Action funded by the EUROPEAN UNION

EUWI+ EU WATER INITIATIVE FOR EASTERN PARTNERSHIP

European Union Water Initiative Plus for the Eastern Partnership (EUWI+ 4EaP)
Georgia

LOCAL CONTRACTOR FOR THE GEOPHYSICAL, ISOTOPE, HYDROCHEMICAL, BACTERIOLOGICAL AND HYDRODYNAMIC ASSESSMENT OF TWELVE SELECTED WELLS TO BE INCLUDED IN THE NATIONAL GROUNDWATER MONITORING NETWORK IN THE ALAZANI-IORI RIVER BASIN DISTRICT IN GEORGIA

8 August 2019

1. Financing

European Union (ENI/2016/372-403)

2. Procedure

Single Tender Procedure according to EU PRAG

3. Contracting Authority

International Office for Water (IOW)

4. Nature of contract

Service contract

5. Time period of implementation

2 September 2019 – 27 March 2020

6. Contract amount

Maximum amount 20,000 €

7. Background information

The 'European Union Water Initiative Plus for Eastern Partnership (EaP) Countries (EUWI+)' (EUWI+) addresses existing challenges in both development and implementation of efficient management of water resources. It specifically supports the Eastern Partnership[1] countries to move towards the approximation to EU acquis in the field of water management with a focus on trans-boundary river basin management as identified by the EU Water Framework Directive (WFD).
The overall objective of EUWI+ is to improve the management of water resources in the EaP countries. The specific objective is to achieve convergence of national policies and strategies with

[1] The Eastern Partnership (EaP) is a policy initiative launched at the Prague Summit in May 2009. It aims to deepen and strengthen relations between the European Union and its six Eastern neighbours: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

the EU Water Framework Directive, Integrated Water Resource Management (IWRM) and relevant Multilateral Environmental Agreements (MEAs).
EUWI+ is divided into three result areas as follows:

- Result 1: Legal and regulatory frameworks improved in line with the WFD, IWRM and MEAs;
- Result 2: River Basins Management Plans designed and implemented in line with the WFD principles;
- Result 3: Lessons learnt regularly collected, shared and communicated to stakeholders.

This assignment will contribute to the implementation of Result 2 of EUWI+ in Georgia. Under the WFD, River Basin Management Plans (RBMPs) are the planning tools which give the overall orientation of basin water management, the objectives to be reached, and the priority measures to be implemented. In Georgia, the selected pilot area for the EUWI+ project RBMP development are the Alazani-Iori and Khrami-Debed River Basin Districts (RBDs).

The objectives of EUWI+ include strengthening of the hydrological and hydrochemical monitoring networks of the participating countries and assisting the countries to meet their obligations under multilateral environmental agreements, such as the Water Convention, and under the WFD. These objectives include ensuring that adequate infrastructure and equipment are available for sound monitoring of water quality and quantity in pilot areas, and supporting the overall process of development of RBMPs in the project countries.

The groundwater monitoring network in the Alazani-Iori River Basin District is shown in Figure 1 below. According to the technical report *'Delineation of groundwater bodies of Alazani-Iori River Basin District*', developed with EUWI+ support, the total number of groundwater monitoring sites in the RBD is less than 30 (see annex 1). A minimum of three monitoring sites per groundwater body or group of groundwater bodies is recommended, and where GWBs are large and heterogeneous, it is likely that significantly more monitoring points will be needed to meet the WFD monitoring objectives. Considering that there are 23 groundwater bodies (GWBs) in the Alazani-Iori RBD, a high number of GWBs is not covered by monitoring sites.

The technical report further showed that in most cases there is no correct or precise information about groundwater monitoring sites in the available old reports. Thus, it is impossible to link the wells that were found in the RBD with the ones listed in the existing data catalogues. Therefore, it is difficult to define the wells' technical characteristics (construction, lithology, drained groundwater horizon, etc.). These circumstances make it impossible to define which groundwater horizon is tapped by the well, or to measure its parameters to ensure proper monitoring of groundwater, as required by the WFD.

