

CHAPTER 1

BACKGROUND

1.1. Information on the project owner

The National Gas Transmission Company "Transgaz" SA (hereinafter referred to as "Transgaz SA") was established under Government Decision 334/2000, as a Romanian legal entity organized as a public share company, with the purpose of fulfilling the national strategy for transportation, international transit, dispatching and gas engineering and research in gas transmission, and other complementary or ancillary activities to the main object of activity.

"Transgaz SA" is the technical operator of the national gas transmission system, answering its operation in terms of quality, safety, economic efficiency and environmental protection.

Project owner:

Name of the beneficiary: Societatea Națională de Transport Gaze Naturale „Transgaz” SA
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1.2. Information on the certified author of this documentation

SC Unitatea de Suport pentru Integrare SRL, hereafter USI, is a privately owned company organized as a limited liability company, registered with the Chamber of Commerce and Industry Cluj under Trade Register no. J / 12/1014 / 12.07.2001 and having the Sole Registration Code RO 14054736.

The main activity of USI consists in *Activities of business management consultation*, and as secondary activity *Studies and research in physics and natural sciences*.

In its work, USI enjoys working with a strong body of experts, with a high training in natural sciences and extensive experience in the design, promotion and management of specific projects.

Since 2007, due to its expertise and experience, USI has been certified by the Ministry of Environment and Sustainable Development as a company able to develop environmental impact assessment studies and environmental balance sheets.

As of 13.04.2010, USI was registered in National Register of Environmental Studies at position 188, recognized as expert in the elaboration of: environmental reports, environmental impact reports, environmental balance sheets, location reports and adequate assessments.

However, their experience in developing environmental technical documentation is more extensive, starting with 2005, when personnel working within USI was individually certified on different levels of expertise. Thus, USI still remains one of the oldest companies active in the field, its portfolio of clients including public and private companies that finished technical-scientific and specific administrative services evidenced by a number of over 500 documents.

As evidence of their performance quality, USI is certified through the Quality Management System by ISO: 9001 and ISO: 14001.

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MINISTERUL MEDIULUI,
APELOR ȘI PĂDURILOR

CERTIFICAT DE ÎNREGISTRARE

În conformitate cu prevederile Ordonanței de urgență a Guvernului nr. 195/2005 privind protecția mediului, aprobată cu modificări și completări prin Legea 265/2006, cu modificările și completările ulterioare și ale Ordinului ministrului mediului nr. 1026/2009 privind condițiile de elaborare a rapoartelor de mediu, rapoartelor privind impactul asupra mediului, bilanșurilor de mediu, rapoartelor de amplasament, rapoartelor de securitate și studiilor de evaluare adecvată.

În urma evaluării solicitării de reînnoire din data de 05.03.2015 depuse în procedura de înregistrare de:

**S.C. UNITATEA DE SUPT PENTRU INTEGRARE
S.R.L.**

cu sediul în: Cluj-Napoca, str. Baladei, nr.35, județul Cluj,
Telefon: 0744 826619, fax: 0264 410071, e-mail: smihut2000@yahoo.com
CUI RO 14054736 înregistrată în Registrul Comerțului la J12/1014/2001

persoana juridică este înscrisă în *Registrul Național al elaboratorilor de studii pentru protecția mediului la poziția nr. 188* pentru

RM	<input checked="" type="checkbox"/>
RIM	<input checked="" type="checkbox"/>
BM	<input checked="" type="checkbox"/>
RA	<input checked="" type="checkbox"/>
RS	<input type="checkbox"/>
EA	<input checked="" type="checkbox"/>

Evaluat la data de: **05.03.2015**
Reînnoit cu data de : **14.04.2015**
Valabil până la data de : **14.04.2020**

PREȘEDINTELE COMISIEI DE ÎNREGISTRARE

**Mihail FĂCĂ
SECRETAR DE STAT**

1.3. Name of the project

DEVELOPMENT OF THE ROMANIAN GAS TRANSMISSION SYSTEM ON BULGARIA-ROMANIA-HUNGARY-AUSTRIA ROUTE

Throughout this documentation, reference is made to the project by the acronym BRUA.

1.4. Description of the project and its stages

1.4.1. Brief presentation of BRUA project

The proposed project involves the construction in Romania of a new gas transmission pipeline to facilitate the connection of Gas Compression Station Podișor and Horia gas metering station in the direction of Podișor-Corbu-Hurezani-Hateg-Recaș-Horia.

The pipeline to be installed will be made of steel sections with a diameter of 800mm (32"), will run for a total top view length of approximately 528.689 kilometers, and is designed to transport gas at a pressure of 63 bar.

Pipeline route follows the general direction from SE Westwards, crossing the counties of Giurgiu, Teleorman, Dambovita, Arges, Olt, Valcea, Gorj, Hunedoara, Caras-Severin, Timis and Arad (see Fig.1.A).

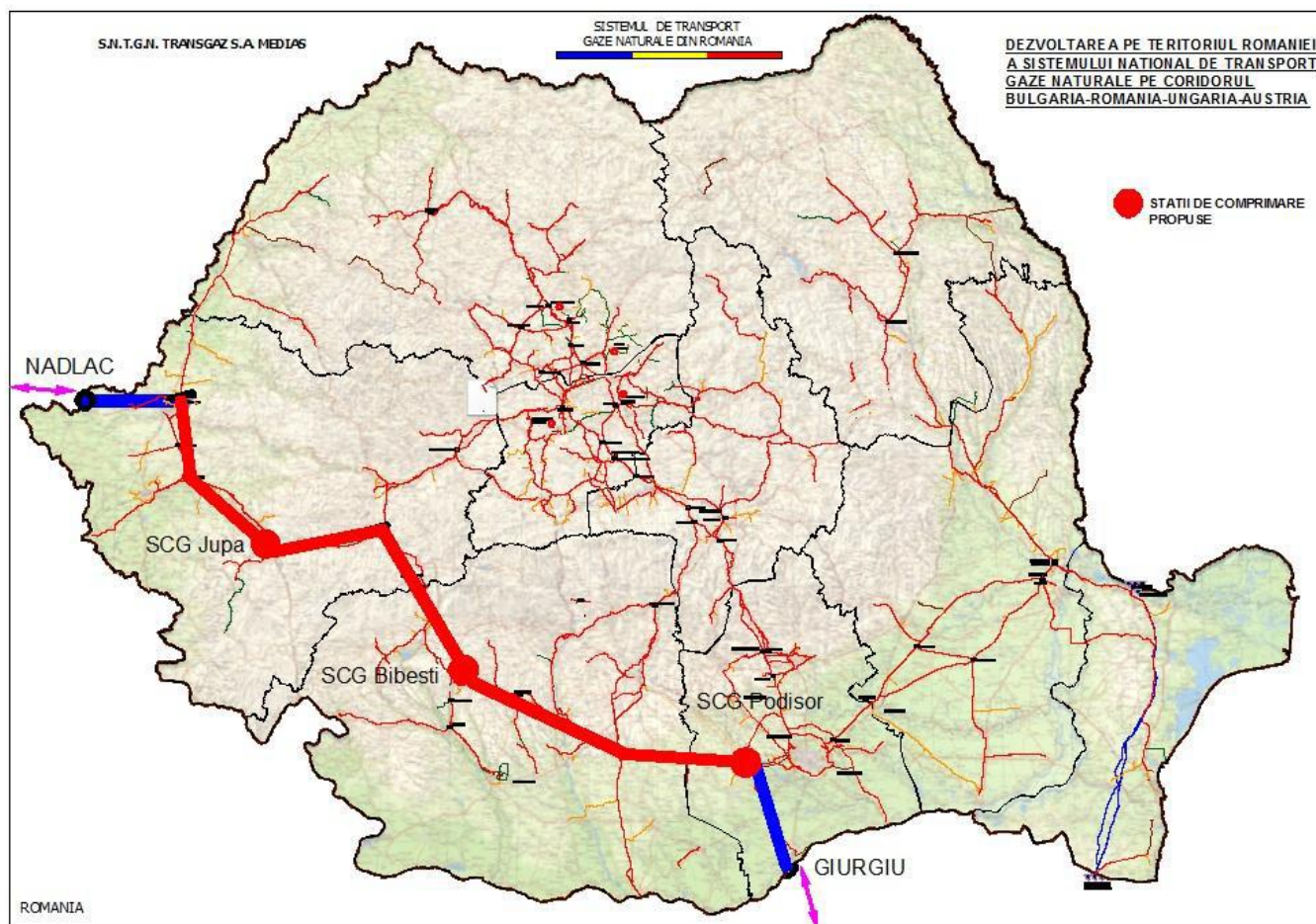


Fig. 1.1. –BRUA route (red line)

The project is part of a larger project developed at European level, through the EU program of projects of common interest (PCI) (PCI 7.1.5. - Romanian section), partially carried out by EU funds. Transgaz intends to get EU funds by "Connecting Europe Facility".

Administrative overlapping to Romania's national territory is presented in FIG. nr.1.II:

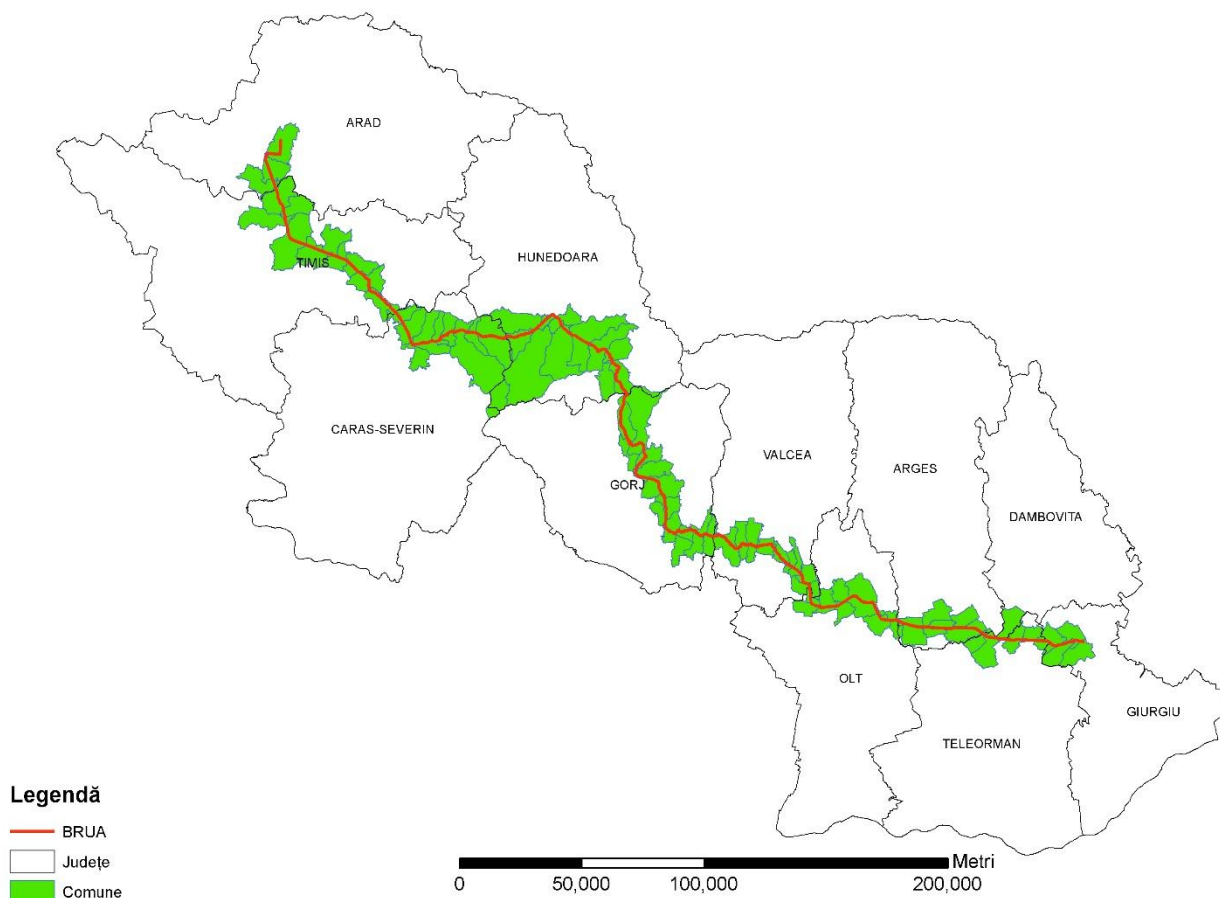


Fig. 1.II. – Overlapping of BRUA to Romania's administrative units (uat)

1.4.2. Description of the opportunity and necessity of BRUA

Related to the necessity and opportunity BRUA Project aims to attain the following objectives:

- Diversification of gas supply to European countries;
- Transmission to the European markets of the gas reserves from the Caspian region;
- Assurance of 1.5 billion m³ / year reverse flow to Bulgaria by the end of 2019;
- Development of 4.4 billion m³ / year reverse flow to Hungary as of 2019;
- Achievement of competitive transmission costs and consequently of competitive gas transmission tariffs, as compared to other energy projects, including in comparison to the costs that are kept relatively high in liquefied natural gas produced in Northern African countries representing one of the gas supply alternatives;
- Coverage of constant consumption increase of trends and forecasts in European countries amid an ongoing decline in medium and long-term gas supplies from the Russia;

This pipeline will ensure future interconnection with pipelines that will supply gas as potential sources from the Black Sea. Interconnectivity at a regional scale of the gas transmission systems will ensure a high comfort of the population on the long run (given their wide use as heating source), eliminating the risk caused by interruption of supply and providing constant industrial energy in production processes. Therefore the project as a whole assures a continuous and steady growth and higher stability and security.

Under these circumstances the development of the Romanian gas transmission infrastructure for the Black Sea gas to be transported to Romania-Hungary border is one of the major priorities of Transgaz. In this regard, BRUA project was included in the 10-year network development plan (TYNDP) of Transgaz.

1.4.3. Technical elements of BRUA

The entity responsible with the implementation of the project is Transgaz, the licensed operator of the National Gas Transmission System in Romania, and the investment is planned to be achieved over a period of 4 ÷ 5 years. Gas transmission pipeline design will be done in accordance with the "Technical regulations for design and execution of gas transmission pipelines" approved by ANRE Order no. 118/2013. The pipeline will be designed to allow cleaning and PIG inspection.

Pipeline laying will be under the frost depth, i.e. at a depth of 1.00 m measured from the ground surface to the pipeline upper generatrix, except for passageways under-crossings, when pipeline will be mounted at a depth of at least 1.50 m.

Seismic classification is in accordance with the Code for Seismic Design - indicative P 100 - 1/2013.

A digital data teletransmission system will be built. Communication support will be made up of a group of optic fiber ducts. The optic fiber route will be parallel to and of the same length as the pipeline and fiber optic installation works will be performed in the pipeline working strip. Fibre optic route will be marked with terminals and electronic markers except for the areas where undercrossings are performed by drilling.

According to GD 766/1997 and Regulation on the establishing of the categories of construction importance, the gas pipeline falls within the "normal C construction importance".

The project is affecting mainly areas of land outside buildable perimeters belonging to municipalities (communes, towns, cities), to private owners, local governments or public domain.

A statement on the town planning and land improvement plans according to the local urban plans (PUG), is summarized in Table. 1.1.:

Table no.1.1. BRUA development in accordance to town planning and land improvement

County	Administrative unit	Length (m)	
		within buildable area	outside buildable area
Giurgiu	Bucșani	324,8	1344,6
	Crevedia Mare	0	3213,8
	Mârșă	0	6322,9
	Roata de Jos	0	10450,3
Teleorman	Grația	0	255,5
	Poeni	589,2	8335,3
	Scurtu Mare	0	84,2
	Tătăraștii de Jos	0	4761,4
	Tătăraștii de Sus	0	2293,8
Dâmbovița	Șelaru	0	3087,3
Argeș	Popești	0	6976,7
	Izvoru	0	3479,2
	Râca	0	3720,9
	Căldăraru	0	10775,4
	Bârla	294,1	9831,3
Olt	Corbu	0	4234,7
	Potcoava	0	5728,9
	Scornicești	672,9	15457,4
	Oporelu	0	6201,1
	Priseaca	0	331,2

County	Administrative unit	Length (m)	
		within buildable area	outside buildable area
	Teslui	0	7369,5
	Strejești	0	2557,2
	Grădinari	0	6846,2
Vâlcea	Voicesți	0	1168,1
	Drăgășani	198,8	4547,4
	Ștefănești	0	2385,4
	Sutești	254,9	4062,4
	Crețeni	0	2417,1
	Gușoeni	612	8058,9
	Măciuca (Oveselu)	470,8	9446,3
	Fântănești	326,5	3907,3
	Tetoiu	147,6	5368,9
	Lăcusteni	0	927
	Zătreni	308	11915,5
Gorj	Dănciulești	251,7	3361,8
	Stejari	0	5210,9
	Hurezani	113,3	9903
	Vladimir (Andreești)	375,8	8413,7
	Bărbătești	0	1087,2
	Jupânești	205,8	8087
	Târgu Cărbunești	142,4	12912,5
	Scoarța	235	6657,6
	Bălănești (Voitești de Vale)	437,2	9902,3
	Bumbești Jiu	0	8164,5
	Turcinești	0	379,8
	Schela (Sâmbotin)	658,1	22222,8
Hunedoara	Vulcan	5977	14980,4
	Bănița	1680	4379,9
	Baru	1550	6629
	Pui	230	8879,9
	Sălașu de Sus	0	6438,8
	Sântămărie Orlea	0	3982,1
	Totești	0	3515,5
	Hațeg	0	228
Hunedoara	Totești	0	9268
	Densuș	0	2638,9
	Sarmisegetuza	635	11312,8
Caraș-Severin	Băuțar	433,6	13072,8
	Marga	407,5	4103,4
	Zăvoi	0	5397,8

County	Administrative unit	Length (m)	
		within buildable area	outside buildable area
	Oțelul Roșu	392,8	5945,1
	Glimboca	0	4025,5
	Obreja	92,4	8758
	Caransebeș	0	1965,6
	C-tin Daicoviciu (Căvăran)	0	8877,7
	Sacu	0	5291,6
Timiș	Gavojdia	0	15835,3
	Lugoj	258	8723,5
	Costeiu	0	7066,9
	Belint	0	6300,1
	Ghizela	0	4128,3
	Topolovatu Mare	0	7936,7
	Recas	0	12988,5
	Pischia	0	3154,8
	Bogda	0	4220,4
	Fibis	0	220,8
	Masloc	0	9271,9
Arad	Sagu	0	3348,9
	Fantânele	1490	10050
	Vladimirescu	363,9	11457,1
TOTAL		20129,1	508560,2

Thus, most of BRUA (96.2%) is outside city limits and only a small proportion (3.8%) overlaps with the town buildable area, and usually at crossings sections that were in turn selected so as to avoid inhabited areas.

A representation of BRUA overlap with areas included in the buildable (urban) or outside city limits is shown in FIG. 1.III .:

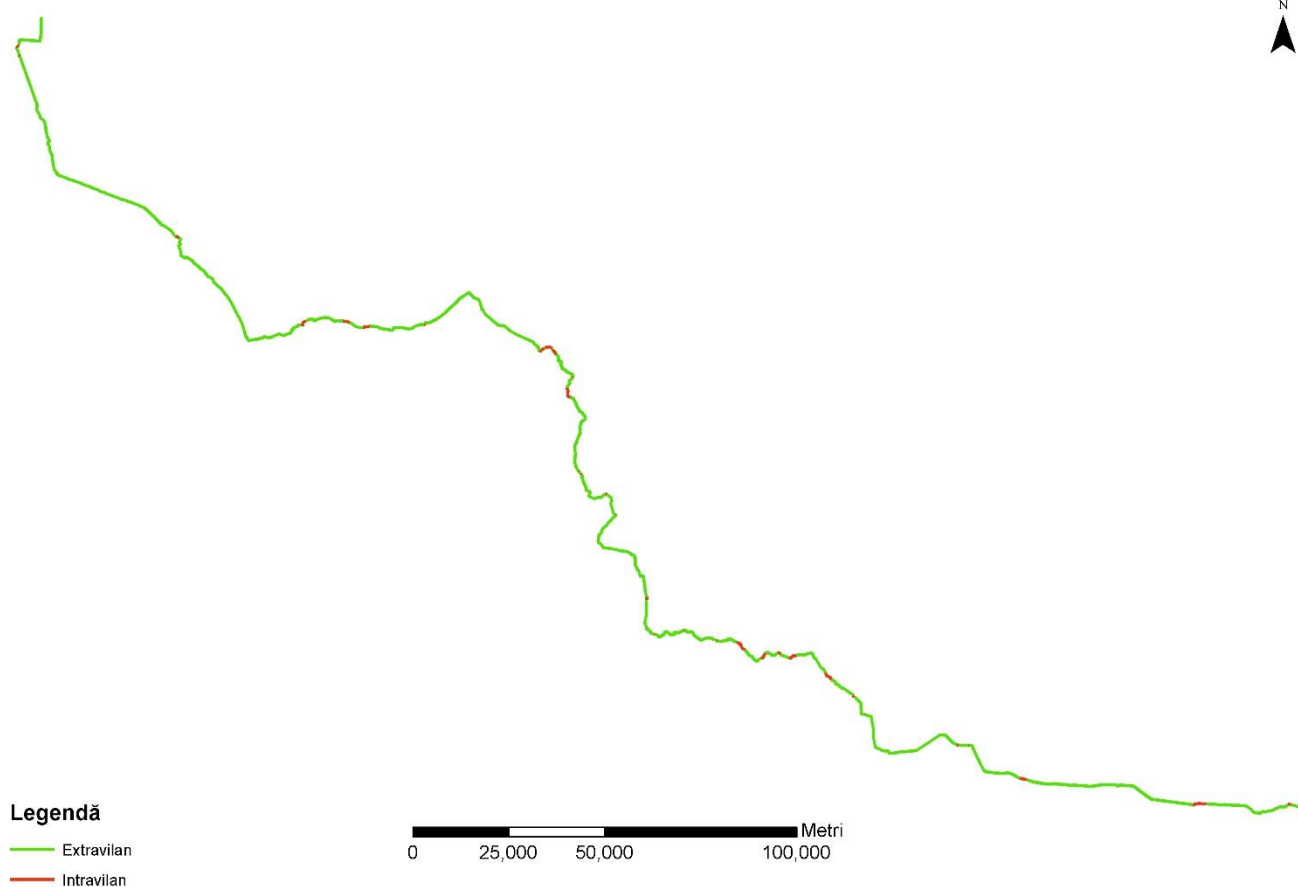


Fig.1.III. Overlapping of BRUA with buildable areas (red) and outside city limits areas (green)

In terms of current economic use of the land most of it is arable, orchards, meadows, forests, roads, railways, waterways, construction and unproductive land.

The legal framework for right of way, land owners' agreement and the right of use to assure operation is regulated under National Law no. 123/2012 – Power and Gas Law as updated, and there are legal procedures stated under Law 255/2010 on expropriation for public utility reasons for the necessity of some national, county and local interest objectives.

The land that will be temporarily or permanently occupied is either in the public and private ownership of municipalities or is state owned, or the private property of local communities, or the property of individuals / businesses, while some of it is managed by agencies and national authorities in various fields. Subsequently there will be preparatory actions for the expropriation and / or temporary / permanent removal of land from the agricultural / forestry fund of BRUA footprint lands. The amount of compensation and concession fees owed to affected landowners will be calculated (negotiated) according to the applicable law and will be paid by the works beneficiary.

