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REPORT

ON EVALUATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF INVESTMENT PROPOSAL

Design and construction of new above-ground facilities – a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas Metering Station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones

NON-TECHNICAL SUMMARY



April 2022

Table of Contents

1	Characteristics of investment proposal.....	14
1.1	Overview of the investment proposal	14
1.2	Location	14
1.3	Physical characteristics of the investment proposal.....	14
1.3.1	Background.....	14
1.3.2	Site description	15
1.3.2.1	Inlet separation and GMS.....	17
1.3.2.2	GTCU 1,2, 3, 4	17
1.3.2.3	Gas pipelines on site	18
1.3.2.4	Individual separation.....	18
1.3.2.5	Manifold.....	18
1.3.2.6	Gas separation and heating	18
1.3.2.7	Pressure regulation	18
1.3.2.8	General separation.....	18
1.3.2.9	Gas drying plant	19
1.3.2.10	Triethylene glycol regeneration plant	19
1.3.2.11	Formation fluids separation plant	19
1.3.2.12	Electrical and C&I building	19
1.3.2.13	Building for: FGPU; Workshop for Instrumentation air; boiler room for heating, gas seal preparation installation.....	19
1.3.2.14	PPU, Switchgear, Distribution switchgear (KPY 20/0.4 kV)	19
1.3.2.15	Emergency diesel generator	20
1.3.2.16	Tank and pump station for fire-fighting water.....	20
1.3.2.17	Access control point	20
1.3.2.18	On-site water pipelines.....	20
1.3.2.19	Site sewerage system	20
1.3.3	Infrastructure connections.....	21
1.3.3.1	Road connections.....	21
1.3.3.2	Gas pipeline branches, pipings and gatherings to CS Chiren UGS.....	21
1.3.3.3	Branch from an existing water supply pipeline to Chiren UGS.....	21
1.3.3.4	Rainwater drainage from Chiren UGS.....	21
1.3.3.5	Technological site for flare system.....	21
1.3.3.6	Anode grounding devices.....	21
1.3.4	Areas required, (such as developed land, agricultural land, forest areas, etc.) during the construction phase and the operation phase.....	21
1.3.5	Crossings of natural and engineering obstacles.....	22
1.4	Description of the main characteristics of the stage of operation of the investment proposal.....	22
1.4.1	Basic technological processes.....	22
1.4.2	Current state.....	22
1.4.3	Expansion of the new site.....	23
1.4.4	Basic raw materials and materials for the realisation of the investment proposal and their transportation.....	23
1.4.4.1	During the construction works	23
1.4.4.2	During the operation.....	23
1.4.5	Stages of implementation (construction works, operation, decommissioning).....	24
1.4.5.1	Construction works	24
1.4.5.2	Operation	26
1.4.5.3	Decommissioning	26
1.5	Assessment by type and amount of expected residual substances and emissions	26
1.5.1	Expected waste.....	27
1.5.1.1	During the construction works	27
1.5.1.2	During the operation	27

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

1.5.2	Water contamination	27
1.5.2.1	During the construction works.....	27
1.5.2.2	During the operation.....	28
1.5.3	Air pollution.....	29
1.5.3.1	During the construction works.....	29
1.5.3.2	During the operation.....	29
1.5.3.3	Quantitative emission estimates.....	30
1.5.3.4	Greenhouse gas emissions.....	31
1.5.4	Soil contamination	31
1.5.4.1	During construction.....	31
1.5.4.2	During operation.....	31
1.5.5	Noise, vibration, radiation.....	32
1.5.5.1	During construction.....	32
1.5.5.2	During operation.....	32
1.5.6	Risks from the presumed human health effects.....	33
1.5.6.1	During construction.....	33
1.5.6.2	During operation.....	33
1.6	Comparison of the proposed technologies and installations with the conclusions submitted in the comparative best available techniques guidance documents	33
2	Alternatives for the implementation of the investment proposal.....	34
2.1	Zero alternative.....	34
2.2	Other alternatives	34
2.2.1	In terms of location.....	34
2.2.2	In terms of the technology.....	34
2.2.3	Alternative in terms of facility capacity.....	35
2.2.4	In terms technical and economic indicators of the number of GTCU.....	35
2.3	Choice of alternative, taking into account the effects of IP impacts on the environment.....	35
3	Description of relevant aspects of the current environmental situation.....	36
3.1	Ambient air and climate	36
3.1.1	Climatic conditions.....	36
3.1.1.1	Existing condition	36
3.1.1.2	Short description of the possible evolution if the IP is not implemented.....	36
3.1.2	Ambient air quality standards	36
3.1.3	AAQ assessment.....	36
3.1.3.1	Existing condition	36
3.1.3.2	Summary of likely evolution if the IP is not implemented.....	37
3.2	Waters	37
3.2.1	Surface waters.....	37
3.2.1.1	Existing condition	37
3.2.1.2	Summary of likely evolution if the IP is not implemented.....	37
3.2.2	Underground waters	37
3.2.2.1	Existing condition	37
3.2.2.2	Summary of likely evolution if the IP is not implemented.....	37
3.3	Soils.....	38
3.3.1	Existing condition.....	38
3.3.2	Summary of likely evolution if the IP is not implemented	38
3.4	Subsoil and mineral diversity.....	38
3.4.1	Existing condition.....	38
3.4.1.1	Geological structure	38
3.4.1.2	Physical and geological processes and phenomena	38
3.4.1.3	Seismicity	38
3.4.1.4	Engineering and geological conditions.....	38

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

3.4.1.5	Mining usufruct	38
3.4.2	Summary of likely evolution if the IP is not implemented	38
3.5	Landscape and natural sites	39
3.5.1	Existing condition	39
3.5.2	Summary of likely evolution if the IP is not implemented	39
3.6	Biodiversity	39
3.6.1	Flora.....	39
3.6.1.1	Existing condition	39
3.6.1.2	Summary of likely evolution if the IP is not implemented.....	39
3.6.2	Fauna.....	40
3.6.2.1	Existing condition	40
3.6.2.2	Summary of likely evolution if the IP is not implemented	40
3.6.3	Protected territories and protected zones.....	40
3.6.3.1	Existing condition	40
3.6.3.2	Summary of likely evolution if the IP is not implemented.....	40
3.7	Cultural and historical heritage.....	40
3.7.1	Existing condition.....	40
3.7.2	Summary of likely evolution if the IP is not implemented	40
3.8	Harmful physical factors	41
3.8.1	Existing condition.....	41
3.8.2	Summary of likely evolution if the IP is not implemented	41
3.9	Waste	41
3.9.1	Existing condition.....	41
3.9.2	Summary of likely evolution if the IP is not implemented	41
3.10	Health and hygiene aspects	42
3.10.1	Existing condition.....	42
3.10.1.1	Population and demographic features	42
3.10.1.2	Population migration (mechanical growth)	42
3.10.1.3	Demographic indicators.....	42
3.10.1.4	Diseases incidents and morbidity of the population	42
3.10.2	Summary of likely evolution if the IP is not implemented	42
3.11	Tangible assets	42
3.11.1	Existing condition.....	42
3.11.2	Summary of likely evolution if the IP is not implemented	42
4	Description of the elements under Article 95(4) which are likely to be significantly affected by the investment proposal	42
4.1	Methodology for assessing impacts on environmental components and factors.....	43
4.2	Ambient air and climate	45
4.2.1	Ambient air – identifying pollution zones	45
4.2.1.1	Impact during construction	45
4.2.1.2	Impact during operation.....	46
4.2.1.3	Assessment methodology	46
4.2.1.4	Identification of impacts	46
4.2.2	Climate.....	46
4.2.2.1	Impact during construction and operation.....	47
4.2.2.2	Measurement control.....	47
4.2.2.3	Methodology for calculating annual amounts of pollutants in ambient air - NO _x , SO ₂ , CO	
4.3	Waters	47
4.3.1	Surface water.....	47

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

4.3.1.1	Assessment methodology	47
4.3.1.2	Identification of impacts.....	47
4.3.1.3	Assessment of impacts	48
4.3.2	Ground water	48
4.3.2.1	Assessment methodology	48
4.3.2.2	Identification and assessment of impacts	49
4.4	Soils	
4.4.1	Assessment methodology.....	49
4.4.2	Identification of impacts	49
4.4.3	Assessment of impacts.....	50
4.5	Subsoil and mineral diversity.....	50
4.5.1	Assessment methodology.....	50
4.5.2	Identification and assessment of the impacts during construction	50
4.5.3	Identification and assessment of the impacts during operation.....	51
4.6	Landscape and natural sites.....	51
4.6.1	Assessment methodology.....	51
4.6.2	Identification of impacts	51
4.6.3	Assessment of impacts.....	52
4.7	Biodiversity	52
4.7.1	Assessment methodology.....	52
4.7.2	Identification of impacts	52
4.7.2.1	Impact during construction.....	52
4.7.2.2	Impact during operation	53
4.7.3	Flora.....	53
4.7.3.1	Impact during construction.....	53
4.7.3.2	Impact during operation	53
4.7.4	Fauna	53
4.7.4.1	Mammals (other than bats)	53
4.7.4.2	Bats	53
4.7.4.3	Birds	53
4.7.4.4	Amphibians and reptiles	54
4.7.4.5	Terrestrial invertebrates	54
4.7.4.6	Fish and aquatic invertebrates	55
4.7.5	Protected areas and protected zones.....	55
4.8	Cultural – historical heritage.....	55
4.8.1	Assessment methodology.....	55
4.8.2	Identification and assessment of impacts during construction	55
4.8.3	Identification and assessment of impacts during operation.....	55
4.9	Harmful physical factors	55
4.9.1	Assessment methodology.....	55
4.9.2	Identification of impacts	55
4.9.2.1	Impact during construction.....	55
4.9.2.2	Impact during operation	56
4.9.3	Assessment of impacts.....	57
4.9.3.1	Impact during construction.....	57
4.9.3.2	Impact during operation	57
4.10	Waste.....	58
4.10.1	Impact during construction.....	58
4.10.2	Impact during operation	58
4.11	Health and hygiene aspects	58

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

4.11.1	Assessment methodology.....	58
4.11.2	Impact during construction.....	59
4.11.3	Impact during operation	59
4.12	Tangible assets	59
4.12.1	Assessment methodology.....	59
4.12.2	Impact during construction.....	60
4.12.3	Impact during operation	60
4.13	Summary of impacts.....	60
5	The likely significant environmental effects of the investment proposal arising from	70
5.1	The construction and operation of the investment proposal, including demolition, destruction and decommissioning activities, if applicable.....	70
5.1.1	The likely significant environmental effects of the investment proposal arising from the construction of the investment proposal including demolition, destruction activities .	70
5.1.1.1	Ambient air and climate.....	70
5.1.1.2	Waters	70
5.1.1.3	Soils.....	70
5.1.1.4	Subsoil and mineral diversity.....	70
5.1.1.5	Landscape and natural objects	70
5.1.1.6	Biodiversity, Pas and PNAs.....	70
5.1.1.7	Cultural historical heritage.....	70
5.1.1.8	Health and hygiene aspects.....	70
5.1.1.9	Tangible assets	71
5.1.2	The likely significant environmental impacts of the investment proposal arising also from the operation of the investment proposal	71
5.1.2.1	Ambient air and climate.....	71
5.1.2.2	Waters	71
5.1.2.3	Soils.....	71
5.1.2.4	Subsoil and mineral diversity.....	71
5.1.2.5	Landscape and natural objects	71
5.1.2.6	Biodiversity, PAs and PNAs	71
5.1.2.7	Cultural historical heritage.....	71
5.1.2.8	Health and hygiene aspects.....	71
5.1.2.9	Tangible assets	71
5.1.3	The likely significant consequences of the environmental impacts of the investment proposal arising also from decommissioning.....	71
5.2	The use of natural resources, in the particular subsoil, soil, water and biological diversity, taking into account, as far as possible, the sustainable availability of these resources	72
5.2.1	Waters.....	72
5.2.2	Soils	72
5.2.3	Subsoil and mineral diversity	72
5.2.4	Biological diversity	72
5.3	The emissions of pollutants, noise, vibrations, non-ionising radiations and radiation; the occurrence of harmful effects and disposal and recovery of waste	72
5.3.1	Emissions of pollutants.....	72
5.3.2	Noise, vibration, non-ionising radiations and radiation; the occurrence of harmful effects.....	72
5.3.2.1	Noise, vibration, non-ionising radiations and radiation; the occurrence of harmful effects during construction	72
5.3.2.2	Noise, vibration, non-ionising radiations and radiation; the occurrence of harmful effects during operation.....	73
5.3.3	Disposal and recovery of waste	73

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

5.4	Risks to human health, cultural heritage or the environment, including as a result of accidents or catastrophes.....	73
5.4.1	Risks to human health	73
5.4.2	Risks to cultural heritage	73
5.4.3	Risks for the environment.....	73
5.4.3.1	Ambient air	73
5.4.3.2	Waters	73
5.4.3.3	Soils.....	73
5.4.3.4	Subsoil and mineral diversity.....	74
5.4.3.5	Landscape and natural objects	74
5.4.3.6	Biological diversity, PAs and PNAs.....	74
5.5	Combining the impact with the impact of other existing and/or approved investment proposals, taking into account any existing any environmental problems related to areas of particular ecological importance that are likely to be affected or related to the use of natural resources....	74
5.5.1	Other existing and/or approved investment proposals	74
5.5.1.1	Ambient air and climate.....	74
5.5.1.2	Waters	74
5.5.1.3	Soils.....	74
5.5.1.4	Subsoil and mineral diversity.....	75
5.5.1.5	Landscape and natural objects	75
5.5.1.6	Biological diversity, PAs and PNAs.....	75
5.5.1.7	Cultural historical heritage.....	75
5.5.1.8	Harmful physical factors	75
5.5.1.9	Waste	75
5.5.1.10	Health and hygiene aspects.....	75
5.5.1.11	Tangible assets	75
5.5.2	Combining the impact with the impact of other existing and/or approved investment proposals	75
5.5.3	Existing environmental problems related to areas of particular environmental importance	75
5.5.4	Existing environmental problems related to the use of natural resources....	75
5.6	The climate impact of the investment proposal (e.g. the nature of extent of greenhouse gas emissions) and the vulnerability of the investment proposal to climate change	76
5.7	Use of technologies and substances	76
5.7.1	Hazardous chemical substances.....	76
5.7.2	Enterprises or facilities with a low or high risk potential	76
6	Estimated methods or data used to determine and prepare the assessment	77
6.1	Ambient air and climate	77
6.2	Waters	77
6.2.1	Surface water.....	77
6.2.2	Ground water	77
6.3	Soils.....	77
6.4	Subsoil and mineral diversity.....	77
6.5	Landscape and natural sites.....	77
6.6	Biological diversity	77
6.7	Cultural – historical heritage.....	77
6.8	Harmful physical factors	77
6.9	Waste.....	77
6.10	Health and hygiene aspects	77
6.11	Tangible assets	77
7	Description of the intended mitigation and monitoring measures	77

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

7.1	Ambient air and climate	77
7.2	Waters	78
7.2.1	Surface water.....	78
7.2.2	Ground water	78
7.3	Soils	79
7.4	Subsoil and mineral diversity.....	79
7.5	Landscape and natural objects.....	79
7.6	Biological diversity	80
7.7	Cultural – historical heritage	80
7.8	Harmful physical factors	80
7.9	Waste.....	80
7.10	Health and hygiene aspects	80
7.11	Tangible assets	80
7.12	Plan for implementing the measures.....	81
8	Description of the anticipated significant adverse impacts from the investment proposal on the environment and on human health arising from the vulnerability of the investment proposal and the risk of major incidents and/or disasters of major importance	88
8.1	Risk assessment	88
8.1.1	Accidents related risks.....	88
8.1.2	Risk assessment methodology	88
8.1.3	Risk assessment.....	88
8.1.4	Environmental risk	89
8.2	Description of the anticipated adverse impacts of the investment proposal on the immediate environment and on human health resulting from the vulnerability of the investment proposal to the risk of major incidents and/or relevant disasters	89
8.2.1	Atmospheric air	89
8.2.2	Waters.....	89
8.2.2.1	Surface water.....	89
8.2.2.2	Ground water	89
8.2.3	Soils.....	90
8.2.4	Subsoil and mineral diversity.....	90
8.2.5	Landscape and natural reserves.....	90
8.2.6	Biological diversity.....	90
8.2.7	Cultural and historical heritage.....	90
8.2.8	Harmful physical factors	90
8.2.9	Waste	91
8.2.10	Health and hygiene aspects	91
8.2.11	Tangible assets	91
8.3	Monitoring and applicable measures for preventing or mitigating significant adverse effects form the above described events on the environment and on human health	91
8.4	Details regarding the readiness for and the manner of response to emergency situations	92
9	Opinion and received conclusions.....	92
10	Description of the difficulties, (technical reasons, scarcity or lack of data) encountered during the collection of information for the development of the EIA Report.....	92
11	Conclusion conforming with the requirements of Art. 83 par. 5	93

List of Figures

Figure 1 Diagram of wells' location at Chiren UGS.....	16
Figure 2 Diagram of the DD of all installation point sources located at the existing an at the new site of Chiren	34
Figure 3 Soil varieties in the region of UGS Chiren	44
Figure 4 Landscape groups in the region of UGS Chiren	46
Figure 5 Visual impact	62

List of Tables

Table 1 Matrix for summarizing the potential impacts of implementing the IP.....	75
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List of abbreviations used

BD Basin Directorate
BD DR Basin Directorate Danube Region
PCU Piston compressor unit
FGPU Fuel Gas Preparation Unit
DWWTP Domestic waste water treatment plant
WSS Water Supply and Sewerage
GMS Gas Metering Station
GEC Gas engine compressor
GTE Gas turbine engine
GTCU Gas Turbine Compressor Unit
SG State Gazette
ICE Internal combustion engines
EIAR Environmental Impact Assessment Report
ECU Electric Compressor Unit
EKATTE Unified classifier of administrative-territorial and territorial units
BDA Biological Diversity Act
WA Water Act
EA Energy Act
PA Protected area
CHA Cultural Heritage Act
CCMA Climate Change Mitigation Act
EPA Environmental Protection Act
PPA Public Procurement Act
WMA Waste Management Act
SDA Spatial Development Act
ExEA Executive Environment Agency
SDS Safety Data Sheet
IP Investment proposal
DD Discharge device

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

AAQ Ambient air quality

C&I Control and instrumentation

EF Efficiency factor

VA Valve assembly

CP Complex permit

DSG Distribution switchgear

CS – Compressor Station

CU - Compressor unit

HFL Highly flammable liquids

MH Ministry of Health

MEW Ministry of Environment and Water Ministry of Environment and Water

ELV emission limit values

BAT Best Available Techniques

EIA Environmental Impact Assessment

GHG Greenhouse gas

UGS Underground Gas Storage

PPU Production Power Unit

FF Fire-fighting

WWTP Waste water treatment plant

RBMP River Basin Management Plan

FRMP Flood Risk Management Plan

RHI Regional Health Inspection

RIEW Regional Inspectorate of Environment and Water

MCP Medium combustion plant

CIW Construction and Installation Works

TEG Triethylene glycol

FDP Fine dust particles

CC Centrifugal compressor

Introduction

Investor and contractor information

This evaluation of Environmental impact assessment (EIA) concerns investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

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Company in charge of the procedure under Chapter Six of the Environmental

Protection Act:

CHIMCOMPLECT ENGINEERING AD with Executive Director Dpil. Eng. Krikor Topakbashiyan, which company is a participant in association UGS CHIREN-ENGINEERING DZZD and, according to an agreement of association establishment, is in charge of implementation of the activities under the EPA of the subject-matter of contract No. 4922/29.03.2021.

Head of EIAR: Mirolyub Todorov Lozanov

Information on EIA procedure

The Environmental Impact Assessment (EIA) Report of the investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones with Contracting authority Bulgartransgaz EAD is being developed based on letter Outgoing № OBOC-17/16.03.2021 of the competent authority MoEW.

Based on this MoEW letter, Terms of Reference for the scope and content of the EIA has been prepared, which complies with the requirements of Art. 10, para. 3 of the Ordinance on the conditions and procedures for carrying out an environmental impact assessment - the EIA Ordinance (SG No. 25/2003, last amended and supplemented SG No. 67 of August 23, 2019). Together with the Terms of Reference, an Application was prepared and submitted with scope and content of Annex No. 1 of the Ordinance under Art. 119 of the EPA, in accordance with

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

the requirements of Art. 10, para. 3, item 9, "a" of the EIA Ordinance, as well as an updated notification for classification under Art. 103, para. 5 of the EPA and application under Annex No. 3 of the Ordinance under Art. 103, para. 9 of the EPA without the annexes.

Pursuant to the requirements of MoEW letter, consultations were held with the competent authority, specialized departments and representatives of the public concerned, in accordance with Art. 9, para. 1 and para. 4 of the EIA Ordinance - MoEW, MH, ME, RIEW Vratsa, Basin Directorate Danube Region, with centre Pleven and the public concerned - Vratsa Municipality, the village of Chiren.

Regarding the submitted Terms of Reference for the scope and content of the EIA for the investment proposal, in its letter Outgoing No. OBOC-17/11.01.2022, the competent authority MoEW has expressed an opinion that: the submitted Terms of Reference has been prepared according to the requirements of Art. 95, para. 2 of the EPA and complies with Art. 10, para. 1 and para. 3 of the EIA Ordinance.

The EIA report was prepared in accordance with Art. 96, para. 1 of the Environmental Protection Act (EPA, SG No. 91/2002, last amended SG No. 21 of March 12, 2021) and Art. 12, para. 1 of the Ordinance on the conditions and procedures for carrying out an EIA (EIA Ordinance, SG No. 25/2003 last amended and supplemented SG No. 67 of August 23, 2019). It observes the content of the Terms of Reference approved by the MoEW and complies with the requirements of Art. 96, para. 1 of the EPA and with the requirements of:

- *MoEW - letter Outgoing No. OBOC-17/11.01.2022*
- *RIEW Vratsa - letter Outgoing No. OBOC-EO-271(1), 14.10.2021*
- *MH opinion - letter Outgoing No. 26-00-2950/10.11.2021*
- *Basin Directorate Danube Region - letter Outgoing No. ПУ-01-128(4), Pleven, 24.09.2021*
- *Ministry of Energy - letter Outgoing No. E-26-B-566, 04.10.2021*
- *Vratsa Municipality - letter Outgoing №0400-139(3), 28.09.2021*

Pursuant to Art. 10, para. 6 of the EIA Ordinance, as a separate **Annex to the EIA report, the assessment under Art. 99a, para. 1 of the EPA – assessment on application of BAT**, shall be enclosed. In preparing the assessment, the scope and content requirements have been observed for determining the best available techniques under the Ordinance on the terms and procedure of issuing complex permits and methodological guidelines, approved by the Minister of the Environment and Water - according to §1a of the Additional provisions of the EIA Ordinance. Since the EIA procedure of the IP is being carried out according to Art. 94, para. 1 of the EPA, it falls within Annex No. 1 and is subject to a general EIA procedure and the procedure under Art. 117, para. 1, so the Assessment on application of BAT according to Art. 99a, para. 1 of the EPA is presented in the enclosed Application for CP (Annex II).

The EIA report was prepared by a group of experts with a supervisor holding a master's degree and meet the requirements of Art. 11, para. 4 of the EIA Ordinance.

1 Characteristics of the investment proposal

1.1 Overview of the investment proposal

The purpose of the storage facility is to compensate seasonal fluctuations in domestic gas consumption and to store certain quantities of natural gas as emergency reserve. The gas storage operation is cyclic, whereas the natural gas injection period is within April - October and the natural gas withdrawal period is within November - March.

The investment proposal for expansion (above-ground part) of Chiren UGS aims to achieve an active storage gas volume of 1,000,000,000 m³ at 150 barg reservoir pressure and daily withdrawal of up to 10,000,000 m³. In order to achieve the described parameters, a new technological site will be set up with all the necessary new technological equipment, adjacent to the existing one and inseparably connected to the territory of the currently operating Chiren UGS. It is planned after construction and commissioning of the newly designed equipment, the existing equipment at the old site to be kept in reserve until the operational safety of the new equipment is proven. After that period, upon reaching the optimal operating mode of the new facilities and proving their effectiveness, the existing natural gas injection and withdrawal facilities will be kept as reserve and will be kept at Chiren UGS site. Setting up of the new site and its equipment will not result in changing the essence of the operating processes currently taking place at the existing operational site of Chiren UGS. The planned increase in the active volume of the storage will be achieved by increasing the injection capacity of equipment mostly by a general increase in the power of compressor units used, as well as of their efficiency.

Design options have been developed for the IP. In the **EIA Report, the design options proposed by the Contracting authority are described and equally evaluated.**

1.2 Location

The compressor station of the expansion of the above-ground facilities of Chiren UGS, will be implemented on a new site located in the land of the village of Chiren, Vratsa Municipality, Vratsa district and in close proximity to the existing one. The necessary area for implementation of the investment proposal, according to the technological, fire protection and construction requirements, is approximately 82.24 dka. Site dimensions will be 300 m to 320 m, located in an agricultural area. The affected properties at site are owned by municipal-private, private and public-private partnerships. The area required for purchase is about 82.24 dka. It is planned to establish a 10.0m easement outside the design fence, which falls within the purchase area.

The location of the new site is more than 1.2 km from the building boundaries of the village of Chiren. The field has existing technical infrastructure and tangible assets.

1.3 Physical characteristics of the investment proposal

1.3.1 Background

The Investment proposal includes Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

In injection mode, 3+1 gas turbine compressor units (GTCU), each with a total rated thermal input of 18 MW, will be used at the newly set up site. The fuel gas required for GTCU operation, as well as the gas for own needs, will be heated in the fuel gas preparation unit

Non-technical summary of EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage (UGS) and their connection to the existing ones.

(FGPU). This process will be carried out by three water heating boilers, operating in 2+1 mode, each with 0.1 MW thermal input, and 0.3 MW total rated thermal input. In addition to technological needs, these boilers provide heat-transfer medium for room heating - FGPU.

In withdrawal mode, gas will pass through a gas heating system consisting of 5 gas heaters (each with a thermal input of 3.1 MW) operating in 4+1 mode with a total installed thermal input of 15.5 MW. After depressurization, the gas will pass through a drying plant. It will consist of three absorption columns and a general system for regeneration of triethylene glycol. The TEG regeneration system will consist of two heaters (in 1+1 mode) for TEG, each of 0.7 MW power. The TEG regeneration plant will have 1.4 MW total thermal input.

Separate water heating boilers will be used for household needs at site:

- *For access control point - with 0.004 MW power;*
- *For Production Power Unit (PPU) building - with 0.042 MW power;*
- *For GMS building – two boilers each with 0.1 MW power.*

The newly installed total rated thermal input at Chiren UGS site will be in the amount of 89,446 MW.

1.3.2 Site description

Chiren UGS operation is carried out by exploitation-injection and observation wells.

So far, 24 exploitation wells have been constructed, connected by gas pipelines (gatherings) to the UGS site, as well as 14 observation wells, used to monitor the change in static levels depending on the volume of gas and its reservoir pressure in the productive horizons of the underground storage. Gas pipelines are located underground at 0.8 to 1 m depth. After compression, carried out in CS Chiren, gas is injected into the wells by means of constructed gatherings.