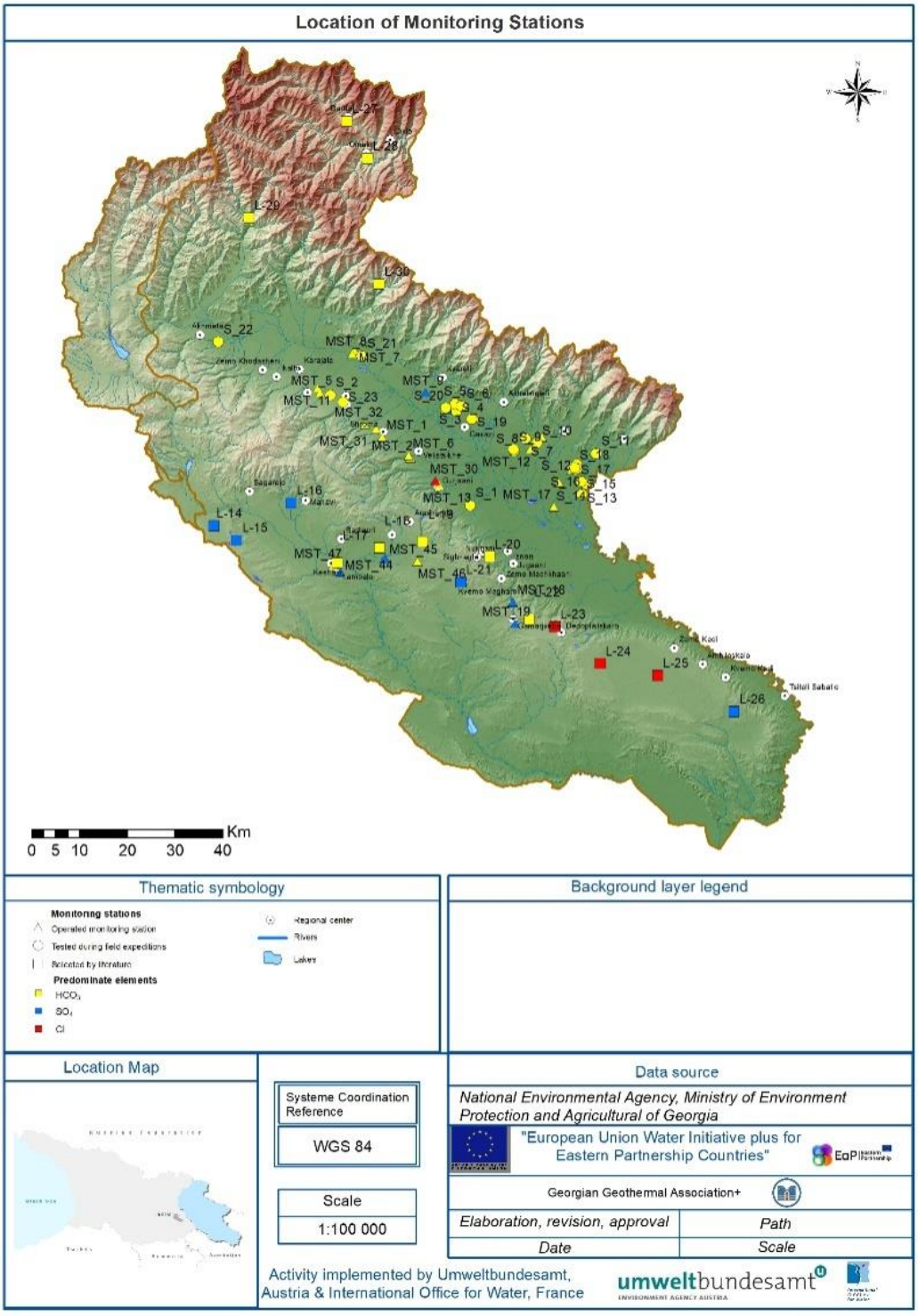

Figure 1: Groundwater monitoring network (Technical Report 'Delineation of groundwater bodies of Alazani-Iori River Basin District')

Since drilling new boreholes is very expensive and available financial resources are limited, it should be checked whether and which suitable existing monitoring sites are available. With support by a separate contractor and the EUWI+ thematic lead for groundwater, the National Environmental Agency of Georgia (NEA) will select such monitoring sites for further analysis. These wells may already be part of NEA's groundwater monitoring network or be existing wells which are not yet part of that network, such as water supply abstraction wells.