In accordance with the *Technical Standards for the design and implementation of gas transmission pipelines* approved by decision of the A.N.R.E. President no. 118 / 09.20.2013 art. 28 to 29 and Annex. 8, Working strip width for pipeline mounting is 21 m in agricultural land, pastures, hayfields, unproductive lands and areas for vineyards, orchards, forests, the working strip is 14 m. In areas with cross slopes of over 5° terraces will be constructed for the mounting of the gas transmission pipeline. Terraces width will be 10 meters.

The total area of land to be occupied with works for the construction of the investment objective is approx. 1083 ha of which temporarily occupied land area is approx. 1071 ha and the permanently occupied land area is approx. 12 hectares.

Along the route, in the 11 counties, the gas transmission pipeline will cross: communication routes (communication routes of public utility: national roads (DN), county roads (DJ), communal roads (DC), railways (CF), roads of private use), bodies of water registered or unregistered in the Land Register, valleys and channels, oil pipelines, gas pipelines, water pipelines, telecommunications networks (fiber optic) and forests, grassland and agricultural-ecosystems.

On BRUA route there will be a whole series of technological elements serving the transmission network, as follows:

- 3 gas compressor stations: Podișor, Bibești and Jupa;
- 43 line valves;
- 20 cathodic protection stations.

The pipeline route (see fig. 1.IV.) will be generally parallel to the existing pipeline sections belonging to the National Gas Transmission System. In some parts, some sections of pre-existing pipeline routes will be replaced by new pipelines.

In choosing the route, in some sections, there have been some deviations from the initial path caused mainly by safety reasons, but also for the purpose of reducing the impact on some environmental factors. The optimized route was intended to avoid areas of conservation interest or environmental sensitive areas and housing areas.

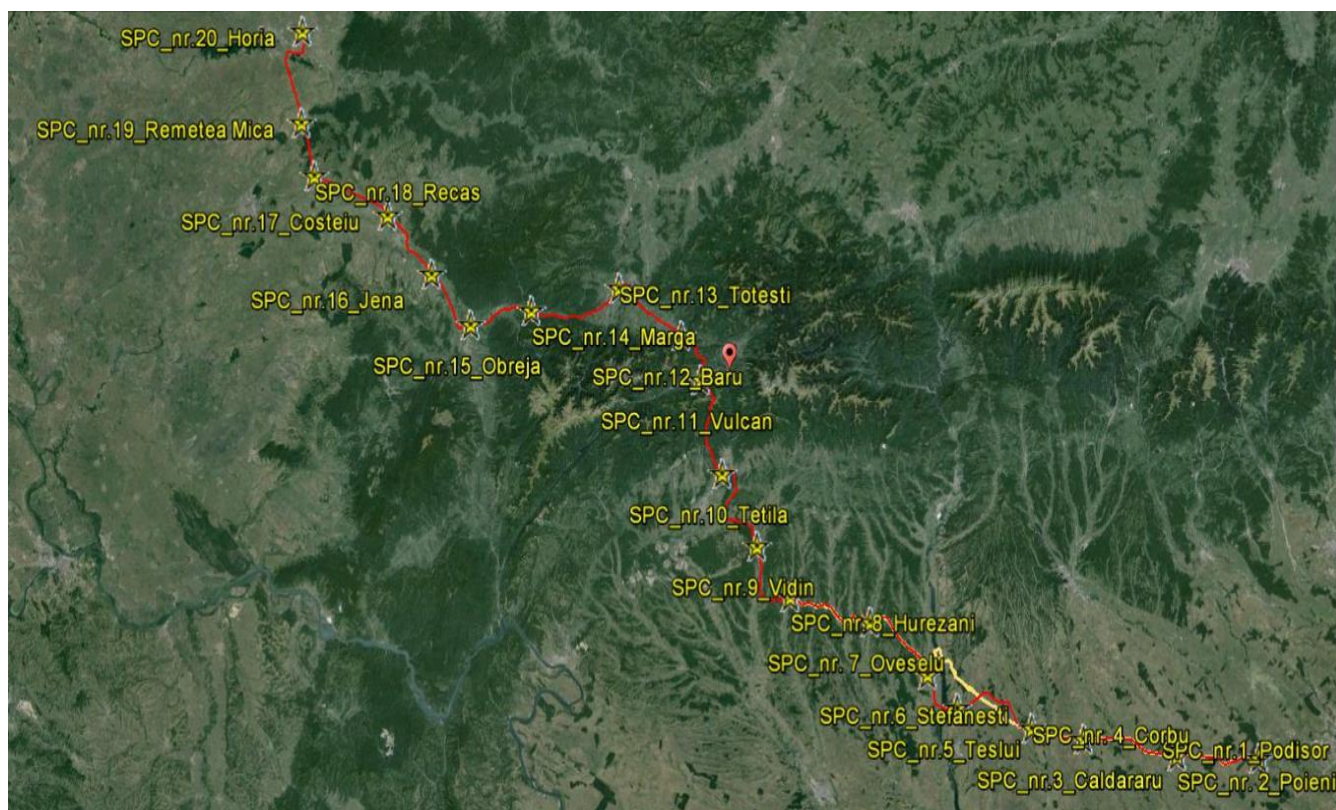


Fig. 1.IV. – Position of the cathodic protection stations on BRUA route

Cathodic protection stations (SPC) will be placed in the gas compression stations and in the line valve stations (see fig.1.V). A Summary on the position of SPC along BRUA is presented in Table. 1.II.

Table nr.1.II. Distribution of SPC along BRUA

SPC no.	Locality	Precise position along BRUA
SPC 1	Podișor	km 0 + 098
SPC 2	Poeni	km 29 + 789

SPC no.	Locality	Precise position along BRUA
SPC 3	Căldăraru	km 63 + 577
SPC 4	Corbu	km 82 + 017

SPC no.	Locality	Precise position along BRUA
SPC 5	Teslui	km 114 + 228
SPC 6	Ștefănești	km 132 + 147
SPC 7	Oveselu	km 161 + 982
SPC 8	Hurezani	km 196 + 465
SPC 9	Vidin	km 224 + 087
SPC 10	Bumbesti Jiu	km 259 + 626
SPC 11	Vulcan	km 292 + 949
SPC 12	Baru	km 313 + 780

SPC no.	Locality	Precise position along BRUA
SPC 13	Totești	km 342 + 771
SPC 14	Marga	km 377 + 612
SPC 15	Obreja	km 402 + 000
SPC 16	Jena	km 424 + 949
SPC 17	Coșteiu	km 450 + 368
SPC 18	Recaș	km 478 + 798
SPC 19	Remetea Mică	km 495 + 470
SPC 20	Horia	km 528 + 680

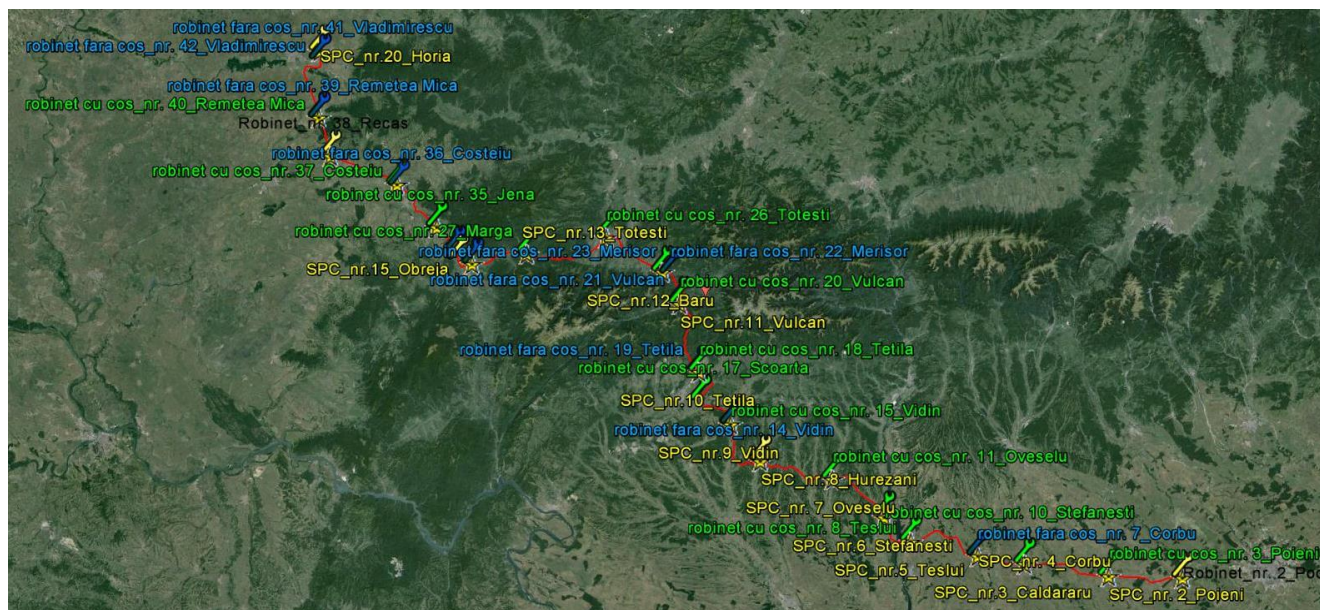


Fig. 1.V. Position of valves along BRUA

A Summary on the position of valves along BRUA is presented in Table. 1.III.

Valve no.	Locality	Precise position along BRUA
R1	Podișor	km 0
R2	Podișor	km 0 + 098
R3	Poeni	km 29 + 789
R4	Căldăraru	km 63 + 506
R5	Căldăraru	km 63 + 577
R6	Corbu	km 82 + 017
R7	Corbu	km 82 + 256
R8	Teslui	km 114 + 228
R9	Drăgășani	km 131 + 883
R10	Ștefănești	km 132 + 147
R11	Oveselu	km 161 + 982
R12	Hurezani	km 196 + 400
R13	Hurezani	km 196 + 465
R14	Vidin	km 223 + 882
R15	Vidin	km 224 + 087
R16	Scoarța	km 241 + 449
R17	Scoarța	km 241 + 562
R18	Bumbesti Jiu	km 259 + 626

Table nr.1.III. Distribution of taps along BRUA

Valve no.	Locality	Precise position along BRUA
R19	Bumbesti Jiu	km 260 + 332
R20	Vulcan	km 292 + 949
R21	Vulcan	km 293 + 784
R22	Merișor	km 309 + 887
R23	Merișor	km 310 + 065
R24	Baru	km 313 + 780
R25	Baru	km 313 + 912
R26	Totești	km 342 + 771
R27	Marga	km 377 + 612
R28	Obreja	km 401 + 487
R29	Obreja	km 402 + 000
R30	Jupa	km 409 + 200
R31	Jupa	km 409 + 280
R32	Prisaca	km 412 + 545
R33	Prisaca	km 413 + 050
R34	Jena	km 424 + 618
R35	Jena	km 424 + 949
R36	Coșteiu	km 449 + 425

Valve no.	Locality	Precise position along BRUA
R37	Coșteiu	km 450 + 368
R38	Recaș	km 478 + 798
R39	Remetea Mică	km 495 + 181
R40	Remetea Mică	km 495 + 470
R41	Vladimirescu	km 525 + 213

Valve no.	Locality	Precise position along BRUA
R42	Vladimirescu	km 525 + 313
R43	Horia	km 528 + 680

A synthetic presentation of BRUA is presented in table no. 1.IV:

Table nr.1.IV. Main characteristics of BRUA

Item	Measurement unit	Size
Maximum operation pressure	bar	63
Designed pressure	bar	63
Total top length including stations (2D)	km	528,689
Total top length without stations (2D)	km	528,535
Total real length including stations (3D)	km	529,789
Total real length without stations (3D)	km	529,635
Outline pipeline diameter	mm	813
Water crossings (rivers, streams, valleys, channels, gushings)	pcs	380
Large river crossings	pcs	9
Highway crossings	pcs	2
National roads crossings	pcs	23
County roads crossings	pcs	77
Communal roads crossings, public and private property roads crossings	pcs	93
Railroads crossings	pcs	16
Forests crossings	km	67,383
No. of valve stations with cathodic protection and pressure discharge	pcs	16
No. of valve stations with cathodic protection without pressure discharge	pcs	4
No. of valve stations without cathodic protection with pressure discharge	pcs	2
No. of valve stations without cathodic protection and systems of pressure monitoring	pcs	21
No. of line valves in the 3 Compressor stations SCG (SPC in SCG Podișor)	pcs	5
Line valves and cathodic protection stations in Horia SPC	pcs	1
Control valves at Technological Node connection	pcs	8
PIG stations	pcs	6
Cathodic protection stations	pcs	20
Compressor stations	pcs	3
No. of compressor units per compressor station	pcs	3 (2a+1r)

The project structure includes:

- Gas transmission pipeline, diameter of 32 "(813 mm), buried at a depth of 1.00 m from the upper pipeline generatrix;
- 3 gas compressor stations located in the towns of Podișor, Bibești, Jupa, and ancillary equipment;
- 43 line valves placed along the pipeline route;
- 20 cathodic protection station located along the pipeline route;
- Central Dispatching Center for data acquisition, control and surveying;

Following the calculations, the inclusion of the pipeline route in the location classes according to *Technical Standards for the design and execution of gas transmission pipelines*, the analysis of the piping selection and of the procurement costs for such piping, the decision was made to use 32 "material L415NE according SR EN ISO 3183-2013.

The piping for the construction of the gas transmission pipeline for the Bulgaria - Romania - Hungary - Austria route has been sized according to the "Technical Standards for the design and implementation of gas transmission pipelines" approved by ANRE Order no. 118/2013. Sizing calculation results based on location classes are shown in Table. 1.V:

Table nr.1.V. Dimensional characteristics of BRUA pipeline classes

Piping	Location class	Characteristics	Curves
Linear path	1a	welded pipe Ø 813 x 8,8 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 10,0 mm steel L415NE SREN ISO 3183/2013
	1b	welded pipe Ø 813 x 10,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 11,0 mm steel L415NE SREN ISO 3183/2013
	2	welded pipe Ø 813 x 11,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 12,5 mm steel L415NE SREN ISO 3183/2013
	3	welded pipe Ø 813 x 14,2 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 16,0 mm steel L415NE SREN ISO 3183/2013
	4	welded pipe Ø 813 x 16,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 17,5 mm steel L415NE SREN ISO 3183/2013

Length depending on classes:

- Class location 1a	=	124,860 km,
- Class location 1b	=	267,304 km,
- Class location 2	=	26,960 km,
- Class location 3	=	109,565 km,
- Class location 4	=	0,00 km,
TOTAL	=	528,689 km.

According to the A.N.R.E. norms, when sizing pipelines and stations, the route depends on the class of location, and additional safety measures are required as follows:

- full control of pipe body, including manufacturing welds, by nondestructive methods;
- full control of welds made on site by penetrating radiation or ultrasound;
- strength test is performed with water, pressure Pmax 1.4, for sections of pipeline in Class 3 location;
- reinforced insulation or extremely reinforced insulation depending on the selected insulation system.

Regarding the sections where BRUA changes direction (both horizontally and vertically) long-range curves will be used, with Rmin = 5 x DN.

Protection tubes that will be used to the undercrossings of national roads, county and municipal sites and railways will be made of steel pipe, according to SR 6898 / 1-95, and seals between the tubing and pipeline will be made with spacers and bellows seal that are technically certified.

All materials, fixtures, garments and accessories used for the execution of the gas transmission pipeline will meet the manufacturing standards and norms of and will be accompanied by quality certificates that will be kept (archived) to be included in the construction log book.

At reception materials will be checked to correspond to their quality certificated.

Any replacement or change of material can only be made with the written consent of the general engineer and of the beneficiary.

Entrepreneurs will use fillers that have qualified welding procedures adequate for L415NE steel pipes for welded joints in the coating station, on site and in ironworks workshops.

All garments in the project that are to be executed in the workshop will be accompanied by quality certificates containing all relevant information on the quality of raw materials and fillers used for their machining (pipe, flanges, fittings, bolts, gaskets, welding electrodes, etc.)

When executing the ironworks consideration will be paid to the fact that pipeline will be constructed as a piggable pipeline. To this end, the assembly by welding of valves and fittings, will provide the nominal diameters, according to manufacturing norms.

Before shipping to site, all fittings and ironworks (including reversal curves) will be subject to strength test and the outer surface will be protected with a layer of primer.

All materials, fixtures, garments and accessories used are properly stored for the entire implementation period so as to avoid damage, degradation or waste.

During construction and installation of the pipeline, electricity and fuel for operation of the equipment will be provided by the contractor responsible for the works.

Since gas transportation is made in closed-loop system (under pressure) during operation of the pipeline there is no need for raw materials, energy or fuel.

Compression stations will be connected to the power network and an internal gas supply network will be assured so as to provide the necessary energy for operation (operation assimilated to administrative duties).

After analysis of geological data, crossings of water courses (channels, valleys, gullies, etc) will be made by open cut, pipes will be underground concrete casted pipes laid 2 m below the valley floor and part of them will be crossed by horizontal drilling.

National roads, county roads, local roads and railways will be crossed by horizontal drilling.

A summary of the main Project components by national administrative units is summarized in the table below 1.VI:

Table nr.1.VI. Main components of BRUA within administrative units

County	Places	BRUA Objective
Giurgiu	Bucșani	Pipeline route: 1637,4 m x 21 m + 32 m x 14 m + 35027 mp SCG Podișor + 360 mp (valve station);
	Crevedia Mare	Pipeline route: 1263,8 m x 21 m + 1950 m x 14 m
	Mârșă	Pipeline route: 6322,9 m x 21 m;
	Roata de Jos	Pipeline route: 10450,3 m x 21 m;
Teleorman	Grația	Pipeline route: 3884,3 m x 21 m;
	Poeni	Pipeline route: 8924,5 m x 21 m + 1450 mp (pipe storage) + 154 mp (valve station);
	Scurtu Mare	Pipeline route: 84,2 m x 21 m;
	Tătărăștii de Jos	Pipeline route: 4761,4 m x 21 m;
	Tătărăștii de Sus	Pipeline route: 2293,8 m x 21 m;

County	Places	BRUA Objective
Dâmbovița	Șelaru	Pipeline route: 3087,3 m x 21 m;
Argeș	Popești	Pipeline route: 6976,7 m x 21 m;
	Râca	Pipeline route: 3720,9 m x 21 m;
	Izvoru	Pipeline route: 3479,2 m x 21 m;
	Căldăraru	Pipeline route: 10775,4 m x 21 m + 11922 mp (Site organization + pipe storage) + 27 mp (valve station);
	Bârla	Pipeline route: 10125,4 m x 21 m;
Olt	Corbu	Pipeline route: 4073,2 m x 21 m + 161,5 m x 14 m + 2351 mp (pipe storage) + 30 mp (valve station);
	Potcoava	Pipeline route: 4851,4 m x 21 m + 877,5 m x 14 m;
	Scornicești	Pipeline route: 15527,3 m x 21 m + 603 m x 14 m;
	Oporelu	Pipeline route: 6201,1 m x 21 m;
	Priseaca	Pipeline route: 331,2 m x 21 m;
	Teslui	Pipeline route: 7259,5 m x 21 m + 110 m x 14 m + 1728 mp (pipe storage) + 52 mp (valve station);
	Strejești	Pipeline route: 2557,2 m x 21 m;
	Grădinari	Pipeline route: 6846,2 m x 21 m;
Vâlcea	Voicești	Pipeline route: 1168,1 m x 21 m;
	Drăgășani	Pipeline route: 4746,2 m x 21 m + 82 mp (valve station);
	Ștefănești	Pipeline route: 2385,4 m x 21 m;
	Sutești	Pipeline route: 4317,3 m x 21 m;
	Crețeni	Pipeline route: 2417,1 m x 21 m;
	Gușoeni	Pipeline route: 8670,9 m x 21 m + 11000 mp (Site organization + pipe storage);
	Măciuca	Pipeline route: 7713 m x 21 m + 2204,1 m x 14 m + 180 mp (valve station);
	Fărtățești	Pipeline route: 3054 m x 21 m + 1179,8 m x 14 m;
	Tetoiu	Pipeline route: 4373,6 m x 21 m + 1142,9 m x 14 m;
	Lăcusteni	Pipeline route: 927 m x 21 m;
	Zătreni	Pipeline route: 11432,5 m x 21 m + 791 x 14 m + 1924 mp (pipe storage);
Gorj	Dănciulești	Pipeline route: 2987,3 m x 21 m + 626,2 m x 14 m;
	Stejari	Pipeline route: 4256,1 m x 21 m + 954,8 m x 14 m;
	Hurezani	Pipeline route: 7204,5 m x 21 m + 2698,5 m x 14 m + 37426 mp (SCG Bibești) + 2960 mp (valve station);
	Vladimir	Pipeline route: 7118,1 m x 21 m + 1671,4 m x 14 m + 1438 mp (pipe storage);
	Bărbătești	Pipeline route: 1087,2 m x 21 m;
	Jupânești	Pipeline route: 8292,8 m x 21 m;
	Târgu Cărbunești	Pipeline route: 8724,9 m x 21 m + 4330 m x 14 m + 84 mp (valve station);
	Scoarța	Pipeline route: 4543,3 m x 21 m + 2349,3 m x 14 m + 85 mp (valve station);
	Bălănești	Pipeline route: 8559,2 m x 21 m + 1780,3 m x 14 m;

County	Places	BRUA Objective
	Bumbești Jiu	Pipeline route: 6699,2 m x 21 m + 1465,3 m x 14 m + 85 mp (valve station);
	Turcinești	Pipeline route: 379,8 m x 21 m + 11284 mp (Site organization + pipe storage);
	Schela	Pipeline route: 17046 m x 21 m + 5834,9 m x 14 m;
Hunedoara	Vulcan	Pipeline route: 16687,4 m x 21 m + 4270 m x 14 m + 1572 mp (pipe storage) + 263 mp (valve station);
	Banița	Pipeline route: 2521,3 m x 21 m + 3538,6 m x 14 m;
	Baru	Pipeline route: 7190,6 m x 21 m + 988,4 m x 14 m + 66 mp (valve station);
	Pui	Pipeline route: 9099,9 m x 21 m + 10 m x 14 m + 1387 mp (pipe storage);
	Sălașul de Sus	Pipeline route: 6072,2 m x 21 m + 366,6 m x 14 m;
	Sântămăria Orlea	Pipeline route: 3873,1 m x 21 m + 109 x 14 m;
	Totești	Pipeline route: 3515,5 m x 21 m + 135 mp (valve station)+ 5752,5 m x 21 m
	Hațeg	Pipeline route: 228 m x 21 m;
	Densuș	Pipeline route: 2638,9 m x 21 m
	Sarmizegetusa	Pipeline route: 9301,8 m x 21 m + 2646 m x 14 m
Caraș-Severin	Băuțar	Pipeline route: 13506,4 m x 14 m; Site organization: 10136 mp
	Marga	Pipeline path: 2381,9 x 21 m +2129 m x 14 m; tap station: 292mp
	Zăvoi	Pipeline route: 5397,8 m x 21 m
	Municipiul Oțelu Roșu	Pipeline route: 6337,9 m x 21 m
	Glimboca	Pipeline route: 4025,5 m x 21 m
	Obreja	Pipeline route: 8850,4 m x 21 m Valve station: 356mp; pipe storage: 1200mp
	Municipiul Caransebeș	Pipeline route: 1965,6 m x 21 m
	Constantin Daicoviciu	Pipeline route: 8877,7 m x 21 m; valve station: 356mp; SCG Jupa: 33883 mp
	Sacu	Pipeline route: 5291,6 m x 21 m
Timiș	Găvojdia	Pipeline route: 15835,3 m x 21 m valve station: 356mp
	Municipiul Lugoj	Pipeline route: 8981,5 m x 21 m; pipe storage: 1243 mp
	Coșteiu	Pipeline route: 7066,9 m x 21 m; valve station: 356mp
	Belinț	Pipeline route: 6300,1 m x 21 m
	Ghizela	Pipeline route: 4128,3 m x 21 m
	Topolovățul Mare	Pipeline route: 7936,7 m x 21 m; Site organization: 10050 mp
	Orașul Recaș	Pipeline route: 10120,5 m x 21 m + 2868 m x 14 m
	Pișchia	Pipeline route: 3022,8 m x 21 m + 132 m x 14 m
	Bogda	Pipeline route: 4220,4 m x 14 m
	Mașloc	Pipeline route: 7435,9 m x 21 m + 1836 m x 14 m; valve

County	Places	BRUA Objective
		station 356mp
	Fibiș	Pipeline route: 220,8 m x 21 m
Arad	Șagu	Pipeline route: 3348,9 m x 21 m
	Fântânele	Pipeline route: 11540 m x 21 m; pipe storage: 1267 mp
	Vladimirescu	Pipeline route: 11821x 21 m; valve station: 128mp; SCG Horia: 400 mp

Note: For the valve stations the areas taken into account were the areas that exceeded the working strip.