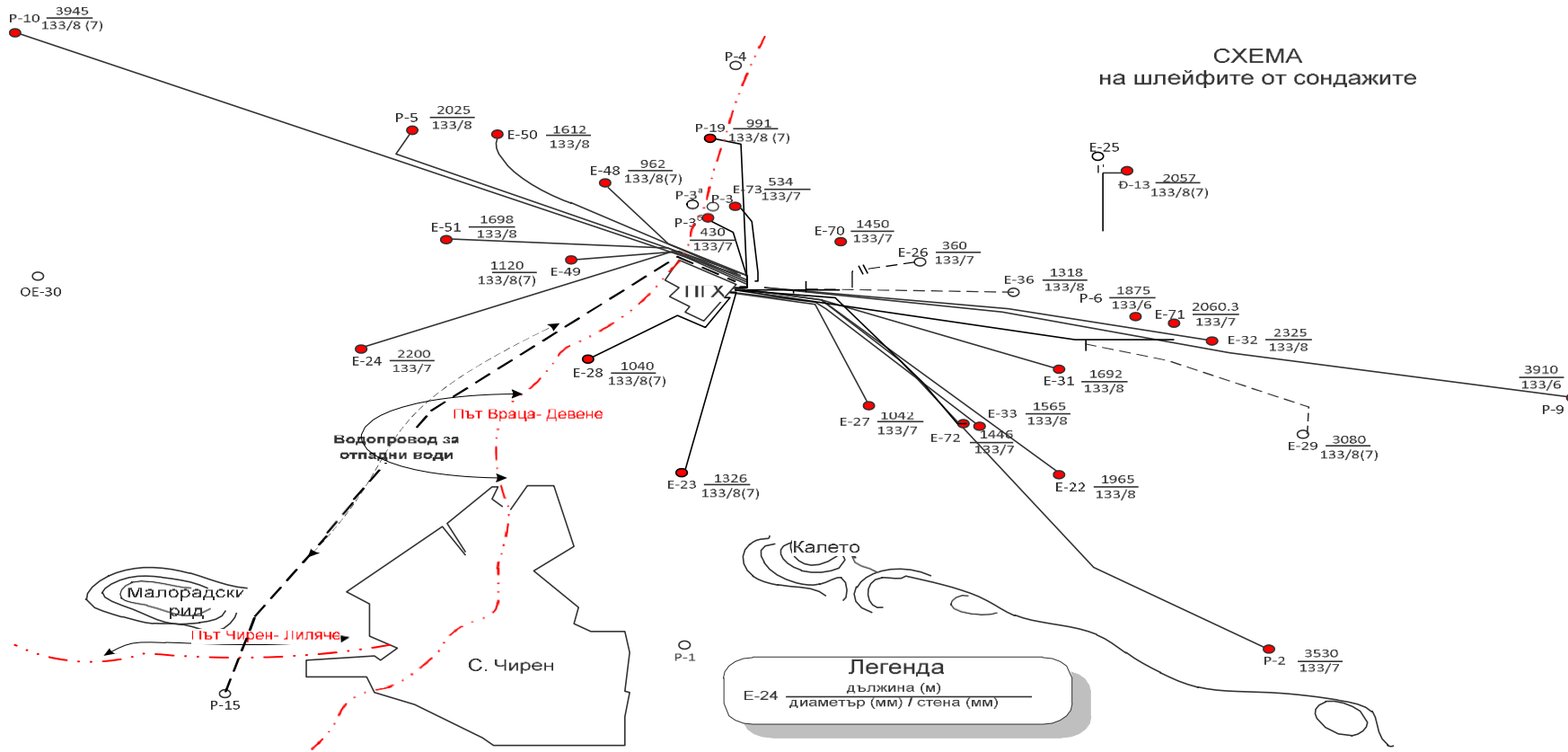


Figure 1 Diagram of wells' location at Chiren UGS

Currently, the following main buildings and facilities are located on the main, existing site of the Company, at an area of 53,313 m² and a built-up area of 5,174 m²: Administrative building with canteen and kitchen; Company gas station; Compressor workshop; Garages; Warehouses; Service-operational unit; Gas metering point; Fan cooling towers; Gas drying plant; Gas AVG and water cooling plant; Collective manifold; Pump station for industrial water; Storage tank for MC-20 oil and triethylene glycol (TEG), etc.

There is a warehouse for highly flammable liquids (HFL) close to the main site, with a separate Excise tax warehouse for energy product - gas condensate, where the following are located: Methanol tank; Automatic pouring device (stand) and automatic discharge device for methanol; Gas condensate tank, equipped with fire extinguishing and cooling systems; Autofill device (stand) for gas condensate; Pump station for gas condensate and methanol; Modular moveable container to the tax warehouse, for administrative-domestic and service activities; Underground tank for fire-fighting water with pump station, Storz fire hydrants and nozzles; Underground water drainage tank.

The total installed thermal input of the currently operating site is **34.66 MW**, as follows:

- *Gas engine compressors type ГМК -10 ГКHAM № 1÷8 with heat capacity 3.88 MW each;*
- *Water heating boilers BUDERUS, type G 605-740/12 № 1÷3 with rated thermal input 0.74 MW each and*
- *Triethylene glycol regeneration unit № 1 with 1.4 MW power.*

In addition, emergency gas unit No. 1 with 1.67 MW rated thermal input is also available at site.

The newly designed equipment, which will ensure Chiren UGS operation, will be located at a newly designated technological site (shown in **Annex 1 and Annex 2 of the EIAR**) in the immediate vicinity southwest of the existing one. The equipment consists of four gas turbine compressor units (GTCUs), including a gas turbine engine (GTE), driving two centrifugal compressors (CC), ancillary equipment to the GTCU, individual separation unit, Gas metering station (GMS), manifold, gas purification and heating, general separation, gas drying plant, triethylene glycol regeneration plant, formation fluids separation plant. In addition to the above equipment, a production and energy unit (PEU), a fuel gas preparation unit (FGPU), a tank with a fire-fighting pump station, access control point and a fence are also planned to be constructed.

1.3.2.1 Inlet separation and GMS

The purpose of the inlet separation and GMS is to ensure the necessary gas purity and its metering before passing through GTCU in injection mode, as well as quality control of that gas and reducing its pressure to operating parameters in withdrawal mode.

The inlet separation system and GMS consist of two main parts - filter separators and metering lines. There will be six filter separators, vertical, cartridge type, located outdoors. The condensate collected from them will be directed by pipelines to formation fluids treatment system and in close proximity to filter-separators a building housing the GMS will be constructed. In withdrawal mode from Chiren UGS, the gas passes through the GMS, where its pressure is decreased to the operating parameters of the respective gas pipeline for which it is intended - 37 - 44 barg for Vratsa I and Vratsa II, and 50 - 75 barg for stage part of site: Expansion of the gas transmission infrastructure of Bulgartransgaz EAD parallel to the north (main) gas pipeline to the Bulgarian-Serbian border“ at Valve assembly Butan-Chiren, the passing gas quantity is metered and its quality is verified by a gas analyser/chromatograph.

1.3.2.2 GTCU 1, 2, 3, 4

Four GTCUs (gas turbine compressor units) are planned to be installed at the new site of Chiren UGS, each of 18 MW rated thermal input. GTCU will provide the necessary pressure increase during natural gas injection mode at Chiren UGS. The operating configuration will be 3 + 1, three operating GTCUs and one back-up. Each GTCU is equipped with a gas turbine engine (GTE), driving two centrifugal compressors (CC) via a common shaft (tandem configuration). Each GTCU also includes an electrical and control and instrumentation building, an underground oil tank, drainage water and gas condensate, an oil cooler, a fire protection system and a fuel gas system.

The substances discharged from each GTCU - drain water, gas condensate and oil - will be collected in the atmospheric reservoirs provided for each GTCU and the relevant waste will be treated according to the Waste Management Act (WMA) after being classified according to Ordinance No. 2 on the classification of waste.

1.3.2.3 Gas pipelines on Site

On-site pipelines of various diameters are planned to be installed to ensure natural gas transmission between the individual units and facilities.

1.3.2.4 Individual separation

The individual separation unit will be used in withdrawal mode from Chiren UGS and it will provide separation of liquid impurities from natural gas during natural gas withdrawal from UGS. The unit will consist of 28 individual vertical filter separators (one for each well). In addition to separating the liquid phase, methanol will be injected into the individual separation unit in order to prevent the formation of crystal hydrates in equipment. The separated fluid will be transported by pipelines to the formation fluids separation plant (three-phase separation).

A methanol tank of 30 m³ capacity will be constructed on the new site of Chiren UGS, which will ensure the operating process for 40 days.

1.3.2.5 Manifold

The designed manifold is a system that will ensure the separation of solid particles from natural gas (in withdrawal mode from UGS), as well as metering of the passing gas through an orifice plate. The manifold consists of 28 separate lines, one for each well. Individual separation filters will be installed on the same lines. The separation of solid pollutants from the withdrawn natural gas will be provided by cyclone separators. The separated solids and condensate will be directed to condensate tanks to the formation fluids treatment system.

1.3.2.6 Gas separation and heating

Gas separation and heating group will ensure the attainment of the relevant natural gas parameters prior to the next steps of dehydration and pressure drop. This group will be designed to operate at 2 000 000 – 10 000 000 Nm³/d, with a pressure of 60-140 barg and temperature 8 – 40°C.

Three separators are expected to be installed 3 that will run in 2 + 1 (two in operation and one back-up).

Following the separation, the gas will be heated. The system consists of five heaters (operating 4 + 1), connected to a common antifreeze tank (a mix of water and propylene glycol).

1.3.2.7 Pressure regulation

The unit will ensure pressure drop of the gas withdrawn prior to its dehydration. The

exit pressure will be within the range (55 – 80 barg) and will depend on the direction in which it will be pumped beyond UGS site. To ensure the work process, two lines are provided, which will operate in 1 + 1 mode (one in operation and one back-up).

1.3.2.8 General separation

The purpose of the total separation is to capture any condensate formed after reducing gas pressure in withdrawal mode. The unit will consist of three filters in 2 + 1 configuration (two in operation and one back-up). The filters will be vertical with automatic separation of the collected condensate and its direction to the three-phase separator (formation fluids separation system).

1.3.2.9 Gas drying installation

The facility will consist of three absorption columns, ensuring the natural gas dehydration. The absorbent used in the columns will be triethylene glycol (TEG). The facility is envisaged for the entire passing through gas quantity during withdrawal -2 000 000 – 10 000 000 Nm³/d and will consist of three absorption columns, operating in 2 + 1 mode (two in operation and one back-up). Natural gas with moisture content will enter the columns, which will be absorbed by the dehydration agent – TEG. After saturation, the triethylene glycol will be automatically separated and will pass through a regeneration facility.

1.3.2.10 Triethylene glycol regeneration facility

The triethylene glycol regeneration facility is an inseparable part of the gas drying plant and will ensure continuous feed of dry TEG to the operating absorption columns. The facility will be designed with a capacity of 1100 kg/h triethylene glycol at a pressure of 4,5 barg. The temperature range of the facility is +25 - +204°C. Following the evaporation of the absorbed water, TEG will be cooled by about 5°C and will be pumped into the absorption columns.

1.3.2.11 Installation for separation of formation fluids

Drainage water and condensate separated in the facilities listed above in withdrawal and injection mode are collected in the formation fluids separation facility.

The installation will include three drainage atmospheric tanks (each with a volume of 5m³) and two horizontal three-phase separators operating in 1 + 1 mode (one in operation and one back-up) and with overall dimensions D = 2200 mm and L = 6900 mm. Their construction will ensure the separation of three phases - gas, gas condensate and water. The separated gas will be directed to a vent/flare located on a separate fenced site of dimensions 100 to 100 meters.

The separated formation waters and gas condensate will be supplied via pipelines to tanks located on the existing site of Chiren UGS. The gas condensate will be stored in a gas condensate tank (refer to **Annex 2 of EIAR**), and formation water will be stored in industrial reinjected water tank and from there it will be further reinjected in well P-15.

1.3.2.12 Electrical and Control and Instrumentation buildings

Four identical buildings located next to each of the four GTCUs. The building will house the GTCUs control systems, external modules of the CS control system and the electrical equipment.

Also, three more electrical and instrumentation buildings are envisaged, which will provide the respective technological facilities - TEG regeneration facility; individual separation; manifold; separation installation, heating and regulation of gas pressure; general separation; formation fluids separation installations and gas drying.

1.3.2.13 Building for: FGPU; Workshop for Instrumentation air; boiler room for heating, seal gas preparation plant

The building includes: Fuel gas preparation unit (FGPU), Instrumentation air room, electrical room and boiler room for heating. The construction of the building is on one level and is divided into four rooms, each with a separate entrance. The technological preparation of natural gas for its further use as fuel gas is carried out in the Fuel gas preparation unit (regarding GTVU 1, 2, 3 and 4). Three hot water boilers (2 in operation and 1 back-up) for technological and household needs of the Fuel gas preparation unit will be located in boiler room. A separate room will house two Instrumentation air compressors - one in operation and one back-up. In addition, the plant shall include filters, dryers and instrumentation air receivers. The plant will provide purified, dry HVAC air for the needs of the facilities. There will be no permanent workplace in the building.

1.3.2.14 Power Production Unit (PPU), Switchgear, Distribution switchgear (KPY20/0.4 kV)

The rooms in the building are located on one level, each with a separate entrance. The switchgear, the distribution switchgear and two transformer chambers/stations are located in the southern part of the building.

1.3.2.15 Emergency diesel generator

Provides emergency power supply to the CS in case of failure of the external power supply. Its nominal heat output will be about 3.3 MW.

1.3.2.16 Tank and pump station for fire fighting water

The necessary water quantities for fire fighting will be stored in a tank with a volume of 205m³. The fire tank will be covered, half-dug, monolithic, of reinforced concrete, two-chambered, covered with soil to prevent freezing. Such emergency fire-fighting reserve is envisaged to be restored in no more than 24 hours.

1.3.2.17 Access control point

At the entrance to the new site, a building will be located ensuring access control.

1.3.2.18 On-site water pipelines

There is a functioning separate water supply system on the existing site of Chiren UGS, consisting of drinking water supply, fire water supply system with installed fire hydrants and open water tank for fire and technological needs and a water pipeline.

The site water supply system of the newly constructed site will consist of three separate water pipelines:

- *Water pipeline for drinking and household needs;*
- *Water pipeline for fire fighting needs;*
- *Branch from existing water supply pipeline for fire-fighting needs from a pump station built on the nearby Chiren III dam close to the new fire-fighting tank.*

Water on site will be used for potable and household water needs. According to the technology of units' operation, no water shall be used for direct production technological needs in the entire production process.

The fire-fighting tank will be supplied by a branch from water supply pipeline from an existing pump station built on the nearby Chiren III dam close to the new fire-fighting tank.

1.3.2.19 Site sewerage system

Domestic and rainwater will be discharged from the buildings and technological installations on site.

According to the technology of units' operation, no water is used for production and direct technological needs in the entire production process and no production water shall be discharged.

A separate sewerage system will be designed, including: building household and rain sewerage, site sewerage for domestic waste water, site sewerage for rain water, street drains, inspection man-holes, monitoring shaft.

Waste water from the new site of Chiren UGS is domestic water and rainwater.

The new domestic waste water shall be discharged to the existing shaft of the existing domestic sewerage (**shown in Annex 2 of the EIAR**) and from there to the existing domestic waste water treatment plant (DWWTP). Afterwards they are directed into a mixed flow from the existing site.

The new rain waste water shall be discharged in the existing mixed sewerage.

Receiver of the general mixed flow of domestic and rain waste water from the old and new site of Chiren UGS is a dry gorge in Lakite area in the land of the village of Chiren, according to the Permit for waste water discharge into surface water bodies №13140017/14.06.2007.

1.3.3 Infrastructure connections

1.3.3.1 Road connections

Three access roads will be constructed to the site: a new road connection from asphalt road Chiren - Devene to the newly designed CS and the storage site /road connection 1/, of 6.0 m width and about 118.0 m length with asphalt pavement, and the other two access roads will begin from the existing site of Chiren UGS to the new compressor station.

In order to provide road access to the technological site for flare system at Chiren UGS and for fire protection needs, the construction of a durable pavement of crushed stone on an existing field road with identifier 81400.1.565 is planned.

1.3.3.2 Gas pipeline branches, pipelines and gatherings to CS Chiren UGS

For the land of the village of Chiren, gas pipeline branches, pipelines and gatherings will be designed, described in detail in **item 1.3.3.2 of the EIAR**.

According to pipes' diameter and Ordinance No. 16 of 09.06.2004 for the *easements of energy sites*, a 30-m easement zone is set up, 15 m each on both sides of the newly designed gas pipeline branches for connection with gas pipelines Vratsa 1 and Vratsa 2 and flare system.

In this zone the following are not allowed: any type of construction, soil cultivation (plowing) of the soil at a depth greater than 0.5m, as well as lighting a fire, planting perennial tree plantations, carrying out drilling works, exploration and production of underground natural resources, parking of all types of vehicles, storage of waste and materials, actions of third parties on facilities of the energy sites, etc.

1.3.3.3 Branch from an existing water supply pipe to Chiren UGS.

A new water supply branch is planned to be constructed for water supply of the expansion of Chiren UGS site. It will be supplied by the existing water supply pipeline to Chiren UGS. It is intended to supply buildings and facilities at compressor station site with potable and household water. The water pipeline will have a diameter of 150 mm and a length

of 86 m. An easement zone of 6.0m (3.0m on both sides along the axis of the pipe) is envisaged, where construction and permanent crops are not allowed.

1.3.3.4 Rainwater drainage from Chiren UGS

The route of the newly designed off-site rainwater drainage, draining rainwater from the site, is envisaged to be 90m long and to be discharged together with the mixed waste water into a dry gully in Lakite area in the village of Chiren, according to Permit for waste water discharge into surface water bodies №13140017/14.06.2007. An easement zone of 6.0 m (3.0 m on both sides along pipe axis) is envisaged, where construction and permanent crops are not allowed.

1.3.3.5 Technological site for flare system

A new technological site for a flare system used for gas burning is planned to be constructed. The gas released manually by the various systems and devices during repair activities and normal operation will enter the flare system through a gas pipeline.

1.3.3.6 Anode grounding devices

Regarding the electrochemical protection of all underground steel pipelines (gatherings to the drilling wells), routes of anode grounding conductors outside the technological site are planned to be constructed. The routes will be located east and west of the site. They will pass through the land of the village of Chiren.

1.3.4 Areas required, (such as developed land, agricultural land, forest areas, etc.) during the construction phase and the operation phase

Expansion of Chiren UGS site

During the construction and operation phase, the investment proposal will cover an area of 82.24 dka. The properties on which the compressor station will be constructed fall on the land of Chiren village with EKATTE 81400, Vratsa Municipality, Vratsa district.

The affected areas in terms of permanent use are - fields/cornfields (21,129 dka); grassland (4,482 dka); vineyard (56,633 dka).

The necessary areas for easements of gas pipeline branches, pipelines and gatherings, newly designed road connections, water supply pipeline, newly designed rain sewerage to Chiren UGS, technological site for a flare system, anode grounding devices, are described in detail in item 1.3.4. of EIAR.

Temporary construction site (Temporary settlement)

A site for temporary construction (temporary settlement) is planned to be located within the site of compressor station, adjacent to the newly installed GTCUs immediately next to the newly built access road to the site.

1.3.5 Crossings of natural and engineering obstacles

Crossings of natural obstacles

The facilities of the investment proposal do not cross natural obstacles.

Crossings of engineering obstacles

The gas pipeline branch connecting with the Vratsa 1 gas pipeline crosses, as follows:

- At km 0+111 - asphalt road Devene - Chiren;
- At km 0+124 - water supply pipe, feeding Chiren UGS;
- At km 0+198 - gas pipeline branch Vratsa 2;

- *At km 0+196 - gathering pipe to well 28, which will be dislocated with this project.*

The water supply pipe leading to the new site of Chiren UGS crosses, as follows:

- *At km 0+028 - gas pipeline to the town of Montana;*
- *At km 0+064 - gas pipeline branch Vratsa 2;*

The newly designed storm drain from the new site crosses, as follows:

- *At km 0+021 - gas pipeline branch Vratsa 2;*
- *At km 0+050 - gas pipeline to the town of Montana;*
- *At km 0+078 - water supply pipe, feeding Chiren UGS;*

1.4 Description of the main characteristics of the stage of operation of the investment proposal

1.4.1 Basic technological processes

The main processes of Chiren UGS relate to natural gas storage and can be conditionally divided into two stages:

- *Injection Mode: Inflow of natural gas to the technological site of the storage facility, purification, measurement and injection into the underground reservoir;*
- *Withdrawal Mode: Withdrawal of gas from the underground reservoir, purification, heating, pressure regulation, measurement and supply to external gas pipelines.*

1.4.2 Current state

Withdrawal period

During this period, natural gas is withdrawn from the gas storage facility using 24 exploitation wells.

Injection period

Chiren UGS compressor station is used to inject natural gas into the underground gas storage during the April - October period of every year.

1.4.3 Expansion of the new site

Injection Mode:

The natural gas enters the site of the storage facility via an underground gas pipeline (Vratsa I/II or the pipeline network of the site: „Expansion of Bulgartransgaz EAD gas transmission infrastructure parallel to the Northern (main) gas pipeline to the Bulgarian-Serbian border" at valve assembly Butan-Chiren) and flows into the entry separation and the GMS.

Withdrawal Mode:

The gas is withdrawn from the underground storage and passes through an individual separation and the manifold. The two are combined into one unit located on each of the 28 separate lines from the wells.

1.4.4 Basic raw materials and materials for the realisation of the investment proposal and their transportation

1.4.4.1 During the construction works

Raw materials and materials

The construction works for the facilities at the compressor station site, the accompanying facilities and the infrastructure connections to it will require inert materials (crushed stone, sand, and gravel), concrete and water.

Pressure test – hydrotest

Possibility of providing water for testing the gathering pipes; the water is supplied from Chiren dam, using the existing supply water supply.

Hazardous chemicals

Some of the following hazardous chemical substances are expected to be used during the construction activities, in quantities lower than the threshold values for "Low risk potential" according to Appendix No.3 of the Environmental Protection Act:

- *Fuels and lubricating oils for the construction equipment involved in the construction of the gas pipeline - diesel fuel, transmission oils and motor oils;*
- *Specific energy carriers required for the construction and installation works related to the construction of the gas pipeline - gasoline, diesel, propane-butane, acetylene in gaseous form;*
- *Technical gases and gas mixtures – oxygen gas, argon gas, carbon dioxide gas, welding mixture of argon and carbon dioxide.*

1.4.4.2 During the operation

Raw materials and materials

- *Hazardous chemicals - the following dangerous chemical substances and mixtures are expected to be present and stored on the territory of the Chiren UGS:*
 - *Methanol* - will be used to prevent the formation of crystalline hydrates in the facilities. Methanol is currently stored at the existing flammable liquids storage site in a maximum volume of 250 m³. For the technological needs of the new site, it is planned to build a new tank with a volume of 30 m³, which will be supplemented with a tanker truck.
 - *Gas condensate* - As a result of the UGS operation in production mode, together with natural gas, formation water, gas condensate and solid impurities - clay, sand, etc. are withdrawn. The separated gas condensate will be removed from the site via an underground pipeline to an existing excise tax warehouse at the flammable liquids site. The condensate reservoir volume is 525,5 m³.
 - *Natural gas* - It is planned to store 1,000,000,000 Nm³ of natural gas in the underground storage structures. The maximum capacity of the station will be 10 000 000 m³/d.
 - *Diesel fuel* - one underground tank with a capacity of 5.2 m³ is available at the existing UGS site.
 - *Gasoline* - also on the existing site, one underground tank with a volume of 17.4 m³ is available.
 - *Hydraulic oil, antifreeze and windshield washer fluid* – used for the transportation equipment at the existing site. They are available in small quantities, being stored in original packaging in a fuel and lubricating materials storage facility.
 - *Emulsiol-borol (lubricating and cooling liquid)(Finish 1M) and sealing oil* – used in repair work at Chiren UGS and are stored in a fuel and lubricating materials storage facility in minimal quantities in original packaging.
- *TEG* – On the existing site, 2 TEG flow tanks are available, each with a total volume of 16 m³, as well as one saturated TEG tank with a similar volume. On the newly

designed site, there will be one TEG flow tank with a volume of 5 m³ and 1 tank for saturated TEG with a volume of 10 m³, which TEG will be used in the natural gas dehydration installation.

- Oil MC 20– used as lubricant at the existing gas motor compressors. According to the available Safety data sheet, the substance is not classified as dangerous. It is stored under atmospheric conditions of an open storage for oils in five tanks.
- Lubricating oil TP 32 - lubricating turbine oil is used to lubricate and cool GTCUs sliding bearings. A safety data sheet is available for the used lubricating turbine oil and it is classified as non-hazardous. Initially, the required amount of oil for 4 GTCUs is 16 m³ (4 m³ for 1 GTCU. Periodically in the process of operation for each GTCU, a study is made for the oil indicators. When the oil does not meet these indicators, it is replaced. At 30,000 operating hours, during the first GTCU overhaul, the oil is completely changed.
- Antifreeze - a mixture of (propylene glycol and water) - will be used in a closed loop of the natural gas heating system and will be in a maximum volume of 50 m³.
- Electricity - the maximum electrical power that can be consumed by Chiren UGS is 1000 kW.
- Water

Consumption of potable water, water quantities and hydraulic dimensioning

The necessary firefighting reserve is calculated at 205m³ at an assumed 20 l/s, necessary for external fire extinguishing of open technological installations GTCU for 3 hours.

1.4.5 Stages of implementation (construction works, operation, decommissioning)

1.4.5.1 Construction works

The preparation of the working site consists of various activities, such as removal of the humus layer, alignment, etc. After this activity, the main construction equipment can enter the construction site and construction and transport activities can then begin.

The following activities are envisaged during the construction of the compressor station and its adjacent facilities:

- *Tracing (marking) the construction site and the strips for off-site communications (gathering pipes, gas pipeline branches, access road, water supply, sewerage and the facilities provided therefor - shafts);*
- *Clearing the grounds of trees, bushes, etc.;*
- *Designation of the location of underground installations of third parties;*
- *Execution of access road to the construction site, which includes excavation for road bed and ditches, laying of sub-base and base layer according to the design and formation of roadside ditches ensuring road drainage. Laying of the finishing layer is carried out after completion of construction and installation activities with heavy construction equipment (excavators, bulldozers, lifting machines, light and heavy-duty transport machines for the delivery of technological equipment and construction materials, etc.);*
- *Provision of water supply and water drainage facilities to the water use sites and the hydraulic test sites;*
- *Provision of on-site sites for storage and installation of the technological equipment, pipes, fittings, steel elements for the construction of the buildings on the site,*

construction materials and equipment, etc.;

- Fencing the construction site and the sections to it with a temporary fence;
- Removing the humus layer from the soil with landfill storage. The implementation is planned with a bulldozer with back and forward and diagonally movement of the bulldozer on site. The width and thickness of the humus layer is determined depending on the type of terrain and soil;
- Excavations for the foundations of the buildings and facilities on site and the trenches on and off site will be completed with a rotary or single bucket excavator and the collection of earth masses at a landfill. The width of the trenches is determined as a function of depth and soil type to avoid trench instability;
- The construction of underground communications and facilities on the site and outside of it includes the implementation of the following construction and installation works:
 - Installation of water supply, sewerage and shafts on the site;
 - Implementation of electrical conduit cable network. Cable routes are planned for laying all control and power cables on the site, necessary for the power supply of the individual sub-sites. Inspection shafts are provided for servicing the cables. The passage of the pipeline network on the territory of the entire site is underground. Pipelines shall be buried underground in trenches. The minimum distance from the ground to the topmost row of pipes is 60 cm under the elevation of the ground and 80 cm when passing under a road. A bed of sand is formed under the pipes. The bundles of pipes are concreted with concrete. The backfilling in the green areas is performed by soil. When the pipes pass under a road, backfilling is performed by ballast. Inspection shafts are monolithic, reinforced concrete, buried;
- Implementation of foundations for technological facilities (formwork, reinforcement, concrete works and backfilling);
- Construction of roads on site;
- Placement of supports on the sides of the trenches to arrange and stabilize the pipes after they are placed along the routes, next to the excavated trenches and constructed supports;
- Laying of pipes, elbows and fittings along the sections designated for the installation of the technological pipelines on the site;
- Laying the pipeline next to the trenches on pads (wooden material, no less than 150 mm x 100mm)
- Execution of welding works (automatic, semi-automatic and manually). Welding is performed according to the technological documentation of the contractor in compliance with BDS EN 12732.
- 100% visual control of welded joints for gas pipelines;
- 100% non-destructive (radiographic or ultrasonic) control of welded joints;
- Laying insulation of the welded joints of the pipes on the site;
- Checking the quality of the insulation of the gas pipeline with a spark detector along the entire length of the section;
- Laying the welded section of the gas pipeline in the trench with pipe-laying machines.
- Laying the welded above-ground section of the gas pipeline on pre-installed supports with load lifting machines.

After laying the gas pipes in the trench the following must be carried out:

- *Final backfilling of trenches with prior laying of signal tape;*
- *Soil layer densification;*
- *Backfilling of the excavations on the site;*
- *Soil layer densification;*
- *Return and back spreading of the removed humus layer in the areas designated for green areas;*
- *Installation of the compressors on the finished foundations;*
- *Installation of metal structures for the compressor workshops;*
- *Installation of a production and energy unit (PEU) - a one-story building consisting of the following premises - a transformer substation with a distribution switchgear, a battery, a room for electrical switchboards, a control panel, a communication room, an operator's room, a boiler room, service and household rooms, a bathroom, etc.;*
- *Installation of a one-story building consisting of a fuel gas preparation block, Instrumentation air compressor room, electrical room, heating boiler room and installation for fuel gas preparation, with the installation of exhaust gases stack;*
- *Installation of a reservoir and fire-fighting water station;*
- *Construction of an access control point;*
- *Installation of technological equipment on the site, on the built foundations. The lifting and transportation equipment provided by the builder will be used according to their individual weight and u elevation for the installation;*
- *Ventilation and air-conditioning systems and electrical installation works on the sub-sites (buildings and facilities) - Power, lighting, grounding and lightning protection installations;*
- *Installation of heating, cooling and air conditioning installations and equipment;*
- *Architectural and finishing works, including finishing coatings of the access road and roads and sidewalks on the site, ditches, other facilities;*
- *Start-up and adjustment works and 72-hour tests in operational conditions.*
- *Installation of a fence on the site;*
- *Landscaping.*
- *External connections – water supply pipe and sewerage.*

1.4.5.2 Operation

The processes related to the storage of natural gas, namely those of injection and withdrawal from the underground gas storage, are carried out in a closed system under high pressure, without contact of the gas with the environment. The work process of the CS and its adjacent facilities at Chiren UGS is continuous - 24 hours a day, 365 days a year. The main production processes are described in item 1.4.1.

1.4.5.3 Decommissioning

Procedures will be prepared for the decommissioning process and the following basic measures will be implemented to facilitate the decommissioning activities of the facility.

1.5 Assessment by type and amount of expected residual substances and emissions

The types of waste and emissions expected to be generated during the implementation of the IP are described below.

1.5.1 Expected waste

According to the regulatory requirements in force in the Republic of Bulgaria, the waste generated during the construction and operation phases is intended to be handed over for subsequent treatment to companies holding a permit, complex permit or registration document under Art. 35 of the Waste Management Act for the relevant activity and a waste site, based on a signed written contract.