The focus will be put on wells in GWBs without NEA monitoring sites or with an insufficient number of monitoring sites, and on monitoring sites of NEA's monitoring network for which it is not known which groundwater horizon and GWB is tapped because there are no or only incorrect records of the well's technical characteristics such as filter length and location.

The contractor for this study will analyse the twelve selected wells for chemical and quantitative (hydrodynamic) monitoring in detail in order to improve NEA's groundwater monitoring network in the Alazani-Iori RBD, and hence the understanding of the GWBs. The aim of this study is to find out whether the condition and technical design of each selected, well as well as the characteristics of the drilled surrounding rock, are suitable for determining which GWBs are tapped by the filter sections of the well and whether the well can be included in NEA's groundwater monitoring network. The filter sections of the well should not link two different groundwater horizons or GWBs.

The detailed analysis will have a broad scope and will include geophysical logging, isotope analysis, chemical analysis, bacteriological analysis and hydrodynamic analysis. With geophysical well logging, the composition, variability and physical properties of the rocks around the borehole can be determined. Thorough conceptual understanding of GWBs is necessary to assess whether they are at risk of failing to achieve good status, whether they actually do achieve good status, and whether taken protective measures were effective. The service will be carried out in three phases of four wells each. The required field work will be done in

- Early September 2019 (phase 1),
- Second half of October 2019 (phase 2), and
- Late 2019 or early 2020 (phase 3).

The contractor will create or update, as required, the characterisation tables for each analysed monitoring site (see annex 2). The contractor will also update GWB characterisation tables and texts whenever the analysis yields new or more detailed understanding of the GWB.

The services will be carried out in close cooperation with NEA, the national project representative of EUWI+ and the EUWI+ thematic lead for groundwater.

8. Scope of works & deliverables

8.1. Scope of works

The selected local contractor for this assignment will analyse a total of twelve groundwater wells by means of geophysical, isotope, hydrochemical, bacteriological and hydrodynamic methods, as well as further analyses as required, in the Alazani-Iori River Basin District in Georgia. NEA will provide the contractor with the required details of these wells. The wells will be analysed in three phases of four wells each. Each phase will consist of field work and analysis and interpretation, including the completion of the characterisation table for each well. The timing for field work is provided in section 9.2. The analysis and interpretation for each phase will be done within four weeks of the field work. NEA staff will participate in the field work of phase 1. The field work of phase 2 will be done in parallel with an EUWI+ groundwater survey in the Alazani-Iori and Khrami-Debed RBDs, which will also aim to extend the coverage of groundwater monitoring to all GWBs.

In principle, the contractor will apply the same analysis methods in all three phases. With plausible scientific or technical explanation why other methods are more appropriate, the contractor may adapt the methods before each phase after written confirmation by NEA and the EUWI+ thematic lead for groundwater monitoring.

8.2 Tasks to be performed

<u>Analysis of the wells</u>

Geophysical analysis

Several geophysical methods are possible for the required analysis, of which at least the following have to be applied:

- Video logging
- Mechanical Methods

    - Caliper logging: Provides a continuous record of average borehole diameter
- Electrical methods
    - Resistance electric logging: Electrical resistance increases with grain size and decreases with borehole diameter, density of water-bearing fractures, and increasing dissolved-solids concentration of borehole fluid
    - Fluid temperature logging: Provides a continuous record of the temperature of the fluid in the borehole.
    - Fluid resistivity logging: Measures the electrical resistance (fluid conductivity) of fluid in the borehole. Logs reflect changes in the dissolved-solids concentration of the borehole fluid.
- Radioactive methods
    - Gamma logging: Records the natural-gamma radiation emitted from rocks penetrated by the borehole.

In particular, a video logging and a well caliper survey (cavernometry) shall be carried out in order to determine the construction of the water bearing horizon and the filtrate tube. Gamma logging and electric logging (by means of thermometer and resistance methods) must be conducted to find out the composition of the water bearing horizon and the filter screen parts of the storage tube. Where wells tap several groundwater horizons, the samples should be taken from the individual horizons with the help of a special depth test in order to study each horizon separately.