1.4.4. BRUA route

Pipeline route generally follows the direction SE Westward and crosses the counties Giurgiu, Teleorman, Dambovită, Argeș, Olt, Valcea, Gorj, Hunedoara, Caras-Severin, Timis and Arad.

On the there will be placed three gas compressor stations, as follows:

- Gas Compression Station (GCS) Podișor: in the area of the technological node (NT) Podișor (jud. Giurgiu);
- Gas Compression Station (GCS) Bibești: in the area of the technological node (NT) Hurezani (jud. Gorj);
- Gas Compression Station (GCS) Jupa: in the area of Zăgujeni village (jud. Caras-Severin).

There will be 43 line valves on the pipeline route and 20 cathodic protection stations.

BRUA will follow generally a parallel route to existing pipeline transportation systems 2 South-West Oltenia and three belonging to the National Gas Transmission System.

In choosing the route, in some sections, there has been some deviations from the route that would parallel the existing pipelines for safety reasons or to reduce environmental impact, etc.

The length of the route plan natural gas pipeline on the territory of 11 counties is about 528.7 km as follows:

- Giurgiu county	21.656 km
- Teleorman County	19.948 km;
- Dambovită County	3.087 kilometers;
- Argeș county	35.078 km;
- Olt county	49.399 km;
- Valcea County	56.523 km;
- Gorj County	98.609 km;
- Hunedoara County	78.810 km;
- Caras-Severin County	58.764 km;
- Timis County	80.105 km;
- Arad County	26.710 km;

TOTAL 528.689 km

The land categories for each administrative unit to be crossed by the pipeline will be determined at the elaboration of the Soil Survey and classification in quality classes, prepared by the Office of Soil Survey and Agrochemistry of each county.

A summary analysis on BRUA pipeline route BRUA (see fig.1.VI.) is summarized in type-sheets created for each sector of 5 km and attached to this document.

A synthetic territorial summary is presented in Table. 1.VII:

Table nr.1.VII. Situation of BRUA footprint

Objective	Occupied surface	
	Temporary (mp)	Permanent (mp)
SCG Podișor	-	35027

Objective	Occupied surface	
	Temporary (mp)	Permanent (mp)
SCG Bibești	-	37426
SCG Jupa	-	33883
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Pipe storage	1200	-
Site organization and pipe storage	10000	-
Site organization and pipe storage	10000	-
Site organization and pipe storage	10000	-
Site organization and pipe storage	10000	-
Site organization and pipe storage	10000	-
Site organization within SCG Podișor	5000	-
Site organization within SCG Bibești	5000	-
Site organization within SCG Jupa	5000	-
Valve stations	-	9.796
Technological roads to valve stations	-	7.181
BRUA pipeline route (working strip)	10.630.795	-
Total (mp)	10.707.795	123.313

Total (ha)	1.070,77	12,33
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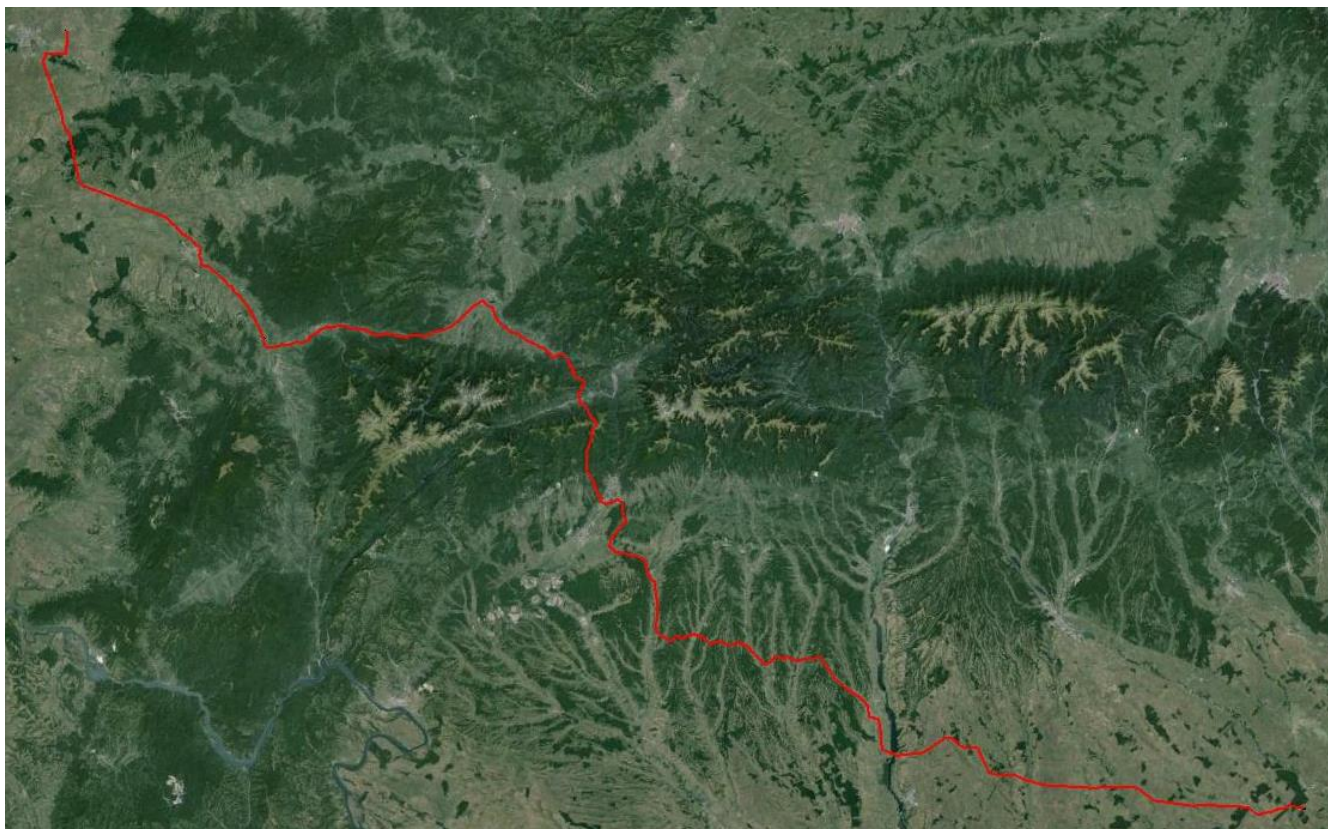


Fig.1.VI. BRUA route – based on GoogleEarth

1.4.5. BRUA components

The following components can be distinguished:

1.4.5.1. Transmission sections

a. *Podișor-Corbu Section*

- | | |
|---------------------|----------------|
| • Outline diameter: | 813 mm (Ø 32") |
| • Length: | 80,610 km; |
| • Design pressure: | 63 bar; |

BRUA will follow an approximate parallel path to Podișor-Corbu Pipeline 1 and Pipeline 2, both of Ø 20".

Podișor-Corbu section will cross the counties: Giurgiu, Dâmbovița, Teleorman, Argeș and Olt on the administrative territories of several communities (see Table no.1.VIII):

Table no.1.VIII. Podișor-Corbu section

County	Communities of
Giurgiu	Bucșani
	Crevedia Mare
	Mârșa
	Roata de Jos
Teleorman	Grația
	Poeni
	Tătăraștii de Jos

County	Communities of
	Tătăraștii de Sus
Dâmbovița	Șelaru
Argeș	Popești
	Râca
	Izvoru
	Căldăraru
	Bârla
Olt	Corbu

This section will cross over 104 obstacles, as follows (see Table no.1.IX):

Table no.1.IX. The 104 obstacles on Podișor-Corbu section

Obstacle	Quantity (pcs.)	Name
Main water crossings	13	Neajlov river, Dâmbovnic river, Glavacioc river, Valea Vii spring, Valea Viroși spring, Valea Clănița spring, Dobrei spring, Teleorman river, Bucovel spring, Căinelui spring, Burdea spring, Tecuci spring and Cotmeana river
Channel crossings	18	HC 1 – Valley, HC 2 – Valea de Margine, HC 3 – Valea Strâmbă, HC 4 – left confluent of Valea Pietrișului, HC 5 – left confluent of Teleorman river, HC 6 – left confluent of Teleorman river, HC 7 – Valley, HC 8 – Valley, HC 9 – Valea Strâmbeni, HC 10 – Valea Plescara, HC 11 – Valea Berzei, HC 12 – Valea lui Taras, HC 13 – Valea Cioroiului, HC 14 – Valea Bălăcelul, HC 15 – Valea Copacului, HC 16 – Valley, HC 17 – Valea Lerului, HC 18 – Valea Coada Alamu
National roads crossings	2	DN 61, DN 65 A
Conty roads crossings	6	DJ 412 D, DJ 601, DJ 701, DJ 503, DJ 504, DJ 679
Communal roads crossings	6	DC 82, DC 2, DC 131, DC, DC 137
Railroads crossings	1	CF 907
Other gas pipelines crossings	7	Dn 500 Podișor – Giurgiu, Podișor – Corbu, Line 1 Dn 500 and Line 2 piggable Dn 500
Other gas and Petron crossings	38	22 x Dn 80, 1 x Dn 100, 2 x Dn 125, 5 x Dn 150, 2 x Dn 200, 2 x Dn 250, 2 x Dn 300, 2 x Dn 90 water
Gasoline and crude oil crossings	5	1 x Dn 150 – gasoline, 3 x Dn 250 – crude oil, 1 x Dn 250 optic fibre
Optic fibre crossings	8	-
Forests	1.982 km	UAT Bucșani lenth 32 m, UAT Crevedia Mare lenth 1950 m

On this section there will be installed 5 line valves (R), one control valve (RR) and 3 cathodic protection stations (SPC) as follows:

- R 1 - km 0: inside the gas compressor Podișor;
- SPC R 2 + 1 - km 0 + 980: interconnection with existing pipelines and Technological Node Podișor, including cathodic protection station;
- R 3 + SPC 2 - km 29 + 789: Undercrossing upstream of county road DJ 659, the town Poieni, including cathodic protection station;
- R 4 - km 63 + 506: upstream of the railroad undercrossing CF 907, Căldăraru town;
- R 5 + SPC 3 - km 63 + 576: downstream of the railway CF 907 undercrossing, Căldăraru town, including cathodic protection station;
- RR 1 - km 80 + 600: Interconnection of Corbu Technological Node.

b. Corbu – Hurezani section

- | | |
|---------------------|----------------|
| • Outline diameter: | 813 mm (Ø 32") |
| • Length: | 115,898 km; |
| • Design pressure: | 63 bar; |

The pipeline will be built partly on the site of the existing pipeline Corbu - Hurezani, Pipeline 1 of Ø 20 " and partly parallel to existing pipelines Corbu - Hurezani Pipeline 1 , 2 and 3 all of Ø 20".

The pipeline will cross the counties of Olt, Valcea and Gorj on the administrative territories of the following communities listed in Table no.1.X:

Table no.1.X. Corbu-Hurezani section

County	Community of
Olt	Corbu
	Potcoava
	Scornicești
	Oporelu
	Priseaca
	Teslui
	Strejești
	Grădinari
Vâlcea	Voicești
	Drăgășani
	Ștefănești
	Sutești,
	Crețeni
	Gușoeni
	Măciuca
	Ghioroiu
	Fărtățești
	Tetoiu
	Zătrei
Gorj	Dănciulești
	Stejari

County	Community of
	Hurezani

This section will cross a number of 214 obstacles, as presented in Table no.1.XI:

Table nr.1.XI. The 214 obstacles crossed by the segment Corbu-Hurezani

Obstacles	No. of crossings	Name
Main water crossings	34	Vedea river, Osica spring, Negrișoara spring, Plapcea Mică spring, Plapcea spring, Pialița valley, Gota river, Stejarului valley, Teslului river, Olt river, Oporelu channel, Dâlga channel, Dâlga spring, Bazavanul spring, Dâlga spring, Putreda spring, Pesceana river – 3 times, Verdea spring, Pesceana river, Gușoianca spring – 5 times, Cerna river, Glămana spring, Omorocea spring, Sașa spring, Olteț river, Peșteana spring, Plosca spring, Amărăzuia spring
Channel crossings	43	HC 19 – Valley, HC 20 – Valea Șoimului, HC 21 – Valley, HC 22 – Valley, HC 23 – Valea Vișoara, HC 24 – Valea Vișoara, HC 25 – Channel 5, HC 26 – Valea Berbecului, HC 27 – Valea Gura Văii, HC 28 – Channel 6, HC 29 – Channel 7, HC 30 – Valea Adâncătura, HC 31 – Valea Graur, HC 32 – Valea Racovăț, HC 33 – Channel 8, HC 34 – Channel 9, HC 35 – Channel 10, HC 36 – Channel 11, HC 37 – confluent of Pesceana river, HC 38 – confluent of Pesceana river, HC 39 – confluent of Gușoianca spring, HC 40 – confluent of Gușoianca spring, HC 41 – Channel 12, HC 42 – Burdălești spring, HC 43 – confluent of Cerna river, HC 44 – Channel 13, HC 45 – confluent of Glămana spring, HC 46 – Channel 14, HC 47 – Channel 15, HC 48 – Channel 16, HC 49 – Channel 17, HC 50 – Channel 18, HC 51 – Channel 19, HC 52 – Channel 20, HC 53 – Channel 21, HC 54 – Channel 22, HC 55 – Channel 23, HC 56 – Channel 24, HC 57 – Channel 25, HC 58 – Valley, HC 59 – Valley, HC 60 – Valley, HC 61 – confluent of Plosca spring
National roads crossings	6	DN 65, DN 64, DN 67 B de 2 ori, DN 65 C, DN 67 B,
County roads crossings	14	DJ 703, DJ 657 D, DJ 657 C, DJ 657, DJ 546 E, DJ 546, DJ 648 B, DJ 677 D, DJ 643 B, DJ 676 A, DJ 676, DJ 676 G, DJ 605 A, DJ 605 B
Communal roads crossings	18	DC 21 A, DC 21 de 2 ori, DC 52, DC 89, DC 59, DC 58, DC 57 de 2 ori, DC de 3 ori, DC 86, DC, DC 72, DC, DC 74 – 2 times
Other public roads crossings	2	DUP - 2 times
Private roads crossings	4	DP 7 – 2 times, DP 5 – 2 times
Railroads crossings	2	CF 901, CF 203
Transgaz pipeline crossings	42	Line 1, Line 2 and Line 3 Dn 500 Corbu – Hurezani, Scornicești Connector, Dn 350, Dn 250 Alunu – Zătrești, Dn 300 Grădiștea – Văleni partially decommissioned

Obstacles	No. of crossings	Name
Petrom gas and water pipeline crossings	7	Dn 250 decommissioned, 3 x Dn 500, Dn 200, Dn 350, Dn 250
Crude oil and gasoline pipelines crossings	30	Dn 250 Line 2 crude oil Radinești – Ploiești – 17 times, Dn 150 Line 1 gasoline Țicleni – Ploiești – 10 times, crude oil - 3 times
Romgaz pipeline crossings	11	Dn 100
Petrotrans pipeline crossings	1	Dn350
Forests	8,9256 km	UAT Corbu lenght 161,5 m, UAT Potcoava lenght 877,5 m, UAT Scornicești lenght 603 m, UAT Teslui lenght 110 m, UAT Măciuca lenght 2201,1 m, UAT Fântărești lenght 1179,8 m, UAT Tetoiu lenght 1142,9 m, UAT Zătreni lenght 791 m, UAT Dănciulești 626,2 m, UAT Stejari lenght 954,8 m, UAT Hurezani lenght 274,8m.

Along the pipeline there will be installed a number of 8 line valves (R), one control valve (RR) and 5 cathodic protection stations (SPC) as follows:

- R 6 + SPC 4 - km 82 + 017: upstream of the railway CF 901 Undercrossing city Corbu, including cathodic protection station;
- R 7 - km 82 + 256: downstream of the tailboard railway CF 901, Corbu village;
- R 8 + SPC 5 - km 114 + 228: Undercrossing upstream of county road DJ 546 E, Corbu village, township Teslui including cathodic protection station;
- R 9 - km 131 + 884: upstream of the railroad undercrossing CF 201, Drăgășani town;
- R10 + SPC 6 - km 132 + 148: downstream of the railway CF 201 undercrossing, Drăgășani town, including cathodic protection station;
- R11 + SPC 7 - km 161 + 986: Undercrossing downstream of national road DN 67 B, city Oveselu, Măciuca including cathodic protection station;
- RR 2 - km 196 + 288: control valve Node Interconnection Technology Hurezani;
- R 12 - km 196 + 400: inlet of Bibești gas compressor station, Busuioci place, village Hurezani;
- R 13 + SPC 8 - km 196 + 465: outlet of Bibești gas compressor station, Busuioci place, village Hurezani including cathodic protection station.

c. Hurezani – Hațeg section

- | | |
|---------------------|----------------|
| • Outline diameter: | 813 mm (Ø 32") |
| • Length: | 146,263 km; |
| • Design pressure: | 63 bar; |

BRUA route will follow generally the existing pipeline Hurezani - Hațeg pipeline Ø 20 ". The pipeline will cross the counties of Gorj and Hunedoara on the administrative territories of the following communities presented in Table no.1.XII:

Table no.1.XII. Hurezani-Hățeg section

County	Community of
Gorj	Hurezani
	Vladimir
	Bărbătești
	Jupânești
	Târgu Cărbunești
	Scoarța
	Bălănești
	Bumbești Jiu
	Turcinești
	Schela
Hunedoara	Vulcan
	Banita
	Baru
	Pui
	Sălașul de Sus
	Sântămăria Orlea
	Totești
	Hățeg

On this route this section will cross 261 obstacles presented in Table no.1.XIII:

Table no.1.XIII. The 272 obstacles crossed by Hurezani-Hățeg section

Obstacle	No	Name
Main water courses crossings	37	Amaradia river, Totea river, Vladimir river, Gilort river, Zlast river, Budieni river, Amaradia river 3 times, v. Inoasa de 2 ori, Iazul Topilelor, r. Jiu, r. Cartiu, pr. Baleia, Jiul de Vest river, Crevedia spring 3 times, Răchita valley, Crivadia river 3 times, Muncel river, Bărușor river, Valea Verde spring, Bărbat river, Rușor river, Serel river, Râul Alb river, Păros river, Sălaș river, Sibișel river, Râul Mare, 3 gullies
Channels crossings	98	HC 62 – Channel 26, HC 63 – Channel 27, HC 64 - Channel 28, HC 65 – Channel 29, HC 66 – confluent of Vladimir river, HC 67- Channel 30, HC 68 – Channel 31, HC 69 – Channel 32, HC 70 – Channel 33, HC 71 – Channel 34, HC 72 – Channel 35, HC 73 – Channel 36, HC 74 – Channel 37, HC 75 – Channel 38, HC 76÷HC 83- confluent of Gilort river 8 times, HC 84 – Channel 39, HC 85 – Channel 40, HC 86 – Channel 41, HC 87 – confluent of Gilort river, HC 88 – valley, HC 89 – valley spring, HC 90 – Channel 42, HC 91 – Channel 43, HC 92 – Channel 44, HC 93 – Channel 45, HC 94 – Channel 46, HC 95 – Channel 47, HC 96 – Channel 48, HC 97 – Channel 49, HC 98 – Channel 50, HC 99 – Channel 51, HC 100 – Channel 52, HC 101 – Channel 53, HC 102 – Channel 54, HC 103 – Channel 55, HC 104÷HC 108 – valley

Obstacle	No	Name
		5 times , HC 109 – Channel 56, HC 110 – Channel 57, HC 111 – Channel 58, HC 112 – Channel 59, HC 113 – Channel 60, HC 114 – Channel 61, HC 115 – Channel 62, HC 116 – Channel 63, HC 117 – Channel 64, HC 118 – Channel 65, HC 119 – Channel 66, HC 120 – Channel 67, HC 121 – Channel 68, HC 122 – afl. r. Baleia, HC 123 – Channel 69, HC 124 – Channel 70, HC 125 – Channel 71, HC 126 – Channel 72, HC 127 –Matiești spring, HC 128 – Corbu spring, HC 129 – Channel 73, HC 130- Mielului valley, HC 131- confluent of Crivadia river, HC 132 – valley, HC 133 – Channel 74, HC 134÷HC 136 – valley 3 times, HC 137 – Channel 75, HC 138÷HC 140 – valley 3 times, HC 141- Channel 76, HC 142- Channel 77, HC 143-Channel 78, HC 144-valley, HC 145- Channel 79, HC 146-Channel 80, HC 147-Channel 81, HC 148-Channel 82, HC 149-Channel 83, HC 150-Channel 84, HC 151-Channel 85, HC 152-Channel 86, HC 153-Channel 87, HC 154-Channel 88, HC 155- Maleiei valley, HC 156- Channel 89, HC 157-Channel 90, HC 158 – Channel 91 Raul Mare, HC 159-Channel 92, HC 160-Channel 93.
National roads crossings	5	DN 6B, DN 67, DN 66, DN 66A, DN 68.
County roads crossings	44	DJ 662 de 2 ori, DJ 661 de 3 ori, DJ 675, DJ 663, DJ 665A, DJ 665, DJ 664 de 23 ori, DJ 666 de 8 ori, DJ 667, DJ 667, DJ 667 A, DJ 686.
Communal roads crossings	12	DC 38, DC 44, DC 43, DC de 5 ori, DC 72, DC 78, DC 63, DC 281/1
Public roads crossings	32	DUP de 32 ori.
Railroads crossings	7	CF 116, CF 116, CF 116, CF 117, CF 202, CF 202, industrial railroad
Transgaz pipeline crossings	18	Bibești-Sâmbotin-Hațeg pipeline 16 times, Vest 1 pipeline, Dn 600, gas distibution pipeline.
Romgaz pipeline crossings	1	Dn 100
Petrom pipeline crossings	15	Dn 500 (4 times)
Petrofac pipeline crossings	3	Dn 150, Dn 250, Dn 150
Forests	29,138 km	UAT Hurezani lenght 2423,7 m, UAT Vladimir lenght 1671,4 m, UAT Târgu Cărbunești lenght 4330 m, UAT Scoarța lenght 2349,3 m, UAT Bălănești 1780,3 m, UAT Bumbesti Jiu lenght 1465,3 m, UAT Schela lenght 5834,9 m, UAT Vulcan 4270 m, UAT Bănița lenght 3538,6 m, UAT Baru lenght 988,4 m, UAT Pui lenght 10 m, UAT Sălașu de Sus lenght 366,6 m, UAT Sântămărie Orlea 109,0 m.