1.5.1.1 During the construction works

The waste is expected to be generated classified according to the Ordinance 2/23.07.2014 classifying the waste. Laid down in details in **Table 8, item of the EIA Report**.

Regarding the treatment of the waste generated during the construction works, the same will be done according to the legislation in force in the country - the Waste Management Act and the regulations thereto.

Construction waste - in accordance with the requirements of the Waste Management Act and the Ordinance on construction waste management and the use of recycled construction materials together with the preparation of the technical design, a construction waste management plan will be prepared and agreed with the responsible authorities. This waste will be temporarily stored in designated areas on the construction site of the extension of Chiren UGS.

With regard to all non-hazardous waste, prior to the start of construction works, sites will be set aside for separate collection and handing over to companies that have the necessary registration documents for subsequent treatment according to the order of the Waste Management Act, located on the territory of the extension of the storage facility.

With regard to hazardous waste, it is planned to be stored on specially marked sites with a concrete or impervious base and the same to be handed over for subsequent treatment to companies holding the necessary permits under Art. 35 of the Waste Management Act and/or registration document, based on a signed contract. They will be generated during the operation of the equipment, the use of various raw materials and the performance of the construction and installation works.

Municipal waste will be generated by the workers engaged in the construction works. Municipal waste with code 20 03 01 mixed municipal waste will be generated and collected mainly by those working on the construction site. Mixed municipal waste will be collected in containers and handed over to an external company for landfilling.

1.5.1.2 During the operation

The generated waste will be a consequence of the repair activities of the technological, electronic and electrical equipment of the entire site of Chiren UGS and the household activities of the employees.

In essence, no formation of different types of waste other than those already classified that is linked to the production activity of the existing Chiren UGS is expected.

Until the time of their hand-over, waste will be preliminary stored at special locations within the boundaries of the site of Chiren UGS.

Treatment of the waste generated during operation will be arranged by their subsequent hand-over to licensed companies holding the necessary permits under the Waste Management Act.

1.5.2 Water contamination

1.5.2.1 During the construction works

During the construction works, it is planned to set aside a site for temporary construction (temporary settlement), located within the site of the compressor station, adjacent to the newly installed GTCUs immediately next to the newly built access road to the site.

Bottled drinking water and chemical toilets will be provided for the workers.

The maximum number of workers on the construction site will be around 150, and they will not spend the night in the temporary settlement. They will stay there only during the working day.

1.5.2.2 During the operation

At the main existing Chiren UGS site, a gravity sewerage network for domestic, rainwater and production waters is in place.

Concerning the newly designed site and according to the technology applied in the operation of the GTCUs and the gas motor compressors, no water will be used for the production and technological needs throughout the entire production process and no production waters shall therefore be discharged.

The following types of water flows will be formed as a result of the activity of the new IP for the expansion of Chiren UGS:

- *Cooling waters in a closed cycle (circulating waters): the waters formed during emergency leaks or as a result of any periodic maintenance of can be included in these cooling waters:*
 - *the fuel gas preparation unit and its boiler for household needs, part of the newly designed site*
 - *the boiler room for heating to the Access Control building and the one for heating and BGV to PPU, both of them for the new IP for the expansion of Chiren UGS*
- *Domestic and faecal waste waters from the sanitary units of the Production and Energy Unit (PPU), access control building and electrical and instrumentation buildings to GTCU 1 to GTCU 4 for the new IP for the expansion of Chiren UGS. All domestic waste waters along the relevant branch of the newly constructed sewerage system will enter an existing domestic waste water treatment plant located at the main site of Chiren UGS.*
- *Conditionally clean rainwater from the site of Chiren UGS expansion*
 - *the quantities of rainwater running through an independent sewerage network on the newly built site will be brought to the existing site sewerage system.*

The construction of a separate sewerage network is planned for the disposal of the generated waste water flows.

The waste water from the site of the new IP for the expansion of Chiren UGS will be led to Stream 1 of the sewerage network of the site of the existing site of Chiren UGS.

During the operation of part of the newly planned installations, a liquid phase (formation water) will also be formed, which will be separated by the separation during the withdrawal of natural gas. Formation water will be formed from the following new installations: individual separation facility, condensate separation facility, natural gas dehydration facility. The separated liquid phase (formation water) will be piped to Stream 4 of the existing Chiren UGS site.

Pleven Water Authority issued a permit concerning the re-injection activities No.12570003/16.12.2015, amended and renewed by virtue of decision No.2757/30.09.2019 until 25.11.2023.

The existing activities on Chiren UGS generate two more wastewater streams – Stream 2 and Stream 3, which are not the subject to this document, given that they do not concern the generated wastewater streams from the newly designed site, but only such of the existing one site.

1.5.3 Air pollution

1.5.3.1 During the construction works

During the construction of the new site of Chiren UGS, unorganised emissions of dust and harmful substances of the exhaust gases from the internal combustion engines of the construction equipment used are expected.

The construction phase as a whole will not have a significant impact on ambient air quality in terms of dust emissions. In order to prevent the risk of pollution, it is necessary to observe a precise schedule of the construction works consistent with weather conditions, for instance dry powdery materials should not be loaded/unloaded in strong winds.

1.5.3.2 During the operation

During the operation of the investment proposal related to the expansion of the capacity of Chiren underground gas storage facility, the atmospheric air will be polluted by combustion emissions.

Organised emissions of fuel sources - point sources

The organised sources of gaseous emissions - sulphur oxides (SOX), nitrogen oxides (NOX) and carbon monoxide (CO) are the existing ones (at the current UGS site) and the ones planned to be located on the new site, south of the existing site.

Existing sources

- **8 gas motor compressors (GMCs)**, type ГМК -10 ГКHAM, with a heat capacity of 3.88 MW each. Flue gases are discharged through own exhaust devices.
- **1 exhaust device on the Triethylene glycol regeneration unit (TEG)** with a capacity of 1.4 MW. Flue gases are discharged through an own exhaust device.
- **1 emergency gas unit** with a nominal capacity of 1.67 MW – not regulated.
- **3 water heating boilers, manufactured by BUDERUS**, type G 605-740/12 with a nominal thermal capacity of 74 MW each. Flue gases are discharged through own exhaust devices.

New sources

- **4 gas turbine engines (GTEs)** of the gas turbine compressor units (GTCUs) in a regime 3+1 with a thermal capacity of 18 MW each. Flue gases are discharged through own exhaust devices.
- **5 gas heaters** heating the natural gas, running 4+1, each with a capacity of 3.1 MW.
- **2 TEG regeneration system heaters, running 1+1**, each with a capacity of 0.7 MW.
- **3 water heating boilers for technological domestic needs of the fuel gas preparation unit**, each with a capacity of 0.1MW operating in a regime 2 in operation, and 1 backup. Flue gases from burning the natural gas are discharged through own exhaust devices.
- **4 water heating boilers for domestic needs: 1 for the access control building 0.004**

MW, 1 for the production and energy unit (PPU) – 0.042 MW and 2 for the GMS building, each – 0.1 MW. Flue gases are discharged through own exhaust devices.

- **1 emergency diesel generator** with a nominal capacity of 3.3 MW – not regulated.
- **Flare** - in an operating regime of the storage facility (injection and withdrawal) a three-phase separation system runs as well that separates the formation waters, gas condensate and natural gas. The separated amounts of natural gas are minimal and are conveyed and burned in a flare located on a designated outdoor site. The estimated (expected) annual gas consumption is 26 250 Nm³.

Monitoring

According to the Ordinance on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCP), the pollutant to be regulated and subject to emission control is only nitrogen oxide in the flue gases of:

- *The 8 gas engine compressors (GECs) and the triethylene glycol (TEG) regeneration unit at the existing site;*
- *The 4 gas turbine compressor units (GTCU) and the 5 natural gas preheating boilers at the new site.*

Although there is no emission limit value (ELV) for carbon monoxide in the MCP Ordinance, the operator shall monitor this pollutant as well in accordance with Annex 2(H) of the MCP Ordinance. Sulphur dioxide Emissions shall not be monitored.

Pursuant to ORDINANCE No 1 of 27 June 2005 on emission limit values for harmful substances (pollutants) emitted into the atmosphere from sites and activities with stationary emission sources, the pollutants which are limited and subject to emission control are sulphur and nitrogen oxides and carbon monoxide in the flue gases of:

- *the TEG regeneration unit (until the provisions of the MCP Ordinance come into force in 2030 (if it is operating by then)) and the 3 f heating boilers, type G 605-740/12, at the existing site,*
- *the 2 preheaters of the TEG regeneration system at the new site.*

Figure 2 provides a diagram of the DD of all point sources that emit emissions to ambient air (controlled under the MCP Ordinance and Ordinance 1/2005, respectively) from the natural gas combustion process.

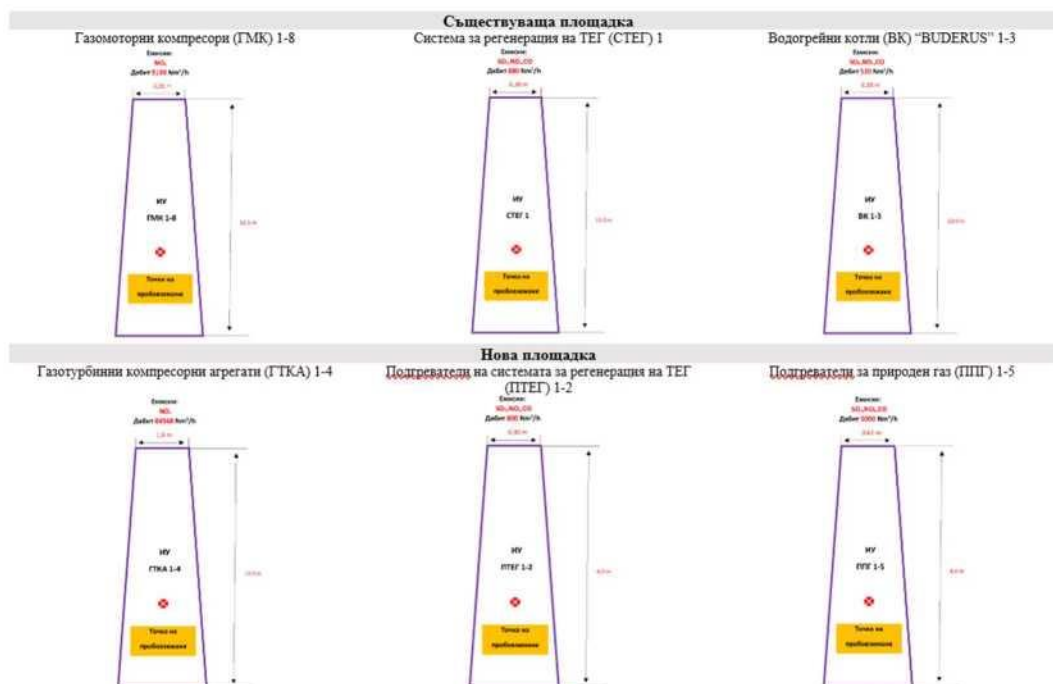


Figure 2 Diagram of the DD of all installation point sources located at the existing an at the new site of Chiren

Abatement equipment

The basic technological process foresees no abatement treatment facilities to be used at the DD.

1.5.3.3 Quantitative emission estimates

1.5.3.3.1 During construction

Estimates of gaseous and particulate emissions during construction are based on the following activities:

- *Clearing, digging, bulldozing, levelling, and excavation works;*
- *Dust material handling - loading and unloading of earth materials;*
- *Dust generation from wind erosion at open dust areas (earth heaps or earth tips);*
- *ICE of construction machinery;*
- *Transportation scheme for earth material removal and delivery of raw materials and supplies.*

In this case, the construction site during construction works is defined as a point source and diffuse from the transport scheme. All of these are diffuse emission sources.

The assessment of dust emissions from a point source, gaseous emissions from a point source and gaseous emissions from a diffuse source (transport scheme during construction) is shown in [section 1.5.3.3.1 of the EIAR](#).

1.5.3.3.2 During operation

They can be systematized into the following 2 groups of point and diffuse sources

The assessment of point source emissions and diffuse source emissions (transport during operation) is shown in [section 1.5.3.3.2 of the EIAR](#).

1.5.3.4 Greenhouse gas emissions

Under both options for Chiren UGS implementation, the nominal installed thermal

capacity of its installations (at the existing and at the new site) is 124,106 MW.

The annual amount of natural gas is $45.77 \times 10^6 \text{ Nm}^3$, which is equivalent to a thermal output of 1,567.4 TJ or 87.05 Gg CO₂ eq. of greenhouse gases, determined according to the emission factors for CO₂ of fossil fuel for the purposes of the annual greenhouse gas emission reports for 2020¹.

The most recent publicly available National Report about the Status and Protection of Environment in the Republic of Bulgaria, 2021, includes data on total greenhouse gas (GHG) emissions for 2019, which are 55,955.28 Gg CO₂ eq. Compared to this GHG emissions from Chiren UGS are only 0.155%.

Following the commissioning of Chiren UGS, its CO₂ emissions will be included in the European greenhouse gas emissions trading scheme.

1.5.4 Soil contamination

1.5.4.1 During construction

The construction activities for the implementation of the investment proposal are envisaged to be within the site of the envisaged compressor station and within the easements of the gatherings, the connection to the flare and the transport connections and no additional agricultural or forestry land is envisaged to be used.

No contamination with construction, domestic or industrial waste is expected to occur on the soil cover both on the envisaged compressor station site and in the easements of the gatherings, flare connection and transport connections.

1.5.4.2 During operation

During normal operation of the compressor station, no substances are expected to be emitted from the facilities into the air or water that have the capacity to directly contaminate on-site and off-site soils. Therefore, contamination of the soil cover is not expected to occur in the long term, both on the envisaged compressor station site and on off-site areas.

1.5.5 Noise, vibration, radiation

1.5.5.1 During construction

IP implementation is related to the construction of infrastructure connections shown and described in detail in **section 1.3.3 of the EIAR**.

Noise during construction activities at Chiren UGS site

On the basis of the noise levels of the machinery potentially to be used during the construction of the Chiren UGS expansion, the expected maximum envisaged noise level shall be approximately $L_{\Sigma} = 109.8 \text{ dBA}$, which shall be within 350 m of the site of the envisaged expansion. Since the distance of the existing site and its designed expansion to the settlement boundaries of the village of Chiren is more than 1,000 m (1,500 m and 1,200 m respectively), the construction of the newly designed expansion would guarantee a noise impact level for a 24-hour period of less than 45 dBA.

Noise during construction activities of the infrastructure connections

During the construction of the infrastructure connections, the source of noise in the environment will be the construction machinery used to carry out the various types of construction work - excavation, filling, drilling, concrete, welding, assembly, transport activities, etc. During IP implementation, the noise impact will be concentrated in and around the working strip, and a cumulative noise load from the different construction machinery is expected during daylight hours. At certain times, an equivalent noise level of 85 to 90 dBA can be expected in the vicinity of the operating machinery carrying out different types of activities (work strip

¹ <http://eea.government.bg/bg/r-r/r-te/vazhno10/view>

preparation, pipe distribution and laying, welding, excavation, etc.).

At the sites of the temporary bases serving the construction of the newly designed expansion of Chiren UGS and the associated infrastructure connections, a noise equivalent level of approximately 75 dBA can be expected at certain times.

Noise levels from construction activities and transport are expected to be local, in the area of the construction activities and access roads and would be a minor negative in significance, short-term, temporary and reversible.

Vibration during construction activities for the construction of the newly designed Chiren UGS site and infrastructure sites

The main sources of general vibration impact at the various sub-sites are not construction equipment and machinery, but vehicles (mainly heavy vehicles).

Existing compressors and vibrating underground pipelines are also a source of vibration in the IP area.

It can be concluded that the expected impacts would be in the area of the construction activities and access roads and would range from minor negative to low or even having a low significance, short-term, temporary and reversible.

1.5.5.2 During operation

Noise during operation

An analysis of the impact of the noise emitted from the newly designed site of Chiren UGS on the equivalent levels at the site boundaries based on calculations made is shown in the Application for CP ([Annex II to the EIAR](#)), which shows that the expected average noise level at the measurement contours at the site boundaries is 50.12 dB(A), which is 20 dB(A) below the 70 dB(A) limit.

According to the calculations made of the noise levels from the newly designed site in the area of the nearest object of protection, a residential building located in the village of Chiren, the maximum expected sound assessment level is 19.09 dB(A), which is approximately 2.35 times below the night-time noise level limits for residential areas and 2.88 times below the daytime levels. The data provided shows that no increase in background noise is expected in the residential area (for settlements without significant noise sources, the background noise is approximately 30 dB(A)). At present, there is no evidence of an increase in the background noise in the area of Chiren village from the existing site.

No change in the acoustic situation at the impact site (Chiren village) is expected after IP implementation.

Vibrations during operation

Regardless of which of the facilities at the new Chiren UGS site will be in operation, those on the existing site or those on the newly designed site, practically all of the vibration exciters on the compressor side are outside the 1Hz-80Hz frequency range in which the total vibrations affecting humans are regulated, i.e., the primer vibrations excited by these dynamic forces are outside the regulation zone of total vibration to people.

Other sources of vibration during operation are vibrating underground pipelines, the vibration of which is due to flow turbulence at elbows, tees and fittings. These vibrations are typically broadband in the frequency range 30Hz to 80Hz. Primer vibrations excited by the vibration-isolated compressor foundation are of very low intensity and decay rapidly in the environment. At a distance of more than 10 m from the vibration-isolated foundation, the

measured vibrations are typically lower than the human vibration perception threshold. In this regard, it can be concluded that the operation of the facilities at Chiren UGS site creates no conditions of discomfort and poses no danger to people, even at the underground gas storage site.

The implementation of the investment proposal is not a source of harmful physical factors such as light, heat radiation or electromagnetic radiation and no harmful effects on the environment are expected from the physical factors such as noise, vibration, ionising or non-ionising radiation.

1.5.6 Risks from the presumed human health effects

1.5.6.1 During construction

During construction activities, the construction site will be a point source of dust emissions, engine gas emissions, and noise. At a distance of more than 1,000 m, the noise generated at the construction site attenuates to the daily noise standard in a populated area. Engine gases are quickly dispersed at the construction site. The increase in transport traffic from construction service vehicles will be insignificant and will not result in a noise increase when passing through populated areas.

1.5.6.2 During operation

The operation of the new Chiren UGS site will not result in any change in the AAQ and noise load and will not have an adverse health effect on the population.

Some of the physical factors of the work environment, such as noise and overheating microclimate, may only have an impact on a limited number of workers. These are conventional work environment factors for which preventive measures have been developed and tested in practice and their application leads to a reduction and limitation of health risks. Expected effects are insignificant.

1.6 Comparison of the proposed technologies and installations with the conclusions submitted in the comparative best available techniques guidance documents

Pursuant to Article 10, para. 6 of the EIA Ordinance, as a separate **Annex to the EIAR, the assessment under Article 99a, para. 1 of the EPA – assessment on application of BAT**, shall be enclosed. In preparing the assessment, the scope and content requirements have been observed for determining the best available techniques under the Ordinance on the terms and procedure of issuing complex permits and methodological guidelines, approved by the Minister of the Environment and Water - according to §1a of the Additional provisions of the EIA Ordinance. Since the EIA procedure of the IP is being carried out according to Article 94, para. 1 of the EPA i.e., falls within Annex No. 1 and is subject to a general EIA procedure and to a procedure under Article 117, para. 1, the Assessment on the application of BAT according to Article 99a, para. 1 of the EPA is submitted to **Supplemented Application for CP (Annex II to the EIAR)**.

2 Alternatives for the implementation of the investment proposal

In considering the possible alternatives/options on an equal footing, with the criteria relevant to each, a matrix will be applied as set out in **section 2 of EIAR**.

Based on this, the preferred alternative/option for the implementation of the investment proposal will be identified, for which a detailed assessment of the specific impacts will be made in the following sections of the EIAR, applying the methodology for assessing impacts on environmental components and factors detailed in **section 4.1**

2.1 Zero alternative

Application of zero alternative, i.e. if the envisaged investment proposal is not implemented, results in missed economic benefits for the Contracting Authority, as well as social and financial negatives for the workers, local population, municipalities and the region as a whole. Last but not least, the non-implementation of the IP will also negatively affect the national level by blocking UGS capacity increase, which in turn may have a negative effect on the economy and the population.

The investment proposal does not contravene national legislation, therefore there is no reason to apply the zero alternative.

2.2 Other alternative

2.2.1 In terms of location

The new site must also comply with the following requirements:

- Have minimal impact on the environment;
- Avoid protected areas, Natura 2000 sites and natural landmarks;
- Be remote from settlements, civil and special sites and their adjacent infrastructure, mining and underground development, quarries, explored and concession areas of mineral resources, etc.;
- Be distant from areas of archaeological importance;
- Not in wooded and rocky areas, irrigation, drainage fields, water catchment areas, landslide areas, geologically unstable terrain, areas with pronounced erosion, etc., risk areas;
- To be located in a manner that is easily feasible from an engineering point of view, in accordance with environmental legislation;
- Have, as far as practicable, a minimum impact on agriculture;
- Have minimal risk to the security of the compressor station and settlements;
- On this basis, the designated new site is located more than 1.2 kilometres from the construction boundaries of the Chiren village, in close proximity, to the southwest of the existing one, in which new site all necessary new process equipment will be located.
- In view of the above, no other alternatives have been considered with regard to the location of the new Chiren UGS site.

2.2.2 In terms of technology

A centrifugal compressor concept driven by a gas turbine engine (GTE) has been used to implement the expansion of the Chiren UGS.

Based on the comparative analysis of the different possible concepts, Option V (ESA) and Option VI (BCA) were rejected as feasible. Therefore, a comparison of the alternatives in terms of technical and economic indicators on the number of GTCUs, in terms of capacity of the facilities will only be made for the GTCU concept - Option I, Option II, Option III and Option IV.

2.2.3 Facility capacity alternative

In order to develop a workable optimal option for the operation of the UGS, a detailed study of the geological structure was carried out to determine the hydrodynamic regime of the UGS, and four main option solutions (alternatives) of operating modes at different formation

pressures and flow rates were considered to maximize the operating volume and maximum daily rate:

Option I with formation pressure 116 barg, gas flow 4,400,000 m³/day⁻¹ (183,333 m³/hour⁻¹)

Option II with formation pressure 130 barg, gas flow 8 000 000 m³/day⁻¹ (333,333 m³/hour⁻¹)

Option III with formation pressure 150 barg, gas flow 10 000 000 m³/day⁻¹ (416,660 m³/hour⁻¹)

Option IV with formation pressure 180 barg, gas flow 12 000 000 m³/day⁻¹ (500, 000 m³/hour⁻¹)

On the basis of the comparative analysis carried out in **Section 2.2.3 of the EIAR** of the different possible options for the capacity of the UGS facilities, Option I, Option II and Option IV are rejected as feasible. For this reason, a comparison of the alternatives in terms of *technological and economic indicators regarding the number of GTCUs* will be made for Option III only.

In view of the above, this EIAR will consider and assess the potential impacts on environmental components and factors for Option III.

2.2.4 In terms of the technical and economic indicators of the number of GTCUs

Based on the comparative analysis in **Section 2.2.3** justifying the preferred capacity of the UGS facilities for the new compressor station, **Section 2.2.4 of the EIAR** compares the technical and economic indicators of the alternative solutions (sub-options) of Option III on the number of GTCUs - 2+1 or 3+1.

Based on the comparison of the advantages and disadvantages of configuration of the number of GTCUs (Option III A: 2+1 or Option III B: 3+1, as the best option and preferred for application in the project is Option III C: 3+1 – GTCU.

2.3 Choice of option taking into account the effects of the environmental impacts of the IP

Based on the equitable consideration of the possible alternatives/options, the best option and the preferred option for implementation is Option III C: 3+1 - GTCU, which is planned to be implemented at a new process site located adjacent to the existing one at Chiren UGS, for which a detailed assessment of the specific impacts will be carried out in the following sections of the EIAR, applying the Methodology for the assessment of impacts on environmental components and factors detailed in **section 4.1**.

3 Description of relevant aspects of the current state of the environment

3.1 Ambient air and climate

3.1.1 Climatic conditions

3.1.1.1 Existing condition

UGS Chiren is located to the north of the town of Vratsa in the northern part of the municipality, characterized by flat, plain topography. According to the climatic zoning of Bulgaria, the area of the IP falls within the temperate-continental sub-region of the European-continental climatic area.

Resulting from the analysis of the data and the evaluations of the climatic and meteorological

conditions, the following conclusions can be made about the processes and phenomena that have adverse impact on the self-purification abilities of the air layer in the area of UGS Chiren.

- *In the area of UGS Chiren, the average wind speed is not high - in 72% the speed is up to 4 m/s, which is a sign of poor capabilities of pollutants dispersion emitted by the DD of the CS. The openness of the terrain provides ventilation in the area, but the potential for purification of the atmosphere prevents the dispersion of impurities in vertical direction and transports them in horizontal direction. In this way, the maximum pollution has lower values (the time for mixing with ambient air is longer) and is transported away from the source. Such conditions are present in the late evening hours - moderate and low atmospheric stability (Class E and F).*
- *Because the amount of precipitation is below the average for the country and because of the large number of days without precipitation - about 65% during the year, these conditions do not contribute for the wet purification of the atmosphere.*
- *Fogs play particularly adverse impact when the presence of solid particles in the air is due to pollution with dust and flue-dust from the combustion of liquid/solid fuels or from wind erosion. The dissipation of fogs occurs after sunrise as the ground surface heats up and the temperature in the lower ground layers of the atmosphere rises, amplifying air turbulence (stability class A, B or C – generally in 35% of the cases) or when air masses change in the event of an atmospheric front. Due to their low number during the year (about 40 days) and the openness of the IP terrain, fogs are not a factor, which contributes for the pollution in the region.*
- *The prevailing winds from the northern quarter of the horizon (from 315° to 45° is only in 10.6% of the cases during the year and shows that the nearest settlement the village of Chiren in this direction (more than 1000 m) is not threatened to be polluted with excessive concentrations of harmful substances from the sources of UGS Chiren after the implementation of the IP.*

3.1.1.2 Short description of the possible evolution if the IP is not implemented

With or without implementation of the IP (zero alternative), there would be no change in the regime and spatial distribution of climate elements values in the area under consideration.

3.1.2 Ambient air quality standards

The ambient air quality standards from the EU directives and the national legislation are systemized in the **tables in item 3.1.2. of the EIA Report.**

3.1.3 AAQ assessment

3.1.3.1 Existing condition

In the analysis of the recorded concentrations of the controlled pollutants for 2020, exceeding of the standards for protection of human health were established only for the FDP₁₀ indicator - 23 counts of the daily average standard (DAS) of 50 µg/m³ for FDP₁₀, which is below the permissible standard of 35 counts per year.

Due to the fact that the combustion installations at Chiren UGS are natural gas fired and there are no emissions of FDP₁₀, the site is not included in the assessments in the Updated AAQ Management Program of Vratsa Municipality.

3.1.3.1.1 Companies with production activities in the area of UGS Chiren

The closest production facilities to the site of UGS Chiren are: a Fish Farm and a Dairy Farm, which are unlikely to be affected by emissions from the gas storage facility, both during construction and operation.

The distance to the two aggregate quarries is over 2 000 m, which is not a prerequisite for a cumulative impact between dust emissions during the construction of the new Chiren UGS site and dust sources from the activities in the quarries.

3.1.3.2 Summary of likely evolution if the IP is not implemented

The sources of emissions, which are seasonal, are household heating appliances in the village of Chiren, which are mainly heated with solid fuel (wood and coal). The limited number of pollutants from domestic heating in the vicinity of Chiren UGS and their small capacity, as well as the meteorological characteristics of the area, are a prerequisite for good quality of the ambient air.

3.2 Waters

3.2.1 Surface waters

3.2.1.1 Existing condition

According to the division of river regions at national level, the IP falls within the Danube River Basin Management Region, managed by the Danube River Basin Directorate (DRBD) and more specifically falls within part of the Ogosta River catchment.

Regarding the RBMP for the Danube Region 2016-2021, the investment proposal does not fall within the scope of a designated area of significant potential flood risk (SPFR) and there are no prohibitions and restrictions concerning the implementation of the proposed activities. According to the Preliminary Flood Risk Assessment (PFRA) in the Danube River Basin Management District 2022-2027 available on the website of the BDDR: www.bd-dunav.org, the planned activities and the implementation of the IP do not fall within the identified Areas of Significant Potential Flood Risk (ASPRF).

The activities foreseen in the IP fall in areas where the waters are sensitive to biogenic elements - sensitive and vulnerable zone, according to art. 119a, par. 1(3) of the Water Act.

IP does not fall in zones:

- for protection of potable water from surface water bodies (Article 119a, par. 1, item 1, of the WA);
- intended for recreation, water sports and/or bathing (Art. 119a par. 1, item 2 of the WA);
- for the protection of economically significant species of fish and other aquatic organisms (Art. 119a, par. 1, item 4 of the WA);
- designated for conservation of habitats and biological species in which the maintenance or improvement of the water status is an important factor for their conservation (Art. 119a, par. 1, item 5 of the WA).

