in the current state of the analyzed water bodies.

Regarding cumulative impact, existing work and planned projects on 4 surface water bodies were analyzed where potential cumulative cause-effect mechanisms were identified. Of all the projects planned in the area only in the case of projects "Rehabilitation of the Pașcani - Dărmănești railway line" and "Rehabilitation of the Dărmanesti - Vicșani railway line" potential cumulative cause-effect mechanisms were analyzed, proposing demolition works of existing structures and their reconstruction in the same positions and with the same structural characteristics. The level of impact estimated as a result of the cumulative effect is insignificant, a very small increase in the affected area being quantified. Given that the rehabilitation of the railway proposes projects in areas already affected by the railway infrastructure, the generation of a significant cumulative impact was not considered, the pressures on the water bodies as a result of the existing railway and maintained in the future at the same volume and after completion. modernization projects.

For the underground water body Lunca and the terraces of the Siret river and its tributaries - ROSI03, potential impacts generated by the project were analyzed on the quantitative elements in the execution stage, works for the realization of pile foundations by means of drilled piles influencing locally the flow dynamics in the underground layers transited by these works. However, the changes regarding the dynamics of the flow will be manifested at a distance of a maximum of 10 m from the area where the works will be carried out, thus, according to the specialized literature⁷, the impact on the water bodies is assessed as insignificant.

In conclusion, the works carried out in the project are not able to lead to deterioration of the quality of surface water bodies and underground water bodies, nor to preventing the implementation of environmental stability objectives on them. Thus, the project is not able to generate significant negative impacts on water bodies.

In order to further reduce the level of the identified effects, additional measures were proposed in the present study, details in the next section. These have the role of mitigating/reducing the effects generated by the works proposed in the quality elements plan.

4.5 IDENTIFYING AND ESTABLISHING ADDITIONAL PRACTICAL/ACHIEVABLE IMPACT MITIGATION/REDUCTION MEASURES, INCLUDING THE IMPACT OF KUMUTUL IF APPROPRIATE

Following the assessment of the impact of hydrotechnical works on water bodies, in this study a series of measures were proposed with the aim of minimizing the impact on quality indicators such as the structure of the riparian zone, the depth and width of the river, ichthyofauna. These solutions correspond to those included in the technical Normative for hydrotechnical works NTLH-001 "Criteria and principles for the evaluation and selection of technical design solutions and the realization of hydrotechnical works for the arrangement/redevelopment of watercourses, to achieve the environmental objectives in the field of water" approved. by Order no. 1215/2008.

These measures are based on the good practices recommended in the case of transport infrastructure projects and existing national literature in the field.

Table no.4-14 Measures to avoid and reduce impacts associated with the project on water bodies

Quality element/quality indicator (parameter).	Proposed additional measure	Implementation location
The vegetation structure of the riparian zone	At the end of the construction works, rehabilitation works will be carried out in the riparian zone, which consists in the planting of some native arboreal or shrubby plant associations.	In the area where diversion and bed protection works are proposed: <ul style="list-style-type: none"> • Dragomirna water body (Dragomirna lake - cf Suceava) (RORW12-1-17-30_B3) – km 7+950 - 8+050; • Pătrăuțeanca water body (RORW12-1-17-28_B1) – km 11+550 - 11+650; • Horaiț water body (RORW12-1-17-24A_B1) – km 36+400 - 36+800; • Negostina water body (RORW12-1-3_B1) – km 41+950 - 42+250. In the area where the construction of a bridge is proposed - the water body Podul Vătafului (RORW12-1-17-30B_B1).
	Site organizations must be located as far as possible from surface water bodies, in no case less than 50 m from their banks.	In all locations.
	The temporary access roads will be located at a distance bigger from the water bodies of the surface AND it will avoid vegetative damage specific to	In all locations.