On its route there is a total of 13 line valves and 5 cathodic protection stations as follows:

- R 14 - km 223 + 882: upstream of the railroad undercrossing CF 116, Târgu Cărbunești;

- R 15 + SPC 9 - km 224 + 087: downstream of the railway CF 116 undercrossing, Târgu Cărbunești, valve station equipped with flare gas, including cathodic protection station;
- R 16 - km 241 + 449: upstream of the railroad undercrossing CF 116, Scoarta place;
- A 17- km 241 + 562: downstream of the tailboard railway CF 116, Scoarta place, valve station equipped with flare gas;
- R 18 + PPS 10 - km 259 + 626: upstream of the railway CF 116 Undercrossing city Bumbesti Jiu, valve station equipped with flare gas, including cathodic protection station;
- R 19 - km 260 + 332: downstream of the railway CF 116 Undercrossing city Bumbesti Jiu;
- R20 + PPS 11 - km 292 + 949: upstream of the railway CF 117 Undercrossing Vulcan place, valve station equipped with flare gas, including cathodic protection station;
- R 21 - km 293 + 784: downstream of the railway CF 117 Undercrossing Vulcan place;
- R 22 - km 309 + 887: upstream of the railroad undercrossing CF 116, Bănița town;
- R 23 and km 310 + 065: upstream of the railroad undercrossing CF 116, Bănița town;
- R 24 + PPS 12 - km 313 + 780: upstream of the railroad undercrossing CF 116 Baru, valve station equipped with flare gas, including cathodic protection station;
- R 25 - km 313 + 912: downstream of the railway CF 116 undercrssing, Baru;
- R26 + PPS 13 - km 342 + 771: 68 DN downstream of the tailboard in the village Totesti, valve station equipped with flare gas, including cathodic protection station;

d. Hațeg – Recaș section

- | | |
|---------------------|----------------|
| • Outline diameter: | 813 mm (Ø 32") |
| • Length: | 136,037 km; |
| • Design pressure: | 63 bar; |

The route of this section will generally follow a paralell route to the existing pipeline Vest I and Vest II. This section will cross over the counties Hunedoara, Caraș-Severin and Timiș on the administrative territory of the places in Table no.1.XIV:

Table no.1.XIV. Hurezani-Hațeg section

County	Community of
Hunedoara	Totești
	Densuș
	Sarmisegetusa
Caraș-Severin	Băuțar
	Marga
	Zăvoi
	Municipiul Oțelu Roșu
	Glimboca
	Obreja
	Municipiul Caransebeș
	Constantin Daicoviciu
	Sacu
	Găvojdia
Timiș	Municipiul Lugoj
	Coșteiu
	Belint

County	Community of
	Ghizela
	Topolovățul Mare
	Orașul Recaș

This segment will cross over 244 obstacles as presented in Table no.1.XV:

Table no.1.XV. The 244 obstacles crossed by Hurezani-Hătege section

Obstacle	Quantity	Name
Main water courses crossings	35	Rausor river, Breazova river, Breazova river, Zlotina river, Breazova river, Valea Zeicani spring, Talher spring, Talher spring, Vana Mare spring, Macicas spring, Timis river, Satului spring, Eruga spring, Eruga spring, Iaz 3, Iaz 2, valea Muntean spring, Bistra Marului spring, Valea Mare spring, Niermesu spring, Valea Bucova spring, Bistra spring, Spaia river, Stiuca river, Timis river, Binis river, Glavita river, Bega river, Minisul Batran spring, channel Chizdia, Glogovatu spring – Iosifalau area, Mociur river, DB17 outlet, Isvatita valley, DD16 cutting, Lipari river.
Channels crossings	86	Channels, valley, bodies of water not registered in the Land Book
Highway crossings	2	A 1 Lugoj – Arad highway, A6 Lugoj-Orșova highway
National roads crossings	7	DN68, DN68, DN6 (E70), DN6 (E70), DN6 (E70), DN6 (E70), DN 68A,
County roads crossings	9	DJ 687 L,DJ 687 G,DJ 608 B, DJ 683, DJ 680, DJ 609, DJ 609 B, DJ 609 A, DJ572
Communal roads crossings	15	DC90, DC Odovasnita, DC 90A, DC92, DC 87, DC 88, DC 16A, DC, DC, DC Ciuta village, DC, DC Obreja – Glimboca, communal road, DC Vama Marga – Marga, DC 2, DC92, DC91, DC83, DC75.
Other public roads crossings	2	str. Traian Vuia Lugoj.
Railroad crossings	4	CF 215, CF 100, CF 100, CF 216.
Transgaz pipeline crossings	74	Dn 500 Vest 2 pipeline, Vest 1 pipeline
Other pipeline crossings	10	To be received from owners
Forest	18,281 km	UAT Sarmizegetusa length 2646 m, UAT Băuțar length 13506,6 m, UAT Marga length 2129 m.

There will be 12 line valves on this section and 5 cathodic protection stations installed as follows:

- R27 + PPS 14 - km 377 + 612: SRM near Marga Marga village, valve station equipped with flare gas, including cathodic protection station;
- R 28 - km 401 + 487: upstream of the railroad undercrossing CF 215, Iaz town, village Obreja;
- R 29 + PPS 15 - km 402 + 000: downstream of the railway CF 215 undercrossing, Iaz pond, village Obreja valve station equipped with flare gas, including cathodic protection station;
- R 30 - km 409 + 200: inlet of Jupa Gas Compression Station, Zăgujeni town, village Constantin Daicoviciu;
- A 31- km 409 + 280: outlet of Jupa Gas Compression Station, Zăgujeni town, village Constantin Daicoviciu;
- R 32 - km 412 + 545: upstream of the railroad undercrossing CF 100, Prisaca town, village Constantin Daicoviciu;
- R 33 - km 413 + 050: downstream of railway CF 100 undercrossing, Prisaca town, village Constantin Daicoviciu valve station equipped with flare gas;
- R 34 - km 424 + 618: upstream of the railroad undercrossing CF 100, Jena town, village Gavojdia;
- R35 + PPS 16 - km 424 + 949: downstream of the railway CF 100 undercrossing, Jena town, village Gavojdia, valve station equipped with flare gas, including cathodic protection station;
- R 36 - km 449 + 425: upstream of the railroad undercrossing CF 216, Coastal Towns;
- R37 + PPS 17 - km 450 + 368: downstream of the railway CF 216 undercrossing, Coastal Towns, valve station equipped with flare gas, including cathodic protection station;
- R38 + PPS 18 - km 478 + 798: Node Interconnection Technology Receaș, including cathodic protection station;
- RR 3 - km 478 + 79: Receaș Interconnection Node.

e. Receaș – Horia section

• Outline diameter:	813 mm (Ø 32")
• Length:	49,881 km;
• Design pressure:	63 bar;

The route of this section will generally follow in a route parallel to the existing pipeline Vest I and Vest II. The pipeline will cross the counties Timiș and Arad on the administrative territory of the communities presented in Table no.1.XVI:

Table no.1.XVI. Receaș-Horia section

County	Community of
Timiș	Orașul Receaș
	Pișchia
	Bogda
	Mașloc
Arad	Fibiș
	Șagu
	Fântânele
	Vladimirescu
	Horia

This segment will cross over 54 obstacles as presented in Table no.1.XVII:

Table no.1.XVII. The 54 obstacles from Recaş-Horia section

Obstacle	No.	name
Main river crossings	5	Mures river, Fibis spring, Berecsăul Mic spring, Bacinul spring, Gherteamoș spring,
Channel crossings	20	Channels
National roads crossings	3	DN7, Arad Sud-Est beltway, 2 crossings
County roads crossings	5	DJ 709 , DJ 682 , DJ 682 A , DJ 691 , DJ 609.
Other public road crossings	2	Dc ,Dc.
Railroad crossings	2	CF 207, CF 300.
Transgaz pipeline crossings	10	Dn 500 Vest 2 pipeline, Dn 400 Mașloc-Arad pipeline, Dn 600 Arad-Recaș pipeline
Other pipeline crossings	6	irrigation
Forest	9,056 km	UAT Recaș lenght 2868 m, UAT Pișchia lenght 132 m, UAT Bogda lenght 4220,3 m, UAT Mașloc lenght 1836 m.

On this section a number of 5 line valves and two cathodic protection stations will be placed:

- R 39 - km 495 + 181: upstream of the railway CF 207 Undercrossing city Remetea Mica commune of Masloc;
- R40 + PPS 19 - km 495 + 470: downstream of the railway CF 207 Undercrossing city Remetea Mica common Masloc, valve station equipped with flare gas, including cathodic protection station;
- R 41 - km 525 + 213: downstream of the railway CF 100 undercrossing, Tudor Vladimirescu locality;
- R 42 - km 525 + 313: upstream of the railroad undercrossing CF 100, Tudor Vladimirescu locality;
- R43 + PPS 20 - km 528 + 680: SMG Horia interconnection, including cathodic protection station;

Technical data

1.4.5.2. Interconnection points

- NT Podișor: by Podișor – Giurgiu pipeline and a control valve;
- NT Corbu: by Line III Corbu-Hurezani pipeline and a control valve;
- NT Recaș: by control valve;

1.4.5.3. Upgrading of Horia Gas Metering Station

The upgrading of Horia gas metering station will consist in the addition of a supplementary metering line. This upgrade leads to a metering capacity of the station of 500,000 Smc/h.

1.4.5.4. Compressor stations

GCS Podișor will be located in Giurgiu, near Podișor Technological Node. Connection of the station to the transmission pipelines will provide bidirectional flow as follows:

a. Flow direction from Hungary to Bulgaria

- Suction from Dn 800 Horia - Podișor pipeline (Corbu – Podișor section) designed and / or from Podișor Technological Node through a valve station;
- Discharge to Dn 500 Podișor - Giurgiu pipeline;

b. Flow direction from Bulgaria to Hungary:

- Suction from Dn 500 Giurgiu - Podișor pipeline;

- Discharge to Dn 800 Podișor - Horia designed pipeline (Podișor - Corbu section) and, optional, to in Podișor Technological Node through a valve station.

Technical specifications (preliminary):

- Suction Pressure: 20 ÷ 40 bar bar
- Discharge pressure: 30 bar ÷ 63 bar
- Maximum compressed flow rate: 508,000 Nmc / h
- Number of units: 3 (2 active + 1 backup);
- Maximum Ratio: 1.8

SC Bibești will be placed in Gorj County, in Busuioci place, belonging to the village Hurezani. Connection of the station to the transmission pipelines will provide a bidirectional flow as follows:

- Flow direction from Hungary to Bulgaria:
 - Suction from Dn 500 Horia - Podișor pipeline (Hațeg – Hurezani section) and / or from designed Dn 500 pipeline connected to Hurezani Technological Node through a valve station;
 - Discharge to Dn 800 Horia - Podișor designed pipeline (Hurezani - Corbu section).
- Flow direction from Bulgaria to Hungary:
 - Suction from Dn 800 Podișor – Horia designed pipeline (Corbu – Hurezani section) and / or from designed Dn 500 pipeline connected to Hurezani Technological Node through a valve station;
 - Discharge to Dn 800 Podișor - Horia designed pipeline (Hurezani – Horia section).

Technical specifications (preliminary):

- Suction Pressure: 20 bar ÷ 40 bar
- Discharge pressure: 30 bar ÷ 63 bar
- Maximum compressed flow rate: 565,000 Nmc / h
- Number of units: 3 (2 active + 1 backup);
- Maximum Ratio: 1.8

Jupa GCS will be located on the territory of the commune Constantin Daicoviciu, place of Zăgujeni, Caras-Severin county. Connection of the station to gas transmission pipelines will provide bidirectional flow as follows:

- Flow direction from Hungary to Bulgaria:
 - Suction from Dn 800 Horia - Podișor designed pipeline (Horia Recaş section);
 - Discharge to Dn 800 Horia - Podișor designed pipeline (Hațeg-Jupa section).
- Flow direction from Bulgaria to Hungary:
 - Suction from Dn 800 Horia - Podișor designed pipeline (Hațeg-Jupa section);
 - Discharge to Dn 800 Horia - Podișor designed pipeline (Horia Recaş section).

Technical specifications (preliminary):

- Suction Pressure: 20 ÷ 40 bar bar
- Discharge pressure: 30 bar ÷ 63 bar
- Maximum compressed flow rate: 565,000 Nmc / h
- Number of units: 3 (2 active + 1 backup);
- Maximum Ratio: 1.8

You can find below a synthetic summary of the compressor stations in Table no.1.XVIII:

Table no.1.XVIII. Synthetic summary of compressor stations

No. crt	Compressor station	name	Square meters
---------	--------------------	------	---------------

			surfaces
1.	Podișor	Giurgiu county	35027
2.	Bibești	Gorj county	37426
3.	Jupa	Caraș-Severin county	33883

1.4.5.5. Logistic warehouses (for temporary storage of the pipe segments)

Distinct pipe storages will be placed strategically on BRUA route so as to ensure a continuous flow of materials required for site organization. Typically, pipe storages are located between two such work sites so there is the possibility of alternative supply, depending on the workflow.

Each logistic warehouse will occupy an area of approx 1200sqm, to be fenced by wire fence; on the site there will be installed modular containers to serve the personnel involved in operational activities.

The locations identified for temporary storage of the pipe segments for BRUA are summarized in Table no.1.XIX:

Table no.1.XIX. Pipe segments for BRUA

No. crt	Type of organization	name	Access road surfaces sq.m.	Square meters surfaces	Km pipeline
1.	Pipe storage	Poeni, Teleorman county	250	1200	28+380
2.	Pipe storage	Corbu, Olt county	1151	1200	80+460
3.	Pipe storage	Cherlești, Olt county	528	1200	118+160
4.	Pipe storage	Zătreni, Vâlcea county	724	1200	176+400
5.	Pipe storage	Frasin, Gorj county	238	1200	211+875
6.	Pipe storage	Jiu Paroșeni (Vulcan), Hunedoara county	372	1200	292+800
7.	Pipe storage	Pui, Hunedoara county	187	1200	329+120
8.	Pipe storage	Iaz, Caraș-Severin county	0	1200	404+406
9.	Pipe storage	Lugoj, Timiș county	43	1200	438+950
10.	Pipe storage	Fântânele, Arad county	67	1200	512+600

There will also be pipe storages at the site organization (see below) to assure direct supply of work fronts.

1.4.5.6. Work sites

Five distinct site organizations will be located on BRUA route. Each site organizations will facilitate the operation of up to 4 (simultaneous) work fronts.

The situation of these work sites is summarized in Table no. 1.XX:

Table no.1.XX. Site organizations

No. crt	Type of organization	name	Suprafete drumuri acces mp	Square meters surfaces	Km pipeline
1.	Site organization and pipe storage	Căldăraru, Argeș county	1922	10000	61+255
2.	Site organization and pipe storage	Gușoeni, Vâlcea county	1000	10000	150+140
3.	Site organization and pipe storage	Turcinești, Gorj county	1284	10000	261+825
4.	Site organization and pipe storage	Bucova, Caraș Severin county	136	10000	368+413
5.	Site organization and pipe storage	Petrovaselo, Timiș	50	10000	470 + 000

No. crt	Type of organization	name	Suprafete drumuri acces mp	Square meters surfaces	Km pipeline
		county			

There will also be additional site organizations and pipe storages in each gas compressor station to serve both the work fronts in the future technological platforms of the gas compressor stations, as well as nearby sections of the gas transmission pipeline in table 1.XXI.

Table nr.1.XXI. Nearby pipeline sections

No. crt	Type of organization	name	Square meters surfaces	Km pipeline
1.	Site organization inside Podișor GCS	Podișor, Giurgiu county	5000	0
2.	Site organization inside Bibești GCS	Hurezani, Gorj county	5000	196+340
3.	Site organization inside Jupa GCS	Zăgujeni, Caraș Severin county	5000	409+186

1.4.5.7. Other structures

Pipeline will also be served by the following systems:

- Sensitive fiber optic;
- Monitoring System in order to detect unauthorized excavations near the pipeline route;
- Intrusion Monitoring System for valve stations
- Fire Monitoring System for valve stations;
- Data acquisition and control systems
- Pipeline corrosion protection system

1.4.6. Description of the construction phase

1.4.6.1. General construction works

Works execution will take place in the succession of the technological process of pipeline laying in accordance with the "Technical rules for design and execution of gas pipelines", as approved by A.N.R.E. Order no. 118/2013. The Beneficiary shall ensure the necessary permitting for the contractor to facilitate the works on the working strip, including for natural and public obstacles crossings. Working strip width is 21 m; in forests, orchards and difficult areas working strip will be narrowed to 14.0 m. Figure no.1.VII. and 1.VIII. schematically shows the arrangement of the working lane width of 21 m, and in Fig. 1.IX. you can find the image of such a working strip.

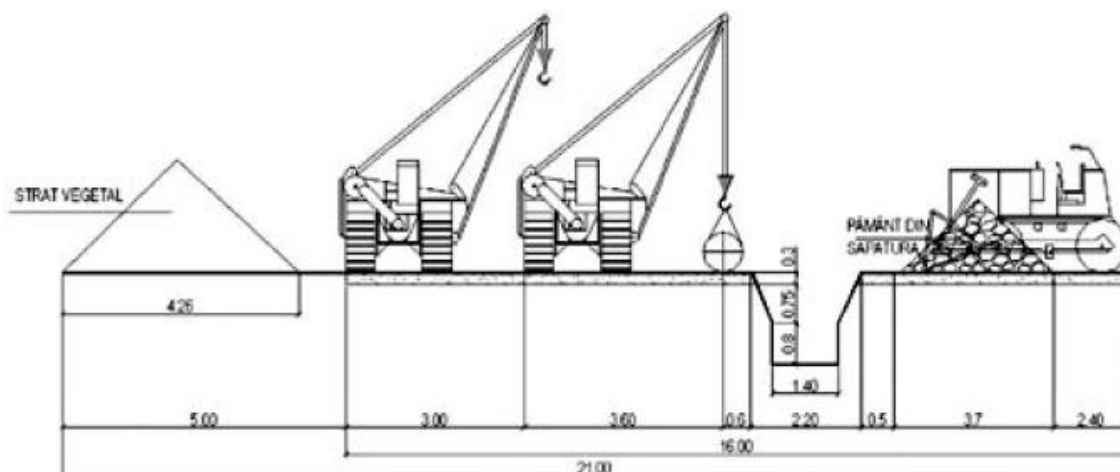


Fig. 1.VII. arrangement of working strip, 21m width

The pipeline will be installed underground to 1.00 m between the soil surface and upper pipe generatrix, except for areas of intersection with communication channels, where the depth of installation will meet the requirements of STAS 9312/88, while at undercrossings of waters registered in the Land Register depth of laying will be below the quotas set in the hydrological study and that will be presented in alignment sheets.

According to GD 766/1997 and to the Regulation concerning the importance categories in constructions, pipeline falls within the "normal C importance construction".

Exterior corrosion protection will be made by isolating corrosive polyethylene HDPE grade B2 and B3 according to EN ISO 21809-1 for the entire route.

Also, all full line butt welds and curves will be insulated with heat-shrinking sleeves or cold applied tapes (reinforced insulation). Above-ground parts of plants along the pipeline will be protected by applying a layer of anti-corrosive primer and two coats of paint.

The route by-passes construction areas, except in areas where for technical and economic reasons by-pass is not possible, where the pipe will be placed along the existing pipelines route, in the built-up area of the places.

Workmanship of the trench (manual or mechanical) for pipeline mounting was set according to the characteristics of the terrain, to excavation volumes, to facilities and constructor equipment, as follows:

- manually in areas where pipeline is laid at small distances from other gas pipelines, sewage or underground facilities, telecommunications and electricity networks, in nearby and interception areas to communication routes and in places where there's no access for digging equipment.
- mechanical, by rotary excavators and Castor type excavator, in areas where access is possible, as well as works that require movement of large volumes of ground.

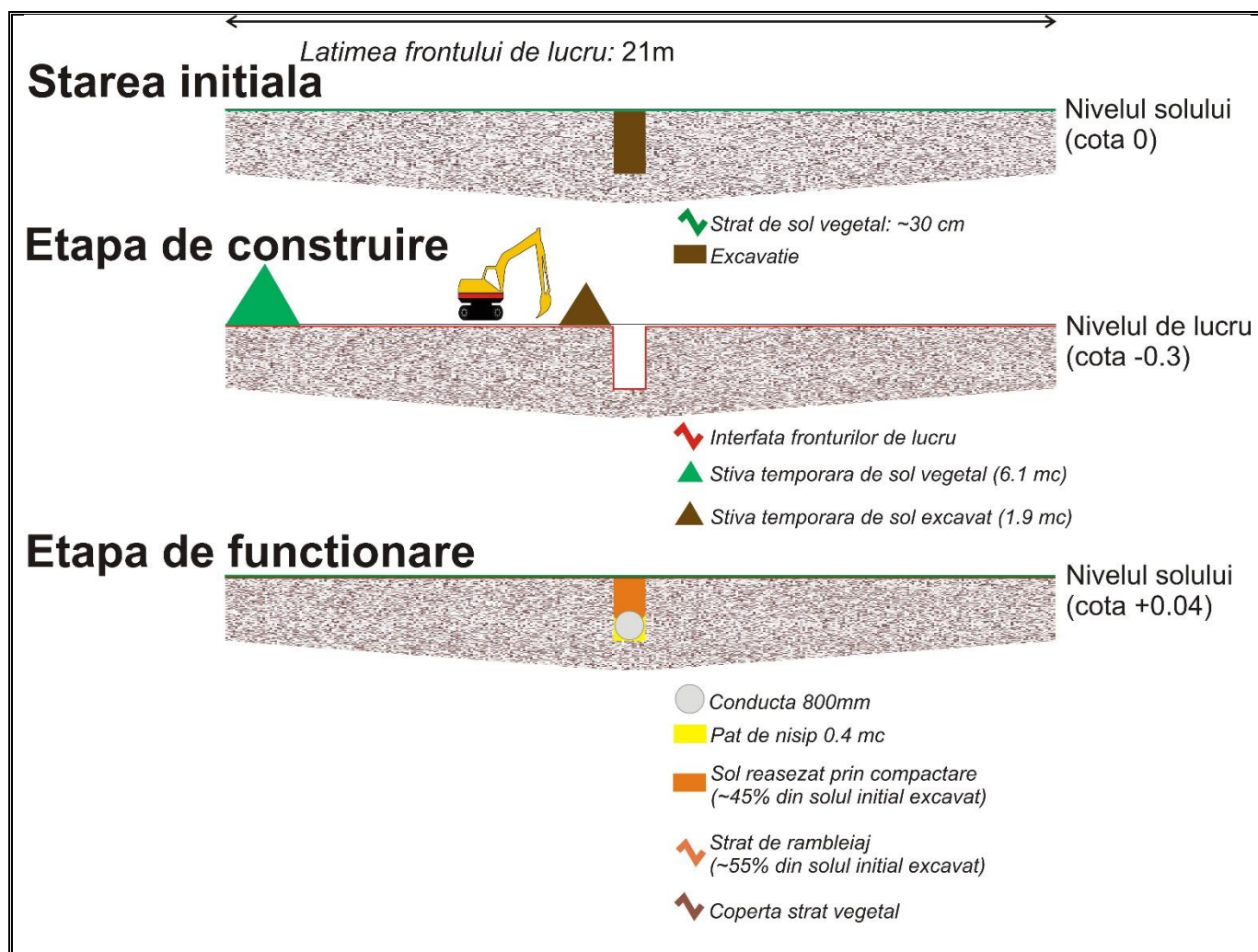


Fig.1.VIII. Functional scheme of the technological process for pipeline laying

When determining the depth of the trench consideration will be paid to the fact that pipeline will be permanently laid below frost depth, ie at a depth of 1.00 m measured from the ground surface to the upper generatrix of the pipeline, except for crossings of communication channels, where pipeline will be laid at a depth of at least 1.50 m. Also, the depth of pipeline laying will vary from one case to another, but not less than 1.00 m up to pipeline upper generatrix, in cases where it intersects other underground pipelines and equipment (water pipelines, sewers, etc.). Pipes will be connected by electric butt welding by rotation, to create the sections, and on site (in the ditch) to create the line of the pipeline, with observance of the quality factor for weld joint of 1 ($\varphi = 1$).