There are no designated sanitary protection zones (SPZ) in the area of the IP in accordance with Ordinance No. 3 of 16.10.2000 on the conditions and procedure for the study, design, approval and operation of sanitary protection zones around water sources and facilities for potable water supply and around mineral water sources used for medicinal, prophylactic, drinking and hygienic needs.

3.2.1.2 Summary of likely evolution if the IP is not implemented

If the investment proposal is not implemented, no changes in the natural evolutionary processes of surface water are expected. Changes related to climate change, precipitation and atmospheric temperatures are possible. There may also be changes related to the implementation of other investment proposals in the area, agricultural activity, waste water discharge, spills, etc.

3.2.2 Underground waters

3.2.2.1 Existing condition

In hydrogeological aspect, the present investment proposal is related to the groundwater bodies formed in the basin of the Iskar River and in particular to the karst waters formed in the Marble karst basin (Urgonian limestones) - groundwater body BG1G000K1ap043 - Karst waters in the Marble massif - see **Annex 6 of the EIA Report**.

The water body under consideration comprises the karst groundwater, accumulated in the Lower Cretaceous sediments in the area. From the analysis of the anthropogenic load, according to the official records of the Danube Region Basin Directorate, it was established that the groundwater body having code BG1G000K1ap043 - Karst waters in the Marble massif is used for potable and domestic purposes as per the described in details in the **EIA Report water supply facilities. by the water intake facilities detailed in the EIA**.

According to the information available in the BDDR, there are no sanitary protection zones (SPZ) in the area of the IP, according the provisions of Ordinance No. 3/16.10.2000, and it does not fall within a buffer zone with a radius of 1000 m around potable water supply facilities, for which it is necessary to comply with restrictions according to Annex 1 to the National Catalogue of Measures to the FRMP.

The investment proposal falls within the potable water protection zone from groundwater bodies, according to art. 119a, par. 1, item 1 of the WA.

3.2.2.2 Summary of likely evolution if the IP is not implemented

If the investment proposal is not implemented, changes in groundwater conditions are possible due to impacts, mainly on groundwater levels and their resources from climatic changes related to precipitation and the temperature and from the implementation of other investment proposals in the area, agricultural activities, settlements without sewerage, water losses from depreciated facilities, etc.

3.3 Soils

3.3.1 Existing condition

Soils in the region

Mainly grey forest soils (Haplic Luvisols, FAO) and dark grey forest soils (Luvic Phaeozems, FAO) are present in the area of the investment proposal.

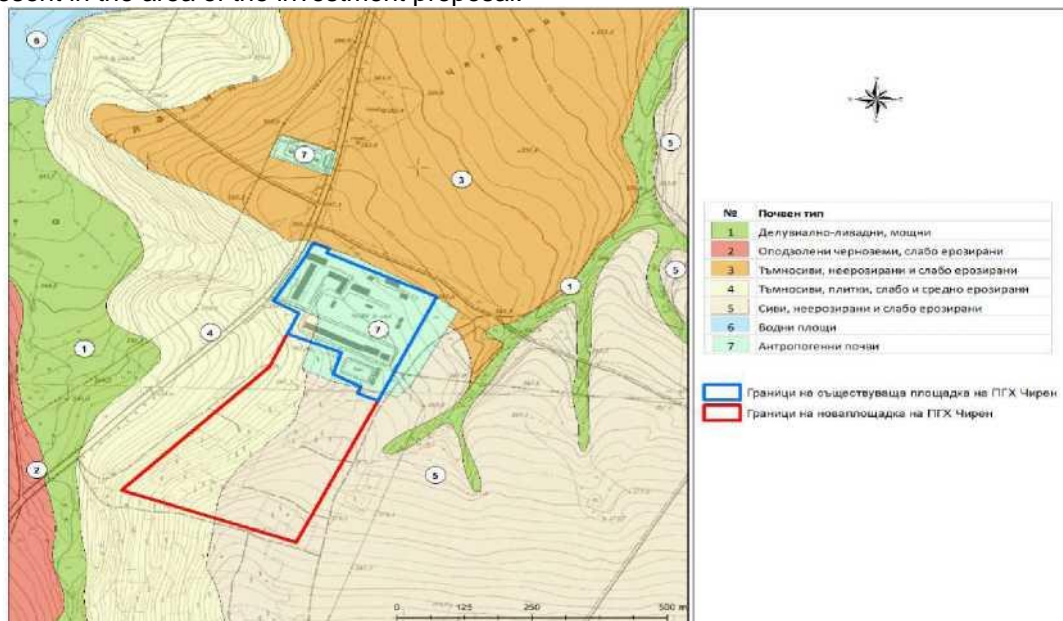


Figure 3 Soil varieties in the region of UGS Chiren

According to data from the annual level I monitoring carried out by RIEW Vratsa, there are no heavy metals contaminated soils in the region.

No salinization processes are observed within the territory of the district, and soil erosion (coastal and water erosion) is observed along the river banks of the Danube river and the Iskar river.

3.3.2 Summary of likely evolution if the IP is not implemented

The non-implementation of the investment proposal will lead to the preservation of the existing soil conditions in the area.

3.4 Subsoil and mineral diversity

3.4.1 Existing condition

3.4.1.1 Geological structure

The present site is located within the reach of the Chiren area, falling within the Chiren brachyanticlinal fold of the Marble Anticline.

Geochronologically, the area is represented by rocks of Permian to Quaternary age.

3.4.1.2 Physical and geological processes and phenomena

There are no distinct physical and geological phenomena and processes, such as silting and karst, in the area of the IP site.

3.4.1.3 Seismicity

According to the seismic zoning of the Republic of Bulgaria, the site of the IP falls in an area with seismic activity level VII according to the MSQ and seismic coefficient $K_c = 0.10$.

3.4.1.4 Engineering geological conditions

The present site is located within the reach of the Chiren area, falling within the Chiren brachyanticlinal fold of the Marble Anticline.

It is mandatory the design of the compressor station to be preceded by engineering and geological investigations and studies of the immediate subsurface and the groundwater therein.

3.4.1.5 Mining usufruct

The investment proposal will not have negative impact on the condition of the subsoil. No concession areas of underground mineral deposits, listed in the National Reserves and Resources Balance are affected.

3.4.2 Summary of likely evolution if the IP is not implemented

If the investment proposal is not implemented, changes in the condition of the subsoil may result in periodic and short-term waterlogging and drying due to climatic changes, related to precipitation and temperature.

3.5. Landscape and natural sites

3.5.1. Existing condition

The classification of landscapes is based on the one developed by A. Velchev, N. Todorov and R. Penin scheme of regional landscape differentiation of Bulgaria. According to this classification, the area of the investment proposal falls within the South Danube-Ludogorsk region.



Landscape groups

- 30 Hilly, karst and oak-hickory vegetation (Q.frainetto, Q.pubescens, Q.cerris)
- 31 Upland and foothill erosional-sedimentary with oak forests (Q.frainetto, Q.robus, Q.cerris) with undergrowth
- 33 Foothill-hilly and karst with oak forests and scrub
- 34 Foothill-kettle, erosion-accumulative with oak woodlands (Q.frainetto, Q.robus) and rarely shrubs
- 40 Plain and plain-lowland accumulative with oak woodlands (Fraxinus oxycarpa, Ulmos minor) and scrubs
- 50 Lowland and valley, cumulative with poplars, willows, alder and longleaf forests and meadows
- 62 Low montane, erosional-sedimentary with oak and oak-hickory forests with undergrowth

Figure 4 Landscape groups in the region of UGS Chiren

According to the landscape map of Bulgaria (M 1:500 000), the investment proposal falls in the group of Hilly and foothill hilly warm-humid landscapes in the type of Hilly and foothill-hilly erosion-sedimentation with oak forests (Q. frainetto, Q. robus, Q. cerris) with undergrowth.

3.5.2. Summary of likely evolution if the IP is not implemented

The non-implementation of the investment proposal will lead to the preservation of the existing state of landscapes in the area.

3.6. Biodiversity

3.6.1. Flora

3.6.1.1. Existing condition

The IP falls on the territory of the Pre-Balkan-Western floristic region. The natural vegetation in the area is highly fragmented by agricultural crops. The preserved forests are mostly of Quercus cerris

and *Quercus frainetto*. Mixed forests of oak (*Quercus dalechampii*) and Oriental hard beam (*Carpinus orientalis*) have occurred in places, and a combination of silver-leaved lime (*Tilia tomentosa*) and common hornbeam (*Carpinus betunus*) can be seen on limited areas.

The IP site is located in arable land.

The IP does not provide potential habitat for plants of conservation significance. There are no natural habitats listed in Annex 1 of the BDA on the territory of the IP.

3.6.1.2. Summary of likely evolution if the IP is not implemented

If the IP is not implemented the evolution of the existing flora, vegetation and natural habitats in the area will follow the existing course of development, unless it is disturbed by natural factors or anthropogenic influence. Given that the area affected by the IP is in arable land, the development of the vegetation therein will depend mainly on the developed agricultural activity.

3.6.2. Fauna

3.6.2.1. Existing condition

The IP is within the territory of the western part of the Pre-Balkan natural-geographical area. The predominant fauna in the area is of the Euro Siberian and European type, Mediterranean species are few due to the barrier role of the Balkan Mountains. Both important from conservation point of view and widespread species can be seen.

The following mammals can be seen - otters, minks, spotted ferrets, etc. The area offers habitat for both cave and forest bat species, including the greater horseshoe bat, smooth-nosed bat, long-winged bat, long-billed noctule, mechelle horseshoe bat, etc. Birds include tits, sparrows, blackbirds, song thrushes, meadow pipits, white storks, buzzards, lesser spotted eagles, woodpeckers, etc. The two species of tortoises common in Bulgaria, the common bog turtle, boobies, various species of snakes and lizards are found in the area. In the ponds there are Balkan and common pintail, black barbell, bitterling, etc. The area is rich in invertebrate fauna.

3.6.2.2. Summary of likely evolution if the IP is not implemented

Taking into account the fact that the area affected by the IP is in arable land, the development of animal life in it will depend mainly on agricultural activities.

3.6.3. Protected areas and protected zones

3.6.3.1. Existing condition

The IP does not fall within the boundaries of protected areas within the meaning of the Protected Areas Act (PAA), as well as within the boundaries of protected areas of the Natura 2000 network. The nearest protected areas and protected zones are listed in **item 3.6.3.1 of the EIA Report**.

3.6.3.2. Summary of likely evolution if the IP is not implemented

The area affected by the IP is located at significant distance from PAs and PZs. If the investment proposal is not implemented (zero alternative), the currently existing factors and impacts will continue to act. The development of the environment, the plant and animal conenoses will follow the existing trend, unless it is disturbed by natural factors or anthropogenic influence or special measures are taken to improve the conservation status.

3.7. Cultural-historical heritage

3.7.1. Existing condition

The territory of the village of Chiren is poorly explored and has few registered immovable cultural heritage sites. In the village, the church "St. Ascension of the Lord", built in 1859, has the status of artistic immovable cultural heritage site under the Cultural Heritage Act /CHA/.

In the village there is a memorial plate erected on the burial place of Georgi Komitcheto - a legendary revolutionary from Botev's detachment.

In connection with the reconstruction of the gas pipeline off-take Vratsa - 1, preliminary archaeological surveys were carried out to search for archaeological sites during which one archaeological site was registered in the land of the village. It is located 1.9 km to the north from the village of Chiren, 260 m to the west from the boundaries of the new Chiren UGS site and 450 m away from the installations located on it.

3.7.2. Summary of likely evolution if the IP is not implemented

If the investment proposal is not implemented, the existing state of the cultural heritage will be preserved.

Failure to implement the investment proposal, on the other hand, may limit the possibility of discovering new immovable cultural heritage sites.

3.8. Harmful physical factors

3.8.1. Existing condition

The investment proposal will be implemented in the land of the village of Chiren. The distance from the currently operating site of UGS Chiren to the nearest settlement - the village of Chiren is about 1500 m, respectively the distance from the boundaries of the new site to the gas storage facility to the nearest settlement - the village of Chiren is about 1200 m. The infrastructure facilities that need to be constructed in connection with the implementation of the IP (road connections, gas pipeline off-takes, pipelines, gatherings, etc.) are located outside the regulated boundaries of the settlements, with varying distances to areas with regulated noise requirements - mainly the residential area of the village of Chiren.

Sources of noise on the territory of the investment proposal are the existing site of UGS Chiren, which expansion is also subject to assessment, as well as traffic flows on the adjacent road of the national road network - asphalt road II-15 Devene - Chiren. This road is also crossed by infrastructure facilities planned for construction, serving the IP, such as the gas pipeline off-take for connection with the Vratsa 1 gas pipeline, which crosses the road connection at km 0+111.

Taking into account the low traffic on the road Devene - Chiren, the area of the IP is not characterized by excessive background noise levels for the status of the territory under consideration - a production area, considering the activity of the existing site of UGS Chiren.

Sources of vibration in the area envisaged for the implementation of the IP are the facilities at the existing site of UGS Chiren, as well as the existing vibrating pipelines ensuring the momentary operation of the underground gas storage facility. In normal operation of the facilities in working order, vibrations are practically excited outside the frequency range from 1Hz to + 80Hz, in which the general vibrations affecting humans are normalized, i.e. no conditions for discomfort are created and there is no danger to people even on the site of the underground gas storage facility.

3.8.2. Summary of likely evolution if the IP is not implemented

Failure to implement the investment proposal will not lead to a change in the levels of harmful physical factors in the area proposed for its implementation.

The likely evolution in the event that the investment proposal is not implemented will be entirely dependent on the development of the area, increase of road traffic and the implementation of other investment proposals which are not the subject of this assessment and which nature cannot be foreseen at this moment.

3.9. Waste

3.9.1. Existing condition

Vratsa Municipality has a regional landfill for disposal of mixed household waste, located in the Piskavets area in the land of the town of Vratsa, which meets the European and the national

environmental norms and standards and together with the neighbouring municipality of Mezdra manages its waste on regional basis.

There is no landfill for construction waste on the territory of Vratsa Municipality.

The system for scheduled garbage collection and transportation of mixed household waste covers all 23 settlements in Vratsa municipality and 100% of the population of the municipality.

3.9.2. Summary of likely evolution if the IP is not implemented

No change in waste management in Vratsa municipality is expected if the investment proposal is not implemented.

3.10. Health and hygiene aspects

3.10.1. Existing condition

In 2020 the population of the village of Chiren is of 919 people, the population of Vratsa municipality is of 72 126 people and the population of Vratsa district is of 155 377 people. 58.8% of the population lives in the towns and 41.2% in the villages.

3.10.1.1. Population and demographic features.

The data presented in the EIA Report demonstrate the dynamics of population decline for the last four years in the district and municipality of Vratsa, and the village of Chiren and show a significant decrease in population in the district of Vratsa.

3.10.1.2. Population migration (mechanical growth)

In 2020, 5 064 people settled in Vratsa district, while 4692 left the district, or the positive MG was 372 people, or 2.4% respectively. The data on the migration process in the district repeat the general trend in the country.

3.10.1.3. Demographic indicators

The population ageing processes are more pronounced than the average data for the country in more than half of the districts, including Vratsa District. The data show a significantly less favourable age structure of the population in the district compared to the average data for the country – by 5.4% less is the working population in the district and by 3% more is the population over working age. The district has 0.6 percentage points less population under working age.

3.10.1.4. Disease incidence and morbidity of the population

The poverty line for Vratsa district is BGN 4 395 per year, or BGN 367 average monthly income, and 24.5% of the population in the district lives in poverty.

Health care in Vratsa region is provided by 12 hospitals - 5 Multidisciplinary hospitals and 4 specialized hospitals. In the outpatient care there is 1 DCC, 20 MC and 1 DC (dental centre). In the district one medical doctor serves 264 people and one medical dental doctor 1 359. In comparison, the average values for the country are 233 and 964 people respectively who are served by the respective specialists.

The general health status of the workers does not differ significantly from the health status of the population in the country. No diseases that could be related to the conditions and nature of work were registered.

3.10.2. Summary of likely evolution if the IP is not implemented

No change in the demographic and/or health indicators of the population in the IP area is expected if the IP is not implemented.

3.11. Tangible assets

3.11.1. Existing condition

Detailed information on all available tangible assets, located on the site of the existing gas storage are described in details in item 1.3.2.

Tangible assets that are close and are crossed by the IP are described in item 1.3.5.

3.11.2. Summary of likely evolution if the IP is not implemented

If the investment proposal is not implemented, the condition of the tangible assets is expected to evolve in line with natural and anthropogenic processes. Consequently, the capacity of the currently operating Chiren UGS Chiren will not be increased.

4 Description of the elements under Article 95, par. 4 which are likely to be significantly affected by the investment proposal

4.1. Methodology for assessing impacts on environmental components and factors

In general, the assessment of specific impacts in the EIA Report consists in determining the source of the impact, identifying the pathway to the receptor, and finally establishing of control on the effect of the impact. The assessment of impacts defines the identified impacts according to their 'significance', which is derived from the relationship between the 'magnitude of impact' and the 'sensitivity of the receptor' with respect to an impact resulting from a specific activity related to the investment proposal.

Identification of impacts

The potential impacts have been identified in relation to the implementation of the investment proposal as a result of the construction, commissioning and operation of the site and the auxiliary facilities. Often one and the same activity or facility has impact(s) on more than one receptor (environmental component/factor). In this respect, a detailed and comprehensive description of the investment proposal plays a key role, allowing for a complete identification of the expected impacts, as well as an up-to-date assessment of the significance of each of them.

The identification of expected impacts for the investment proposal has been prepared on the basis of specific activities and facilities and the results from the consultations with the stakeholders.

Extent/ size/ magnitude of the impact

The magnitude of the impact is usually expressed through quantitative and qualitative values compared to local, national and international standards. For some impacts, values/parameters cannot be applied. In such cases, the assessment is subjective and based on the expert's experience and good international practice. In the case of emergencies (catastrophes, natural disasters, accidents), impacts are considered in the context of the probability of the event and the consequences therefrom.

In general, the criteria for the extent/size/ magnitude of the impact can be considered as:

- Over time, e.g. duration of recovery or of impact;
- In space, according to the physical extent of impact;
- Quantitatively or qualitatively, where indicators of the status of the respective component/factor can be applied.

Receptor/resource sensitivity

For the purpose of the impact assessment, an assessment of the quality of the impact receptor or so-called receptor is made. In general, it can be summarized that receptors are all

components of the environment.

In the course of the assessment, the sensitivity/importance of each receptor has been determined using individual, quantitative and/or qualitative criteria, defined separately for each environmental component/factor in the EIA Report, the part, concerning the assessment of expected impacts. These criteria take into account the specific characteristics of the receptor in terms of:

- Existing receptor status - geographic distribution, presence and abundance, value (conservation status), etc.;
- Capacity to restore resistance to stress;
- Recovery period, etc.;

All these factors determine the sensitivity of the receptor. For the specific IP, a 7-level scale of the receptor sensitivity/value is applied, shown in the impact assessment matrix.

Assessment of impacts

The impacts expected from the implementation of the investment proposal are heterogeneous and can be defined in different ways. For the project the expected impacts are assessed as:

- direct or indirect;
- primary and secondary;
- positive and negative depending from the final effect;
- reversible (over a period of time) and irreversible (permanent);
- short, medium and long term;
- local, regional, national or cross-border;
- as a result of routine activity or in case of accidents.

In addition to the impacts listed above, potential cumulative impacts are also identified and assessed in the EIA Report. They can occur as a result of different types of interaction:

- with accumulation - the total effect from various impacts in a particular receptor;
- in case of interaction - different impacts interact with each other to produce a new significant impact;
- With add-on effect - the effect from the impacts from the proposed development and other existing or planned projects in the immediate vicinity;
- over time - a series of impacts that occur at different points in time, which individually are not important but cumulatively over the period are significant.

The assessment of impacts to receptors/receiving environment was prepared by considering the sensitivity/value of the receptor or the resource and the magnitude/severity of impact summarized in the following matrix:

Extent/ size/ magnitude of the impact	Receptor sensitivity /Value of the receptor or the resources						
	Extremely low	Very low	Low	Average	High	Very high	Extremely high
Positive (high positive)							
Low positive							
Very low positive							
Insignificantly positive							
Without change							

Insignificantly negative							
negative (low negative)							
High negative							
Very high negative							

The impact significance determined as per the matrix in the figure above does not take into account the implementation of mitigation measures. The matrix defines the significance in seven main groups:

- **Impacts with strong/high positive significance** - may be associated with a long-term or permanent positive effect, with impact over a very large area, etc.
- **Impacts of moderate (medium) positive significance** - noticeable and pronounced impact over a large area and with a prolonged period of occurrence
- **Impacts of low/low positive significance** - associated with temporary, short-term, time and area limited impacts
- **Impacts of minor positive significance** – expected positive impact occurring in very small quantities over a small area, a negligible impact or a very short period of action with complete reversibility. No measures required.
- **No impact is expected and no mitigation measures are required.**
- **Impacts of Negligible Negative Significance** –negative impact is expected occurring in very small quantities over a small area, a negligible impact or a very short period of action with complete reversibility. No measures required.
- **Impacts of low/low negative significance** - manifested by temporary, short-term, limited in time and area, easily reversible impacts, etc. Mitigation measures may be necessary and may be avoided without special measures other than adherence to best practice during operation.
- **Impacts of moderate (medium) negative significance** - need to be considered in combination with other factors, resulting from medium or long-term, permanent negative impacts, on large area, secondary, cumulative, synergistic. Need to be reduced or mitigated by mitigation/compensation measures or by selection of alternatives.
- **Impacts of high/high negative significance** – constant, irreversible impact of high intensity, over a significant area, affecting important components of the environment. The impact cannot be avoided/mitigated by selecting alternatives or applying mitigation/compensation measures.

However, strict distinction between these groups is not possible and in many cases the final assessment of impact significance falls somewhere in between.

Due to the fact that assessing the significance of impacts is not a precise discipline, a simple approach with numbers or quantitative indicators is not always possible in the impact assessment process. Sometimes the assessment is subjective and relies on observations or the subjective professional opinion of the respective expert or of third parties.

In view of this, a multidisciplinary approach has been adopted in the assessment of impacts for the IP, where the opinion of experts, based on their many years of experience in their respective fields, has also been used to verify the outcome of the application of the matrix presented above.

In some cases, where appropriate, environmental risks have also been identified, depending on the significance of the impact and the likelihood of its occurrence. The degree of risk is defined in three groups:

- significant, unacceptable risk to the environment;

- acceptable risk for which mitigation measures and control of impacts need to be foreseen; and
- low risk for which no mitigation measures are necessary.

4.2. Ambient air and climate

4.2.1. Ambient air - identification of pollution zones

4.2.1.1. Impact during construction

Areal dust source

The impact during construction from excavation activities for preparation of the site for the installation of the gas turbine units, water boilers and other utilities, and during movement of construction equipment within the work area of the site and from the transport scheme, is local, short-term, reversible, and insignificant. The degree of impact is negligible and does not threaten the ambient air quality (AAQ) of settlements in the area.

4.2.1.2. Impact during operation

Determination of pollution zones

Point sources

As result from the performed study on the expected changes in the air quality of the air basin from the emissions of the organized (point) sources of the installations from the existing or the new site of Chiren UGS, (which will not be operated simultaneously) in both modes (injection and withdrawal) when the design capacity is reached, with which a complex permit will be applied for, it can be concluded that in the annual and short term aspect, during combustion of natural gas, the ambient air quality in terms of both nitrogen oxides and sulphur oxides and carbon monoxide will not be adversely affected, and the impact is acceptable at local and regional scale.

4.2.1.3. Assessment methodology

The ambient air impact assessment, described in **item 4.1 - Methodology for the assessment of impacts of this EIA Report**, resulting from the construction and operation of the investment proposal has been made according to the criteria of ambient air quality (AAQ), in accordance with Regulation No. 11 of 14 May 2007 on standards for arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons in ambient air and Regulation No. 12 of 15 July 2010 - on standards for sulphur dioxide, nitrogen dioxide, fine dust particles, lead, benzene, carbon monoxide and ozone in ambient air and Ordinance No 7 on ambient air quality assessment and management.

The criteria for assessing the extent/ size/ magnitude of impact and the Criteria for assessing of receptors' sensitivity are presented in **Table 1 and Table 2 of the EIA Report**.

4.2.1.4. Identification of impacts

4.2.1.4.1. During the construction

The impact during construction - excavation activities for preparation of the site for installation of the gas turbine units, boilers and other utilities: the movement of construction equipment within the work area and from the transport scheme is direct, local, medium-term, temporary, reversible and insignificant.

The magnitude of impact is negligible negative and does not threaten the ambient air quality (AAQ) of settlements in the area and the ecosystems.

Considering the sensitivity of the receptor as extremely low, the significance of the impact is assessed as minor negative and acceptable at local and regional scales.

4.2.1.4.2. During the operation

On annual and short-term basis, ambient air quality in terms of sulphur and nitrogen oxides and carbon monoxide will not be adversely affected by the operation of Chiren UGS when full capacity is reached.

The magnitude of impact is insignificant and there will be no adverse effect on the settlements in the area and the ecosystems.

The significance of the impact is assessed as negligible and acceptable at local and regional scales.

The impact during operation from point sources as well as from the transportation scheme is local, long-lasting, reversible, and insignificant. The magnitude of impact is negligible and does not threaten the ambient air quality (AAQ) of settlements in the area.

4.2.2. Climate

4.2.2.1. Impact during construction and operation

The levels of greenhouse gas (GHG) emissions from combustion CO₂ emissions at Chiren UGS compared to the national GHG emissions are specified in item 1.5.3.4.

After commissioning, the combustion CO₂ emissions from the CS will be included in the European Emissions Trading Scheme, and the Operator of the installation shall be subject to updating the Greenhouse Gas Emissions Permit (GEGP) in view of monitoring and participation in the European Emissions Trading Scheme (EETS).

4.2.2.2. Control of measurements

The Company will document and store on the territory of the relevant operating site the results of its own monitoring. The Operator will report the information from the self-monitoring information as part of the AER.

4.2.2.3. Methodology for calculation of annual amounts of pollutants in ambient air - NO_x, SO₂, CO

The calculation formula is specified in **item 4.2.2.3 of the EIA Report.**

4.3. Waters

4.3.1. Surface waters

4.3.1.1. Assessment methodology

The assessment of the impact on surface water resulting from the construction and operation of the investment proposal has been made on the basis of the applicable in the country regulatory requirements and the impact assessment methodology described in **item 4.1 of this EIA Report.**

The criteria for assessing the extent/ size/ magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in **Table 3 and Table 4 of the EIA Report.**

4.3.1.2. Identification of impacts

All waste water generated from the activities of the new IP will be discharged together with the mixed waste water Stream 1 from the existing site of Chiren UGS. Currently the discharge is to a dry gully in the area of Lukite in the land of the Chiren village, in accordance with the current Permit No. 13140017/14.06.2007 for the use of a water body for the discharge of wastewater into a surface water body. The commissioning of the newly designed expansion of the production site at UGS Chiren is related to a procedure for the issuance of a complex permit, which is ongoing in parallel with the environmental impact assessment procedure, which is to regulate the discharge of the generated wastewater flows after the implementation of the investment proposal.

Impacts during construction

Since the implementation of the investment proposal is not related to activities in surface

water bodies, potential impacts could be observed only on the chemical status of surface water bodies, expressed in the formation of small volumes of wastewater, mainly during rainy periods, from accidental discharge of petroleum products, metallic particles and other pollutants during use and possible accidents with construction machinery and transport vehicles, as well as from pre-commissioning activities.

In order hydraulic tests of the gas pipeline off-takes and gatherings to be made, certain quantities of water will be required, which are planned to be supplied by a pumping station constructed at the nearby dam Chiren III and in accordance with issued Permit No. 11490001/14.06.2007 for water intake from a surface water body.

After the hydraulic test, the water to which no additives are to be added and which will be considered conditionally clean, will be discharged in an appropriate manner into the storm sewer manholes on the CS site together with the mixed wastewater from UGS Chiren into a dry gully in the area of Lukite in the land of the Chiren village, in accordance with Permit No. 13140017/14.06.2007 for discharge of wastewater into surface water bodies. During the hydraulic test, if possible, a certain amount of water will be reused in a working cycle, by being transferred from one test section to another.

Impacts during operation

No impact on surface water is expected after finalization of the construction and restoration phase as the main and ancillary technological processes are not a source of wastewater.

4.3.1.3. Assessment of impacts

The assessment of impacts on surface water bodies has been made in the impact area. With regard to surface waters, and based on the impacts identified above, it has been assessed that the impact area covers the closest surface water bodies (a gully located approximately 60 m from the production site) as well as surface water bodies that will be directly affected by the water intake processes, such as Chiren III dam, and by the discharge processes of the generated waste streams - a dry gully in the area Lakite in the land of the village of Chiren. The affected water bodies fall within the boundaries of the surface water body Ribene River from the source to the running into a feeder at Lesura including Trikladenci dam, code BG1OG400R1219, determined in good ecological status and unknown chemical status, and with the following objectives: Keeping the good ecological potential and good chemical status.

Impacts during construction

Impacts to surface waters are anticipated as result of accidental leaks of oil and petroleum products from construction machinery, as well as a result of water intake and discharge processes during the hydraulic testing of the pipeline off-takes and gatherings.

The described potential impacts resulting from accidental oil and petroleum product leaks and the discharge of generated wastewater from the hydraulic testing process appear to be negative impacts at the local level, with indirect effect, resulting from accidental leaks, to direct, at wastewater discharge, temporary, short-term, only for the construction period, and reversible.