Isotope analysis

An analysis of stable isotopes will be carried out at each well. The exact scope of these analyses will be determined by NEA and UBA and will be consulted with the contractor.

Hydrochemical and bacteriological analysis

The geophysical analyses will be complemented by hydrochemical and bacteriological analysis of all selected wells. The exact scope of these analyses will be determined by NEA and UBA and will be consulted with the contractor. It will likely be similar to the scope of Georgia's national groundwater monitoring and the parameters analysed during the EUWI+ fall 2018 groundwater survey (standard on-site parameters, major ions, heavy metals and a set of pesticides).

Hydrodynamic analysis

The filtration conditions of the groundwater horizontal horizon (hydraulic conductivity, transmissivity) shall be determined at each well. The data must be recorded and processed through modern digital devices and specialized software.

Further analysis as required

Besides the minimum required analyses as described above, the contractor shall carry out all analyses needed and reasonably feasible to complete the characterisation tables for each selected well.

<u>Further tasks</u>

- Following the analyses of each well, assess whether it is fit to be included into NEA's groundwater monitoring network, and which GWB will be covered by the well.
- For each suitable well, develop the technical design documentation for the refurbishment works and the equipment which will be required to include it into NEA's groundwater monitoring network. These will include drawings and technical specifications for a local contractor, according to the requirements of Georgia's legislation and regulations. The contractor has to provide a reasoned cost estimate for these required works and supplies, as well as for the continued operation and maintenance of the well as part of NEA's groundwater monitoring network.
- Update the characterisation (table and text) of each GWB covered by the analysed wells.
- Update or create, as required, all required GIS layers for the analysed wells, the updated NEA groundwater monitoring network, and the GWBs in Esri format (.shp) on a scale which is as close as possible to 1:100,000. Produce appropriate, clear and useful maps in QGIS format and as TIF files (300 dpi) based on a template provided to the contractor by EUWI+. Maps will respect the standard GCS_WGS_1984 projection (Geographic Coordinate System of the World Geodetic System) of the UTM coordinate system (Universal Transverse Mercator) or the official projection system adopted at national level.
- Provide all datasets and their descriptions in English and Georgian for the metadata catalogue developed with EUWI+ support. The complete template files in English and Georgian will be

transmitted to the contractor. It is understood that the metadata forms will have to be collected from each data producer while collecting data, but their production is not under the responsibility of the contractor. All raw dataset will be made available on the EUWI+ FTP server.
- Respond to limited and reasonable ad-hoc tasks related to the overall scope of the provided services and requested by NEA and the EUWI+ thematic lead.
- Write a final report which will provide an overview of all rendered services and will bring all created documents.

Output:
- Full data and their interpretation of the geophysical, isotope, hydrochemical, bacteriological and hydrodynamic analyses, and further analyses as required, of the twelve wells.
- Characterisation of the analysed wells according to the template for the characterisation of monitoring sites (annex 2 of this document).
- Assessment whether each well is fit to be included in NEA's groundwater monitoring network, and which GWB will be covered by the well.
- Technical design documentation for each suitable assessed well in the required level of detail so that it can be used as the basis for contracting refurbishment works, and cost estimate for these refurbishment works and the equipment, as required to include it into NEA's groundwater monitoring network.
- Update of the characterisation of GWBs where required, based on the technical report '*Delineation of groundwater bodies in the Alazani-Iori River Basin District*'
- Update or development of the relevant GIS layers and maps, based on the technical report '*Delineation of groundwater bodies in the Alazani-Iori River Basin District*'.
- Datasets and their metadata forms.
- Output as required for the limited and reasonable ad-hoc tasks related to the overall scope.
- A final report bringing together and summarising all rendered services.

8.3 Deliverables and reporting

All deliverables are as described in section 8.2. At the end of the assignment, the final report will be prepared in Georgian and English languages and will be submitted to the beneficiary at national level and the EUWI+ thematic lead in Word and PDF formats (no paper copies, only electronic versions) first for comments and then for approval. A template for the final report will be provided to the contractor.