Fig.1.IX. Image of a working strip for gas pipeline laying

Assembly and laying of the pipeline in the trench in final position will be made depending on field conditions, on constructions and installation along the pipeline, as follows:

- the sections (maximum two doublets) joined by electric welding in full line on the side of the trench and definitive laying in the trench;
- pipe by pipe (for concrete cast pipeline) and definitive laying in the ditch;
- pipeline assembly in the trench, in final position, will be made by on site welding achieved by welding performed "in place" in the pits position;

When assembling welded pipes consideration will be paid to EN ISO 9692-1: 2004 and EN ISO 9692-2: 2000.

Pipe welding assembly will be made in accordance with API Std. 1104-1105.

In order to eliminate surface defects and areas of geometric errors in all phases of execution of welded joints, checking will be performed by:

- welder;
- foreman;
- QC authorized personnel;
- welding responsible.

All welds will be checked visually and by non-destructive methods (at 100% rate).

Weld control will be performed by use of gammagraphy or ultrasound method).

Pre-installation operations for the pipeline are:

- Checking and correction of the trench bottom: to be formed only by straight sections between two adjacent pits positions and to contain no hard objects that could damage the cable insulation;
- Checking of insulation;
- Arrangement of profiling between pipeline and trench;
- Checking of launching devices.

Pipeline laying will be made in previously dug trench, using launcher type TL.4 mobile cranes (Fig. 1.X). Changes in direction, both horizontally and vertically, will be made through CMF curves (minimum 5 x DN).

To avoid exceeding of material elasticity limit during pipeline laying, pipeline will be laid with observance of the following conditions:

- Distance between launchers: max. 15m;
- Maximum lifting height for pipeline during the laying process: 1.5 m;

To further reduce tensions and thermal expansion and to avoid damage to the insulation, pipe fitting final position is recommended to be made at an ambient temperature of approximately 10-15°C (in the morning during the summer or midday during winter).

Cold weather at temperatures below + 5 ° C, pipeline laying in definitive position will be made by observance of the technology elaborated and qualified to this end by the contractor and referring to pipeline connection by welding in the insulation chamber, on site and in joining pipes by welding station insulation, on site and in ironworks workshops.

Post pipeline laying operations are the following:

- Checking and insulation of all welds performed in pit position;
- Execution of pressure tests after filling of pipeline trench;



Fig. 1.X. Schematic view of gas transmission pipeline laying (left) and view from the construction site (right)

Filling of pipeline trench with soil after laying will be performed manually and mechanically, according to the "Technical regulations for the design and execution of gas transmission pipelines", approved by Order A.N.R.E. no. 118/2013.

Filling of pipeline trench will only be performed after:

- Checking and insulation of all welds performed in pits position;
- Installation of potential outlets (where applicable);
- Carrying out of strained soil layer;
- Carrying out of drainage vents (where applicable).

Filling the trench will be performed with soil from excavations that is stored on the side of the trench, and then finally the topsoil, that was stored separately, will be added.

In farmland areas after trench filling the topsoil will be reinstated so that after compacting the land is reinstated to its initial state.

Where there are undercrossings of drainage channels, pipeline will be casted in concrete in order to compensate hydrostatic force.

The depth of pipeline laying ranges from 1.50 m to 2.0 m from valley floor to the upper limit of the concrete casted pipeline.

Where depths are considerable, the pipeline will connect to the crossing section through curves ranging between 5° ÷ 45°.

1.4.6.2. Special construction activities

UNDERCROSSINGS

a. Undercrossing of waters

Watercourse crossing is performed in open trench or by horizontal drilling.

In order to establish and verify the impact of the pipeline crossing the riverbeds the water level corresponding to the calculus flow rate needs to be determined by hydraulic. At undercrossings of waters that are not registered in the Land Register pipeline laying depth will be below the scouring quotas established by the Hydrological Study to be presented in alignment sheets.

Most rivers will be undercrossed by concrete casted pipeline in open trench with the exception of the rivers Mures, Jiu, Olt, Timis (2x), Bega, Chizdia, Râul Mare, Cotmeana and a torrent located downstream from the town of Targu Cărbunești, which will be crossed by horizontal drilling.

After crossing works are executed, affected riversides will be restored to their initial state.

b. Undercrossing of communication channels

Design of crossings of communication lines shall be in accordance with STAS 9312-87 "pipelines under-crossings of railways and roads outside town limits", which provides that pipeline will be mounted in metallic protection tubes.

Motorways, national roads, county roads, communal roads, public utility roads and private asphalted roads and railways are undercrossed by horizontal drilling, and pipeline is installed in protection tube.

MOUNTING - CONSTRUCTION WORKS

For some of the Project's objectives, such as gas compression stations, the general mounting-construction works are taken into account, meaning:

- Excavation for foundations;
- Foundation works (monolith) with reinforced concrete;
- Bricklaying, belts and floors;
- Thermal insulation, plastering, painting;
- Mounting of double glazed windows and doors made of wood or aluminum structure;
- Covers (Gamble roof or Hip roof made of tiles or blue with a minimum 30° slope).
- Plumbing to ensure drinking water supply depending on local solutions (wells drilled / spring intake or assurance of connections to local networks);
- Finishing works;
- Commissioning of technological monitoring, control and command equipment;
- Works for technical and urban connections;
- Installing of wastewater treatment plant;
- Usage: work housing and technical and administrative areas;
- The architectural solution is proposed to resort to plywood wood / natural stone as area specific elements, suitable to fit into the landscape.

WORKS FOR PIPELINE ARRANGEMENT ON SLOPES, ON CONTOURS

In areas with cross-cut slopes along pipeline mounting direction higher than 23° horizontal terraces will be built to allow access to the execution equipment. Works will be similar to the opening of a quarry level, assuming achievement of horizontal surfaces to allow excavation for pipeline laying.

1.4.7. The main stages of investment are:

Duration of Project construction is estimated at 31 months.

- Feasibility studies and FEED September. 2013 - November 2016 (pipeline and GCS)

- Permitting – construction permits July 2016 - November 2016
- Procurement for works execution September 2016 - March 2017
- Execution phase March 2017 - December 2019

The term for commissioning is expected in December 2019.

Lifecycle service for gas transmission pipelines is 40 years.

1.4.8. Description of the operational phase

The duration of safe and technologically efficient operation with no overhauling and major maintenance works for BRUA was estimated at 40 years.

In the operational phase gas taken over through Podișor GCS from the pipeline systems that will make the connection with the Romania-Bulgaria Interconnector, will be transported through the pipeline system to SC Bibești where transportation will continue to SC Jupa, that in turn will manage the volumes to the pipeline systems that will assure the connection with the Romania-Hungary Interconnector. Please note that the entire system will be bidirectional.

BRUA will assure bi-directional gas flow helping thus balance the regional gas consumption.

1.4.9. Description of dismantling / decommissioning / closure / post closure stage

For BRUA there is no provision of a time limit for operation, but pipeline will be subject to intervention measures for re-technologisation of some system components, maintenance works, etc., so that no decommissioning was set for it.

The assumptions considered, concerning the dismantling / decommissioning / closure / post-closure, remain thus just as a theoretical approach, and will require a concatenation of the following steps:

- Demolition / dismantling of built in structures (buildings, platforms, technological enclosures, etc.) and reinstatement of occupied land to its original state (return to agricultural /natural use) - if there are no alternative solutions found for usage / functioning;
- Earthworks in order to recover the pipelines; pipeline cutting and exploitation; reinstatement of the land to its original state by backfilling; reinstatement of the land to its original state (return to agricultural /natural use); The works will be executed with observance of the steps taken during construction, namely there will be an initial stripping of topsoil and temporarily storing of soil in piles to prevent its damage.

If there will be dismantling/decommissioning/closure/post-closure of BRUA, the adequate steps will be taken according to the legislation in force, namely the steps required for the issuing of an Environmental Audit.

1.5. Duration of operation phase

No operation term has been set for this gas transmission pipeline. It is designed to be used for an unlimited period of time, operation is expected to run for at least 40 years.

There are provided some maintenance and upgrading works for ancillary components (valves, compressor stations, etc.) according to the technical prescriptions, aimed to extend the safe operation of BRUA.

1.6. Information on production to be achieved and resources used for energy production necessary to assure production

In order to implement the BRUA project, during the construction phase the following will be used:

- Pipelines (pipe), custom manufactured, exclusive, dedicated to gas and oil products transmission; the beneficiary will select the supplier based on a selection process that will include a series of requirements and criteria, including those related to the application of environmental standards in production processes;
- Aggregates for concrete production and pipeline concrete casting, by use of existing third party concrete plants, the provision of the necessary material (including crushed stone) by contracting;

- Energy resources (electricity, fuel) for operation of objectives during mounting-construction stage (site organizations, pipe storages, work fronts);
- Water to spray the access routes, for the work fronts and for technological pressure tests;
- Organic matter (vegetal debris, organic fertilizer and chemical amendments) and biological material (seeds, seedlings, etc.) necessary during ecological reconstruction of affected areas.

During the construction process excavations with appropriate equipment (bulldozers, earthmoving, excavators, backhoe loaders, etc.) will be performed. An evaluation of the excavated volume is summarized in Table nr.1.XXII.

Table no.1.XXII. Assessment of excavated volumes for BRUA execution

Technological milestone	Estimate volume (mc)	Mass calculation (t)
Working strip - Topsoil stripping	4,415,607.28	7,064,971.65
Pipe trench - digging	1,872,617.5	2,996,188
Additional excavation works (8%)	149,809.4	239,695.04
Backfilling	6,438,034.2	10,300,854.69
Earthworks	242,788	388,460.8

For excavation a stirring coefficient of 1.3 was applied;

For topsoil a mass coefficient of 1.6mc / ml was applied, and a 1.8mc / ml mass coefficient for the deeper soil.

The restoration works will comprise agricultural (plowing, raking, etc.) techniques as environment reinstatement works for a surface of about 1083 ha.

Deforestation will take place on about 94.33 ha.

The total amount of fuel to be used during construction phase will be of about 512t diesel.

The final output achieved in this phase will consist in the section of gas transmission pipeline, length 528.689 km, and the elements assuring the functioning and operation, consisting of three gas compressor stations (Podișor, Bibești and Jupa) 43 valve stations and 20 cathodic protection stations.

During the operation stage BRUA is expected to provide a maximum annual transport 4.4 billion cubic meters gas.

1.7. Information on raw materials

The following are expected to be used during the construction of the gas transmission pipeline:

- Steel pipe: approx. 530 km;
- Sand: approx. 530t;
- Water (for technological tests): approx. 111,500 cubic meters.
- Concrete: to achieve concrete cast structures, anchoring, reinforcement and other related structures: an estimate of 50,000 cubic meters;
- Building materials and finishes for natural gas compression stations;
- Modular technological sub-assemblies (valves, fittings, etc.) for valve stations and technological nodes;
- Fuel - to supply devices to be used for project implementation;

The project structure includes:

- Gas transmission pipeline, Ø 32 "(813 mm), buried at a depth of 1.00 m from the upper generatrix;
- 3 gas compression stations located in the places Podișor, Bibești, Jupa, and annexes;
- 43 valve stations placed along the pipeline route;
- 20 cathodic protection station located along the pipeline route;
- Main dispatching center for data acquisition, control and intrusion monitoring;

Following the calculations, classification of pipeline route in location classes according to the "Technical Norms for Design and Execution of Gas Transmission Pipelines", following the analysis on the selection of piping material

and on the procurement costs, for project construction Ø 32 " pipe will be used, L415NE material, according to SR EN ISO 3183-2013.

Piping material used for construction of the gas transmission pipeline on Bulgaria - Romania - Hungary - Austria route has been sized according to the "Technical Norms for Design and Execution of Gas Transmission Pipelines " approved by ANRE Order no. 118/2013. The results of sizing calculation depending on location classes are given in Table no.1.XXIII:

Table no.1.XXIII. Results of sizing calculations depending on location classes

Piping material	Location class	Characteristics of piping material	Curves
Pipeline	1a	welded pipe Ø 813 x 8,8 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 10,0 mm steel L415NE SREN ISO 3183/2013
	1b	welded pipe Ø 813 x 10,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 11,0 mm steel L415NE SREN ISO 3183/2013
	2	welded pipe Ø 813 x 11,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 12,5 mm steel L415NE SREN ISO 3183/2013
	3	welded pipe Ø 813 x 14,2 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 16,0 mm steel L415NE SREN ISO 3183/2013
	4	welded pipe Ø 813 x 16,0 mm steel L415NE SREN ISO 3183/2013	welded pipe Ø 813 x 17,5 mm steel L415NE SREN ISO 3183/2013

Length pipe classes location:

- Class location 1a = 124.860 km,
- Class location 1b = 267.304 km,
- Class location 2 = 26.960 km,
- Class location 3 = 109.565 km,
- Class location 4 = 0.00 km location,

TOTAL = 528.689 km.

Changes in pipeline direction (both horizontally and vertically) will use long-range curves, with $R_{min} = 5 \times DN$.

Protection tubes will be used for Undercrossings of national, county and municipal roads and railways; protection tubes will be made of steel pipe, according to SR 6898 / 1-95, and seals between the tube and pipeline will be made by spacers and sealing bellows seal that are technically certified.

All materials, fixtures, garments and accessories used for the execution of the gas pipeline will meet the standards and manufacturing norms and will be accompanied by quality certificates that will be kept (archived) to be included in the CONSTRUCTION LOG BOOK.

At reception materials will be checked to comply with the accompanying quality certificates.

Any replacement or change of material can be made only with the written consent of the owner's engineer and the beneficiary.

Entrepreneurs will use fillers that have qualified for proper welding procedures for L415NE steel pipe designed for welded joints for pipes in the insulation station, on site and in ironworks workshops.

All fittings be executed in the workshop will be accompanied by certificates of quality to comprise all relevant information on the quality of basic materials and fillers from their machining (pipe, flanges, fittings, bolts, gaskets, electrodes welding , etc.).

When executing workshop ironworks due consideration will be paid to the fact that by design pipeline will be Piggabale. To this end, at assembly by welding of valves and fittings, the nominal diameters will be assured according to the manufacturing rules.

Before shipping to the site, all fittings and workshop ironworks (including reversal curves) will be subject to strength test and the outer surface will be protected with a layer of primer.

All materials, fixtures, ironworks and ancillary items used will be properly stored during the execution period so as to avoid deterioration, damage or waste, according to Table no.1.XXIV.

Table no.1.XXIV. The main materials used for BRUA construction

Material	Storage conditions
Piping material	Ramps, avoiding contact with the ground
Pipe installation and profiles	shelves (racks)
Oxygen tubes	According to fire extinguishment rules, MP ord.869 /1990
Insulation materials	Under sheds, protected from solar radiation and rainfall
Welding materials: electrodes, wires, flux, shielding gas, carbide	In closed, vented and dry warehouses, as per suppliers' instructions
Small materials: screws and bolts; fittings; valves	In closed storages
Prefabricated, metal, curves, pipe manifolds	On concrete platforms
Thinner, extraction gasoline, primer, paint, cloth impregnated with organic solvents for degreasing	In warehouses closed under the fire extinguishment rules
Wood	On platforms, avoiding contact with the ground
Gravel, crushed stone	Stored provisional on the ground in the yard at site organizations and working fronts areas
Concrete	No storage; used directly at the work fronts
Fertilizers, chemical amendments	Under sheds, protected from solar radiation and rainfall
Oils, lubricants	Metallic containers in closed warehouses

The whole set of materials used will be purchased under contracts in order to ensure sufficient quantities and pace of supply from specialized and authorized third party companies. In the selection of contractors due consideration will be paid to the extent to which they observe and apply environmental standards in producing and marketing their materials, as appropriate (see Table no.1.XXV).

Table no.1.XXV. Materials used

Raw materials	Estimated quantities	Provenance	Storage mode	Grade danger
Pipe, fittings	> 111,873 t	Specialized producers	Temporary storage in pipe storages, the site organization, construction sites in open spaces, on supports.	Non-hazardous
Ballast, gravel, sand	530 mc	Gravel	Temporary storage at the work fronts. Usually not using immediately store after digging the trench laying.	Non-hazardous
Wood for shuttering	100 mc	Specialized manufacturers of timber	Outdoor storage	Non-hazardous
Reinforced concrete, reinforcement bars	100t	Specialized producers of rolled products	Outdoor storage	Non-hazardous
Concrete	300 mc	Concrete plants	Is not stored. It is used directly on-site cased structures	Non-hazardous

Raw materials	Estimated quantities	Provenance	Storage mode	Grade danger
Fuels	550t	Petrol stations	Temporarily stored in tanks at the site organization.	Hazardous
Lubricants and other petroleum products	50t	Petrol stations	Not stored on site	Hazardous
Fertilizers, chemical amendments	5t	Specialized distributors	Used at completion when lands are restored to their initial use. No storage required.	Hazardous

1.8. Information on physical and biological pollutants affecting the environment, generated by the proposed activity

As for the transmission pipelines focus is also on the influence they have on the change of soil microclimate, with direct effect on the root systems of plants that make up the proximal vegetation cover.

In this regard please note that in the case of gas transmission pipelines working temperatures do not require a certain temperature range to be kept in order to ensure fluidity or output, as in the case of oil transmission that requires a certain transportation temperature in order to avoid an increase in viscosity and a consequently more difficult transportation. Thus, in terms of thermal pollution, BRUA will have a neutral impact.

Gas transmission pipelines are also actively protected by generation of low voltage electrical currents and their levels are controlled by the cathodic protection stations (SC) on BRUA route. Research in this area revealed that between the natural gas transmission systems and the electricity transmission systems electromagnetic interference may occur requiring some additional measures of protection by increasing earthing to the ground and drainage of stray currents. In the Project this phenomenon has been subject to study and adequate measures have been provided to protect the pipeline from the effect of stray currents and electromagnetic interference with the AEL. Given the parallelism, namely BRUA pipeline junction with CONPET pipelines, a coexistence study is conducted on the sections of pipeline between the localities Negreni and Roata – approximate length 30 km- and Măciuca and Hurezani – approximate length 40 km.

During the construction phase, for materials transportation, their handling, for excavation and soil stripping works, as well as for backfilling, there are some fugitive emission of dust, exhaust gas, noise and vibration. At the site organization, pipe storages, and later on, in the operating phase, at GCS, there will be waste water.

An overview of the physical and biological pollutants generated by BRUA building is presented in Table no. 1.XXVI. for the period of construction, the Table no.1.XXVII for operational phases and in Table no.1.XXVIII. for the decommissioning phase.

Table no.1.XXVI. Physical and biological pollutants generated during construction of BRUA

Type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (Maximum permissible limit human and environmental)	Back-ground pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account background pollution		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Atmospheric pollution	Operation equipment in the work front; blasting by transport	Max.5 /objective About 100 machines in operation at a time, spread across the entire route of BRUA	SO₂ : v _{lo} = 350 ug/mc v _{lz} = 125 ug/mc NO_x : v _{lo} = 200 ug/mc NO₂ : v _{la} = 40 ug/mc CO : v _l = 10 ug/mc – (Maximum daily averages 8 hours) PM10 : v _{lz} = 50 ug/mc v _{la} = 40 ug/mc Pb : v _{la} = 0,5 ug/mc As : v _l = 6 ug/mc target value total content of PM10 fraction averaged over a calendar year. CD : 5 ug/mc target value total content of PM10 fraction averaged over a calendar year Ni : v _l = 20 ug/mc target value for total content of PM10 fraction averaged over a calendar year HAP : v _l = 1 ug/mc target value for total content in the PM10 fraction averaged over a year calendar	Characteristic to agro-ecosystem, ecosystems and semi-natural human settlements.	Accidental overruns may occur	Comply with set limits	Accidental overruns may occur	Comply with set limits	Strict observance of working technologies, timing of maintenance of machinery and their periodic inspection protocols. There will be an adequate scheduling of stages for materials supply in order to avoid overcrowding transport routes and training congestion. Technological access routes will be properly signaled, and at the work fronts and sensitive receivers there will be additional corrective measures, if the case, by making water curtains.

Type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (Maximum permissible limit human and environmental)	Back-ground pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account background pollution		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Noise pollution, noise	Operation equipment in the work front, blasting; transport	Max.5 /objective About 100 machines in operation at a time, spread across the entire route of BRUA	According to GD 1756/2006 for earthmoving equipment STAS 10009-88 Building acoustics. Urban Acoustics. Allowable noise limits	Feature agro-ecosyste, ecosystes and semi-natural human settlement.	Overruns may occur accidental	Comply with the limits STAS 10009	Overruns may occur accidental	Comply with the limits	Strict observance working technologies, the timing of maintenance of machinery and their periodic inspection protocols. There will be an adequate scheduling of stages of materials supply in order to avoid overcrowding of transport routes and training congestion. Technological access routes will be properly signaled, and at the work fronts and sensitive receivers there will be additional corrective measures, if the case, by installation of soundproofing panels. Loading / unloading will be closely monitored

Type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (Maximum permissible limit human and environmental)	Back-ground pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account background pollution		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Bacteriological pollution	Modular toilets watertight tanks, cesspools, chemically treated	25 (Site organizations and work fronts); 10 (pipe storage)	According NTPA 002	At least D	Accidental, watertight tanks cracking, overturning or discharge	-	It's not necessary. The sites will be outside of residential areas	-	Modular toilets watertight tanks, cesspools, chemically treated vidanja will periodically based on service contracts with specialized companies to be transported around the wastewater from sewage proximal
Soil pollution	Storage of bulk materials (aprons, rock, etc.), access roads, working faces, uncontrolled waste storage	5 Site organizations, 10 pipe storage	-	-	compaction, erosion	-	It's not necessary. The sites will be outside of residential areas	-	Waste storage areas will be carefully organized and managed, selective collection being accomplished

Table nr.1.XXVII. Physical and biological pollutants generated in the operational phases of BRUA

type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (Maximum permissible limit human and environmental)	Background pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account pollution fund		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Atmospheric pollution	Accidental gas leaks, ventilation, generating noxious emissions, etc.	3 SCG, 43 valve stations	-	Characteristic to agro-ecosystem, ecosystems and semi-natural human settlements.	-	-	It's not necessary. The sites will be outside of residential areas	-	Compliance related to the natural gas transmission technology and equipment technical requirements involved in the transport and monitoring
Noise pollution, noise	Operation SGG	3 SCG	65 dB (A) the maximum permissible according to STAS 10009/88 and 87dB (A) - noise exposure level staff	Characteristic to agro-ecosystem, ecosystems and semi-natural human settlements.	Overruns may occur accidental	Comply with the limits. Take measures to limit noise by placing noise insulation in the halls and bonnet equipment	It's not necessary. The sites will be outside of residential areas	-	In areas with sensitive receptors will install sound-absorbing panels, as applicable; staff will be equipped with appropriate protective equipment.

type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (Maximum permissible limit human and environmental)	Background pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account pollution fund		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Bacteriological pollution	Sewage treatment plant installed at the GCS	3	According TN001 NTPA 002 - where the record will be made at the local sewerage network	At least D	Accidental, damage or cracking micro improper operation of wastewater treatment plants	-	It's not necessary. The sites are to be found outside of residential areas	-	Sewage treatment plant at GCS will be carefully maintained strictly respecting the timing of maintenance and emptying
Soil pollution	Uncontrolled waste storage	3 SCG	-	-	-	-	It's not necessary. The sites are to be found outside of residential areas	-	Waste storage areas will be carefully organized and managed, selective collection being accomplished

Table nr.1.XXVIII. Physical and biological pollutants generated in the decommissioning phase of BRUA

Type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (maximum permissible limit human and environmental)	Background pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account pollution fund		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Atmospheric pollution	Operation of equipment in the work front; transportation	About 100 machines in operation at a time, spread across the entire route of BRUA	SO₂ : v _{lo} = 350 ug/mc v _{lz} = 125 ug/mc NO_x : v _{lo} = 200 ug/mc NO₂ : v _{la} = 40 ug/mc CO : v _l = 10 ug/mc – (maximum daily averages 8 hours) PM10 : v _{lz} = 50 ug/mc v _{la} = 40 ug/mc Pb : v _{la} = 0,5 ug/mc As : v _l = 6 ug/mc target value total content of PM10 fraction averaged over a calendar year. CD : 5 ug/mc target value total content of PM10 fraction averaged over a calendar year Ni : v _l = 20 ug/mc target value for total content of PM10 fraction averaged over a calendar year HAP : v _l = 1 ug/mc target value for total content in the PM10 fraction averaged over a year calendar	Characteristic to agro-ecosystem, ecosystems and semi-natural human settlements.	Accidental overruns may occur	Comply with set limits	Accidental overruns may occur	Comply with set limits	Strict observance of working technologies, the timing of maintenance of machinery and their periodic inspection protocols. There will be an adequate scheduling of stages of material supply in order to avoid overcrowding of transport routes and training congestion. Technological access routes will be properly signaled, and at the work fronts and sensitive receivers there will be additional corrective measures, if the case, by making water curtains.