Impacts during operation

The implementation of the investment proposal will lead to a minimal or even insignificant increase in the quantities of discharged domestic sewage and rain water generated during the operation of the investment proposal and discharged with Stream 1 into a dry gully in the Lakite area, which in turn is not expected to lead to a change in the water levels. With regards to the quality of the discharged waters, the latter will be unchanged and in compliance with the conditions and standards set out in the issued and valid permits for the discharge of the generated wastewater streams into surface water bodies.

It is not expected that the implementation of the investment proposal and its operation will lead to exceeding or changing the already permitted limits and water intake regimes according to

the current permit, therefore the implementation of the IP should not have a significant impact on the biological and hydro morphological quality elements and deterioration of the ecological and chemical status of the surface water bodies and failure to achieve the set environmental objectives.

In view of the above, it can be concluded that no impacts on surface waters in the area of the investment proposal are expected as a result of the operation of the investment proposal.

4.3.2 Groundwater

4.3.2.1 Assessment methodology

The assessment of the impact on groundwater resulting from the construction and operation of the investment proposal has been made on the basis of the applicable national regulatory requirements and the Impact Assessment Methodology described in **item 4.1 of this EIA Report**. In order to make the assessments for surface water and groundwater relevant and also comparable to the implementation of the measures and objectives set out in the RBMP 2016-2021, the methodology applied for the assessment of impacts on groundwater bodies has similar criteria to that for surface water bodies.

The criteria for assessing the extent/ size/ magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in **Table 5 and Table 6 of the EIA Report**.

4.3.2.2 Identification and assessment of impacts

In view of identifying and assessing the impacts, a perimeter or so-called impact area has been considered covering both the groundwater body within the reach of the newly designed site of the investment proposal and the groundwater affected by other activities from the implementation of the IP, including the re-injection of the so-called formation water, discussed above in the present Environmental Impact Assessment Report.

Identification and assessment of impacts during construction

No impact on groundwater is expected due to the fact that the terrain of the site at a depth of about 25-30 m is represented by an alternation of clays and sandy clays acting as a natural screen preventing the penetration of surface water.

In spite of the high sensitivity of the receptor, no impacts on the same are expected, including impacts that would lead to changes in the quantitative and/or qualitative parameters of the groundwater body.

Identification and assessment of impacts during operation

In general, the wastewater from the site form four streams. The discharge into the surface water bodies from Stream 1, Stream 2 and Stream 3 is made in accordance with the Permit for the use of a water body for the discharge of wastewater №13140017/14.06.2007 issued by the Basin Directorate Danube Region (BDDR) – the town of Pleven. The two dry gullies and the reservoir Chiren III dam fall within water body, having code BG1OG400R1219.

Stream 4 is formed from the liquid phase (formation water) separated from the natural gas during withdrawal, which is piped to a treatment facility - a mud-oil trap with a perlite filter. From there, it flows into an industrial tank, wherefrom it is reinjected by a pumping station and pipeline into Well P-15.

For the reinjection activities there is a permit issued by BDDR - Pleven № 12570003/16.12.2015, amended by Decision № 2757 dated 30 September 2019. Subject to compliance with the requirements set out in the permit, no impact on the chemical and quantitative status of the groundwater body (code BG1G000K1ap043 - Karst waters in the Marble massif) is expected.

4.4. Soils

4.4.1. Assessment methodology

The assessment of impacts on soils has been made on the basis of the described in **item 4.1 of the present EIA Report** Impact Assessment Methodology and the current regulatory framework.

The impact assessment criteria extent/ size/ magnitude and the receptor's sensitivity assessment criteria are presented in **Table 7 and Table 8 of the EIA Report.**

4.4.2. Identification of impacts

Impacts during construction

The negative impacts to soils are mainly concentrated in the construction phase of the compressor station, the gatherings, the connection to the flare and the adjacent infrastructure.

Impacts to soils are expressed in:

- Temporary disturbance within the easement of the gatherings, the water supply line and the sewerage lines, the formation water and condensate pipelines, and the connection to the flare; Partial destruction and damage within the compressor station site. Sealing and destruction of soil profile during construction (after removal of humus layer);
- Damage to or destruction within the extent of the road connections proposed to be constructed. Compaction of soils by construction machinery within designated areas;
- Potential local contamination of soils during construction from unforeseen spills of lubricants, fuel and waste.

Impact during operation

No impacts to soils outside the compressor station boundary are anticipated during operation.

Local contamination of soils on site with petroleum products from accidents or with household and construction waste from activities related with the maintenance of the buildings and the facilities is possible.

4.4.3. Assessment of impacts

In accordance with the construction activities referred to in **item 4.4.2 and the Assessment Methodology given in item 4.1,** the magnitude of impacts is defined as:

Moderate adverse impacts that result from activities that lead to contamination or the disturbance or destruction of soils in a given area. Considering the above impacts during construction and operation, and the size of the buildings and facilities, the affected areas of grey forest soils are an insignificant percentage compared to the prevalence of this soil type in the area.

4.5. Subsoil and mineral diversity

4.5.1. Assessment methodology

The assessment of the impact on the subsoil resulting from the construction and operation of the investment proposal has been made on the basis of the regulatory requirements in force in the country and the Impact Assessment Methodology described in **item 4.1 of the present EIA Report.**

The criteria for assessing the extent/ size/ magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in **Table 9 and Table 10 of the EIA Report.**

4.5.2 Identification and assessment of the impacts during construction

The construction works for the implementation of the investment proposal will mainly consist of excavation and backfilling. The impact of these activities will be negative, direct,

temporary and short-term, partially reversible. It is limited in scope to the sections of the construction works to be carried out. The impact will affect only a small part of the surface area of the subsoil, which will subsequently be partially restored. It is assessed as low negative level and taking into account the receptor's sensitivity - medium, it can be concluded that the expected impact is of low or even low negative significance.

Contamination of the surface layers of the geological environment by petroleum products can be expected from accidents and refueling of construction and transport machinery, from contaminated water during excavation and other construction works. This impact is adverse, direct, short-term, localized in the section of the performed construction activities. It is assessed to be of negligible negative significance, taking into account the negligible negative magnitude of the impact and the average sensitivity of the receptor.

There is no direct impact on mineral diversity.

4.5.3 Identification and assessment of the impacts during operation

No impact on the subsoil is expected under normal trouble-free operation of the IP, as no activities disturbing and polluting the geological environment are foreseen.

4.6 Landscape and natural sites

4.6.1 Assessment methodology

The assessment of the impact on the subsoil resulting from the construction and operation of the investment proposal is made on the basis of the regulatory requirements in force in the country and the impact assessment methodology described in **item 4.1 of the present EIA Report.**

The criteria for assessing the extent/ size/ magnitude of the impact and the criteria for assessing receptor's sensitivity are presented in **Table 11 and Table 12 of the EIA Report.**

4.6.2 Identification of impacts

The direct landscape impacts from the construction of the buildings and facilities would be limited within the construction site. Outside the boundaries of Chiren UGS, negative impacts are expected from the construction of the access road and the installation of the necessary connections to the existing interurban water supply pipeline and the connection to the flare.

Visual impact

The areas from which there is visibility to UGS Chiren site are coloured in blue in Figure 5.41 It can be seen that a selected observation point falls on the very boundary of the visible area. This is due to the location of the village of Chiren, which is located on the top and on the southern slope of a hill, the highest parts of which are 45 m higher above sea level than the site of the investment proposal. A big part of the settlement located on the southern slope has no visibility in the northern direction and respectively towards the site of UGS Chiren. This is evident from Figure 5, which shows the elevation profile between the village of Chiren and the site of the investment proposal.

There are no other settlements or sites of tourist and recreational infrastructure within the 2km area. To the west of the site passes the municipal road VRC-1036, which connects the villages of Devene and Chiren and is the object on which the greatest visual impact from the construction and operation of Chiren UGS occurs.

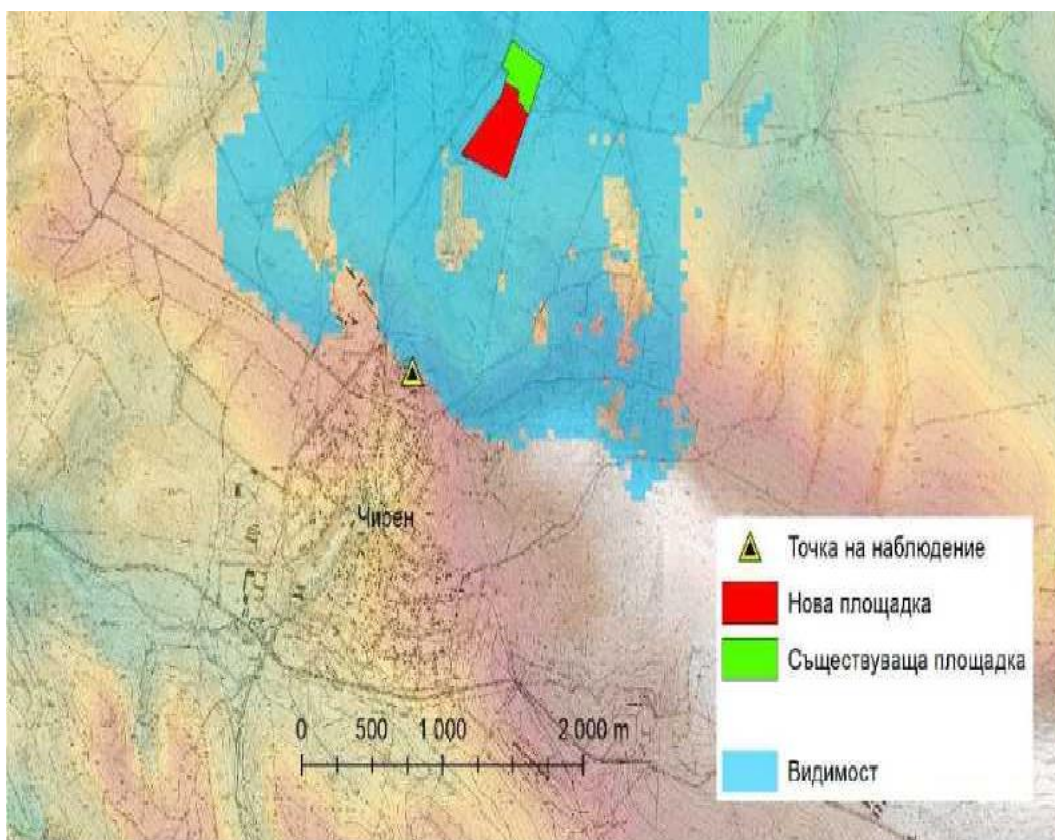


Figure 5 Visual impact

4.6.3. Assessment of impacts

The anticipated visual impact from the construction of the compressor station and its adjacent infrastructure would be adverse, temporary, short-term, local (in the area of construction activities), direct, and moderate in magnitude. No visual impacts are anticipated with respect to the residents of the village of Chiren.

Upon completion of the construction phase, site restoration and recultivation will be performed.

4.7 Biodiversity

4.7.1 Assessment methodology

The assessment of the impacts from the implementation of the project on biodiversity is made in accordance with the current national legislation and the general Methodology for impact assessment adopted by the project, described in details in [item 4.1](#).

The criteria for assessing the extent/ size/ magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in [Table 13 and Table 14 of the EIS Report](#).

4.7.2 Identification of impacts

4.7.2.1 Impact during construction

The potential impacts on biodiversity in the area that can be expected as result of these activities are:

Flora: Destruction of vegetation cover; Transformation of the natural character of the vegetation cover due to the introduction of ruderal and invasive alien species.

Fauna: Loss/damage of habitats; Loss of individuals; Barrier effect/fragmentation;

Disturbance.

4.7.2.2 Impact during operation

During operation, impacts can be expected from the presence and the work of people and machinery/equipment on the IP site. The expected average noise level along the measurement loops at the site boundaries is 50,12 dB(A).

The potential impact on biodiversity in the area as a result of the operation of the IP is disturbance.

4.7.3 Flora

4.7.3.1 Impact during construction

No significant negative impacts on flora, vegetation and habitats are expected as a result of the implementation of the IP during construction.

4.7.3.2 Impact during operation

No significant negative impacts on flora, vegetation and habitats are expected as a result of the implementation of the IP during operation.

4.7.4 Fauna

4.7.4.1 Mammals (other than bats)

4.7.4.1.1 Impact during construction

The IP will be implemented within a relatively small territory, in agricultural land, mostly arable in an area with large areas of similar habitat. The magnitude of impact is low. No significant impacts on populations of mass mammal species are expected in the IP area.

Conservation-relevant mammal species, potentially occurring on agricultural land and inhabiting the area are *Spermophilus citellus* and *Vormela peregusna*. Potential impacts on these are described in [item 4.7.4.1.1 of the EIA Report](#).

4.7.4.1.2 Impact during operation

Disturbance related to the operation of on-site facilities, the presence of people and equipment could be expected during the operation of the IP. Negative impact could also be expected during the maintenance of the easement of the associated infrastructure. The potential fragmentation effect of the proposed infrastructure is assessed as negligible. Minor localized disturbance of low magnitude is possible.

No significant impact on mammals in the area is expected during the operation of the IP.

4.7.4.2 Bats

4.7.4.2.1 Impact during construction

The established habitat where the IP will be implemented is a potential foraging habitat for bats. The only potential impact is disturbance to bats during foraging if activities are carried out at night. Due to the high mobility of bats, which travel long distances during foraging, and the local nature of the impact, no significant disturbance is expected as a result of construction activities. The impact is of low magnitude and assessed as negligible.

4.7.4.2.2 Impact during operation

Disturbance to bats in the area is expected during operation of the IP. Due to the high mobility of bats, their sensitivity is assessed as low. Due to the local nature, the level of the impact is assessed as low. The impact is of negligible negative significance.

4.7.4.3 Birds

4.7.4.3.1 Impact during construction

Loss/damage of habitats

Loss of habitats will occur in the area directly affected by construction activities. The impact

will be permanent but will affect a small area in sub-optimal habitat. There are large areas of this type of habitats in the area. The magnitude of the impact is assessed as low. The sensitivity of the species to this impact is high during the breeding season and low during the other periods. Its significance can be assessed as low during periods of high sensitivity and negligible during the rest of the year.

Loss of individuals

During the breeding season, the expected significance of impact is low. Outside the breeding season, loss of individuals is very unlikely. The sensitivity of adults to this impact is very low. The impact is assessed as negligible. Due to the fact that the loss of individuals is of low to negligible significance, no changes in the species composition of the communities, abundance and population structure of bird species in the IP area are expected. However, in order to prevent impact during the nesting season, a mitigation measure is proposed in the EA.

Disturbance

The sensitivity of the birds to disturbance is high during the breeding season and low during the rest of the year. Impact significance is low during the breeding season and negligible during the rest of the year. However, in order to reduce the impact during the breeding season, a mitigation measure is proposed in the EA.

4.7.4.3.2 Impact during operation

During the operation of the IP, disturbance associated with the operation of the site facilities, the presence of people and equipment can be expected. Negative impact may also be expected during maintenance of the easement of the ancillary infrastructure. The potential effect of fragmentation from the proposed infrastructure is assessed as minor. Minor local disturbance of low intensity is possible.

No significant impact on birds in the area is expected during operation of the IP.

4.7.4.4 Amphibians and reptiles

4.7.4.4.1 Impact during construction

The affected area is agricultural land surrounded by large areas of similar territories. The implementation of the IP will not affect suitable habitats for amphibians and it is not expected such habitats to be affected by the implementation of the IP. The area of the IP is not optimal habitat for reptiles, however it is possible that single individuals may occur in the area.

4.7.4.4.2 Impact during operation

No impact on the herpetofauna in the area is expected during operation of the IP.

4.7.4.5 Terrestrial invertebrates

4.7.4.5.1 Impact during construction

Loss/damage of habitat

The arable land does not provide suitable habitat for the species of conservation significant invertebrates, potentially occurring in the area. However, it is possible that individuals of species such as *Lycaena dispar* and *Euphydryas aurinia* can be seen on the site affected by construction activities. Due to the nature of the affected habitat and the very small area, the magnitude of habitat loss is assessed as low. Due to the high mobility of the imago, the sensitivity is assessed as low. The impact is of minor negative significance.

Loss of individuals

Loss of individuals may occur as a result of accidents during the operation and movement of construction equipment. The sensitivity of the species is assessed to be low due to the high mobility of the imago and high reproductive abilities. Due to the nature of the habitat and the small area affected, the magnitude of the impact is assessed as low. The impact is of minor negative significance.

4.7.4.5.2 Impact during operation

No impact on invertebrates in the area is expected during the operation of the IP.

4.7.4.6 Fish and aquatic invertebrates

There is no suitable habitat for fish and aquatic invertebrates on the properties where the IP will be implemented. No impact on their habitats and populations is expected as a result of the implementation of the IP during the construction as well as during the operation.

4.7.5 Protected areas and protected zones

The protected areas of Natura 2000 and the protected areas under the Protected Areas Act (PAA) are located at a relatively large distance from the IP. The closest Natura 2000 site is more than 3 km away from the IP and the closest protected area as per the PAA is more than 4 km away. Due to the local nature of the impacts of the IP, no direct or indirect impact to the areas and the zones is expected during the construction and the operation.

4.8 Cultural-historical heritage

4.8.1 Assessment methodology

The assessment of the impact resulting from the implementation of the IP on the cultural and historical heritage is in accordance with the current national legislation and the adopted by the project general Impact Assessment Methodology, described in details in [item 4.1](#).

The criteria for assessing the extent/size/magnitude of the impact and Criteria for assessing receptor's sensitivity are presented in [item 4.8.1 of the EIA Report](#).

4.8.2 Identification and assessment of impacts during construction

The probability for presence of unknown archaeological sites within the scope of the construction activities may result to the occurrence of negative impacts that are local, permanent and irreversible. All types of excavation works may affect cultural layers, destroy archaeological structures or destroy artefacts. The excavation activities may also compromise the cultural environment of significant archaeological sites. Taking into consideration the presence of an archaeological site in the immediate vicinity of the investment proposal and in order to prevent the destruction of potential archaeological sites, preliminary archaeological studies- field surveys should be made within the area in accordance with the requirements of Art. 161, para. 1 and Article 148, para. 5 of the CHA. The results from the studies are to be accepted by a Commission under Article 158a of the CHA, which will determine future instructions for any archaeological sites that may eventually be recorded.

4.8.3 Identification and assessment of impacts during operation

No impact on cultural heritage and archaeological sites is expected during operation.

4.9 Harmful physical factors

4.9.1 Assessment methodology

The impact assessment from noise and vibrations on the environment is in accordance with the current national legislation and the adopted by the project general Impact Assessment Methodology as detailed in [item 4.1](#).

The criteria for assessing the extent/size/magnitude of the impact and the Criteria for assessing receptor's sensitivity are presented in [item 4.9.1 of the EIA Report](#).

4.9.2 Identification of impacts

4.9.2.1 Impact during construction

Noise during the construction activities at the site of UGS Chiren

Based on the specified in the EIA Report noise levels for the machinery, which will be potentially used during the construction of the underground gas storage expansion, an estimated

maximum predicted noise level of LI = 109.8 dBA can be predicted. This would be during the site preparation phase, the expansion of Chiren UGS, trenching for the underground pipelines, and excavation for the foundations of the GTCU and other parts of the installations. The expected noise impact at the maximum predicted noise level LI = 109.8 dBA would be up to 350 m from the underground gas storage site. As the distance of the existing site and its newly designed expansion to the settlement boundaries of the village of Chiren is more than 1000 m (1 500 m and 1 200 m respectively), this means that noise impact level of less than 45 dBA over a 24-hour period is guaranteed during the construction of the newly designed expansion.

Noise during construction of the infrastructure connections

The implementation of the IP is related with the construction of infrastructure connections presented and described in details in **item 1.3.3 of the present EIA Report.**

During the construction of the external connections and the crossing of various sites, the source of noise in the environment will be the construction equipment used for various types of construction work - excavation, filling, drilling, concrete, welding, installation, transport, etc. During the implementation of the investment proposal, the noise impact will be concentrated in and around the working strip, and a cumulative noise load from the different construction equipment is expected during daylight hours. At certain periods of time, an equivalent noise level of 85 to 90 dBA can be expected in the vicinity of the operating machinery carrying out different types of activities (work strip preparation, pipe stringing and laying, welding, excavation, etc.).

A source of noise to the environment will also be the cargo transport, which will serve the construction works and will be used for delivery of the necessary materials, elements (pipes) and equipment, and for the removal of waste. The equivalent noise level depends mainly on the number of trips per day and the speed of traffic. The number of trips is determined on the basis of the transport distance for each route, the speed and the loading and unloading time.

Vibrations during construction activities for the newly designed site of UGS Chiren GHG and the infrastructure sites

The drivers of heavy trucks, excavators, bulldozers, as well as the workers will be exposed to general vibrations. Last but not least, people in the settlements that will be affected by the increased intensity of heavy trucks traffic resulting from the transport of materials and labour for the implementation of the investment proposal, will also be exposed to general vibrations.

Existing compressors and vibrating underground pipelines are also a source of vibration in the IP area. Practically all vibration exciters from the compressors are outside the 1Hz + 80Hz frequency range in which the total vibration affecting humans is standardized, i.e. the ground vibration excited by these dynamic forces is outside the zone of standardizing of the total human vibrations. The vibrations from the pipelines are usually broadband in the frequency range from 30Hz to 80Hz. The ground vibrations excited by the vibration-isolated compressor foundation are with very low intensity and attenuate quickly in the environment. At a distance of more than 10 m from the vibration-isolated foundation, the measured vibrations are typically lower than the human vibration perception threshold.

4.9.2.2 Impacts during operation

Noise during operation

With expected noise levels in the range of 80-90 dB(A) from the facilities, as will be the case at the new site of UGS Chiren, the noise levels according to the technical characteristics of the facilities will be 85 dB(A) at 1 m from the compressor casing, the expected noise levels at the production site, at distance of 2 m from the enclosing structures, will be from 45 dB(A) to 55 dB(A). The noise levels from the existing underground gas storage site are given below in this item, and are based on records from actual measurements. The sound power from the GMC is attenuated by the Compressor building.

It is not expected the noise background levels at the different measurement points to have

negative impact on the noise background of neighboring areas. The expected average noise level along the measurement loops at the site boundaries is 50.12 dB(A), which is 20 dB(A) below the 70 dB(A) limit.

Vibrations during operation

Actually all vibration exciters by the compressors are outside the 1Hz + 80Hz frequency range in which the general vibrations affecting a human are standardized, i.e. the ground vibrations excited by these dynamic forces are outside the zone of standardization of the general vibrations of a human.

Other ground vibration exciters at UGS Chiren are the vibrating underground pipelines, the vibration of which is due to flow turbulence at bends, tees and fittings.

No harmful physical factors such as light, thermal radiation or electromagnetic radiation will be generated in the environment as a result of the implementation of the investment proposal and no harmful impacts on the environment from physical factors such as noise, vibration, ionizing or non-ionizing radiation are expected.

4.9.3 Assessment of impacts

No settlements are located in the area of impact defined in terms of the noise factor, as the distance of the existing site and its newly designed expansion to the settlement boundaries of the village of Chiren is more than 1000 m (1 500 m and 1 200 m respectively).

Taking into account the assumed sources of vibrations and their levels, as well as taking into account the area of impact in terms of vibration emissions, the latter may have impact only during the construction, on the settlements and in particular the population affected by the increased intensity of heavy trucks traffic, resulting from the transportation of materials and labour for the implementation of the investment proposal. The sensitivity of the receptor is assessed as medium.

4.9.3.1 Assessment of impacts during construction

Assessment of impacts from the generated during the construction noise

The construction of the facilities at the new site of UGS Chiren, which is an expansion of the existing one, is associated with noise generation in the range of LI = 109.8 dBA, and the expected attenuation of noise levels will be reached at a distance up to 350 m away from their source.

The construction of the infrastructure sites will result in noise levels in the range of 85 to 90 dBA, which will attenuate at no more than 300 m from the point of generation.

At the sites of the temporary bases serving the construction of the newly designed expansion of UGS Chiren and the infrastructure connections related thereto, an equivalent noise level of about 75 dBA can be expected at certain periods of time, attenuating from 200 to 250 m.

Taking into account the distance of the site of UGS Chiren to the nearby settlement of the village of Chiren, it can be concluded that no impact on the population is expected.

Assessment of impacts from vibrations generated during construction

Taking into account the sensitivity of the receptor, medium, and the magnitude of the expected negative impacts - from minor to high negative, in direct dependence on the source and the proximity of the receptor, it can be concluded that the expected impacts will be in the area of the access roads, and will be ranging from minor negative to impacts with low or even low negative significance, short-term, temporary and reversible.

4.9.3.2 Assessment of impacts during operation

Assessment of impacts from the noise generated during operation

According to the calculations of noise levels from the newly designed site in the area of the

nearest subject of protection - a residential building located in the village of Chiren, the maximum expected sound assessment level is 19.09 dB(A), which is approximately 2.35 times below the noise limit values for residential areas for night time and 2.88 times below the daytime levels. The data provided indicate that no increase in background noise is expected in the residential area (for settlements without significant noise sources, the background noise is around 30 dB(A)). Currently there are no data for increase in background noise in the area of the village of Chiren from the existing site.

No change in the acoustic situation at the place of impact (Chiren village) is expected after implementation of the investment proposal.

Assessment of impacts from the vibrations generated during operation

The operation of the facilities at the production site of the underground gas storage after the implementation of the investment proposal will not create conditions for discomfort and does not pose a danger to people even at the site of the underground gas storage. The generated vibrations are either outside the frequency range 1Hz + 80Hz, in which the general vibrations affecting humans are standardized, or they attenuate quickly at their distribution in the environment.

4.10 Waste

4.10.1 Impact during construction

It can be summarized that during the construction phase, impacts on the environment components are expected only as a result of illegal storage of the generated waste, their disposal in unregulated places and their transfer for subsequent treatment to companies that do not have the necessary permits under the Waste Management Act. The expected impacts will be negative, direct, short-term, temporary and reversible, and no secondary impacts and cumulation are expected. Depending on the receptor's sensitivity, ranging from extremely low as is the case for AAQ in the IP area, to extremely high for pregnant women and chronically ill people, and the degree of occurrence of the expected impacts, the significance of impacts can be assessed from negligible negative, through impacts of low/weak negative significance and moderate negative significance to impacts of high/strong negative significance. Compliance with the legal requirements regulated in the Waste Management Act and its by-laws is sufficient grounds to conclude that the lawful collection, storage and treatment of the generated waste will not cause any impacts on the components of the environment.

4.10.2 Impact during operation

All waste generated as a result of the operation of the site will be stored at designated sites that meet regulatory requirements to prevent contamination of the surrounding terrain and individual components and factors of the environment.

During operation - the generated waste is not expected to have harmful impact on the components of the environment. It will be collected separately and removed from the site on a regular basis. It is envisaged all generated waste to be handed over to companies holding a permit, a complex permit or a registration document under Article 35 of the WMA for the respective activity and waste site, on the basis of a signed written contract. In case of non-compliance with the regulatory requirements in the field of waste management, the expected impacts will not differ in type, magnitude and significance from those described for the period of construction of the investment proposal.

4.11. Health and hygiene aspects

4.11.1 Assessment methodology

The assessment of the impact of the adverse physical factors of the environment for the health of the population in the vicinity of the construction site and subsequently the production

site, as well as on that of the workers on the site, both during construction and operation, is in accordance with the current national legislation and the adopted by the project general Impact Assessment Methodology, described in details in Section 4.1. **The tables below summarize the criteria for assessment of impacts on the health of the population and the workers.**

The criteria for assessing the extent/size/magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in **Table 15 and Table 16 of the EIA Report.**

4.11.2 Impact during construction

During the construction and installation activities, the work site will be an organized areal source of dust emissions, exhaust emissions from internal combustion engines of the construction and installation equipment, as well as noise emissions and excessive vibration levels. At a distance of more than 1000 m, the noise generated at the worksite attenuates to the daily noise standard in a populated area, while the emissions from the ICE are quickly dispersed within the worksite boundaries. The traffic increase resulting from the construction and installation works would be negligible and would not result in an increase in noise pollution when passing through populated areas and would not be a factor for deterioration of the AAQ resulting from the generation of emissions in the air, including dust and exhaust emissions from ICE. Under certain climatic conditions, such as dry and windy weather, dust emissions may rarely, and in low concentrations, reach the regulatory boundaries of the village of Chiren and their negative effect will be limited to the level of temporary discomfort and are not expected to affect human health.

During construction and installation activities, at certain periods of time, workers will be working in overheating and/or supercooling microclimates. Heavy physical labour potentiates the effect of overheating microclimates. Considering the sensitivity of the receptor, it can be concluded that the expected impact will be of negligible significance. As a result of a complex impact in extremely rare cases it is possible that acute negative impacts may manifest.

The drivers of excavation and loading equipment will be exposed to excessive noise and vibrations. Although the work on this specific site will be for a relatively short period of time and the anticipated impact will be of minor significance, the prolonged occupational exposure is a prerequisite for the development of permanent disability of the auditory analyzer, the vestibular apparatus, the musculoskeletal system, damage to the parenchymal organs, as well as for the development of vibration sickness, which is not an uncommon occupational disease among construction workers and the development of which is also due to the potential vibration impact by the supercooled microclimate and their combined effect.