Quality element/quality indicator (parameter).	Proposed additional measure	Implementation location
	<p>the riparian area, the banks AND take the substrate of the bed.</p> <p>In the case of temporary arrangements for crossing watercourses, they will be provided in such a way as to ensure the flow section and avoid the interruption of longitudinal connectivity, including during periods of low flow. Solutions will be adopted that do not lead to the alteration of the banks and the substrate of the water course.</p>	<p>In all locations.</p>
The depth and width of the river	A mixed transverse profile will be created on the axis of the protected bed with the gabion mat, which will allow a reduction of the flow section and an optimal water level in the minor bed during periods of low flow.	<p>In the area where diversion and bed protection works are proposed:</p> <ul style="list-style-type: none"> • Dragomirna water body (Dragomirna lake - cf Suceava) (RORW12-1-17-30_B3) – km 7+950 - 8+050; • Pătrăuțeanca water body (RORW12-1-17-28_B1) – km 11+550 - 11+650; • Horaiț water body (RORW12-1-17-24A_B1) – km 36+400 - 36+800; • Negostina water body (RORW12-1-3_B1) – km 41+950 - 42+250.
ichthyofauna	<p>The works in the bed will be carried out only after isolating the working front with temporary dikes, which must be executed in such a way as not to affect the longitudinal connectivity of the water body. The works in the bed will be carried out by maneuvering the machines on the bank.</p> <p>During the execution period i.e. of the works in the bed, if there are species of ichthyofauna, temporary barriers with filters will be set up on the water surface, which will have the role of turbidity control of the water, respectively of the sediments entrained in the water during the works.</p>	<p>In the area where diversion and bed protection works are proposed:</p> <ul style="list-style-type: none"> • Dragomirna water body (Dragomirna lake - cf Suceava) (RORW12-1-17-30_B3) – km 7+950 - 8+050; • Pătrăuțeanca water body (RORW12-1-17-28_B1) – km 11+550 - 11+650; • Horaiț water body (RORW12-1-17-24A_B1) – km 36+400 - 36+800; • Negostina water body (RORW12-1-3_B1) – km 41+950 - 42+250. <p>In the area where diversion and bed protection works are proposed:</p> <ul style="list-style-type: none"> • Dragomirna water body (Dragomirna lake - cf Suceava) (RORW12-1-17-30_B3) – km 7+950 - 8+050; • Pătrăuțeanca water body (RORW12-1-17-28_B1) – km 11+550 - 11+650; • Horaiț water body (RORW12-1-17-24A_B1) – km 36+400 - 36+800; • Negostina water body (RORW12-1-3_B1) – km 41+950 - 42+250.
Sanitary protection areas	During the execution period i.e. of the works in the bed, if there are areas of sanitary protection for the capture of drinking water, temporary barriers with filters will be set up on the body of water,	<p>In the area where the piles and pulleys are proposed (bridge km 53+490 – km 54+570):</p> <ul style="list-style-type: none"> • Siret (border - Lake Rogojesti) (RORW12-1_B0) – km 53+490 – 54+570;

Quality element/quality indicator (parameter).	Proposed additional measure	Implementation location
	<p>which will have the role of controlling pollutants and turbidity. Pof the water, respectively of the sediments entrained in the water during the works.</p> <p>During the execution period, in all points/intersection areas of the project with the adduction, transport, water supply, gravity sewerage and pressure sewerage pipelines existing on the proposed sites, the underground infrastructure networks will be diverted or relocated on a . another route that will not be affected by the proposed construction works, according to the provisions of SR 8591/97⁸which establishes the minimum distances between underground building networks, based on documentation at the level of PT-DDE technical execution project approved by ACET SA Suceava.</p> <p>During the execution period, for all the materials/components that will be assembled/put into operation, "FAM" material approval sheets will be presented, which will be confirmed by ACET SA Suceava before the necessary documentation is drawn up.</p> <p>Before the execution of the diversion/replacement of the water supply and sewage pipes, the beneficiary will obtain all the authorizations and approvals necessary for the execution of the works, in accordance with the legislation in force.</p> <p>At the end of the works of diverting/replacing the water supply and sewage pipes (gravity/under pressure), the beneficiary will start handover-acceptance procedures of the new resulting installations in compliance with all the conditions imposed by the owners.</p>	

⁸Romanian Institute of Standardization, 1997, Underground building networks - Location conditions. SR 8591/97, Bucharest, Romania;

5 ANALYSIS OF THE APPLICATION OF ARTICLE 27 OF THE WATER LAW NO. 107/1996 WITH THE SUBSEQUENT MODIFICATIONS AND SUPPLEMENTS

For the analyzed project, it is not necessary to apply Article 27 of the Water Law no. 107/1996 with subsequent amendments and additions. It is estimated that through the realization and implementation of the analyzed project there is no risk of deterioration of the good condition/good potential and the achievement of their good condition/good potential is not prevented, both at the global level and at the level of the quality elements.