Type of pollution	Source of pollution	No. pollution sources	Maximum allowable pollution (maximum permissible limit human and environmental)	Background pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account pollution fund		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Noise pollution, noise	Operation equipment in the work front; transportation	About 100 machines in operation at a time, spread across the entire route of BRUA	According to GD 1756/2006 for earthmoving equipment STAS 10009-88 Building acoustics. Urban Acoustics. Allowable noise limits	Characteristic to agro-ecosystem, ecosystems and semi-natural human settlements.	Accidental overruns may occur	Comply with set limits	Accidental overruns may occur	Comply with set limits	Strict observance of working technologies, the timing of maintenance of machinery and their periodic inspection protocols. There will be an adequate scheduling of stages of material supply in order to avoid overcrowding of transport routes and training congestion. Technological access routes will be properly signaled, and at the work fronts and sensitive receivers there will be additional corrective measures, if the case, by installing soundproofing panels. Loading / unloading will be closely monitored

Type of pollu tion	Source of pollution	No. pollution sources	Maximum allowable pollution (maximum permissible limit human and environmental)	Background pollution	Calculated pollution caused by activities and measures for the elimination / reduction				Measures to eliminate / reduce pollution
					In the area of the objective	Zone protection / restriction related to the objective, as required by law	In residential areas, recreational or other protected areas taking into account pollution fund		
							Without measures to eliminate / reduce pollution	Implementation measures to eliminate / reduce pollution	
Bacteriological pollution	Toilets modular, watertight tanks, cesspools, chemically treated	Site organizations and work fronts	According to NTPA002	At least D	Accidental, watertight tanks cracking, overturning or discharge	-	It's not necessary. The sites are to be found outside of residential areas	-	Modular toilets watertight tanks, cesspools, chemically treated vidanja will periodically based on service contracts with specialized companies to be transported to proximal wastewater treatment plants
Soil pollution	Storage of bulk materials (pipes dug up), access roads, working fronts, uncontrolled waste storage	Site organizations	-	-	compaction, erosion	-	It's not necessary. The sites are to be found outside of residential areas	-	Waste storage areas will be carefully organized and managed, waste collection will be selective

From the available experience, according to assessments made at the compression station, the noise level generated at the boundary of the perimeters during maximum activity periods (operational periods) records values between 65-80 dBA. Current legislation does not limit the noise level for objectives located outside city limits. However, environmental permits for existing compressor stations of Transgaz require compliance to STAS 10009-88.

1.9. Description of the main alternatives studied by the developer and an indication of the reasons for choosing one of them

The paradigm according to which the most effective solutions in the long term prove to be the most environmentally friendly has been fully understood and assumed by the initiators and promoters of BRUA project. Thus, from the very beginning, chosen solutions aimed to ensuring the *long-term* operating efficiency, which in turn completely ensured also a convergence with the sustainability criteria regarding the environmental factors.

For the initial route selection and optimization the following criteria were considered:

- I. Criteria regarding safety of operation: taking into account the strategic importance of this investment, and the inherent risks in such a major gas transmission infrastructure were analyzed and adopted among the safest global solutions, with integration of all technological quality standards;
- II. Economic criterion: the most effective solutions and methodologies to achieve the gas transmission pipeline were considered, so as to equally assure a long life span; at this level geographical route to follow was also analyzed so as to imply an easy technical approach, with execution costs as low as possible;
- III. Social criterion: routes were selected so that the activity of local communities in the area of influence of the project to be affected as little as possible, both during the construction and the operational phase (which involves the establishment of technological protection perimeters in accordance to the regulations on restricting activities); the housing areas, and transportation routes or networks were avoided as much as possible;

As for the environmental criteria, the project was approached in the light of the principles underlying the environmental legislation, taking into account:

- a. The precautionary principle in decision making
First, taking into account this principle, this document was developed while trying to reflect as faithfully and comprehensively possible the BRUA project, thereby assisting decision-making by the competent authorities.
- b. The principle of preventive action
The principle of preventive measures assumes a pro-active, accountable involvement. Best practice solutions have been taken into account for the Project, especially in the execution phase, so that the impact on the environment to be reasonably prevented, reduced and, where possible canceled by playing a set actions that also play a role in the prevention of propagation of impact waves (particularly indirectly) on the environmental elements or factors.
In particular, during the construction period a monitoring program is envisaged that would ensure ongoing conformity according to Project stages, as well as adjustment to some steps or constructive sequences depending on the space –time particularities to occur along the way and for which an initial assessment was not possible.
- c. The principle of retention of pollutants at source
This principle involves a complete inventory of sources with a potential impact on the elements of conservation interest and for each of these sources solutions will be set to limit and retain pollutants at source. The next step is to apply the principle of 'polluter pays' and to create an environment of high responsibility and awareness towards the environments, the community and the common heritage.

Specifically, this principle has resulted in the proposal to achieve each objective (front work, site organization, permanent industrial objectives) of grassy polders with gradual discharge to function both as mechanical retention devices, and as element able to retain pollutants at the source.

d. The "polluter pays" principle

The environmental legislation makes extensive use of this principle that acts as a rather efficient coercive method. However there are some limitations to the opportunity to use this tool. This principle is noted as being abused of in cases of projects that are of a particular economic (or social) interest and where environmental costs are included in the production costs to be borne ultimately by the final consumer.

e. The principle of conservation of biodiversity and of natural ecosystems specific to the bio-geographical environment

The requirement of biodiversity conservation "in situ" remains crucial, representing the most viable, effective and relevant solution, with implications that are reflected in a large number of action plans. Specifically, the measures of ecological restoration proposed were sized to provide restoration to their original state of impacted areas, including also temporary resettlement actions (translocation) of some elements in the proximal areas, and immediately after works completion a reversible relocation would be assured.

f. The principle of information and participation of the public in the decision-making and access to justice in environmental matters.

During the regulation procedure this principle was fully complied with, transparency measures have been adopted during the entire technical administrative process, and the interested public had available, on ANPM webpage and on the Project beneficiary's webpage, the entire set of material documentation.

During the initial stages of the environmental assessment Project was presented in the media and a number of steps were taken towards the initial consultation of local communities. Such steps are summarized in the Annexes.

1.9.1. Geographical location and administrative locations for the project alternatives

The works are located in the counties of Giurgiu, Teleorman, Dambovită, Argeș, Olt, Valcea, Gorj, Caras-Severin, Hunedoara, Timis and Arad.

In terms of project alternatives, the size and conduct of its geographical location and administrative were maintained, and only route alternatives were developed depending on the criteria for selection of alternatives.

1.9.2. Information on current land use

An analysis of the current use of land was performed by direct study, by walking the entire site, or by driving through the site, so that the entire route structure could be carefully observed.

The study was documented both by taking pictures in digital high resolution (min. 10MPx) made from the operator (perspective) either by aerial photographs taken by drones (prototype 4qrs, DJI Phantom II and DJI Phantom III Advanced) - fig. 1.XI-1.XVIII.



Fig.1.XI. The drone DJI Phantom II Advanced ready to fly (left) and aerial photographs (right) – note the level of detail obtained by aerial photos



Fig.1.XII. Aerial photos merged (stitched) used for the overall analysis, large-scale land use

After analyzing the current use of land, we have identified the following categories:

1.9.2.1. Cultivated land



Fig.1.XIII. Farmland crossed BRUA project: cultivated mosaic strongly fragmented (left); compact monocultural cultivated areas (right)

1.9.2.2. Agricultural land used as pasture

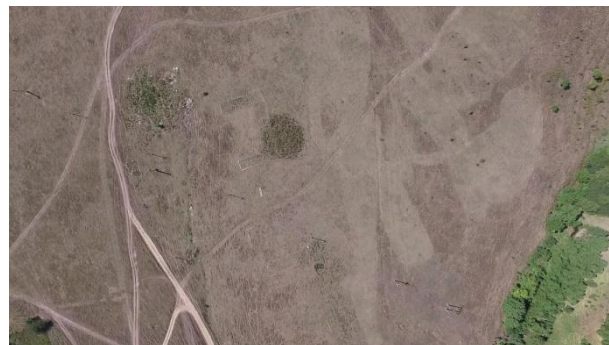


Fig.1.XIV. Pastures crossed by BRUA project

1.9.2.3. Watercourses



Fig.1.XV. Watercourses crossed by the project BRUA: Dâmbovnica (left); Olt (right)

1.9.2.4. Residential Zone



Fig.1.XVI. Residential areas crossed by BRUA: Poieni (left); shape of BRUA in the vicinity of Otelu Roșu (right)

1.9.2.5. Forest areas (forests)



Fig.1.XVII. Forest areas crossed by BRUA: Bolintin Forest

1.9.2.6. Roads



Fig.1.XVIII. Access routes crossed by BRUA: roads

For each sector of 5 km an analysis on land use was performed. The situation is summarized in Annexes.

By use of Corine 2000 (2006) model generated by the project EEA Grants available as a free resource (www.geo-spatial.org/download/datele-corine-landcover-reproiectate-in-stereo70) there has also been made a model of land use (including a perimeter of influence of about 300m wide).

On BRUA route the potential influence areas has been set to a width of 300m (150 + 150m), and an analysis was conducted on the current use of lands. The situation is presented in section 4.5.1.

When works are completed, most of the land will be returned to its natural / economical circuit by the entrepreneurs responsible for the execution, including the environmental reinstatement and the ecological restoration, until their restoration to their initial state.

An exception in this case are the surfaces crossing forest areas, where the working strip will be 14m wide of which a monitoring strip of about 2 m will be maintained for technical monitoring activities, resulting thus in a loss of 8m, and a total loss of forest areas of 57.7 ha. For this Project an anlysis was made regarding the planting of shrub species with less profound roots to contribute to the reduction (cancelation) of the width of the technological corridor and to the functionality restoration of the bio-eco-cenotic habitats of forested mountains, canceling thus phenomena of fragmentation.

1.9.3. Existing infrastructure

The pipeline will intersect with a number of existing infrastructure elements. The situation is summarized in Table 1.XXIX divided by sections:

Table no.1.XXIX Existing infrastructure elements

Section- Podișor -Corbu

Obstacles	Amount (Pcs.)	Name
National roads crossings	2	DN 61, DN 65 A
County road crossings	6	DJ 412 D, DJ 601, DJ 701, DJ 503, DJ 504, DJ 679
Communal roads crossing	6	DC 82, DC 2, DC 131, DC, DC 137
Railways crossings	1	CF 907
Transgaz pipeline crossings	7	Dn 500 Podișor – Giurgiu, Podișor – Corbu, Line 1 Dn 500 and Line 2 piggable Dn 500
Petrom gas and water pipelines crossings	15	22 x Dn 80, 1 x Dn 100, 2 x Dn 125, 5 x Dn 150, 2 x Dn 200, 2 x Dn 250, 2 x Dn 300, 2 x Dn 90 water
Conpet oil and gasoline pipelines crossings	5	1 x Dn 150 – gasoline, 3 x Dn 250 – crude oil, 1 x Dn 250

Obstacles	Amount (Pcs.)	Name
Romtelecom optical fiber crossings	8	optic fibre

Section Corbu-Hurezani

Obstacles	Amount (Pcs.)	Name
National roads crossings	8	DN 65, DN 64, DN 67 B, DN 67 B, DN 67 B/DN 65 C, DN 67 B, DN 67 B, DN 67 B
County road crossings	15	DJ 703, DJ 675 D, DJ 657 C, DJ 657, DJ 546 E, DJ 546, DJ 648 B, DJ 677 D, DJ 643 B, DJ 676 A, DJ 676, DJ 676 G, DJ 676 G, DJ 605 A, DJ 605 B
Communal roads crossing	14	DC 21 A, DC 21, DC 21, DC 52, DC 89, DC 59, DC 58, DC 57, DC 86, DC 72, DC 72, DC 72, DC 74, DC 74 A
Public utility roads crossings	8	DUP 2 times, DUP 2 times 2 times DUP, DUP DUP
Private utility roads crossings	9	DP 7 6 times, 3 times DP 5
Exploitation roads crossings	2	2 times
Railways crossings	2	CF 901, CF 201
Transgaz pipeline crossings	38	Line 1, Line 2, and Line 3 Dn 500 Corbu - Hurezani, Dn 250 Alunu - Zatreani, Dn 300 Grădiștea - partly dismantled Văleni
Petrom gas and water pipelines crossings	7	Dn 250, Dn 250 decommissioned pipeline, 3x Dn 500 Dn 200 Dn 200
Conpet oil and gasoline pipelines crossings	26	250 Fir oil Radinești Dn 2 - 4 times Ploiești, Dn 150 gasoline Ticleni - Ploiești, oil and gasoline pipelines 21 times
Romgaz pipeline crossings	12	Dn 100 Dn 100 Dn 100 Dn 100 7 times, 2 times Dn 100,
Petrotrans pipeline crossings	1	Upon receipt of data from pipelines owners

Section Hurezani-Hățeg

Obstacles	Amount (Pcs.)	Name
National roads crossings	5	DN 6B, DN 67, DN 66, DN 66A, DN 68.
County road crossings	41	DJ 662 2 times, 3 times DJ 661, DJ 675, DJ 663, DJ 665A, DJ 665, DJ 664 18 times, 10 times DJ 666, DJ 667, DJ 667 2 times 686 DJ.
Communal roads crossing	9	DC 44, DC 43, DC 70 B, C 70, C 72, DC 73, DC 63, DC 78 two times.
Public utility roads crossings	14	DUP 14 times.
Exploitation roads crossings	1	
Railways crossings	7	5 or CF 202, CF industrial
Transgaz pipelines crossings	12	Bibescu pipeline Sâmbotin Hățeg.
Romgaz pipelines crossings	1	Dn 100

Obstacles	Amount (Pcs.)	Name
Petrom pipeline crossings	9	Dn 500
Conpet pipeline crossings	1	Dn 150
Petrofac pipeline crossings	3	Dn 150, Dn 250, Dn 150

Section Hațeg-Recaș

Obstacles	Amount (Pcs)	Name
Highways crossings	2	Highway A 1 Lugoj - Arad highway A6 Lugoj - Orsova
Crossing national roads	7	DN68, DN68, DN6 (E70), DN6 (E70), DN6 (E70), DN6 (E70), DN 68A,
County roads crossings	9	DJ 687 L, DJ 687 G, DJ 608 B, DJ 683, DJ 680, DJ 609, DJ 609 B, DJ 609 A, DJ572
Crossing roads	15	DC90 , DC Odovasnița , DC 90A , DC92 , DC 87 , DC 88 , DC 16A DC , DC- DC Village Ciuta , DC , DC Obreja - Glimboca , country road , DC Vama Marga - Marga , DC 2 DC92 , DC91 , DC83 , DC75SE .
Crossings of public roads	2	str. Traian Vuia Lugoj.
Railway crossings	5	CF 917, CF 900, CF 900, CF 212.
Transgaz pipeline crossings	74	The pipeline Dn 500 West 2 , West 1
Crossing another pipe	10	After receiving data from holders pipelines

1.9.4. Natural, historical, cultural, archeological values

According to Law 5/2000 on the National Landscaping - Section III Protected areas, on BRUA route the following benchmarks of historical, cultural and archaeological interest have been defined, and are summarized in Table 1.XXX. below:

Table no.1.XXX. Historical, cultural and archeological benchmarks

County	Places	Protected areas (other than natural areas)	Distance from BRUA (Km)
Gorj	Schela	St. Demetrius Church	0.7
Hunedoara	Banita	Dacic fortification with stone walls and stone towers, ramparts, sanctuary (point "Piatra Cetății")	7
	Pui	Mousterian occupation levels (point „Bordul Mare" Cave)	4
	Sarmizegetusa	Dacian colony - Ulpia Traiana Augusta Sarmizegetusa - the capital of the Roman province of Dacia	0.4

BRUA position to historic, cultural and archaeological landmarks is shown in Figures 1.XIX, 1.XX, 1.XX. and 1.XXII.

By the urbanism certificates that have regulated the administrative-technical procedure for BRUA Project no archaeological discharge procedures were required.

During the construction phase, where such signs of possible archeological traces will emerge, the perimeter will be isolated and the overall activity in the immediate vicinity thereof shall cease. The authorities and the competent institutions will be informed in order to issue the archaeological discharge and subsequently the perimeters in which BRUA may continue will be determined. In the subsequent stages the archaeological discharge will be carried out where items of archaeological heritage were discovered.



Fig.1.XIX. BRUA position to Piatra Cetății (processing by EarthGoogle® and photo by Nicolae Sasu)

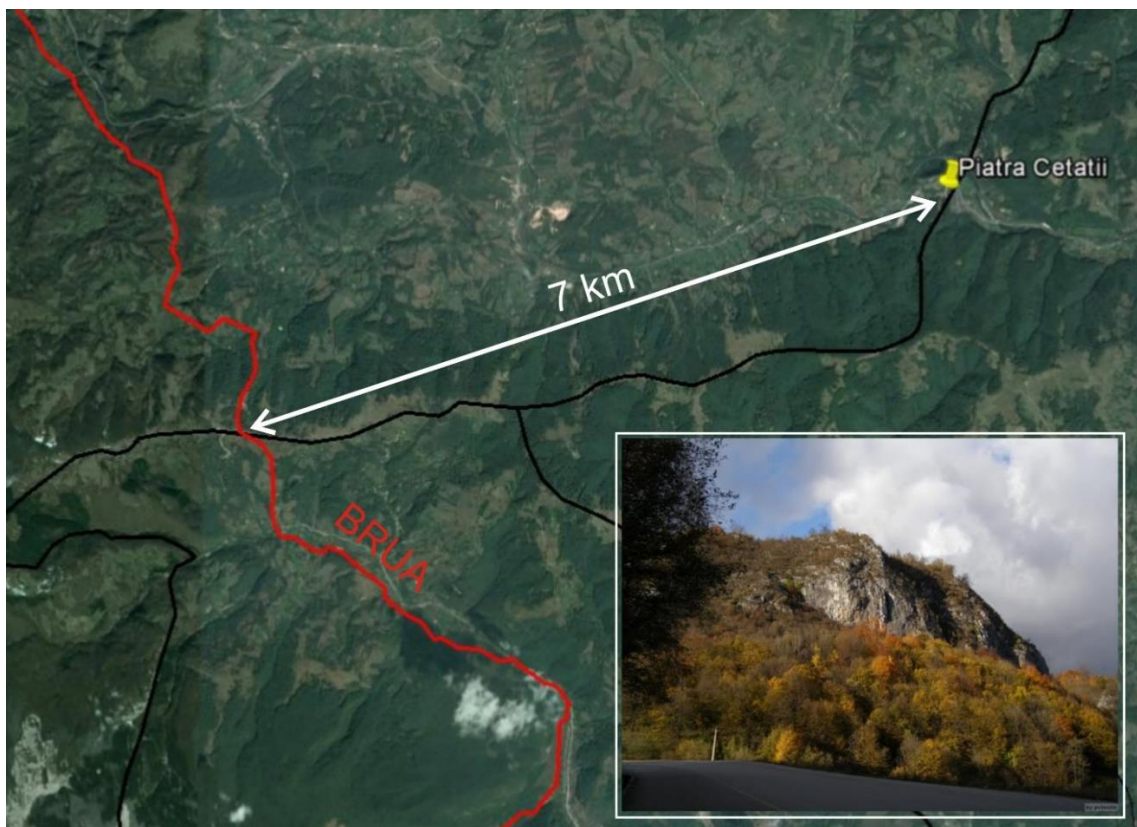


Fig.1.XX. BRUA position to Piatra Cetății (processing by EarthGoogle® and photo by Sorin Pavel)



Fig.1.XXI. BRUA position to Bordul Mare Cave (processing by EarthGoogle® and photo by Dan Gabor)



Fig.1.XXII. BRUA position to Sarmizegetusa: **top** – processing by EarthGoogle © (left); aerial photo of BRUA, marking of working strip (right); **down** - BRUA route near the locality Sarmizegetusa – please note the detour so as to maximize distances from protected areas

1.9.5. Protected natural areas / protected areas

Pipeline route crosses the following protected areas:

Natura 2000 sites:

- ROSCI0063 Defileul Jiului - Length of overlapped section: 0.203km;
- ROSCI0129 Nordul Gorjului de Vest - Length of overlapped section: 14.2km;
- ROSCI0138 Pădurea Bolintin - Length of overlapped section: 2.03km;
- ROSCI0236 Strei-Hațeg - Length of overlapped section: 3.5km;
- ROSCI0292 Coridorul Rusca Montană-Țarcu-Retezat – Length of overlapped section: 3.008km;
- ROSCI0385 Râul Timiș între Rusca și Prisaca - Length of overlapped section: 0.739km;

- ROSPA0106 Valea Oltului Inferior - Length of overlapped section: 1.288km;

Protected areas of national interest:

- Dinosaur Geopark "Hațeg" - Length of overlapped section: 51.744km;

Also, the pipeline route is located adjacent to protected areas as follows:

- Proximal (30-50m) to ROSCI0296 Dealurile Drăgășaniului;
- Proximal (65-142m) on a length of about 2500m to Jiu Valley National Park;
- Proximal (670m) from the site ROSCI0109 Lunca Timișului;
- Proximal (109m) from the site ROSPA0045 Strei-Hațeg;

A summary of the BRUA route in relation to protected natural areas is presented in fig.1.XXIII. Detail aspects of the BRUA position to natural protected areas is presented in fig.1.XXIV - XXXIV (in order of their crossing).

A statement on the geographical location of Natura 2000 sites to BRUA was conducted starting with the cartographic reference items published recently by OM 46/2016 on the regime of natural protected areas and the establishment of sites of Community importance as part of the Natura 2000 European ecological network in Romania, published in the Official Gazette of Romania no. 114 of 02.15.2016 and on the website of the Ministry of Environment, Water and Forests (www.mmediu.ro).