Regarding the negative health effects of conventional factors of the working environment, effective measures have been developed and successfully implemented in practice to reduce and limit the risk to health and which are recommended to be applied during the construction and installation works on the site of UGS Chiren to ensure the protection of the health of workers.

4.11.3 Impact during operation

The operation of the newly designed expansion of UGS Chiren site will not lead to any deterioration of the AAQ in the area of the production site as well as in the nearby settlements. On the other hand, increasing the capacity of the gas storage by constructing new aboveground facilities will not result in noise pollution in the area of the activities and in the nearby and affected settlements. Therefore, the operation of the site will not have adverse health effect on the population.

Some of the physical factors of the working environment, such as noise and overheating microclimates, may have impact only on a limited number of workers. These are conventional work environment factors for which preventive measures have been developed and tested in practice and their implementation leads to reduction and limitation of health risks. The significance of the expected impacts is insignificant.

4.12 Tangible assets

4.12.1 Assessment methodology

The assessment of the impacts from the construction and operation on the tangible assets on and near the construction site and subsequently the production site, is in accordance with the current national legislation and the adopted by the project general Impact Assessment Methodology as detailed in **item 4.1.**

The criteria for assessing the extent/size/magnitude of impact and the Criteria for assessing receptor's sensitivity are presented in **item 4.12.1. of the EIA Report.**

4.12.2 Impact during construction

Taking into consideration the nature of the newly designed infrastructure elements, which may affect existing tangible assets, it can be considered that the risk of disruption or damage to the relevant water supply and sewerage elements or gas pipelines is very low and no such impacts are anticipated if the agreed design is implemented accurately.

Negative impacts can be expected on road infrastructure due to the movement of heavy machinery, especially if the roads are not in condition to accommodate such loads. These impacts are expected to be local, temporary and reversible in case of timely rehabilitation of the roads and are considered to be of minor negative significance.

The implementation of the investment proposal will not have any impact on the machinery and the equipment, as well as the infrastructures, which are on and are servicing the existing site of UGS Chiren.

4.12.3 Impact during operation

During the stage of operation, negative impacts are expected only on the road infrastructure. Traffic is expected to be related with the servicing of the underground gas storage, for which mini-buses for workers and staff private vehicles will be used. Trucks may also be used for the delivery of necessary materials, raw materials and items for UGS Chiren, and the load is expected to be minimal. The relevant negative impacts on the road infrastructure are considered as local and of minor significance.

On the other hand, the implementation of the IP will increase the engineering facilities (newly constructed CS and auxiliary infrastructure and withdrawal and injection facilities), which in terms of tangible assets means a long-term positive impact in the area of the IP, which can be assessed as an impact of moderate/medium positive significance.

4.13 Summary of impacts

The EIA Report presents summarized data on the potential impacts on the components of the environment (the elements referred to in Article 95, para. 4 of the EPA) and the population from the implementation of the investment proposal - during its construction and operation, included in the Matrix for summarizing the potential impacts (Table 1).

The matrix includes a summary of the expected impacts, both before and after the implementation of the mitigation measures, which allows different parameters of the impact significance to be considered includes:

- **Impacts with strong/high positive significance** - may be associated with a long-term or permanent positive effect, with impact over a very large area, etc.
- **Impacts of moderate (medium) positive significance** - noticeable and pronounced impact over a large area and with a prolonged period of occurrence
- **Impacts of low/low positive significance** - associated with temporary, short-term, time and area limited impacts
- **Impacts of minor positive significance** – expected positive impact occurring in very small quantities over a small area, a negligible impact or a very short period of action with complete

- reversibility. No measures required.
- **No impact is expected and no mitigation measures are required.**
 - **Impacts of Negligible Negative Significance** –negative impact is expected occurring in very small quantities over a small area, a negligible impact or a very short period of action with complete reversibility. No measures required.
 - **Impacts of low/low negative significance** - manifested by temporary, short-term, limited in time and area, easily reversible impacts, etc. Mitigation measures may be necessary and may be avoided without special measures other than adherence to best practice during operation.
 - **Impacts of moderate (medium) negative significance** - need to be considered in combination with other factors, resulting from medium or long-term, permanent negative impacts, on large area, secondary, cumulative, synergistic. Need to be reduced or mitigated by mitigation/compensation measures or by selection of alternatives.
 - **Impacts of high/high negative significance** – constant, irreversible impact of high intensity, over a significant area, affecting important components of the environment. The impact cannot be avoided/mitigated by selecting alternatives or applying mitigation/compensation measures.

Table 1 Matrix for summarizing the potential impacts of implementing the IP

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
During construction										
Climate and ambient air										
1. Construction and transport activities at the site of the IP 2. Transport scheme on municipal road VRC1036	<u>Expected</u>	<u>L</u>	<u>Negative/reversible</u>	<u>Direct</u>	<u>Temporary</u>	<u>Short term</u>	<u>No</u>	<u>Insignificant negative significance</u>	<u>No</u>	<u>Insignificant negative significance</u>
Interaction with other elements under Art. 95, para. 4 of EPA	<u>Expected</u>	<u>L</u>	<u>Negative/reversible</u>	<u>Direct</u>	<u>Temporary</u>	<u>Short term</u>	<u>No</u>	<u>Insignificant negative significance</u>	<u>No</u>	<u>Insignificant negative significance</u>
Surface waters										
Chemical condition from emergency leaks of oil and petroleum products	<u>Expected</u>	<u>L</u>	<u>Negative/reversible</u>	<u>Indirect</u>	<u>Temporary</u>	<u>Short term</u>	<u>No</u>	<u>Strong/high negative significance</u>	<u>Necessary</u>	<u>Impacts with low/weak negative significance</u>
Chemical condition from the discharge of generated wastewater streams from the hydrotest	<u>Expected</u>	<u>L</u>	<u>Negative/reversible</u>	<u>Direct</u>	<u>Temporary</u>	<u>Short term</u>	<u>No</u>	<u>Impacts with low/weak negative significance</u>	<u>Not necessary</u>	<u>Impacts with low/weak negative significance</u>
<u>Quantitative condition</u>	<u>Not expected</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>Impact is not expected</u>	<u>=</u>	<u>Impact is not expected</u>
Interaction with the remaining elements under Art. 95, para. 4 of EPA	<u>Not expected</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>Impact is not expected</u>	<u>=</u>	<u>Impact is not expected</u>
Ground waters										
Change in the quantitative and the	<u>Not expected</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>Impact is not expected</u>	<u>=</u>	<u>Impact is not expected</u>

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
qualitative parameters of the ground waters										
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Soils										
Temporary disruption, partial destruction and damage and/or potential local contamination of dark grey forest soils resulting from construction activities	Expected	(L)	Negative	Direct	Temporary	Long-term	Expected	Low/weak negative significance	Necessary	<u>Insignificant negative significance</u>
Temporary disruption, partial destruction and damage and/or potential local contamination of dark grey forest soils resulting from construction activities	Expected	(L)	Negative	Direct	Temporary	Long-term	Expected	<u>Impacts with moderate (medium) negative significance</u>	<u>Necessary</u>	<u>Low/weak negative significance</u>
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Expected</u>	<u>L</u>	<u>Negative, reversible</u>	<u>Direct</u>	<u>Temporary</u>	<u>Short term</u>	<u>No</u>	<u>Insignificant negative significance</u>	<u>No</u>	<u>Insignificant negative significance</u>
Subsurface										

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
Damage of subsurface layers	Expected	L	Negative/Partially reversible	Direct	Temporary	Short term	Not expected	Low/weak negative significance	Not required	Low/weak negative significance
Pollution of the geologic environment	Expected	L	Negative/Partially reversible	Direct	Temporary	Short term	Not expected	Strong/high negative significance	Required	Insignificant negative significance
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	No impact is expected	=	No impact is expected
Landscape										
	Expected	(L)	Negative	Direct	Temporary	Long-term	Expected	Low/weak negative significance	Required	Insignificant negative significance
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	No impact is expected	=	No impact is expected
Biodiversity										
Destruction of vegetation layer	Expected	IP	Negative, reversible / non reversible	Direct	Temporary / constant	Long-term / short term	Insignificant	Insignificant negative	Not required	Insignificant negative
Transformation of natural vegetation layer due to the introduction of alien, ruderal and invasive species	Expected	IP, L	Negative, reversible / non reversible	Direct	Temporary / constant	Long-term / short term	Not expected	Insignificant negative	Required	Insignificant negative
Loss/damage of animal habitats	Expected	IP	Negative, reversible / non reversible	Direct	Temporary / constant	Long-term / short term	Insignificant	Insignificant negative	Not required	Insignificant negative
Loss of individuals (animals)	Expected	IP	Negative, non-reversible	Direct	Temporary / constant	Short term	Insignificant	Insignificant negative	Required	Insignificant negative
Barrier effect/ fragmentation	Not expected	=	=	=	=	=	=	Insignificant negative	=	Insignificant negative

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
Disturbance	Expected	IP, L	Negative, reversible /	Direct	Temporary /	Short term	Not expected	Insignificant negative	Required	Insignificant negative
Interaction with the remaining elements under Art. 95, para.4 of EPA	Expected	IP, L	Negative, reversible	Direct / indirect	Temporary / Constant	Long-term / Short term	Insignificant	Insignificant negative	Not required	Insignificant negative
Cultural and historical heritage										
Impact on sites from the cultural and historical heritage	Expected	IP, L	Negative, non-reversible	Direct	Constant	Long term	Not expected	Strong / high negative significance	Required	Insignificant negative
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	-	-	-	-	-	-	Impact is not expected	-	Impact is not expected
Population and human health										
Impact of the dust during the excavation and loading activities impact on the population.	Expected	L, will affect limited number of the population	Negative and reversible	Direct	Temporary	Short term	No	Impact is not expected	Not required	Impact is not expected
The overall construction activity on the population	Expected	L, R	Positive and from reversible to non-reversible	Indirectly	temporary	Short term	yes	Up to impacts with low/weak negative significance	Not required	Up to impacts with low/weak negative significance
Noise and vibrations impact during excavation and loading activities impact on workers	Expected	L, on limited number of workers	Negative and reversible	Direct	Temporary	Short term	Subject of professional accumulation	Impact with insignificant negative significance with reference to the activities at the specific site	Required	Impact with insignificant negative significance
Impact to workers from metallic aerosols and radiant energy	Expected	L, on limited number of workers	Negative and reversible	Direct	Temporary	Short term	Subject of professional accumulation	Impact with insignificant negative significance with reference to the	Required	Impact with insignificant negative significance

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
during the installation works at welding activities								activities at the specific site		
Interaction with the remaining elements under Art. 95, para.4 of EPA	Expected	L, on limited number of workers	Negative and reversible	Direct	Temporary	Short term	Subject of professional accumulation	Impact with insignificant negative significance with reference to the activities at the specific site	Required	Impact with insignificant negative significance
Tangible assets										
Impact on crossed engineering obstacles	Expected	L	Negative, Reversible	Direct	Temporary	Short term	No	Up to impacts with strong/high negative significance	Yes	Impacts are not expected
Impact on the road infrastructure	Expected	L	Negative, Reversible	Direct	Temporary	Short term	No	Up to impacts with strong/high negative significance	Yes	Impacts are not expected
Impact on TA on the territory of the existing site	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Harmful physical factors										
Generation of noise from the construction mechanization during the construction of the CS	Expected	L	Negative / Reversible	Direct	Temporary	Short term	Expected	Insignificant negative significance of the expected impacts	Not required	Insignificant negative significance of the expected impacts
Generation of vibrations from the construction mechanization during the	Expected	R	Negative / Reversible	Direct	Temporary	Short term	Expected	Insignificant negative significance of the expected impacts	Not required	Insignificant negative significance of the expected impacts

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
construction of the CS										
Interaction with the remaining elements under Art. 95, para.4 of EPA	Expected	R, L	Negative / Reversible	Direct	Temporary	Short term	Expected	Insignificant negative significance	Not required	Insignificant negative significance
Waste										
Interaction with the remaining elements under Art. 95, para.4 of EPA	Expected	IP, L	Negative / Reversible	Direct	Temporary	Short term	Not expected	From insignificant negative To strong/high negative significance	Required	From no impact is expected To insignificant negative
During operation										
Ambient air and climate										
3. Construction and transport activities at the site of the IP 4. Transport scheme on municipal road VRC1036	Expected	L	Negative/reversible	Direct	Temporary	Long-term	No	Insignificant negative significance	Not required	Insignificant negative
Interaction with the remaining elements under Art. 95, para. 4 of EPA	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Surface waters										
Worsening of the chemical condition of the surface waters	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Quantitative condition	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Interaction with the remaining elements	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

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			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
under Art. 95, para. 4 of EPA										
Ground waters										
Change in the quantitative and the qualitative parameters of the ground waters	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Soils										
Impact from the newly constructed sites	<u>Expected</u>	L	Negative / Reversible	Direct	Temporary	Short term	No	Insignificant negative	Not required	Insignificant negative
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Subsurface										
Damage of subsurface layers	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Pollution of the geologic environment	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Landscape										
Impact on the landscape from the newly constructed sites	<u>Expected</u>	(L)	Negative / reversible	Direct	Constant	Long-term	Expected	Insignificant negative	Not required	Insignificant negative

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Biodiversity (including habitats, subject to protection in PZ)										
Disturbance	<u>Expected</u>	IP, L	<u>Negative, reversible /</u>	<u>Direct</u>	<u>Temporary / Constant</u>	<u>Long-term / Short term</u>	<u>Expected</u>	<u>Insignificant negative</u>	<u>Not required</u>	<u>Insignificant negative</u>
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Cultural and historical heritage										
Impact on sites from the cultural and historical heritage	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Interaction with the remaining elements under Art. 95, para.4 of EPA	<u>Not expected</u>	=	=	=	=	=	=	<u>Impact is not expected</u>	=	<u>Impact is not expected</u>
Population and human health										
Impact from the operation of the IP	<u>Expected</u>	L, R	<u>Positive health and social effect to the population / reversible</u>	<u>Indirect</u>	<u>Constant</u>	<u>Long-term</u>	<u>Yes</u>	<u>Impact with low or weak positive significance</u>	<u>Not required</u>	<u>Impact with low or weak positive significance</u>
Impact of the noise, the overheating microclimate to the workers.	<u>Expected</u>	<u>L, to limited number of workers</u>	<u>Negative, reversible</u>	<u>Direct</u>	<u>Temporary, during the duration of the shift and constant during the operation period</u>	<u>Long-term</u>	<u>Professional accumulation</u>	<u>Impact with insignificant negative significance considering the impact from the current site and the mandatory nature of the measures</u>	<u>Required</u>	<u>Impact with insignificant negative significance</u>
Interaction with the remaining elements	<u>Expected</u>	L, only on workers	<u>Negative, reversible</u>	<u>Direct</u>	<u>Temporary, during the duration of</u>	<u>Long-term</u>	<u>Professional accumulation</u>	<u>Impact with insignificant negative</u>	<u>Required</u>	<u>Impact with insignificant</u>

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Component or factor of the environment Activities leading to restoration	Probability for occurrence of the impact ⁱ	Territorial scope of impact ⁱⁱ	Type of the impact		Impact parameter			Summary of expected impacts prior implementation of mitigation measures	Measures to prevent, reduce, compensate negative impacts	Summary of expected impacts, including after implementation of mitigation measures - residual impacts ⁱⁱⁱ
			Positive / negative / reversible / non reversible	Direct / indirect	Frequency ^{iv}	Duration ^v	Cumulativity ^{vi}			
under Art. 95, para.4 of EPA					the shift and constant during the operation period			significance considering the impact from the current site and the mandatory nature of the measures		negative significance
Tangible assets										
Impact on the road infrastructure	Expected	L	Negative, Reversible	Direct	Temporary	Long term	No	Up to impacts with strong/high negative significance	Yes	Impacts are not expected
Impact on TA on the territory of the existing site	Expected	L	Positive, Reversible	Direct	Constant	Long term	Yes	Moderate/ average positive significance	Not required	Impact is not expected
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Waste										
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Harmful physical factors										
Generation of noise loading and vibrations from the operation of the facilities at the production site of UGS Chiren	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected
Interaction with the remaining elements under Art. 95, para.4 of EPA	Not expected	=	=	=	=	=	=	Impact is not expected	=	Impact is not expected

*EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS),
with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.*

- (i) Expected, not expected
- (ii) Local (L), regional @, National (N) or cross border (CB)
- (iii) Temporary or constant
- (iv) Short term, midterm or long term
- (v) Required / Not required
- (vi) Strong/high positive significance, moderate positive significance, low/weak positive significance, insignificant positive significance, impact is not expected, insignificant negative significance, low/weak negative significance, moderate negative significance and strong/high negative significance.

5 The likely significant environmental effects of the investment proposal arising from

5.1 The construction and operation of the investment proposal, including demolition, destruction and decommissioning activities, if applicable

5.1.1 The likely significant environmental effects of the investment proposal arising from the construction of the investment proposal, including demolition, destruction activities

No demolition or destruction activities are planned.

5.1.1.1 Ambient air and climate

No significant impacts on ambient air or climate are expected as a result of the activities envisaged in the project for the construction of a new site of Chiren UGS, both during construction and during operation.

5.1.1.2 Waters

No significant impacts on surface and groundwater, such as those of high or still high negative significance, are expected during the construction works and therefore no significant effects on surface and groundwater are expected either.

5.1.1.3 Soils

No likely significant effects on soils in the area are expected from the implementation and operation of the investment proposal.

5.1.1.4 Subsoil and mineral diversity

No significant effects are expected.

5.1.1.5 Landscape and natural objects

No likely significant effects on the landscape of the area are expected from the implementation of the investment proposal.

5.1.1.6 Biodiversity, PAs and PNAs

The construction of the IP is not expected to lead to significant negative impacts on biodiversity, PAs and PNAs.

5.1.1.7 Cultural historical heritage

The realisation of the investment proposal is not expected to have any likely significant impact on the cultural and historical heritage of the area.

5.1.1.8 Health and hygiene aspects

Consequences on the health of the population

Excavation works will last for a short period of time during which the work site will be an organized area source of dust emissions, motor gas emissions and noise. At a distance of more than 1 000 m, the noise generated at the work site attenuates to the daily noise standard in a settlement. Motor gases are quickly diluted at the work site.

The increase in transport traffic from freight vehicles serving the construction will be negligible and will not lead to an increase in noise load when passing through populated areas.

Under certain climatic conditions, such as dry and windy weather, dust emissions rarely and in diluted quantities can reach the nearest residential buildings of the village of Chiren. Their negative effect will be limited to the level of short-lived discomfort on a small part of the village population and is not expected to have consequences for the health of the population.

Construction of the first phase of the expansion of Chiren UGS will last 24 months. It will involve up to 180 persons at different times.

The two-year construction period will have an indirect beneficial effect on the health and social status of the population in the nearby localities of the municipality and the district and will lead to impacts of low or still weak positive significance.

Effects on the health of construction workers

Excavation works will be for a very short period of time during which workers will be exposed to excessive noise and vibration.

Although work at the specific site will be for a relatively short period of time, prolonged occupational exposure is a prerequisite for the development of permanent impairment of the auditory vestibular analyser. The overcooling microclimate potentiates the vibrational impact and their combined effect leads to the development of vibration disease.

The adverse effect of noise and vibration will be on a very limited number of workers, it will have

a cumulative nature with prior effects. The application of preventive measures leads to a significant reduction and limitation of the health risk.

During the installation works, workers will be exposed to metal aerosols and radiant energy.

A severe negative health effect on the eye analyser and the lungs is possible for a very limited number of workers. A cumulative effect with previous occupational exposures is also possible. The application of preventive measures leads to a significant reduction and limitation of the health risk

5.1.1.9 Tangible assets

No significant consequences are expected from the impacts on tangible assets resulting from the construction activities during the construction of the newly designed expansion of Chiren UGS and its accompanying infrastructure.

5.1.2 The likely significant environmental impacts of the investment proposal arising also from the operation of the investment proposal

5.1.2.1 Ambient air and climate

No significant impacts on both ambient air and on climate are expected as a result of the operation of Chiren UGS.

5.1.2.2 Waters

During normal operation, no significant impacts are expected, incl. those of high or still high negative significance, on surface and underground waters. No significant consequences for surface and underground waters are expected either.

5.1.2.3 Soils

No likely significant impacts on the soils in the area are expected during the operation of the investment proposal.

5.1.2.4 Subsoil and mineral diversity

No significant impacts are expected.

5.1.2.5 Landscape and natural objects

5.1.2.6 Biological diversity, PAs and PNAs

The operation of the IP is not expected to result in significant negative impacts on biodiversity, PAs and PNAs.

5.1.2.7 Cultural and historical heritage

No likely significant impacts on the CHH in the area are expected during the operation of the investment proposal.

5.1.2.8 Health and hygiene aspects

The operation of the new site of Chiren UGS will not lead to a change in air pollution control and to an increase in the noise load and will not have an adverse health effect on the population.

The operation of the IP will have a favourable indirect health and social effect on the population.

Some of the physical factors of the work environment, such as noise and an overheated microclimate, may only have an impact on a limited number of workers. These are conventional factors of the working environment in relation to which preventive measures have been developed and tested in practice, and their application leads to the reduction and limitation of health risks.

5.1.2.9 Tangible Assets

The implementation of the investment proposal related to the expansion of Chiren underground gas storage will have a positive impact on the tangible assets, resulting from the design, construction and commissioning of the newly designed GTCU, as well as the infrastructure accompanying the IP, such as road connections, WSS branches, gas pipeline connections and flow-lines, etc.

5.1.3 The likely significant consequences of the environmental impacts of the investment proposal arising also from decommissioning

In the foreseeable future, decommissioning of both the existing facilities at the currently

operating site of Chiren UGS and the machines and equipment to be installed at the newly designed expansion of the production site is not planned. Therefore, no decommissioning and cessation activities are planned. As decommissioning activities are generally expected to be no different from those during construction, the expected impacts will be similar in nature to those assessed for the construction phase. As a result, it can be concluded that no impacts of strong or high negative significance are expected as a result of the decommissioning activities, which could lead to damage to environmental components and threaten the normal functioning of the ecosystems in the IP area.

5.2 The use of natural resources, in particular subsoil, soil, water and biological diversity, taking into account, as far as possible, the sustainable availability of these resources

5.2.1 Waters

The investment proposal envisages the use of negligible amounts of water to carry out a hydro test of the newly constructed gas pipeline branches and flow-lines. The supply of water for the hydro test will be carried out by means of a pumping station built at the nearby Chiren III dam and pursuant to the issued Permit No: 11490001/14.06.2007 for water abstraction from a surface water body. No negative impacts are expected, incl. those of strong or high negative significance as a result of water use.

During the operation of the investment proposal, water abstraction from surface waters is foreseen pursuant to the currently valid Permit No: 11490001/14.06.2007 amended and extended by Decision No: Vr-1/29.07.2020 valid until 06.05.2025 for water abstraction from Chiren III dam. The implementation of the investment proposal and its operation are not expected to result in exceeding or changing the already permitted water abstraction limits and regimes, in accordance with the current permit, therefore the implementation of the IP should not have a significant impact on the biological and hydromorphological quality elements and result in deterioration of the ecological and chemical condition of surface water bodies and failure to achieve the set ecological targets.

During construction and operation, no use of groundwater is foreseen. Therefore, no impact on their resources is expected.

5.2.2 Soils

During the construction and operation of the investment proposal, the use of the soils in the area as a natural resource is not planned.

5.2.3 Subsoil and mineral diversity

There are no proven resources and reserves of subsoil assets in the subsurface, no extraction of subsoil assets has been carried out or is planned. Therefore, no impact on the resources of subsoil assets is expected

5.2.4 Biological diversity

The IP is not related to the use of biological diversity.

5.3 The emissions of pollutants, noise, vibrations, non-ionizing radiations and radiation; the occurrence of harmful effects and the disposal and recovery of waste

5.3.1 Emissions of pollutants

The amount of emissions generated both during the construction and during the operation of the two sites of Chiren UGS are not a prerequisite for ambient air concentrations, which would be defined as a SIGNIFICANT impact, leading to likely significant consequences under both IP options.

The impact is expected to be direct, local, reversible and without a cumulative effect, with a negligible degree of significance, which will not endanger the ambient air quality of settlements in the area. The significance of the impact is assessed as insignificant and acceptable on a local and regional scale.

5.3.2 Noise, vibrations, ionizing radiations and radiation, occurrence of harmful effects

5.3.2.1 Noise, vibrations, ionizing radiations and radiation, occurrence of harmful effects during construction

Noise

The construction stage, as part of the process of implementing the investment proposal, is related to the generation of noise levels as a result of the operation of construction equipment and mechanization.

Given the location of the production site of Chiren UGS and its distance from populated areas, about 1,200 m from the newly designed expansion to the village of Chiren, the expert assessment is that there is no expected impact on the population in the village during the operation of the machines and facilities at the stages of withdrawal and injection after the putting into operation of the newly designed facilities. As regards the impact on the only receptor located in the impact zone, the production area of the currently operating underground gas storage site, and in particular the risk of affecting the workers at the existing site of Chiren UGS, the sensitivity of which is assessed as very low, it can be concluded that an impact of a negligible to a very high negative degree is expected, directly dependent on the specific location of the construction works within the scope of the construction site, which will result in a minor negative impact. The impact will be short-term, temporary and reversible.

Vibrations

Given the estimated average sensitivity of the receptor assessed in this case, the population in the settlements affected by the increased car traffic during construction for the supply of raw materials and labour, as well as the degree of the expected negative impacts - from insignificant to highly negative, directly depending on the source and the proximity of the receptor, it can be concluded that the expected impacts will be in the area of the access routes, ranging from minor negative to those of low or still weak negative significance, and will be short-term, temporary and reversible.

5.3.2.2 Noise, vibrations, ionizing radiations and radiation, occurrence of harmful effects during operation

Noise

After the implementation of the investment proposal, no change in the acoustic environment in the place of impact (the village of Chiren) is expected.

Vibrations

The operation of the facilities at the production site of the underground gas storage after the implementation of the investment proposal will not create conditions of discomfort and does not pose a danger to people even at the site of the underground gas storage. The vibrations generated are either outside the 1 Hz ÷ 80 Hz frequency range of the general vibrations affecting humans or rapidly attenuate as they spread in the environment.

5.3.3 Disposal and recovery of waste

The implementation of the investment proposal does not provide for waste disposal and recovery activities to be carried out at the site of Chiren UGS after its expansion. The waste generated during construction and during operation will be treated in accordance with the current legislation and the best available practices by companies holding the relevant permits under the Waste Management Act.

5.4 Risks to human health, cultural heritage or the environment, including as a result of accidents or catastrophes

5.4.1 Risks to human health

The implementation of the investment proposal, incl. the stages of construction and operation do not create risks for human health in the area of the IP and therefore are not expected to lead to significant consequences of the impacts of the investment proposal on the health of the population, including as a result of accidents or catastrophes.

5.4.2 Risks to cultural heritage

The implementation of the investment proposal is not a prerequisite for the occurrence of any risks to the CHH in the area of the IP. No significant consequences are expected from the impacts of the investment proposal on the cultural heritage, including as a result of accidents or catastrophes. Compliance with the regulatory requirements related to a preliminary survey of the IP area and the presence of an archaeologist carrying out monitoring during the construction and installation works minimizes even the risk of accidental damage to CHH sites.

5.4.3 Risks for the environment

5.4.3.1 Ambient air

No significant consequences are expected from the impacts of the investment proposal for the AAQ in the area of the IP and nearby settlements, the village of Chiren, including as a result of accidents or catastrophes. Given the light traffic on the municipal road VCR 1036 of heavy goods vehicles serving the construction and operation process and compliance with road traffic rules, no road traffic accidents are expected that would lead to the risk of flash pollution of ambient air.

5.4.3.2 Waters

No significant consequences are expected from the impacts of the investment proposal on surface and groundwater, including as a result of accidents or catastrophes. The implementation of the IP does not create and is not a prerequisite for the occurrence of any risks for surface and groundwater in the area of the IP.

5.4.3.3 Soils

Negative impacts on the soils in the area of Chiren UGS can be expected in the event of major accidents related to the occurrence of fires and possible spills of petroleum products or methanol. The high temperature can lead to damage to soil aggregates and to a temporary decrease in soil fertility. Oil pollution causes permanent damage to soil cover.

5.4.3.4 Subsoil and mineral diversity

The implementation of the investment proposal is not a prerequisite for the occurrence of any risks for the subsoil and mineral diversity in the IP area.

5.4.3.5 Landscape and natural objects

Possible accidents or catastrophes leading to risks to the landscape may have consequences that could not be assessed at this stage, as they depend on the type, scope and scale of the accidents. The likely impacts on landscape components (soils, waters, biodiversity, etc.) can range from low to high, be local, short-term and reversible, or on the contrary - with a longer-lasting and more wide-ranging effect

5.4.3.6 Biological diversity

The impacts of potential accidents or catastrophes on biodiversity cannot be correctly identified and assessed at this stage, as they depend on the type, scope and scale of the accidents. The likely negative impacts on biodiversity may vary but, given the nature of the habitats in the area and the characteristics of the IP, are expected to be local and reversible.