The measures in this study have the role of minimizing the expected effects that may occur as a result of the implementation of the projects and to avoid reducing any potential impacts on the quality elements of the water bodies.

6 THE PROJECT IMPACT MONITORING PROGRAM ON WATER BODIES, INCLUDING THE PRESENTATION OF PROPOSALS OF MONITORING SECTIONS ESTABLISHED ON THE PLAN

In order to realize the project, a monitoring program was proposed, which has the role of fully analyzing the potential effects on water bodies of the works included in the project. In addition, the monitoring program will analyze the effectiveness of the proposed measures to mitigate/reduce impacts. This program is the characteristics of the execution of the works, namely the actual construction of the highway and the expressway, but also periods of operation (the first 2 years of operation).

Since all pressures on water bodies can be quantified by analyzing the biological quality elements, this quality parameter will be analyzed within the monitoring program. In addition, in order to analyze the elements of hydromorphological quality, it is necessary that following the monitoring, in the post-execution period, a more unfavorable situation than the one foreseen in this study results. Thus, for the evaluation of the hydromorphological parameters, it was chosen to identify the way in which the types of hydromorphological changes will increase the sensitivity of the biological elements for the care of a more unfavorable situation.

The monitoring plan was carried out in accordance with the relevant methodological aspects for each element of biological quality, within the updated National Management Plan related to the national portions of the International Hydrographic Basin of the Danube River, developed by the "Romanian Waters" National Administration.

In the preliminary stage of the project, before the initiation of the execution stage, samples will be taken from all the monitoring points proposed in the table below. These indicators, the reference probe against which all subsequent analyzes carried out within the monitoring program will be reported.

Table no.6-1 Program for monitoring the impact on water bodies

No. crt.	Body of water	Monitoring points		Quality elements	reasoning	Minimum duration	Monitoring frequency	
		Bornaj km	Coordinates Stereo 70					
			X					Y
1.	Vătafului Bridge (RORW12-1-17-30B_B1)	km 3+575	595899.815	690396.000	Phytobenthos; Macrophyte; Benthic invertebrate fauna; Fish fauna.	Bed diversion works.	During the execution period	Once a year
2.	Dragomirna (lake Dragomirna - cf Suceava) (RORW12-1-17-30_B3)	km 3+800	592831.622	688530.039	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year
		km 3+800	592831.622	688530.039	Phytobenthos; Macrophyte; Benthic invertebrate fauna; Fish fauna.	Bed diversion works.	During the execution period	Once a year
3.	Pătrăuțanța (RORW12-1-17-28_B1)	km 11+650	589579.170	689097791	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year
		km 11+650	589579.170	689097791	Phytobenthos; Macrophyte; Benthic invertebrate fauna; Fish fauna.	Bed diversion works.	During the execution period	Once a year
4.	Horaiț (RORW12-1-17-24A_B1)	km 25+275	579846091	696785.199	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year

No. crt.	Body of water	Monitoring points		Quality elements	reasoning	Minimum duration	Monitoring frequency	
		Bornaj km	Coordinates Stereo 70					
			X					Y
		km 25+950	580222.412	697559.410	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year
		km 26+250	580276380	697858.731	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year
		km 36+500	580736.229	707937.612	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year
		km 36+425	580749.976	707880.589	Phytobenthos; Macrophyte; Benthic invertebrate fauna; Fish fauna.	Bed diversion works.	During the execution period	Once a year
5.	Negostina (RORW12-1-3_B1)	km 42+200	580257,505	712957.767	Phytobenthos; Macrophyte; Benthic invertebrate fauna; Fish fauna.	Bed diversion works.	During the execution period	Once a year
		km 42+225	580272.783	712936.499	At discharge points from hydrocarbon separators (pH; suspended matter; CCO-Cr; CBO5; petroleum products; heavy metals).	Hydrocarbon separators are located that evacuate the pre-purified water into the water body.	The first 2 years of operation	Once a year

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