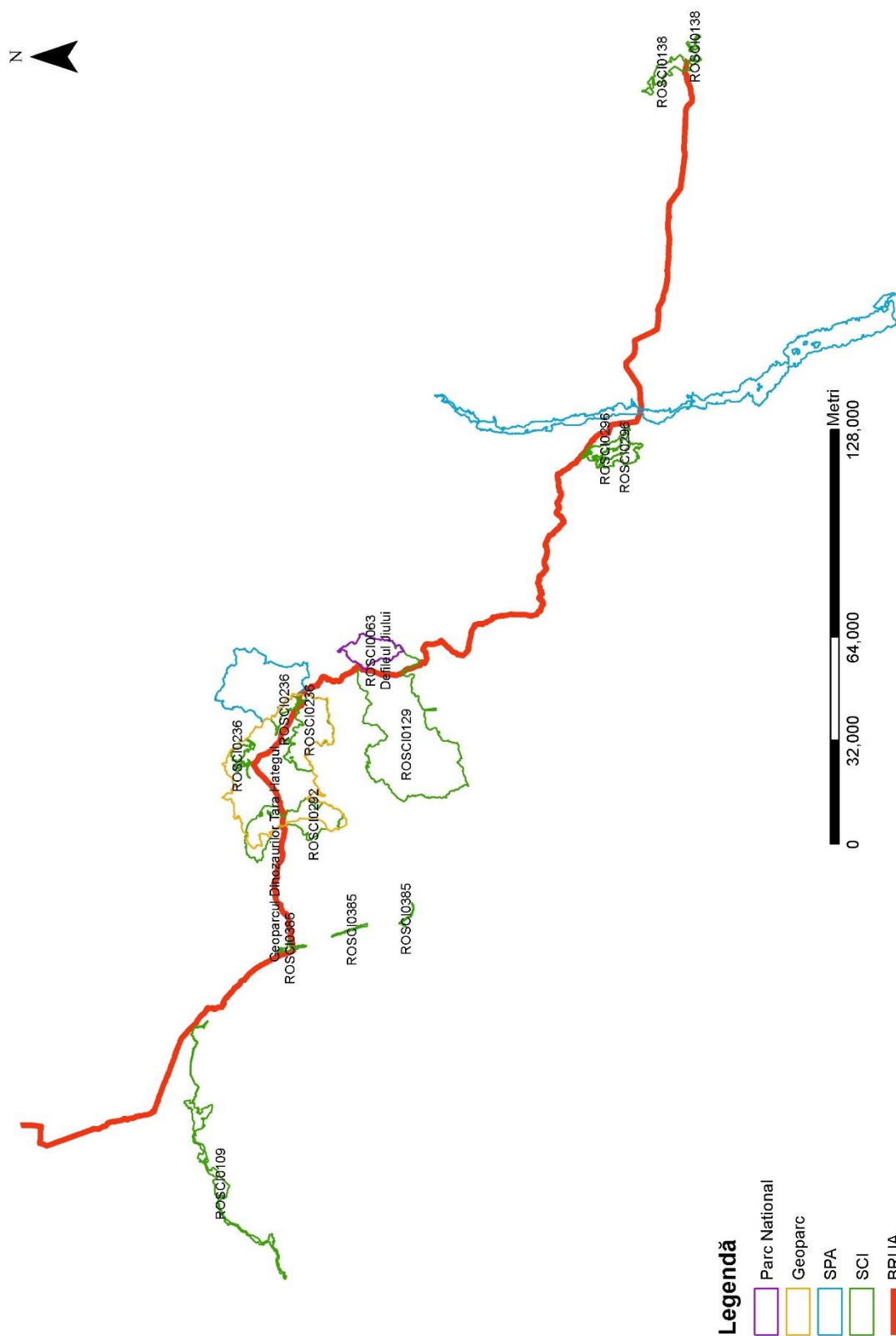


Fig.1.XXIII.- Representation of BRUA route in relation to protected natural areas

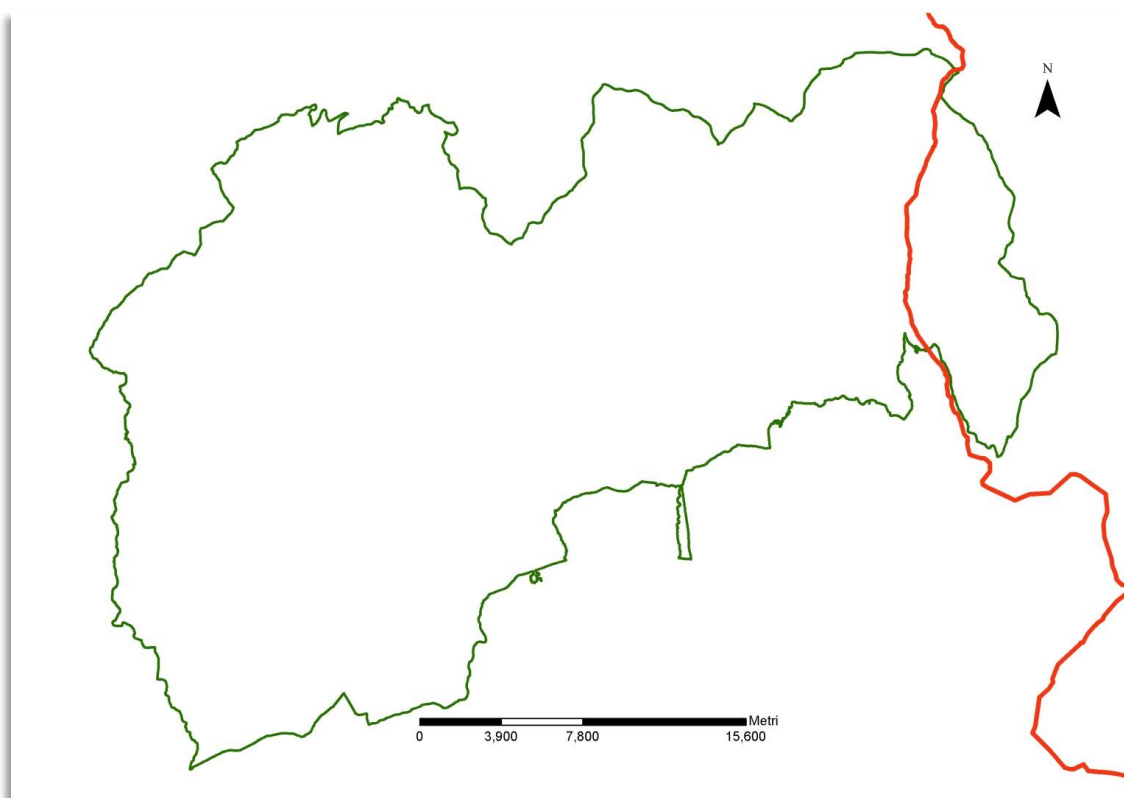


Fig.1.XXIV. Overlapping of BRUA project (red line) with perimeter ROSCI0129 North West Gorj

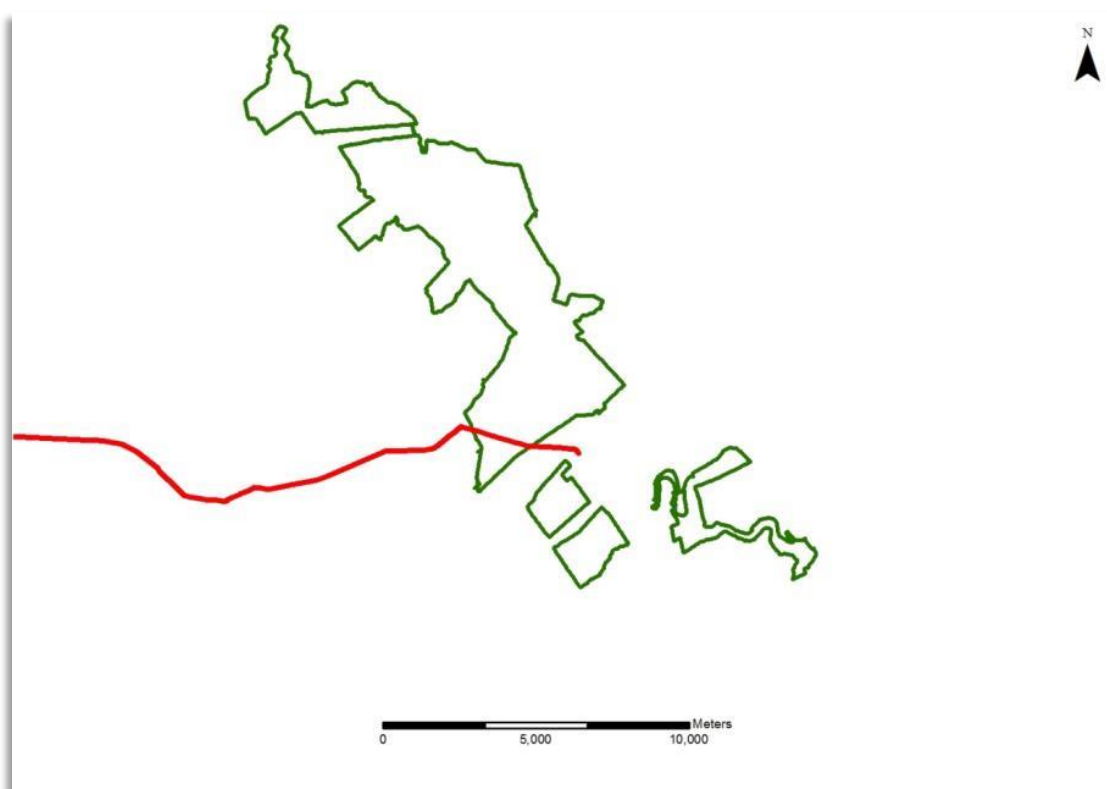


Fig.1.XXV. Overlapping of BRUA project (red line) with perimeter ROSCI0138 Forest Bolintin

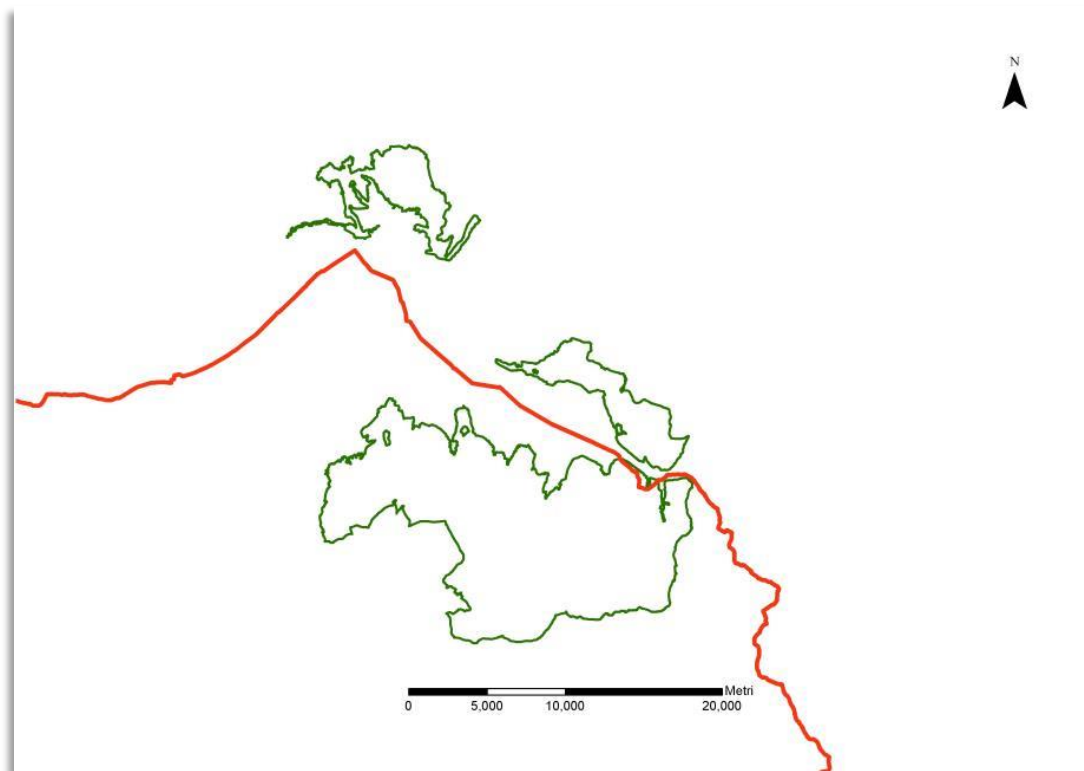


Fig.1.XXVI. Overlapping BRUA project (red line) with perimeter ROSCI0236 stream Hateg

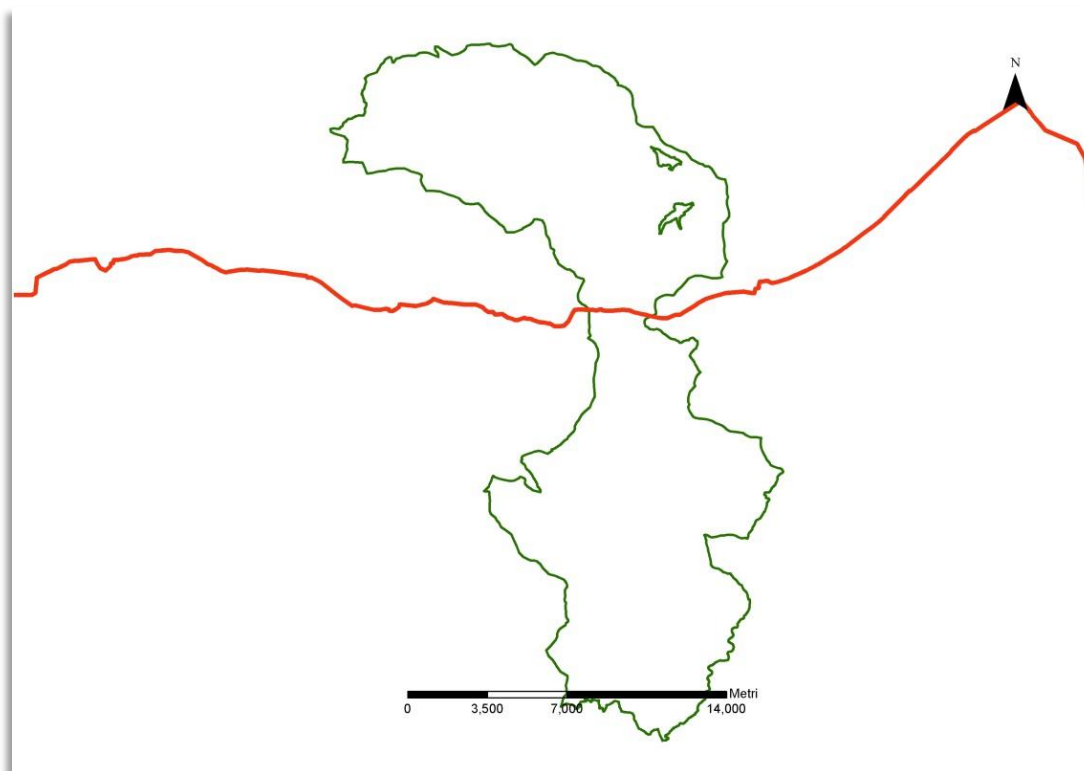


Fig.1.XXVII. Overlapping of BRUA project (red line) with perimeter ROSCI0292 Corridor Rusca Montana-Tarcu Retezat

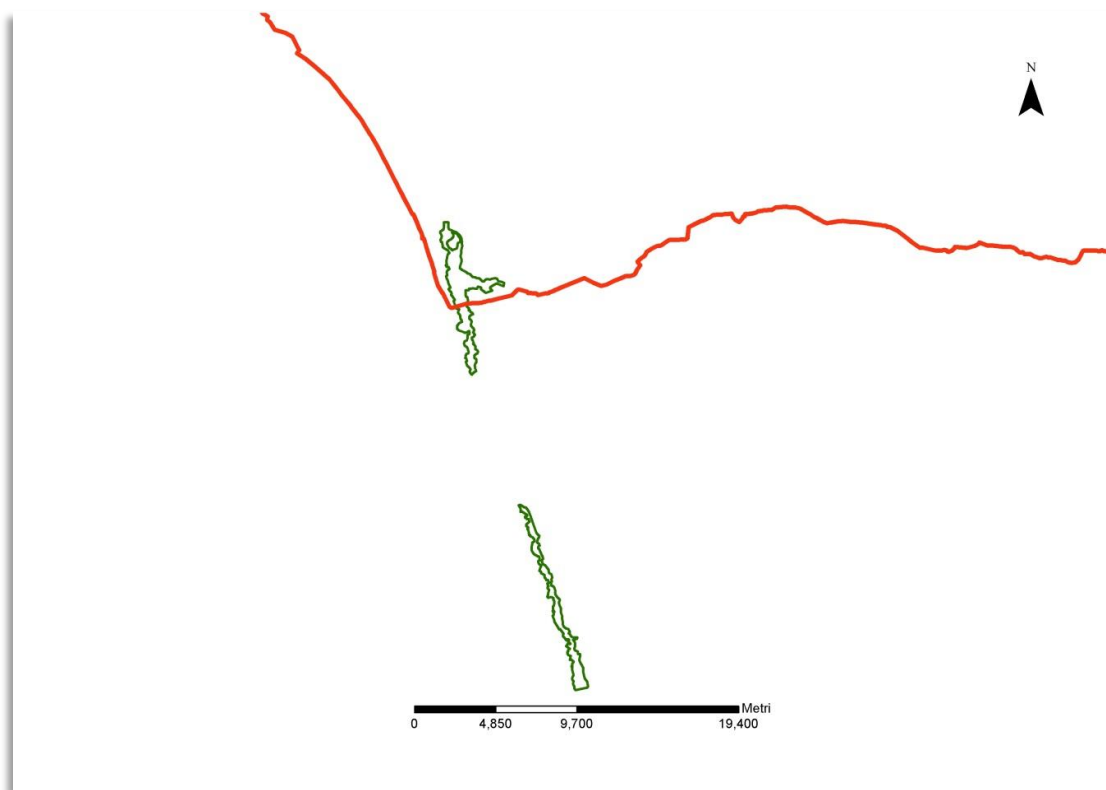


Fig.1.XXVIII. Overlapping of BRUA project (red line) with perimeter ROSCI0385 Timis River between Rusca and Prisaca

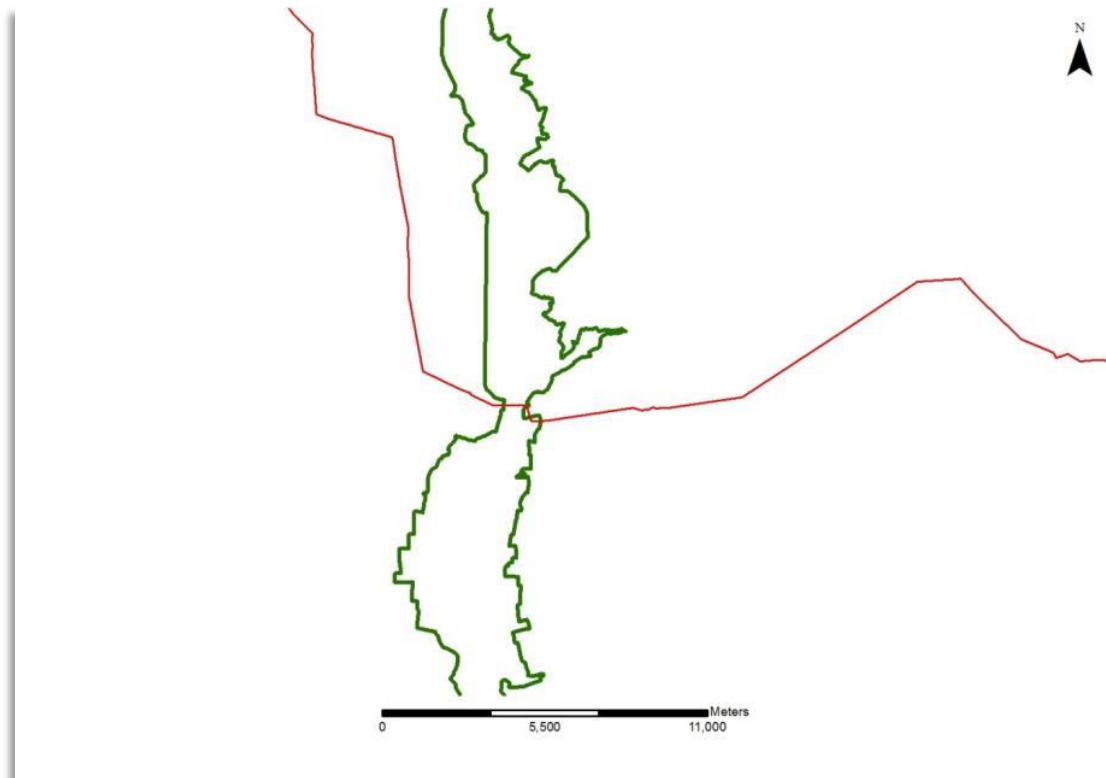


Fig.1.XXIX. Overlapping of BRUA project (red line) with perimeter ROSPA0106 Lower Olt Valley

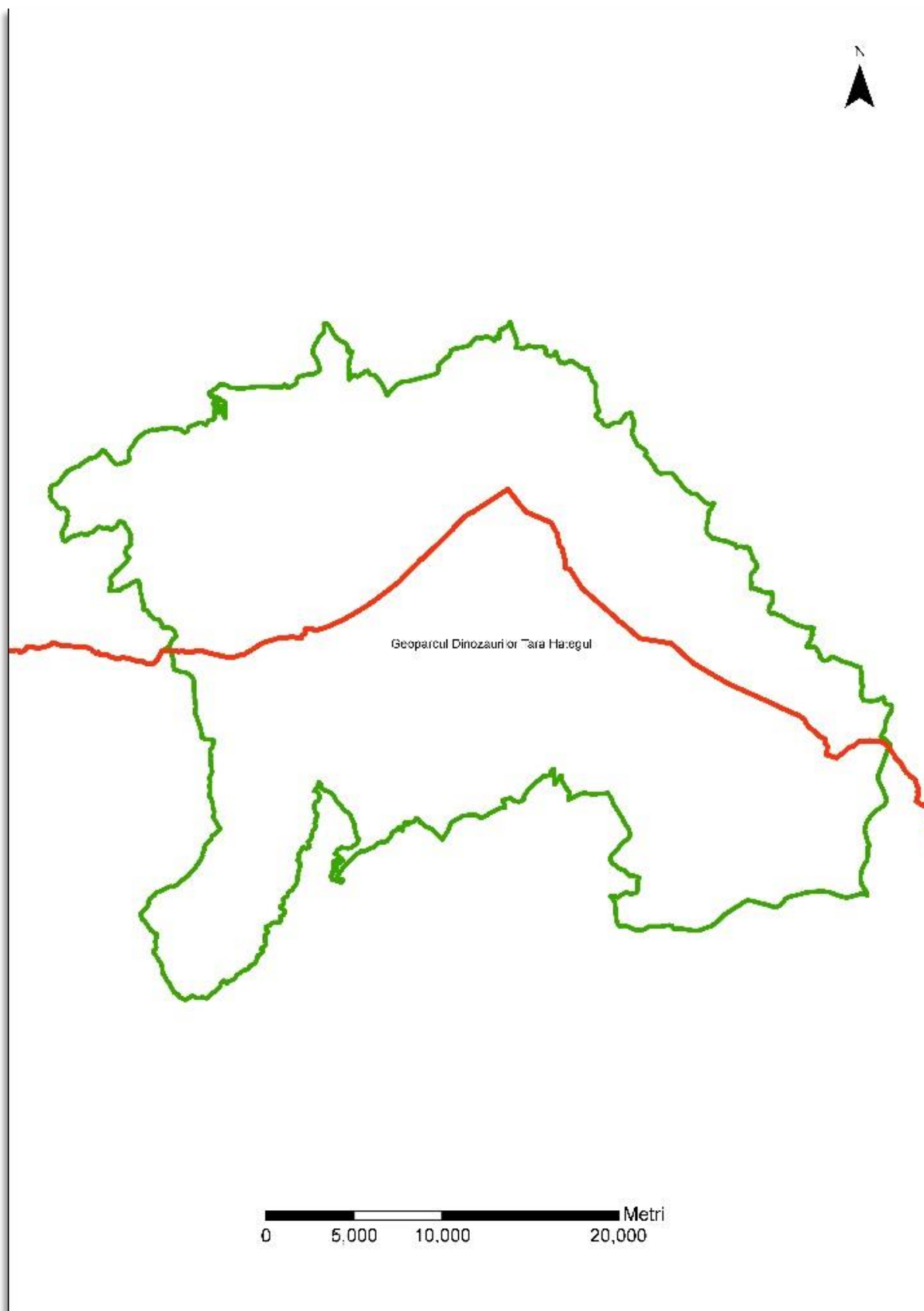


Fig.1.XXX. Overlapping of BRUA project (red line) with perimeter PN Dinosaur Geopark "Țara Hațegului"