5.5 Combining the impact with the impact of other existing and/or approved investment proposals, taking into account any existing environmental problems related to areas of particular ecological importance that are likely to be affected, or related to the use of natural resources

5.5.1 Other existing and/or approved investment proposals

According to information from the national public register with data from EIA procedures on the official website of the Ministry of Environment and Water (<http://registers.moew.government.bg/ovos/?supervisorId=3055&ekDistrictId=6&ekMunicipalityId=49&ekSettlementId=5133>) for the period from 2013 until now, on the territory of Vratsa District,

Vratsa Municipality, village of Chiren, a total of 4 procedures for assessing the need for EIA have been carried out.

In the area of Chiren UGS and at the newly formed technological site inextricably linked to the storage, procedures have been carried out in accordance with Chapter Six of the EPA for new investment proposals, specified in item 5.5.1 of the EIAR.

5.5.1.1 Ambient air and climate

No cumulative impact on ambient air is expected from existing and/or approved investment proposals in the area upon the implementation of the IP.

5.5.1.2 Waters

Taking into account the fact that the discharge of the generated quantities of waste water is based on the necessary permits under the Water Act, it is not expected that the implementation of the IP will lead either to the combination of the impact with the impact of other existing and/or approved investment proposals, nor to a significant negative impact on surface waters, incl. that which would be assessed as having a strong or still high negative significance. The simultaneous discharge of water quantities from other industries will not change the hydrology of the water body to an extent affecting the ecological quality elements.

5.5.1.3 Soils

The agricultural land (NTP-2500 code) belonging to the village of Chiren is about 2650.6 ha, and the area required for the implementation of the investment proposal is 8.2 ha, which amounts to about 0.31% of the total agricultural land. The existing site of Chiren UGS has an area of about 5.5 ha. In total, the new and old site occupy 0.52% of the agricultural land in the territory of the village of Chiren. In view of the low economic potential of the area, the likely appearance of other investment projects will not lead to a significant reduction of agricultural land. There are no large industrial sites on the land of the village of Chiren, and there are currently no plans to construct them.

In the land of the village of Chiren, there are 2 quarries for the extraction of inert materials, as well as a part of a third quarry, the main area of which, however, is located on the land of the neighbouring village of Lilyache.

5.5.1.4 Subsoil and mineral diversity

No cumulative impact on the subsoil and mineral diversity from existing and/or approved investment proposals in the area is expected upon the implementation of the IP.

5.5.1.5 Landscape and natural objects

Due to the lack of other industrial sites in the area of Chiren UGS, both existing and newly planned, no combined impacts on the landscapes are expected. Only a combined visual impact from the old and new site can be expected, both during construction and during operation.

5.5.1.6 Biological diversity

A significant degree of cumulative impact is not expected as a result of the implementation of the IP, when the effect of other past, present and/or expected projects/investment proposals on the land of the village of Chiren is added to the expected impact, regardless of the person who has been implementing them both during construction and during operation.

5.5.1.7 Cultural and historical heritage

No cumulative impact on the CHH is expected from existing and/or approved investment proposals in the area upon the implementation of the IP.

5.5.1.8 Harmful physical factors

Taking into account the noise levels mentioned in the previous items generated during construction, leading to an impact of a negligible to a very high negative degree, as well as the sensitivity of the receptor (extremely low), the working environment and, in particular, the workers at the existing site of Chiren UGS, then the expected cumulative impact will be of negligible negative significance.

5.5.1.9 Waste

When implementing the investment proposal, no cumulative impact is expected from the

impacts of the investment proposal on the waste management process, resulting from combining the impact with the impact of other existing and/or approved investment proposals.

5.5.1.10 Health and hygiene aspects

No cumulative impact on the health and hygiene aspects of the environment in the settlements located near the IP is expected from existing and/or approved investment proposals in the area upon the implementation of the IP.

Cumulative impact on the workers in the area of the construction site and the territory of the existing production site of Chiren UGS is expected, which will be the result of the simultaneous operation of the machines and equipment and the accumulation of generated noise levels and harmful emissions. Taking into account the sensitivity of the receptors and the extent of the expected impacts, it can be concluded that the expected cumulative impacts will be of negligible negative significance.

5.5.1.11 Tangible assets

The implementation of the investment proposal will lead to an increase in tangible assets as a result of the construction of the newly designed machinery and equipment and the newly designed infrastructure accompanying the expansion, which is recognised as a positive cumulative impact together with the other investments in the IP area and in particular the existing machinery and equipment of the now operating site of Chiren UGS.

5.5.2 Combining the impact with the impact of other existing and/or approved investment proposals

Combined impacts are expected mainly during the construction of the newly designed expansion with the processes at the existing site, which in their nature do not differ from those intended to take place at the new site – withdrawal and injection of natural gas — described above in this report.

During the operation of the investment proposal, as a result of the planned expansion, a minor cumulation of impacts on the hydrology of the water body receiving the discharged wastewater is expected, resulting from a minor increase in the quantities of discharged water. Given the sensitivity of the water body, the impact is assessed as low/slight negative significance, and is not expected to significantly affect the water runoff and, hence, to have an impact on environmental and some chemical quality indicators.

5.5.3 Existing environmental problems related to areas of a particular environmental importance

There are no areas of a particular environmental importance in terms of biodiversity in the area of the IP and in its vicinity. The nearest area of the Natura 2000 ecological network is located more than 3 km away from the IP, and the nearest protected area under the PAA - over 4 km away.

The IP does not affect protected areas and protected territories and is not expected to contribute to existing threats/pressures therein.

5.5.4 Existing environmental problems related to the use of natural resources

Since the implementation of the investment proposal, no problems related to the use of underground and surface water and subsoil have been identified. The water supply of the required quantities for the hydro test and the supply of the required water quantities during operation will take place from the water sources currently in use on the basis of existing water abstraction permits, detailed above in this Environmental Impact Assessment Report.

5.6 The climate impact of the investment proposal (e.g. the nature and extent of greenhouse gas emissions) and the vulnerability of the investment proposal to climate change

The implementation of the IP will not have an impact on the regime and spatial distribution of the values of the climatic elements of the adjacent territories of the site of Chiren UGS. No changes in climate are expected to occur during the construction and operation phases of implementation of the IP.

5.7 Use of technologies and substances

With regard to the environment and the population, no significant impacts resulting from the technologies and substances used are expected, insofar as tested methods of construction and construction materials will be applied in the implementation of the IP, the impact of which is estimated to be negligible.

The construction and operation of the expansion of Chiren UGS and the related infrastructure will be carried out in accordance with the requirements of Bulgarian and EU legislation. The materials used in the construction process will meet the current requirements in the country. All planned activities will be carried out in accordance with accepted plans and programs for the implementation of the site. Proven technologies and methods developed on the basis of the experience gained in the construction of other compressor stations and gas pipelines will be applied.

5.7.1 Hazardous chemical substances

With the implementation of the current IP, the capacity of Chiren UGS will be expanded and the available quantities of the following hazardous substances within the scope of Annex 3 of the EPA will increase:

- *increase in the amount of natural gas at the site of Chiren UGS from 1.302 billion Nm³ of natural gas (911 400 t at a gas density of 0.7 kg/m³ at 0°C and 101.325 kPa) according to the validated classification of 2016, up to 1.752 billion Nm³;*
- *change in the available amount of methanol - from 199.4 t according to the validated classification of 2016, up to 223.1 t.*

Hazardous mixtures within the scope of Annex 3 of the EPA (sealing grease for assembly pipes and winter liquid for car windows) are also available at the site, for which no changes in the quantity and/or storage are foreseen.

The activity also uses chemical substances/mixtures that are not classified as hazardous under Regulation (EC) No: 1272/2008 CLP - MC 20 oil and triethylene glycol. With the implementation of the IP, TP 32 oil and propylene glycol will also be used, which are also not classified as hazardous under Regulation (EC) No: 1272/2008.

5.7.2 Enterprises or facilities with a low or high risk potential

Chiren UGS of Bulgartransgaz EAD is classified as an enterprise with a high risk potential, by Opinion UK-75/17.03.2016. A safety report and an internal emergency plan have been prepared for the activity, which were approved by ExEA Decision No: 124 -A2/17.05.2017

In connection with the present procedure, a supplemented notification for the classification of the enterprise was submitted, which was validated by the competent authority (MEW) with ref. No: EIA-17/12.01.2022. Pursuant to Art. 7, para. 4 of the Ordinance on the prevention of major accidents involving hazardous substances and limiting their consequences and Art. 94, para. 1, it. 9 of the EPA, an integral part of this **EIAR are the updated Safety Report and Internal Emergency Plan of the enterprise.**

In the area, there are no other enterprises classified as having a risk potential in accordance with the procedure of the EPA.

6 Estimated methods or data used to determine and prepare the assessment

6.1 Ambient air and climate

The current assessment is based on normative documents, manuals, methodologies and literature, detailed in **item 6.1 of the EIAR.**

6.2 Waters

6.2.1 Surface water

The current assessment is based on normative documents, detailed in **item 6.2.1 of the EIAR.**

6.2.2 Groundwater

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

The current assessment is based on normative documents, detailed in **item 6.2.2 of the EIAR.**

6.3 Soils

The current assessment is based on normative documents and literature, detailed in **item 6.3 of the EIAR.**

6.4 Subsoil and mineral diversity

The current assessment is based on normative documents and literature, detailed in **item 6.4 of the EIAR.**

6.5 Landscape and natural objects

The current assessment is based on normative documents and literature, detailed in **item 6.5 of the EIAR.**

6.6 Biological Diversity

The current assessment is based on normative documents, manuals, methodologies and literature, detailed in **item 6.6 of the EIAR.**

6.7 Cultural and historical heritage

The current assessment is based on normative documents and literature, detailed in **item 6.7 of the EIAR.**

6.8 Harmful Physical Factors

The current assessment is based on normative documents, manuals, methodologies and literature, detailed in **item 6.8 of the EIAR.**

6.9 Waste

The current assessment is based on normative documents and literature, detailed in **item 6.9 of the EIAR.**

6.10 Health and hygiene aspects

The current assessment is based on normative documents and methodologies, detailed in **item 6.10 of the EIAR.**

6.11 Tangible Assets

The current assessment is based on literature, detailed in **item 6.11 of the EIAR.**

7 Description of the intended mitigation and monitoring measures

The intended measures to mitigate the consequences during the design, construction and operation of the IP are described below.

7.1 Ambient air

- *To develop a Plan for the organization of the transport scheme during construction.*
- *To follow the road traffic rules so as to minimize the risk of road traffic accidents.*
- *To maintain the construction and transport equipment in working order.*
- *Not to allow fuel and petroleum leaks.*
- *To keep clean the undercarriage of heavy goods vehicles and to prevent the pollution of the roads from the republican road network by cleaning the undercarriage of the vehicles with water immediately before they access the same.*
- *The intended equipment and means of transport must meet the requirements of Ordinance No: 10/2004 (SG No: 11/2004) - measures to reduce gaseous and particulate pollutants from internal combustion engines installed on off-road and construction machines.*
- *Not to allow the vehicles to be overloaded with powdery substances.*
- *The means of transport must be covered when transporting excavated earth mass, construction materials, construction waste, etc. (Art. 70 of Ordinance 1/2005)*
- *The working mode of the construction and transport machines should not allow the engines to idle.*

- *Use of sprinkler (mobile) installation to suppress dust formation during relevant operations (loading and unloading, excavation, bulk, etc.).*
- *Storage areas for bulk materials (mainly sand and earth) and construction waste in dry and windy weather should be humidified by means of a water tanker.*
- *Use of low-sulphur diesel fuel.*
- *Immediately after the completion of construction work, storage areas for bulk construction materials should be cleaned.*
- *Implementation of internal safety rules and rules for checking the equipment (construction machinery) and preventive maintenance.*
- *The emergency plan should be agreed and implemented with the local fire-fighting teams.*

7.2 Waters

7.2.1 Surface water

No significant impacts on surface water are expected, which is why the design solutions and their implementation should mainly comply with the requirements in the normative documents regarding the protection of their ecological and chemical status. In this regard, we propose the following measures:

- *In the projects for the construction and installation activities, the best available practices for the protection of surface water from pollution should be foreseen and applied during their implementation;*
- *Strict implementation of project decisions on protection of the ecological and chemical status of surface water;*
- *In accordance with Art. 131 of the Water Act, spills and leaks of petroleum products and other pollutants that have occurred on the site of the underground gas storage should be immediately captured and treated, with a view to preventing their entry into the rainwater drainage system and from there into the surface water intake. In the emergency plan for the site, appropriate actions to deal with such situations should be provided for and appropriate means and materials to respond to spills and leaks should be planned;*
- *Measures from Section 7 of the Program of Measures to the RBMP 2016-2021, related to the investment proposal (Letter with ref. No: PU-01-128(1)/17.02.2021 and Letter with ref. No: PU-01-128(7)/24.09.2021 of the Basin Directorate "Danube Region"):*
 - *"Preventing the deterioration of the water state from projects and activities at the stage of investment proposals" with the action: "Preventing the implementation of investment proposals leading to a negative change in the state of water bodies";*
 - *"Reduction of diffuse pollution from industrial activities" with the action: "Disposal of production waste in accordance with the waste treatment requirements".*

7.2.2 Groundwater

No significant impacts on groundwater are expected, which is why the design solutions and their implementation should comply with the requirements in the normative documents regarding the preservation of their quantitative and chemical status. The main measures are:

- *The design and construction must comply with the prohibitions regulated in Art. 46, para. 2 and Art. 118a, para. 1, it. 2, 3 and 4 of the Water Act: it. 2 - the disposal, including the landfilling of priority substances, which may lead to the indirect discharge of pollutants into the groundwater; it. 3 - other activities on the surface and in the underground water body, which may lead to the indirect discharge of priority substances into the groundwater; it. 4 - the use of materials containing priority substances in the construction of structures, engineering construction facilities and others where contact with groundwater takes place or is possible;".*
- *To comply with the prohibitions and restrictions prescribed by the BD DR during design and construction - measures with code PM_2, GD_1 and PM_9 and actions for their implementation*

with code PM_2_2, GD_1_2 and PM_9-2 - "Consultations on the preparation of Terms of Reference for determining the scope and the contents of the Environmental Impact Assessment Report of the IP" ref. No: PU-01-128/24.09.2021

- To comply with the requirements of the BD DR laid down in the permits for the use of a water body - for re-injection of water into borehole P15 - Decision No: 12570003 of 16.12.2015, amended by Decision No: 2757 of 30 September 2019 and Decision No: RR- 05-3/30.10.2019 and for the discharge of wastewater into a surface water body - a dry ravine in the locality of Lakite on the land of the village of Chiren, in accordance with the current Permit No: 13140017/14.06.2007.*
- In order to assess the impact in the overlaying Aptian aquifer, an analysis of the drinking water from borehole TK2 Chiren - operated by WSS OOD - Vratsa, is carried out twice a year in the extractive season.*
- The best available practices for the protection of water bodies from pollution should be foreseen in the projects and applied during their implementation*

7.3 Soils

The negative impacts on soils are mainly the result of disturbance, compaction and sealing during construction. To mitigate the impacts on the soils outside the building boundaries of the site, the following measures must be observed:

- Avoiding soil contamination with construction materials and waste - storage and use of construction materials and mixtures in a way that does not allow soil contamination and damage*
- Avoiding soil contamination with petroleum products - repairs, charging and maintenance of construction equipment only in designated places.*
- In case of spillage of petroleum products and fuels as a result of unforeseen events, the contaminated soils should be seized and treated as hazardous waste.*
- Soils compacted by construction machinery during the construction and maintenance of facilities and infrastructure should be restored through appropriate activities such as planting of suitable vegetation, loosening and other known good practices.*

7.4 Subsoil and mineral diversity

No significant impacts on the subsoil are expected, which is why the measures for their protection consist of bringing the design solutions and their implementation into line with the requirements in the normative documents regarding excavation and filling works, the founding and waterproofing of buildings and facilities, the security of pipelines, water pipes, gas pipelines, etc. Among these measures, the main ones are:

- Conducting engineering and geological surveys and studies, in accordance with the requirements of Art. 12, para. 1, it. 2 and Art. 47, it. 3 of Ordinance No: 4 of 21 May 2001 on the scope and content of investment projects;*
- Strict compliance with the technical requirements of the Norms for the design of flat foundations, including for the special sinking soils;*
- The parameters of the slopes of construction excavations and embankments must comply with the regulatory requirements in the "Rules for acceptance of earthworks and earth structures";*
- Environmentally friendly collection and treatment of household and construction waste;*
- Contaminated earth masses from accidental spills of petroleum products and other hazardous substances and materials must be removed immediately.*
- Maintaining in working order and constant control of the site and rainwater drainage system, water pipes, gas flow-lines, road junctions, etc.;*
- In emergency situations (earthquakes, pollution due to accidental spillage of petroleum products and other hazardous substances and materials), actions should be taken to reduce and eliminate the negative consequences, laid down in the current legal and regulatory documents, and the services directly involved in*

the fight against disasters and accidents should be immediately notified.

7.5 Landscape and natural objects

In order to reduce the visual impacts during the operation of Chiren UGS in the project for the reclamation of the terrain around the buildings and facilities, appropriate plant species should be provided to improve the visual perception of the site.

7.6 Biological Diversity

To minimize or avoid negative impacts, the following measures are considered appropriate:

- *For the biological reclamation of the terrain, only local species should be used and strict measures should be applied against the introduction of invasive alien species (a list of the IAS in the EU is available at: www.moew.government.bg/bg/priroda)*
- *The removal of vegetation in the preparation for construction and the maintenance of the easements should be carried out outside the breeding period of the birds (April - July).*

7.7 Cultural and historical heritage

In order to prevent cultural values from being endangered or destroyed, the investment intention should be preceded by field searches of archaeological sites in accordance with the requirements of Art. 161, para. 1 and Art. 148, para. 5 of the Culture Heritage Act /CHA/. The results of the studies should be accepted by the Commission under Art. 158a of the CHA.

During the implementation of the investment proposal, all excavation activities must be carried out under the supervision of an archaeologist in accordance with the requirements of Art. 161, para. 2 of the CHA. In case of discovery of archaeological sites, Art. 148 and 160 of the CHA must be applied.

7.8 Harmful Physical Factors

The results of the calculations made for the levels of emitted noise during construction and during operation, a result of the implementation of the investment proposal and the construction of the new CS, show that, provided that technically sound machinery and equipment is operated and strict compliance with the regulatory requirements concerning the relevant activity is observed, no noise levels above the legally defined norms are expected. In view of the above, it is not necessary to set measures to be observed during the construction, operation and decommissioning of the compressor station.

7.9 Waste

Regarding the monitoring measures, it is necessary to strictly observe the correct collection and temporary storage of the waste generated during the construction of the IP until it is handed over to licensed companies for subsequent treatment or until its recovery.

During operation, the monitoring measures include a report on the types and quantities of waste generated by the technological activity (production and hazardous), which will be drawn up every month and once a year for the total amount of waste. Pursuant to Ordinance No: 1/04.06.2014 for the procedure and samples for which information is provided by waste management activities, as well as the procedure for keeping a public register, the necessary information for Chiren UGS will be filled in, which is – a report book; an annual report and identification document. The system regular accountability will be carried out through the National Waste Information System in electronic form.

7.10 Health and hygiene aspects

In order to protect the health of the population near the IP site:

- *Avoid exceeding the statutory requirements for ambient air quality and harmful physical factors, including noise and vibrations, in the area of objects subject to health protection located near the territory of the IP.*

In order to protect the health of workers at the IP site:

- *Ensuring safe and healthy conditions of work on the territory of the work site and, if necessary, use of personal protective equipment, such as earplugs when carrying out noise-*

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

emitting activities.

7.11 Tangible Assets

Timely rehabilitation of elements of the road infrastructure damaged in connection with the construction and operation of the IP.

7.12 Plan for implementing the measures

The following table presents a plan of the measures to be taken for reducing the negative environmental consequences and the possible impacts on human health.

№	Measures	Period (phase) of execution	Results
1.	1. Atmospheric air		
1.1	A Plan shall be developed for the organization of the transportation scheme.	Construction phase	Limitation of the harmful emissions from exhaust gases in the atmosphere and minimizing the negative impact on the atmospheric air in the area.
1.2	Observing the traffic rules to minimize the danger of road traffic accidents	Construction & Exploitation	Prevention of volley emissions as a result of traffic accidents causing fires
1.3	The construction and transport equipment shall be maintained in good working order. Do not allow fuel and oil leaks.	Construction & Exploitation	Protection of the air and the health of workers from excess exhaust emissions from the construction and transportation machinery and equipment
1.4	The undercarriage of cargo trucks are to be kept clean so as to prevent contamination of the republican road network; to be washed with water before accessing the roads	Construction phase	Limitation of the contamination of the asphalt pavement of the road by dust deposition which can generate additional dust dispersal from the movement of the vehicles.
1.5	The used equipment and means of transport must meet the requirements of Ordinance No. 10/2004 (State Gazette (SG), No. 11/2004) – “Measures to reduce gaseous and dust pollutants from internal combustion engines installed on off-road and construction machines”.	Construction & Exploitation	Limitation of harmful emissions from exhaust gases in the atmosphere and minimizing the negative impact on the atmospheric air in the area.
1.6	Prevent the overloading of the transport vehicles with dust-type substances.	Construction during cargo loading operations	Avoid scattering, crushing and dispersing of materials which can subsequently become additional sources of hazardous dust emissions. Protection of the air, soils and the health of the workers and the population in the area.
1.7	Transport vehicles are to be covered during transportation of excavated earthen mass, building materials, construction waste, etc., (Art. 70 of Ordinance 1/2005)	Construction & Exploitation phase	Avoidance of dust emissions
1.8	The working schedules of the construction and transport machines should exclude engines working in idle mode.	Construction phase	Reduction of harmful gases in the atmosphere. Protection of the air and the health of the workers and the population in the area.

1.9	Use of sprinkler (mobile) installations for suppressing dust emissions during the respective operations (cargo-unloading, excavation, bul cargo, etc.).	Construction phase	Reducing the dust emissions in the atmospheric air. Protecting the health of workers in the area.
1.10	The storage areas for bulk materials (mainly sand and soil) and construction waste in dry and windy weather are to be sprinkled with water.	Construction works during specific meteorological conditions	Avoidance of excessive dust emissions when working with powder type materials.
1.11	Immediately after completion of the construction works, the storage areas for construction bulk materials are to be cleaned.	After completion of the Construction works	Air protection from wind erosion caused by dust particles.
1.12	Application of internal safety rules and of rules for checking the equipment (construction machines) and preventive maintenance	Permanently and during the Construction works	Limiting the likelihood of volley emissions of toxic substances during accidents and fires
1.13	The emergency plan must be agreed by and implemented in coordination with the local fire brigades	Exploitation phase	Avoidance of volley emissions of toxic substances.
1.14	Using low sulphur diesel fuel	Construction & exploitation phase	Reduction of sulphur oxide emissions in the atmosphere
2.1	Surface waters		
2.1.1	Implementation of the best available practices for protecting the surface waters against pollution and including them in all of the projects on the various construction and assembly activities	Design and construction phase	Protection against surface water pollution
2.1.2	Strict implementation of the projected decisions regarding the preservation of the environmental and chemical state of the surface waters	Construction phase	Protection of the environmental and chemical state of the surface waters
2.1.3	Measures included in Section 7 of the River Basin Management Plans 2016-2021, related to the investment proposal (Letter Ex. No. PU-01-128(1)/17.02.2021 and Letter Ex. No. PU-01-128(7)/24.09.2021 of the Water basin Directorate "Danube Region"): - Preventing the deterioration of the water quality caused by investment project proposals with activity: Preventing the realization of investment proposals leading to negative changes in the quality of the waters ";	Construction and exploitation phase	Prevention of surface water pollution

	- "Reduction of diffuse pollution from industrial operations" with activity: "Disposal of production waste in compliance with the waste treatment requirements".		
2.1.4	In accordance with Art. 131 of the Water Act to capture immediately and treat spills and leaks of petroleum products and other pollutants occurring on the site of the CS, with a view to preventing their entry into the rain collectors and from there into the surface water intakes. The emergency plan for the site should describe the appropriate actions for dealing with such situations and the appropriate means and materials for responding to spills and leaks shall be readily available.	Exploitation phase	Protection from surface water pollution and protection against the pollution and damage of the water basins.
2.2	Ground waters		
2.2.1	The design and construction must comply with the regulated prohibitions in art. 46, par. 2 and Art. 118 a, par. 1, items 2, 3 and 4 of the Water Act: item 2-disposal, including the disposal of priority substances, which can lead to the indirect contamination of the ground waters; item 3: other activities on the surface and in the underground water basins which can lead to indirect penetration of priority substances in the ground waters; item 4: the use of materials containing priority substances in construction works, engineering and construction facilities and others where there is a possibility of contact with the ground waters.	Design and construction phase	Design-related preconditions aimed to avoid significant adverse effects on the ground waters
2.2.2	To observe the prohibitions and restrictions prescribed by BDDR in the design and construction works: measures with code PM_2, GD_1 and PM_9 and actions for their implementation with code PM_2_2, GD_1_2 and PM_9-2: "Consultations on the preparation of a Scope assignment and the content of the Impact assessment Report on the environment of the IP" Ex. No. PU-01-128/24/09/2021	Design and construction phase	Design-related preconditions aimed to avoid significant adverse effects on the ground waters

2.2.3	To comply with the requirements of the GDPR laid down in the permits for the use of water basins - for the reinjection of water into borehole P15 - Decision no 12570003 of 16.12.2015, amended by Decision № 2757 of September 30, 2019 and Decision No. RR-05- 3/30.10.2019 and for the discharge of waste waters in the surface water basin - a dry ravine in the location called "Lakite" in the lands of the village of Chiren, in accordance with the current Permit No. 13140017/14.06.2007	Exploitation phase	Prevention
2.2.4	In order to assess the impact in the overlying Aptian aquifer, an analysis is to be performed of the drinking water obtained from borehole TK2 Chiren – managed by "ViK" OOD - city of Vratsa, twice a year, during the respective season.	Exploitation phase	Prevention
2.2.5	Te projects should include and during their implementation the best available water conservation practices must be applied	Design phase	Design-related preconditions aimed at avoiding the adverse effects on ground waters
3	Soils		
3.1	Avoid soil contamination with construction materials and waste - storage and use of building materials in a way not allowing soil pollution and damage.	Construction phase	Protection of the soils against contamination with construction materials and other waste.
3.2	Avoiding soil pollution with petroleum products - repairs, filling and servicing of construction machinery only specially designated places.	Construction phase	Soil protection from oil pollution
3.3	In the case of spillage of petroleum products and fuels as a result of unforeseen events, contaminated soils to be collected followed by immediate remediation.	Construction and exploitation phase	Reclamation of contaminated soils and prevention of penetration of pollutants in depth.
3.4	Soils, compacted by construction machinery during the construction and maintenance of the facilities and infrastructure to be restored through appropriate good practices.	Construction and exploitation phase	Prevention of soil compacting activities and other construction processes damaging the soil profile
4	Subsoil and mineral diversity		
4.1	Conducting engineering and geological surveys and studies, according to the requirements of Art. 12, par. 1, item 2 and	Design phase	Provision of information on the design justification solutions providing elimination or reduction, to a insignificant degree, of the adverse effects on the subsoil layers

	Art. 47, item 3 of Ordinance No. 4 of May 21, 2001 on the scope and content of the investment projects		
4.2	Strict compliance with the technical requirements and design norms for flat foundations, including specific landslide areas	Design phase	Design related preconditions aimed at avoiding significant adverse effects on the subsoil
4.3	Environmentally friendly collection and treatment of household and construction waste	Construction and exploitation phase	Protection of the subsoil against pollution
4.4	Immediate removal of contaminated soil masses in case of accidental spills of oil products and other dangerous chemicals and materials	Construction and exploitation phase	Protection of the subsoil against pollution
4.5	Maintenance and constant control of the site and rain sewerage, water pipes, gas pipelines, roads links, etc.	Exploitation phase	Protection of the subsoil against pollution
4.6	The parameters of the slopes selected for construction trenches and embankments to comply with the regulatory requirements set in "Rules for the acceptance of earthworks and earthwork sites"	Design and construction phase	Protection of the subsoil against mechanical impacts
4.7	In emergency situations (earthquakes, pollution in case of emergency spillage of oil products and other hazardous substances and materials) action to be undertaken to reduce and eliminate the negative consequences as regulated in the existing legal and regulatory documents and the respective service units, responsible for acting in such cases, should be immediately notified.	Exploitation phase	Restoration and protection against the contamination of the subsoil layers
5	Landscape and natural reserves		
5.1	Provisioning for suitable plant species in the re-cultivation project	Construction and exploitation phase	Reduction of the visual impacts
6	Biodiversity		
6.1	Only local species should be used for landscaping and the application of strict measures against the appearance of invasive alien species should be taken	Construction & Exploitation phase	Preservation of the local vegetation. Preventing the spread of foreign invasive plant species in the area which may gradually lead to a disruption of the traditional species, specific for the area.
6.2	Removal of the vegetation when preparing the construction site is to be carried out	Prior to the construction works	Minimizing individual losses of birds and disturbing their normal life cycles

	outside the bird reproduction period (April - July).		
7	Cultural and historic heritage		
7.1	Field research of archaeological sites according to the requirements of the ZKN (<i>Cultural Heritage Law, Bul.</i>).	To precede the investment intention	Preventing the destruction of archaeological sites and/or structures
7.2	During the realization of the investment proposal, all excavation activities are to be carried out under the supervision of an archaeologist according to the requirements of Art. 161, par. 2 of the Civil Code. In case of discovery of archaeological sites to apply Art. 148 and 160 of the Civil Code.	Construction phase	Preventing the destruction of archaeological sites and/or structures
8	Waste		
8.1	The waste generated during construction and assembly works is to be collected and stored in an appropriate manner in specified locations. Excavated earth masses are to be transported to specially designated landfills coordinated with the municipal authorities.	During the design and construction phase	Preventing the risk of waste pollution of the adjacent territories.
8.2	Preparation of the WMP (Waste Management Plan), according to Art. 11 of the WMA and its strict implementation.	During the design and construction phase	Preventing the risk of pollution with waste of the adjacent territories.
8.3	Generated hazardous waste to be handed over for recovery/recycling, and in case of an impossibility – to be handed over for disposal to licensed companies, on the basis of a concluded contract.	During the construction and exploitation phase	Preventing the risk of contamination with waste.
8.4	The generated household waste to be transported to the regulated solid waste landfill.	During the construction and exploitation phase	Prevention of pollution with hard wastes both on the "Chiren" underground gas storage facility as well as on its adjacent territories.
8.5	To provision an appropriate mode of removal of the waste in order to prevent pollution of the environment.	During the construction phase	Prevention of environmental pollution.
8.6	To implement a system for organized garbage collection, garbage separation on the entire territory of the newly formed underground gas storage site.	During the exploitation phase	Prevention of environmental pollution.
8.7	To provide the necessary containers for the collection and storage of the generated waste; they are to be closed, no spills allowed and measures should be taken according to the	During the exploitation phase.	Prevention of pollution on the territory of the investment proposal.

	type of waste; to be marked by name and code according to the regulatory documents.		
9	Health and hygiene aspects		
9.1	Preventing excessive normative ambient air quality requirements and harmful physical factors, including noise and vibrations in the area of the site, subject to health protection and located near the territory of the IP.	During the construction and exploitation phase	Protecting the health of the population near the IP site:
9.2	Provision of healthy and safe work conditions on the territory of the site and, if necessary, use of personal protective gear such as antiphons when performing noise emitting operations.	During the construction and exploitation phase	Protecting the health of the workers at the IP site:
10	Tangible assets		
10.1	Timely rehabilitation of the elements of the road infrastructure damaged as a consequence of the construction works and the operation of the IP.	Construction and exploitation phase	Restoration of damaged parts of the road infrastructure during the realization of the project
11	Hazardous chemicals. Companies or facilities with low or high risk potential		
11.1	After receiving a positive Environmental Impact Assessment, approval of the project documentation and construction of the site, on the basis of the project documentation to build a local alarm system, according to the requirements of Art. 35, par. 3, item 5 of the Natural Disaster Protection Law.	Design, construction and exploitation phase	Protection of the life and health of the people working in the open.

8 Description of the anticipated significant adverse impacts from the investment proposal on the environment and on human health arising from the vulnerability of the investment proposal and the risk of major accidents and/or disasters of major importance.

8.1 Risk Assessment

“PGH Chiren” (*Underground Gas Storage Facility, Bul.*) is classified as an enterprise with a high risk potential due to the volume of stored natural gas, much exceeding the set risk threshold of 200 tons as per the provisions of Appendix No. 3 of the ZOOS (*Environmental Protection Act, Bul.*), Part 2, item 18, column 3. The remaining, available dangerous chemical storage facilities are insignificant for determining the potential of the enterprise.

The present IP (*Investment Proposal*) is considered within a general EIA (*environmental impact assessment*) procedure, pursuant to Art. 94, par. 1, **item 9 of the Environmental Protection Act and an updated Safety Report has been prepared by the enterprise as a separate document - Appendix III to the EIA.**

8.1.1 Accident related risks

In the submitted Safety report, a risk assessment has been carried out, containing analyses of the scenarios of the main reasons for the occurrence of accidents according to the "Risk matrix" method and CEL (the *triple factor* method) which allow for prioritizing the major accident scenarios.

The attached **Safety report** analyzes the possible accidents on the "Bulgartransgaz" EAD site - the currently existing and the new one. From the scenarios considered in the report and the relevant impact areas, it is concluded that there are no conditions for a "domino effect" to occur. For the purposes of the present EIA report, information is presented further down about the accidents that may occur as a result of the implementation of the investment proposal. Regarding the currently existing site, the possible accidents and danger zones are in accordance with the risk assessment attached to the 2016 Safety report. The implementation of the present IP does not lead to changes in the calculated damage zones in case of a major accident occurring on the now existing site.

8.1.2 Risk assessment methodology

Based on a study of the main risk assessment methods, of their advantages and disadvantages, the CEL, or the “3F” method has been selected (the *triple factor* method).

The assessment of the consequences from the occurrence of a major accident was carried out using the following methods and computational models:

- *Methodology for determining the overpressure and the impulse of the generated shock wave from a physical blast;*
- *Equations used for calculating the safe distance from the site of a leakage during gas flaring;*
- *The software product ALOHA (Aerial Location Of Hazardous Atmosphere - version 5.4.7), developed by the US Environmental Protection Agency (Environmental Protection Agency of the USA);*

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

- *Methodology for the prompt assessment of the possible damages from a major accident with hazardous chemical substances prepared for the Italian Ministry of civil protection, 1994.*

8.1.3 Risk assessment

The EIA Report (DOVOS, Bul.) presents information on the accidents and the relevant areas of impact that may arise as a result of the realization of the investment proposal. The investment proposal does not lead to changes in the accident scenarios which are included in the risk assessment attached to the 2016 Safety report submitted by the enterprise.

8.1.4 Environmental Risk

In the event of a major accident no direct, significant impact on the components and the environmental factors is expected. In case of fire and/or toxic dispersion it is possible for pollutants to be found in the atmospheric air - products of the incomplete combustion during a fire which will dissipate to concentrations which are safe for the residents of the nearby settlements.

An indirect negative effect from the discharge of non-purified fire extinguishing waters, outside of the site of the enterprise, is very possible.

8.2 Description of the anticipated adverse impacts of the investment proposal on the immediate environment and on human health resulting from the vulnerability of the investment proposal to the risk of major accidents and/or relevant disasters

8.2.1 Atmospheric air

Scenario 1 – accidents involving natural gas – In the event of a release and a subsequent dispersion of natural gas, no impact on the ground level atmosphere air is expected because of the high self-cleaning ability of the atmosphere - quick thinning of the methane cloud.

The formation of a flammable cloud will have a local impact due to the ability of the atmosphere to rapidly decrease its concentration. The quantity of the methane emission depends on the magnitude of the accident, i.e. its duration and the quantities of the substance involved in the accident. The impact on the atmospheric air will be direct, negative, short-lived and reversible.

Scenario 2 - methanol related accidents - In an accident involving a spill and/or ignition of methanol - fireball/BLEVE (formation of a cloud with an explosive concentration), the expected impact on the atmospheric air will be direct, short-term and temporary, with a low to a high degree of the impact, but only within the area of the fire itself.

8.2.2 Waters

8.2.2.1. Surface waters

Surface water pollution from major accidents and/or disasters on site of the "Chiren" gas storage facility can be caused by the formation of contaminated water flows resulting from the accident and the subsequent fire-fighting activities. Polluted waters can enter the rain collector system at the CS site and from there, through the external sewer, to the water intake. These waters may be found to contain petroleum products as well as waste substances from the burning and melting of various materials -

construction, insulation, etc. Such an impact can be defined as negative, with a low to medium importance and can be direct, temporary, short to mid-term, reversible and local.

8.2.2.2. Groundwaters

In the event of accidents, groundwater pollution related to the leakage and ignition of natural gas and methanol may be due to the infiltration of small quantities of polluted atmospheric water. Such an impact is defined as negative, of low to medium importance, direct, temporary, short to mid-term, reversible and local.

8.2.3 Soils

Scenario 1 – accidents involving natural gas – In an accident involving an explosion or ignition of leaking gas, the expected impacts on the soils are negative and concentrated around the site of the accident. The impacts result from the high temperature during the flaring of the gas and are expressed in damages to the soil aggregates and the destruction of the soil's micro flora, or in the mechanical destruction of soil aggregates and damages to the soil profile in the event of an explosion.

Scenario 2 - methanol related accidents - In the event of an accident involving a spill and/or ignition of methanol the impact on the soils are negative and concentrated within the scene of the accident.

8.2.4 Subsoil and mineral diversity

In the event of accidents related to leakage and ignition of natural gas and methanol a potentially negative, low to medium significance, direct, temporary, short to mid-term, reversible and local impacts on the subsurface zone of the earth's bowels can be expected to occur as a result of the discharge and dispersal of land masses and a possible saturation with polluted atmospheric waters.

8.2.5 Landscape and natural reserves

Scenario 1 – accidents involving natural gas – Given the local nature of the expected accidents related to explosions and flaring of natural gas the effects on the landscape, outside of the area of the investment proposal, will have a low to negligible negative impact.

Scenario 2 - methanol related accidents - Given the local nature of the expected accidents involving spills and ignitions of methanol the effects on the landscape, outside of the site of the area of the investment proposal, will have a low to negligible negative impact.

8.2.6 Biological diversity

Scenario 1 – accidents involving natural gas - The toxic dispersion of gas without ignition poses no risks to the local vegetation, but may result in the mortality of individual animals/birds of different species and in specific stages of their development - mainly immobile or partially mobile young individuals (the chicks of nesting birds or young mammals in dens and shelters) living within the area of the cloud's dispersal.

Given the nature of the IP and its location, no significant negative and irreversible impacts on biodiversity are expected,

Scenario 2 - methanol related accidents - Given the local nature of the possible accidents related to spillage and ignition of methanol the effects outside of the site of the area of the investment proposal on

the local biodiversity will be have a low to a negligible negative effect.

8.2.7 Cultural and historical heritage

Due to their local nature, the possible accidents related to the leakage and ignition of natural gas and methanol are not expected to exert an impact on any sites of cultural or historical importance.

8.2.8 Harmful physical factors

In the event of the formation of a blast wave, resulting from the ignition of natural gas and methanol and an air shock-wave not exceeding or equal to 0.5 psi, a sound wave with a power of 90 -100 dB is expected to appear, which can cause stress or fear among the personnel working at the gas storage facility. The dangerous threshold value for human hearing, above which various hearing impairments may occur, is 120 dB. The impact from the noise levels will be negative, with a medium to high significance; direct, temporary, short to mid-term, reversible and local.

8.2.9 Waste

According to the risk assessment methodology used, the occurrence of such a risk is minimal as a number of preventive measures will be in place at the site, which will make any accidents almost impossible.

The impact on the components and environmental factors of the site and in its adjacent territory will be negative, with medium to high significance, direct, temporary, short to medium term, reversible and local as the same will be the result of an increase in the amount of generated waste.

8.2.10 Health and hygienic aspects

In the event of accidents related to leakage and ignition of natural gas and methanol negative effects on the health of the people living close to PGH "Chiren" are very possible. The impacts may be the result of the released gases during the burning of various materials and substances on the site, as well as possible igniting of the vegetation near the fire, which will inevitably result in an increase of discharged gases in the atmosphere. The extent of the impact will depend mainly on the current state of the atmosphere and more precisely on the power and direction of the wind which can be negative, with medium to high significance, direct, temporary, short to medium term, reversible and local. Under certain conditions, the impacts may be negligible or non existent.

Negative impacts can be expected from the temporary loss of work places, the disruption of the road connectivity between the villages of Chiren and Devene and damages to or destruction of agricultural products within the range of the fire.

8.2.11 Tangible Assets

In the event of accidents related to leakage and ignition of natural gas and methanol negative impacts on tangible assets may be suffered as a result of the destruction of buildings and facilities, as well as damages to parts of the road infrastructure located near the "Chiren" gas storage facility. These impacts are expected to be negative, temporary and local.

8.3 Monitoring and Applicable measures for preventing or mitigating significant adverse effects from the above described events on the

environment and on human health

The term "Passive measures" includes the possibility and the provision of: the necessary fire resistance ability of the buildings; fire resistance of the structural elements; evacuation conditions; anti-corrosion and fire protection; explosion protection; fire barriers and fire protection sectors; roads and sidewalks on the site, incl., for fire extinguishing and emergency rescue activities and an external access road; stairs for fire extinguishing and emergency rescue activities; required distances between/to buildings and facilities; the required category of the power supply protection systems; external and on-site water pipes and a number of other facilities.

The term "Active measures" includes:

- *the construction of fire-extinguishing installations - for the GTCA fire protection of the equipment located inside the container is in place. An automatic CO2 fire extinguishing system is also provided.*
- *fire alarm installations - these will be built in the electricity and automation buildings, GIS and BPGG. To secure the premises an addressable fire alarm system shall be installed. Regarding GTKA1-4 (gas-turbine compressor units, Bul.), a local fire alarm and gas alarm sensors will be mounted in the containers, including the cable system, etc. The control panel for the alarm and notification systems will be connected to UCS and subsequently to the station management system. The fire alarm is a complex electronic system which consists of different types of automatic fire detectors responding to various signs of the possibility of a fire, prior to its actual breaking out.*

8.4 Details regarding the readiness for and the manner of response to emergency situations

"Bulgartransgaz" EAD has taken all fundamentally important measures which can simultaneously guarantee:

- *compliance with the requirements for the storage of dangerous chemicals, mixtures and waste;*
- *reducing the risk of major accidents.*

The specific measures relating to the training and creating a specific mind set in the personnel and the provision of funds to deal with emergency situations in a timely manner and to perform the required emergency rescue and restoration operations are described in the DOVOS.

9 Opinion and received conclusions

Appendix 8 of the DOVOS presents information on the fulfilment of the requirements of Art. 9, par. 5 in conjunction with Art. 9, par. 1 of the EIA Ordinance. Also attached is a reference on the consultations held so far together with the accepted and rejected comments and the related reasons with copies of the received written opinions and conclusions. In addition, Appendix 8 contains the letters received in connection with the assigned works from the municipalities and the mayors involved.

When preparing the EIA Report on the investment proposal, the **recommendations and answers to the questions were taken into account as they have been placed during the consultations in conformity**

with the requirements of Art. 95, par. 3 of the Environmental protection laws and the Ordinance on the conditions and procedures for carrying out an environmental assessment.

10 Description of the difficulties (technical reasons, scarcity or lack of data) encountered during the collection of information for the development of the EIA report

The contracting authority has provided the fully completed report in a timely manner. It contains all of the available information and documents related to the investment proposal and in addition, no problems have been identified during the consultations and during the visits to the site itself.

Full cooperation was provided by the Contracting authority during the collection of the information and the data on the investment proposal and for the purpose of conducting the consultations.

The team engaged with the development of the present EIA report has met with the good understanding demonstrated by the various institutions in collecting the information necessary for preparing the EIA. Due necessary assistance was provided both by the competent authority - the Ministry of environment and water - as well as by RIOSV-Vratsa, BDDR-Pleven and the Vratsa municipality.

11 Conclusion conforming with the requirements of Art. 83, par. 5

The EIA Report on the investment proposal for the "Design and construction of new ground based facilities - a compressor station with all of its adjacencies technical equipment intended to ensure reliable and continuous operation in the compression and gas extraction mode, as well as a new gas measuring station (GIS), in connection with the expansion of the capacity of the underground gas storage facility "Chiren" and their connection with the currently existing facilities" has been developed by a team of independent experts, basing their work on the individual environmental components and factors. In preparing the EIA Report, the specialists were guided by the principles of reducing and overcoming all possible environmental risks and the risks to human health as well as the need to ensure sustainable development in accordance with the adopted environmental quality norms currently in force in the country.

The EIA Report on the investment proposal contains a description and an analysis of the components of the environment, the cultural heritage and the effects on human health which are expected to be encountered during the realization of IP as well as the interaction between them.

Alternatives and additional variant solutions have been discussed in relevance to the investment proposal and its specific characteristics, given the expected impacts and the consequences from the implementation of the IP on the environment: in terms of technology and in terms of the capacity of the PGH facility, according to the technical and economic indicators of the GTKA. As a result of the fair consideration of all possible alternatives, the "zero" alternative is rejected as impossible, as it would lead to negative social and financial consequences for the workers, the local population, the municipalities and the region as a whole and will be effected negatively on the national level by blocking the increase in the capacity of the gas station which - in turn - will exert a negative impact on the economy and the population as a whole.

Regarding the possible alternatives for the location of the new site and considering the requirements and limitations as a limiting factor described in **item 2.2.1.**, it is decided to allocate the new

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

technological site next to the currently existing facility in close link to the territory of the now operating PGH "Chiren". In the context of the preferred location and on the basis of the alternative thus selected, the extent of the potential impact on the components and factors of the environment has been carefully estimated prior to implementing the investment proposal.

Because, in terms of technology, Option V and Option VI were rejected as a possible realization and due to the shortcomings listed in [item 2.2.2](#), these have not been evaluated in relation to the degree of their possible impact on the components of the surrounding environment.

As a result of the equally based consideration of Option I, Option II, Option III and Option IV, and the comparison with the relevant criteria in terms of the degree of preference and advantages of the respective option based on one and the same criteria, Variant III C: 3+1 - GTKA was selected as the best option preferred for realization, for which in EIA report identifies, describes and assesses the possible impacts on the environment and the local human population which may come as a result of the implementation of the investment proposal, the use of the available natural resources, the emissions of harmful substances, the generation of waste and the creation of discomfort, during the construction works, the normal operation and in emergency situations, applying the Impact Assessment Methodology on the components and factors of the environment as detailed in [item 4.1](#).

Based on the analysis and the forecast of the expected impacts, made in the EIA Report, it can be summarized that in general, no significant impacts are expected in terms of the environment and the health of the local population. Presented below are the conclusions of the Ministry of environment and water resources regarding the expected possible impacts on the environment and human health from the implementation of the investment proposal:

Atmospheric air and climate – The amount of generated emissions, during the construction works as well as during the operation of the new site at the "Chiren" gas storage facility, cannot serve as the precondition for the atmospheric air concentrations to be defined as having a "significant impact". During the construction, and when carrying out the earth-excitation operations and preparing the site for the installation of the gas turbine units the water heating boilers and other engineering facilities the expected impact is direct, local, mid-term, temporary, reversible and insignificant. The impact rate is marginally negative and does not endanger the quality of the atmospheric air (AQ) in the populated areas and the ecosystems. Considering the sensitivity of the receptor as being extremely low, the significance of the impact is assessed as insignificant and acceptable on a local and regional scale. During operation, in the annual and short-term aspect of atmospheric air quality in terms of sulfur, nitrogen oxides and carbon monoxide will not have negative affects during the operation of the PGH "Chiren" at its full capacity. The degree of the impact is insignificant and it will not have a negative effect on the local settlements and ecosystems. The significance of the impact is assessed as insignificant and acceptable in local and regional scale. The impact, during operation from the points sources, as well as from the transport scheme is local, long-lasting, reversible, and insignificant. The degree of the impact is insignificant and does not threaten the quality of the atmospheric air in the human settlements in the area.

No change is expected in the mode and spatial distribution of the values of the climatic elements in the area under consideration.

Surface waters – During the construction works, the impacts on the surface waters are expected to result from accidental spills of oils and petroleum products from the construction machines, as well as the result of the water intakes and discharge processes of waters when conducting the hydraulic test of the gas pipeline deviations and plumes. Possible impacts are outlined as negative on the local level with indirect action, resulting from accidental leaks, to direct in cases of discharge of wastewaters, temporary, short-term and only during the construction period and reversible. During operation, there will be minimal or even negligible increase in the quantities of discharged household-faecal and waste rainwater, discharged with “Potok” 1 in the dry ravine in the “Lakite” area, which in turn is not expected to lead to a change in the water levels. Regarding the quality of discharged waters, the same will be unchanged and complying with the conditions and norms placed in the issued and valid discharge permits for the generated wastewater flows into surface water basins. It cannot be expected that the realization of the investment proposal and its exploitation can lead to an overrun or to changing the already authorized limits and regimes of the water intakes, according to the valid permit, which is why the realization of the IP is not expected to have significant impacts on the biological and hydro-morphological elements and to any deterioration of the ecological and chemical status of the surface waters and to obstruct the achievement of the set environmental protection goals.

Groundwaters – During the construction period no impact is expected on the groundwaters due to the fact that the terrain of the site, at a depth of about 25 – 30 meters, is represented by an alternation of clays and sandy loams appearing as a natural screen preventing the penetration of surface water. Independently from the high sensitivity of the receptor no effects are expected, including such which could lead to a change in the quantitative and/or qualitative parameters of the underground water basins. During operation, the waste water from the site forms four separate streams. Waste water from the site is collected in Stream 1 and Stream 2, and it is directed through off-site sewers to the discharge points in the surface water basins - the dry ravine. Through Stream 3 the sewer system intakes conditionally clean rain waters from the condensate and methanol storage site, which are discharged into the tail of the "Chiren III" dam. Stream 4 is formed from the separated liquid phase (reservoir water) from the separation during natural gas extraction which is then re-injected into Drill P-15, after achieving a chemical composition corresponding to the prescriptions in the permit of BDDR - Pleven No. 12570003/16.12.2015, amended with Decision No. 2757 dated September 30, 2019. In compliance with the requirements, laid down in the permit, no impact on the chemical and quantitative status of these waters is expected (code BG1G000K1ap043 – Karst waters in the “Mramoren” massif).

Soils - The negative impacts on soils are mainly concentrated in and during the construction phase of the compressor station, the plumes, the flare connection and the adjacent infrastructure. These moderate negative impacts result from the activities leading to the destruction of the soils within the area. Given the size of the buildings and facilities, the damaged areas, with gray forest soils, form an insignificant percentage against the background of the distribution of this soil type in the area. During exploitation no impacts are expected to effect the soils beyond the limits of the compressor station.

Subsoil and mineral diversity - No impact on the subsoil layers is expected during normal accident-free operation of the gas station because the initial design of the facility does not envisage activities which can disturb and pollute the geological environment.

EIA Report of investment proposal for Design and construction of new above-ground facilities - a compressor station with all its auxiliary technical facilities to ensure reliable and continuous operation in gas injection and withdrawal mode, as well as a new Gas metering station (GMS), with regard to capacity expansion of Chiren underground gas storage and their connection to the existing ones.

Landscape and natural objects - During the construction of the investment proposal modifications of the existing landscapes and the creation of new ones will be made. The expected visual impact from the construction of the compressor station and its adjacent infrastructure will be negative, temporary, short-lived, local (in the area of the construction activities), direct to mediate degree. No visual impacts, regarding the residents of the village of Chiren, are expected to occur. After completion of the construction stage, restoration and reclamation works on the effected terrains will be carried out.

Biodiversity - The impacts during the construction works and the operation of the IP are assessed as being insignificant regarding the biodiversity, LL and TL after undertaking and executing the relevant mitigation measures.

Cultural and historical heritage - The probability of the presence of unknown archaeological sites within the scope of the construction activities may lead to negative impacts, local in scope, permanent and irreversible. Given the presence of an archaeological site, which is in close proximity to the investment intention, and the need of prevention of the destruction of potential archaeological sites, preliminary archaeological investigations should be carried out and field surveys within the boundaries of the area according to the requirements of Art. 161, par. 1 and Art. 148, par. 5 of the Civil Code. The results from the investigation must be accepted by the Commission under Art. 158 a of the Civil Code, which will determine the future prescriptions of the archaeological sites which may possibly be registered nearby. During operation no impacts on sites of cultural value and archaeological importance is expected to occur.

Harmful physical factors – During the construction period, the source of the noise in the environment will be the construction machinery and equipment used, and its impact will be concentrated in and around the work zone, with expected noise accumulation load from different construction equipment during the daytime. Considering the distance from the site of the "Chiren" gas storage facility to the nearby settlement of Chiren, it can be concluded that no impact on the population can be expected. Regarding the impact on the only receptor located in the area of the impact, the production area of the currently operating site and in particular those working at the existing site of the "Chiren" PGH, whose sensitivity is assessed as very low, it can be concluded that an impact is expected to range from insignificant to a very low degree, directly dependent on the concrete location of construction works within the scope of the site which will result in a negligible negative impact. The impact will be short-term, temporary and reversible. Regarding the newly designed site of the "Chiren" PGH, the main sources of noise will be: gas turbine engines, centrifugal compressors, air-cooled heat exchangers, emergency gas generators in case of failure of the backup power supply. Each generator is equipped with a soundproof cabin, which lowers the level of the noise emitted from it and a muffler is installed on each exhaust. After implementation of the investment proposal no change in the acoustic environment in the location of the impact is possible (the village of Chiren).

Waste - During the construction phase impacts are expected on the components of the environment solely resulting from the possible illegal storage of the generated waste, its disposal in unregulated places and handing it over for further treatment to companies which do not own the necessary permits under the Waste management act. The expected impacts will be negative, direct, short-term, temporary and reversible, as no secondary and cumulative effects are expected. Compliance with

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regulations requirements, as set in the Waste Management Act and the related by-laws, serves as sufficient reason to conclude that the legitimate collection, storage and treatment of the generated waste will not have a negative impact on the natural environment. During operation, the generated waste is not expected to have a hazardous impact on the environmental components. All generated waste is expected to be treated by companies holding the required permits, complex permits or registration documents under Art. 35 of the Waste management act for the relevant activity as well as a dump site for waste, run on the basis of a written contract. In case of a non-compliance with the regulatory requirements in the sphere of waste management the expected impacts will not differ in type, degree and significance from those described as characteristic of the period of realization of the investment proposal.

Health and hygiene aspects - During the construction activities, the work site will be an organized surface source of dust emissions, motor gas emissions and noise. The increase in transport traffic from the cargo vehicles on the site will be of minor importance and will not result in an increase in noises levels when passing through the populated areas. In certain climatic conditions, such as dry and windy weather, dust emissions rarely, and in small quantities can reach the village of Chiren and their negative effect will be limited to the level of temporary discomfort: they are not expected to affect people's health. Regarding the negative health effects from conventional factors typical of the working environment effective measures have been developed and successfully implemented in practice which considerably reduce and limit the health-related risks. The exploitation of the new site of "PGH Chiren" will not lead to a change in the KAV and to an increase in the noise levels thus posing an adverse health risk for the population. Some of the physical factors of the work environment, such as noise and an overheated microclimate, may have an impact on only a limited number of workers. These are conventional factors of the work environment regarding which preventive measures have been developed and tested in practice and their application will lead to a reduction and limitation of the risks to the health of the workers. Thus, the expected impacts are evaluated as insignificant.

Tangible assets - The implementation of the investment proposal will not exert any influence on the machinery and the equipment, and the infrastructural facilities serving the existing site of the "Chiren" PGH. During the stage of operation, a negative impact is expected to effect only on the road infrastructure. The traffic is expected to be related to the servicing of the underground gas storage facility, and it will consist of the which vans will be used to transport the workers and of the personnel's cars. For the supply of necessary equipment, raw materials and elements for "Chiren" PGH trucks will be used although their load is intended to be minimal. The corresponding negative impacts on the road infrastructure are defined as local and of minor importance. On the other hand, with the implementation of the IP, the engineering facilities will increase (the newly built KS and the adjacent infrastructure as well as the facilities for extraction and injection) which, relating to the tangible assets means a long-term positive impact in the IP area, which can be assessed as a moderate to medium positive significance.

PGH "Chiren" is classified as an enterprise with high risk potential due to the presence of natural gas in quantities many times exceeding the threshold of 200 tons (the threshold for a high risk evaluation according to Appendix No. 3 of the Environmental Protection Agency, Part 2, item 18, column 3. Pursuant to the requirements of Art. 94, par. 1, **item 9 of the EPL an updated Report on safety of the enterprise is drawn up as a separate document to the EIA Report which discusses the risk assessment.** As a result of

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the analysis of the scenarios regarding the main reasons for the occurrence of accidents based on the "Risk Matrix" and the CEL (the triple factor method) method which enables the priority order of the major accident scenarios, the conclusion is that a major accident is not expected to have a direct, significant impact on the components and factors of the environment. In case of fire and/or toxic dispersion, pollutants in the atmospheric air may be found - products from the incomplete combustion in the event of a fire which will disperse to concentrations safe for humans in the nearby settlements.

The EIA Report proposes specific measures to prevent, reduce and eliminate to the greatest possible the adverse consequences on the environment as these have been defined by the environmental components concerned for the period of design, construction and operation of the IP.

From the performed analysis, forecast and assessment presented in the EIA report, one can make the conclusion that as a result of the implementation of the investment proposal for "Design and construction of new ground based facilities - a compressor station with all of its adjacencies technical equipment intended to ensure reliable and continuous operation in the compression and gas extraction mode, as well as a new gas measuring station (GIS), in connection with the expansion of the capacity of the underground gas storage facility "Chiren" and their connection with the currently existing facilities" no impacts with negative significance for the environment and human health are expected which do not comply with the environmental quality norms in force in the country, the application of the principles of reducing the risks to human health and insurance and the requirement for sustainable development as well as the implementation of the measures proposed in the report.

The conclusion of the team of independent experts who have prepared the EIA Report is that the investment proposal for the "Design and construction of new ground based facilities - a compressor station with all of its adjacencies technical equipment intended to ensure reliable and continuous operation in the compression and gas extraction mode, as well as a new gas measuring station (GIS), in connection with the expansion of the capacity of the underground gas storage facility "Chiren" and their connection with the currently existing facilities" can be realized as per the requirements of Variant III C: 3+1 - GTKA (gas-turbine compressor units).