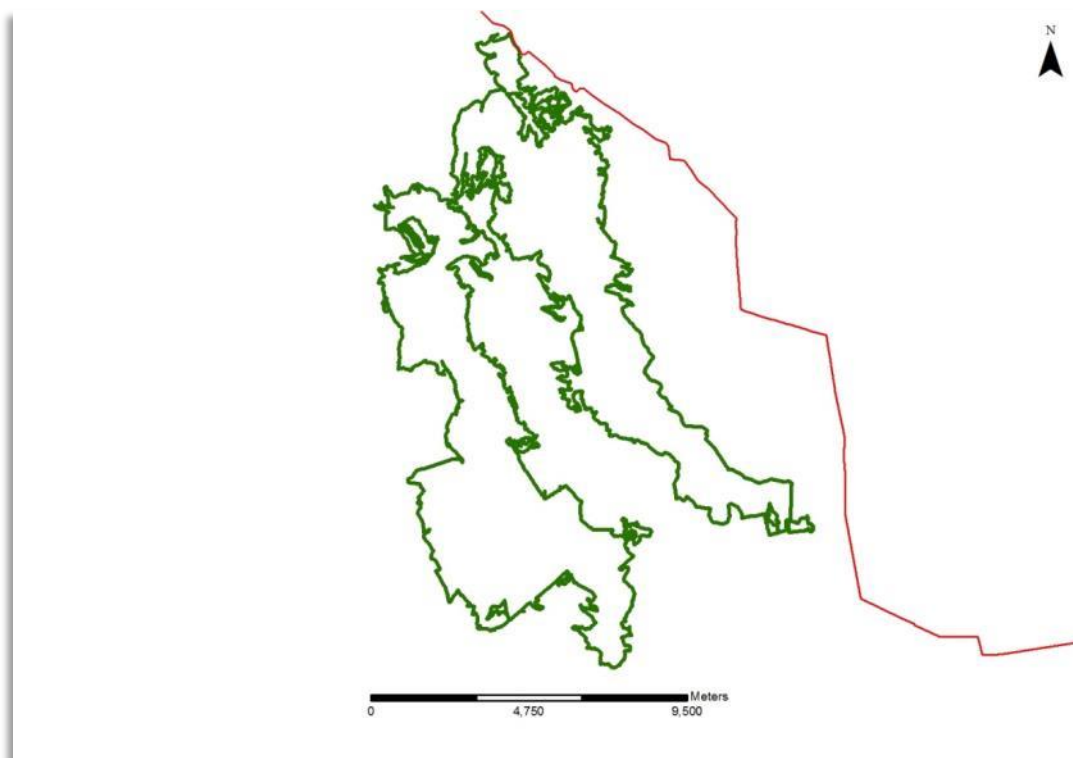


Fig.1.XXXI. Proximity of BRUA project (red line) to the perimeter ROSCI0296 Hills Drăgășani

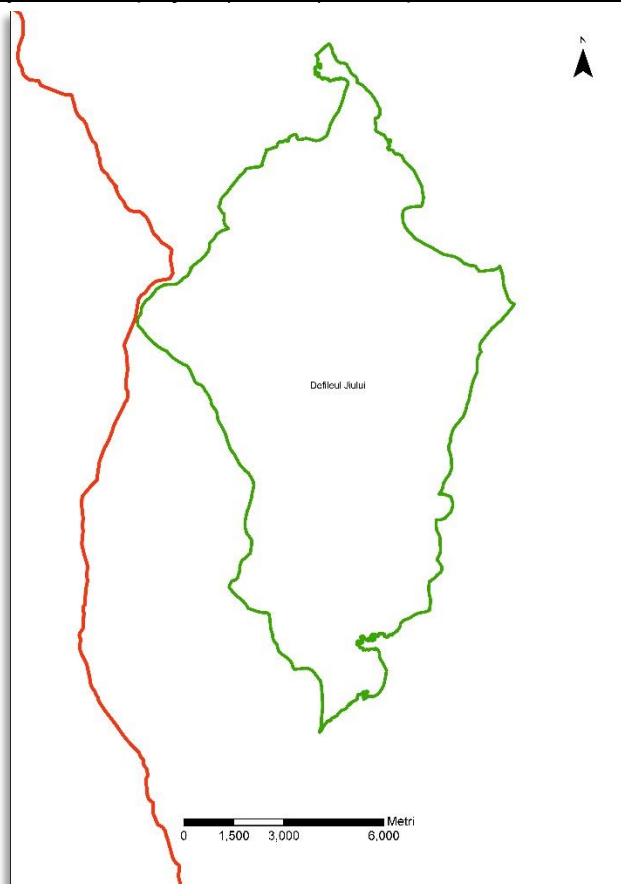


Fig.1.XXXII. Proximity of BRUA project (red line) to the perimeter PN Jiu Valley

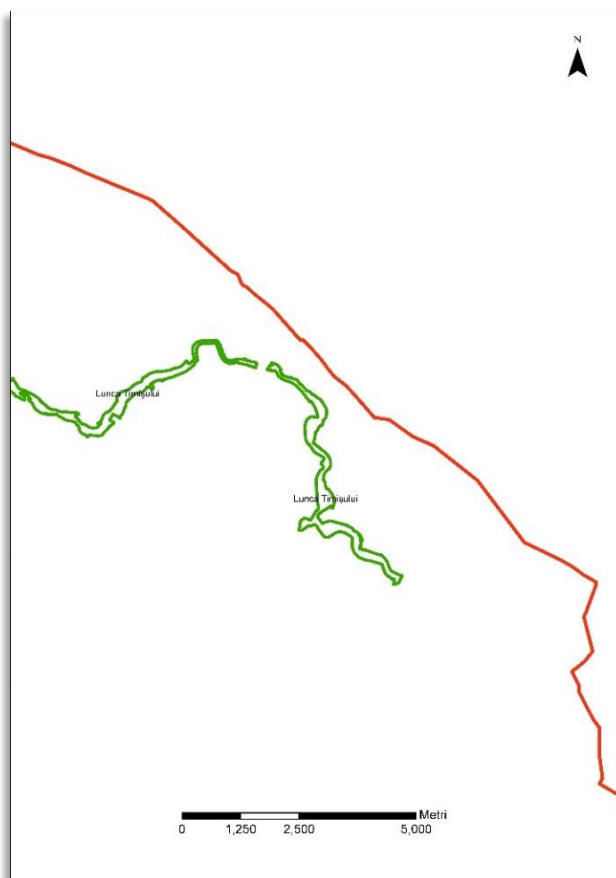


Fig.1.XXXIII. Proximity of BRUA project (red line) to the perimeter ROSC10109 Lunca Timișului

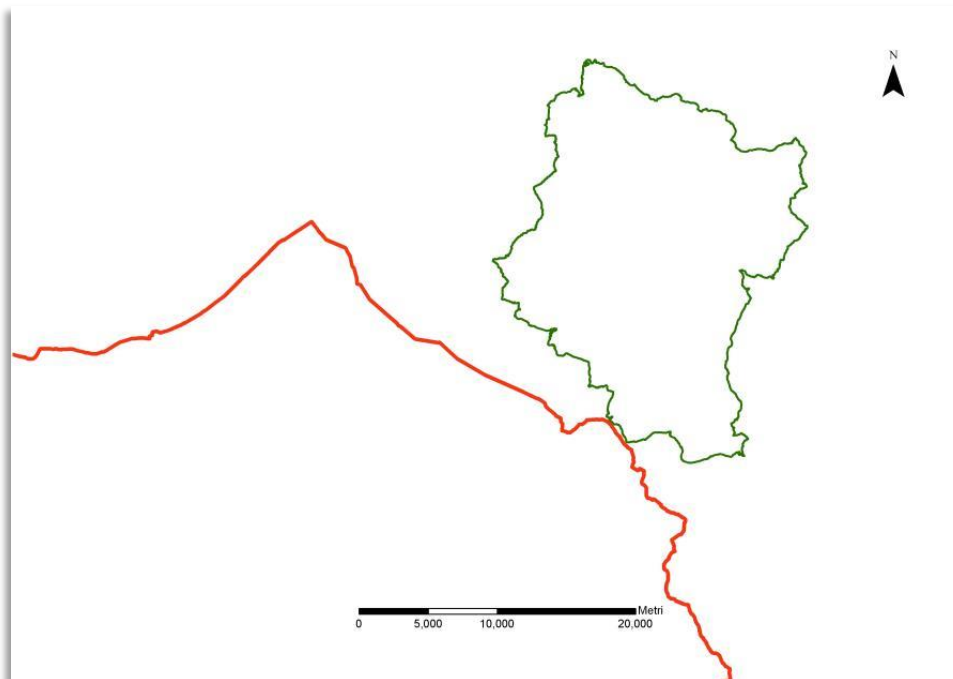


Fig.1.XXXIV. Proximity of BRUA project (red line) to the perimeter ROSPA0045 Strei-Hăteeg

1.9.6. Sanitary protection

According to GD 930/2005 (Article 2). 'Sanitary protection areas are established for the following objectives:

- underground aquifers or groundwater, and their intakes used to replenish the water supply to the population and to economic entities in the food and pharmaceutical industries, to medical units and socio-cultural constructions and installation of drinking water supply systems;
- mineral deposits and related intakes used for internal treatment or bottling plants and bottling plants operating mud treatment;
- therapeutic lakes and muds;
- intake of underground waters or groundwater used for bottling of drinking water, other than natural mineral water.

Delimitation of the protection areas is performed on various risk factors compared with the pollution potential, as follows:

- sanitary protection areas with strict regime;
- sanitary protection areas under restriction regime;
- hydro-geological protection perimeter;

BRUA route does not overlap with sanitary protection areas with a strict regime, and the limited risk associated to construction, operation and decommissioning stages, due to the lack of chemicals or significant quantities of hazardous substances as components of the technological processes, do not lead to the occurrence of any elements which may jeopardize proximal sanitary protection.

1.10. Information on existing documents / regulations on territorial planning / land use in the area of the Project site

The Project has been regulated by the issuance of the Urbanism Certificates, as follows:

- Urbanism Certificate no. 121 / 06.11.2015 for Giurgiu county
- Urbanism Certificate no. 119 / 11.06.2015 for Podișor GCS, Giurgiu County
- Urbanism Certificate no. 65 / 05.27.2015 for Teleorman county
- Urbanism Certificate no. 47 / 14.05.2015 for Dambovită county
- Urbanism Certificate no. 9/5857 / 27.05.2015 for Argeș County
- Urbanism Certificate no. 111 / 10.07.2015 for Ilt county
- Urbanism Certificate no. 41 / 07.16.2015 for Valcea county
- Urbanism Certificate no. 44 / 24.08.2015 for Gorj county
- Urbanism Certificate no. 8 / 06.05.2015 for Bibești GCS, Gorj county
- Urbanism Certificate no. 169 / 10.05.2015 for Hunedoara county
- Urbanism Certificate no. 207 / 02.09.2015 pentru Caras-Severin County
- Urbanism Certificate no. 117 / 06.03.2015 for Jupa GCS, Caras-Severin county
- Urbanism Certificate no. 241 / 13.10.2015 for Timis county
- Urbanism Certificate no. 48 / 08.09.2015 for Arad county

For some of the Protected Natural Areas Management Plans have been proposed, and during the elaboration of this documentation were in various approval stages.

1.11. Information on the proposed connection means to existing infrastructure

For safe operation of the gas compressor stations the connections to the utilities networks of utilities and existing infrastructure are required, as follows:

- Power supply - will be achieved through networks Transformer stations closet o AEL;
- By connection to existing water supply networks or by elaboration of local solutions for water supply through well bores (drinking water and firefighting water);
- Through connection or by providing mono-block water treatment plants for wastewater management;
- Access will be provided through derivations to existing access ways.

For each GCS the detailed solutions are presented as follows:

1.11.1. Podișor gas compressor station (GCS)

Access will be provided from county road DJ 412 B from Podișor Technological Node, by creating a derivation, to be asphalted for the entire length of the compressor station. Water supply will be provided from the existing local network of Podișor village through PE Ø 110 pipeline, for a distance of approx. 2,600 m. The necessary industrial water will be provided from alternative sources (drilling), and such solutions will be provided to the Engineer/Constructor.

For wastewater, given that to date there is no system of common network, the designer of the compressor stations will study the possibilities for wastewater discharge and will provide these facilities in the FEED, whereby the solution of a water treatment plant will be analyzed.

Power supply will be provided from the existing medium voltage 20 kV Goleasca – Clejani network; connection to be assured from a distance of 2,100 m from the site of Podișor gas compressor station. The network line will provide supply of 0.4 kV; in this regard an alternative source has been identified from the existing medium voltage 20 kV Potlogi – Tarom network, a distance of 1,300 m from Podișor gas compressor station, which also supplies power to Mănăstirea by a 0.4 kV network;

1.11.2. Bibești gas compressor station (GCS)

Access will be provided from a technological road, 285 m length, emerging from DJ661. The designer will also examine the usefulness of the additional connection to the existing local road East of the station site.

Water supply will be provided from the existing local network of Bibești village through PE Ø 110 pipeline, for a distance of approx. 420 m. The necessary industrial water will be provided from alternative sources (drilling), and such solutions will be provided to the Engineer/Constructor.

For wastewater, given that to date there is no system of common network, the designer of the compressor stations will study the possibilities for wastewater discharge and will provide these facilities in the FEED, whereby the solution of a water treatment plant will be analyzed.

Power supply will be provided from the existing medium voltage 20 kV network placed at a distance of approx. 600 m from the Hurezani gas compressor station, which also supplies triphasic power to Hurezani Technological Node with three phase 0.4 kV. A second possible supply source of medium-voltage 20 kV power network is at a distance of approx. 1,320 m from Hurezani gas compressor station.

1.11.3 Jupa gas compressor station (GCS)

Access will be provided from a paved road leading to Tehnocer SA Caransebes gravel pit, related to DN6 (about 550 m). The Engineer will also analyze the solution of direct connection to the national road DN 6 through a technological road.

Water supply will be provided from the existing local network of Zăgujeni village, for a distance of about 100m through PE Ø 110 pipeline for a distance of approx. 420 m. The necessary industrial water will be provided from alternative sources (drilling), and such solutions will be provided to the Engineer/Constructor.

For wastewater, given that to date there is no system of common network, the designer of the compressor stations will study the possibilities for wastewater discharge and will provide these facilities in the FEED, whereby the solution of a water treatment plant will be analyzed.

Power supply will be provided from the existing medium voltage 20 kV network managed by Enel Banat, where the proximal line is at a distance of about 550m.

All compression stations are equipped with uninterrupted power supply (UPS) that assures power supply to stations when the automatic transfer switch of power generators assuring (redundant) alternative power supply to stations is off.

Redundant power supply to stations is ensured by electric gas fired generators, sized so that when power is off there is the ability to provide the necessary power for normal operation of the compressor station. In addition, for

each compressor station there are two electric diesel fired generators installed that may be put into operation in extreme cases such as major breakdowns, when there's no electrical connection anymore, and gas pressure for said section is insufficient, or the gas turbine is out of order. Diesel fired electric generators (one active and a backup) will be sized so as to ensure on their own the operation of the entire plant.

1.12. The relationship of the proposed project with other existing or planned projects and the aggregated effects thereof

At national level the Interconnection Strategy for the National Gas Transmission System with the neighboring countries gas transmission systems has been developed.

At European level, starting with July 2009, a joint program has been adopted on economic recovery, with focus on the classification of measures taken by the European Commission aimed to counter-balance the consequences of the economic crisis, whose objective is the contribution to economic recovery and the response to the urgent needs of Member States in terms of securing energy resources.

By the new EU Cohesion Policy three main objectives were pursued: convergence, by assuring providing an atmosphere of competition and creating conditions for the regional-level cooperation across the whole European area.

In this context the connection and relation of BRUA Project with plans and programs have been determined by taking into account the regional dimension of this project, by a centripetal approach, starting from the relevant issues at European level to those set at national level.

1.12.1. The relation with the European Strategy for Sustainable Development (EuSSD)

EuSDS focuses on unsustainable trends related to: climate change and energy consumption, which represent a threat to public health, poverty and social exclusion, management of natural resources, loss of biodiversity, land use and transportation. EuSDS identifies key challenges, targets, operational objectives and corresponding actions. According to EuSDS emphasis is the use of on sustainable resources, their turning into value at a large scale, assurance of access on a large scale, and diversification of gas supplies, the interconnection of national systems and assurance of an extensive network in Europe aiming to avoid discontinuity of supply.

Thus, BRUA intends to put into practice the provisions of this strategy.

1.12.2. The relationship with the guiding principles for Sustainable Spatial Development of the European continent (DDTCE)

Following the Conference of Ministers responsible for Spatial Planning at European level some guidelines have been established outlining the measures through which citizens of the EU can achieve standards of modern living that guarantee and reflect a high standard of living.

From this perspective focus was on the exploitation of natural resources and on the development (diversification) of energy resources as a factor that assures socio-economic development and guarantees constant security.

One can notice thus BRUA congruence with DDTCE elements.

1.12.3. The relation with the Green Book on security of energy supply

Through the document "A European strategy for sustainable, competitive and secure energy" an appeal has been launched to support and commit all Member States in the inclusion of "energy security" clauses in trade agreements, in association and cooperation agreements with producer countries and transit countries establishing a conduct style that eliminates any disruption of energy circuits because of commercial disputes, and additionally outlined the measures to be adopted in the event of unilateral disruption.

In this context focus is on diversification of energy supplies with priority on routes coming from the SE.

One can notice thus BRUA congruence with the Green Paper elements on security of energy supplies and the significant contribution to the diversification of supply solutions and the contribution to European energy security by the creation of a new transmission corridor.

1.12.4. Relation with Government Programs

Lately, despite the great dynamics of the political arena and government programs of all political parties, the need to ensure energy sources and diversification is recognized as a priority while maintaining the interest towards committed actions through which the geostrategic position to be turned into an advantage, and Romania to become a pivotal point in the common European energy strategy. Thus, such Government Programmes facilitated both the European dimension of projects aimed to turn into value the energy resources and of national approaches aimed to expand the distribution networks.

In this regard consideration was paid to concrete solutions on enhancing energy security by upgrading national transmission and distribution systems and increasing the share of electricity production, while reducing consumption of conventional resources instead. Special attention was paid to projects that ensure future network services and a greater flexibility in energy management and energy production.

From this point of view, projects involving the development of production capacities that use natural gas are back in focus.

Again, these Government Programs have highlighted the need to strengthen Romania's energy independence by diversification of supply sources, by increase of interconnection degree of energy networks and by encouraging inter-related projects that enhance gas storage capacities. Attention was also paid to preparations for energy emergency situations with focus on the development of the transmission and storage infrastructure.

Thus, BRUA represents the materialization of these elements that reflect the common interests, consensual accepted by the political class irrespective of their doctrinal orientation, due to the commitment to the principles relating to national interest.

1.12.5. Romania's energy strategy for 2007-2020 (SER)

SER is a fundamental programme aimed at developing long-term socio-economic energy resources, and at providing energy sources and resources representing a fundamental, basic element, that need to be integrated in the economic sector.

The principles SER is based on are designed to assure the energy security, sustainable development and competitiveness of the energy sector.

Even a cursory analysis of the elements related to BRUA show Project's convergence with SER.

1.12.6. Mining Industry Strategy for the period 2010-2020 (SIM)

SIM has undergone a drastic change with the fall of emphasis on increased efficiency and industry outputs, technological developments (which enabled access to new, alternative energy resources) but also in the context of new policies towards a more careful conservation of environmental factors. Moreover, globalization has led to a widening of the markets (particularly hydrocarbon markets) posing significant barriers in the mining sector.

BRUA project appears thus as a natural orientation aimed at ensuring calorific type energy sources intended to offset the restrictions in energy production in the mining sector, representing the appropriate reorientation solution.

1.12.7. National Strategy for Sustainable Development of Romania - 2014-2020-2030 Perspective (SNDDR)

This document proposes and analyses the strategic planning and development of Romania, including forecasted financial support solutions so that the theoretical elements can be enforced.

SNDDR includes several related priorities of which many remain possible to secure the energy sources, and to this end the natural targets consisting of the use of natural resources, diversification of supply and assurance of a better interconnection with neighboring countries are a must.

It is therefore obvious that BRUA should become an item of high priority not only in terms of its approach as a major infrastructure investment, but also from the point of view of its operation.

1.13. Other activities or projects that may arise following the implementation of the project, both during construction and after completion of the project

BRUA, a project of major infrastructure investment, will be able to drive the generation and propagation of waves that will influence the socio-economic environment both at national (local / regional) level, but especially during the operation stage, at cross-national level. At local level we will experience a revival of business environment

services, since for Project support some services will be needed such as food services, repairs, supply of logistics services, mechanical services (repairs, oil changes, consumables, etc.). Given the urgency and the impossibility to plan these elements Project will have to use all local networks of business environments generating consistent profits, even if action time will be limited.

1.13.1. During execution

During the execution stage BRUA will mobilize a range of resources at national and local level through the task assumed by direct business (by concluding works supply contracts) aimed to construct a pipeline to transport natural gas, and also at other associated targets (GCS, Cathodic Protection, valve stations, access roads, etc.).

The volume of materials, raw materials, sand, equipment, etc., will involve a large number of carrier companies that will provide on hire delivery services.

We have to stress a particularity of BRUA, namely the fact that the dynamics of the work fronts work spanning for over 530 kilometers, including, beside the working strip, also technological roads, site organizations, storage facilities, etc. The spread distribution of these elements requires a an extended execution logistic that uses a whole range of local services support, from accommodation and meals, to the provision of complex services such as the supply of technical facilities, technological services, maintenance, repair works, technical inspections, etc.

1.13.2. During operation

During the operation stage BRUA will generate a significant impact in terms of expansion of transmission networks and gas supply networks for distribution to the population, while generating a number of local development projects of technical and public utility to the population.

A primary use of gas resources is in the energy sector. Thus, gas is a favorite source for conversion into electricity due to the flexibility of exploitation and due to the limited impact of gas fired plants on the environment. The conversion rate of gas into electricity remains high since such plants have a high efficiency

In addition, such facilities provide an entire range of services across the system that, in power networks represent an extremely important element, assuring a high efficiency operation under full security conditions.