The contractor shall report to the following persons regarding the progress of works and all day-to-day management issues:
- Mr Merab GAPRINDASHVILI and Ms Nana KITIASHVILI of the Geological Department of the National Environmental Agency (NEA) of Georgia, and
- Mr Zurab JINCHARADZE, the national project representative of the EUWI+ EU Member State Consortium in Georgia, and
- Mr Christoph LEITNER, the EUWI+ thematic lead for groundwater monitoring.

9. Implementation modalities

9.1 Modality

All tasks shall be carried out in close coordination with NEA, the EUWI+ national project coordinator and the EUWI+ thematic lead.

A briefing and de-briefing with NEA, the EUWI+ national project coordinator and the EUWI+ thematic lead will be organised at the beginning and at the end of the assignment, respectively. The national project representative will support the contractor with organising these and any further necessary meetings with the respective staff of NEA and the EUWI+ thematic lead for groundwater monitoring.

The contractor shall provide all means and technical equipment (e.g. hardware, software) necessary for the successful implementation of the tendered services and include in its technical and financial proposal all costs and required means of logistics such as transport to the sites and internally agreed per diems for its staff, if required.

All correspondence and documents related to these services must be written in English. All analysis data and their interpretation, the characterisation tables for groundwater monitoring sites and groundwater bodies, and the final report must be written in English and Georgian.

9.2 Time frame

The assignment will be implemented in three phases. The timing for field work is provided below. The analysis and interpretation for each phase will be done within four weeks of the field work. The exact timing of phase 3 will be decided in fall 2019 during contract implementation.

- Phase 1: Early September 2019
- Phase 2: Second half of October 2019
- Phase 3: Late 2019 or early 2020

The total duration of the assignment is **7 months**. The expected commencement of the assignment is 2 September 2019. The completion date is 27 March 2020.

9.3 Contact details

The EUWI+ beneficiary at national level:
Mr Merab GAPRINDASHVILI and Ms Nana KITIASHVILI
Georgian Focal Point for Groundwater Monitoring at the Geological Department of the National Environmental Agency (NEA) of Georgia
gaprinda13@yahoo.com
nana_kitiashvili@gtu.ge

The coordinator on behalf of EUWI+ (national project representative):
Mr Zurab JINCHARADZE
zurab.jincharadze@euwipluseast.eu

The responsible EUWI+ thematic lead for groundwater monitoring:
Mr Christoph LEITNER
Umweltbundesamt
christoph.leitner@umweltbundesamt.at

10. Participation to the tender

Interested parties (individual and legal persons) are invited to inquire the full tender dossier containing instructions and further information about the tender procedure from:

The responsible project assistant (with Mr Christoph LEITNER in copy):
Ms Daniela CARRETTA
Umweltbundesamt
daniela.carretta@umweltbundesamt.at

Deadline for submission of the technical and financial offer to the responsible project assistant (with Mr Christoph LEITNER in copy) is **28 August 2019, 13:00 CET**.

11. Annexes

Annex 1: List of monitoring sites - Technical report 'Delineation of groundwater bodies of Alazani-Iori River Basin District'
Annex 2: Template for characterisation of monitoring sites (wells or springs)

Annex 1: List of Monitoring sites (technical report 'Delineation of groundwater bodies of Alazani-Iori River Basins District')

X	Y	Monitoring station number	Name of monitoring station	GWB
555026	4631985	MST_1	Kalauri	GPA0006
561020	4627671	MST_2	Zegaani	GPA0006
568205	4637862	MST_3	Sanavardo	GPA0003
588515	4632032	MST_4	Pichkhis-Bogiri	GPA0003
588504	4632038	MST_4a	Pichkhis-Bogiri	GPA0003
588508	4632033	MST_4b	Pichkhis-Bogiri	GPA0003
542010	4641321	MST_5	Kurdgelauri-winery territory	GPA0005
560573	4628153	MST_6	Mukuzani	GPA0006
549190	4650211	MST_7	Shakriani	GPA0003
548774	4649438	MST_8	Gremi	GPA0003
564120	4641296	MST_9	Kindzmarauli	GPA0003
569473	4637754	MST_10	Kuchatani	GPA0005
541501	4642301	MST_11	Kurdgelauri	GPA0005
586092	4629488	MST_12	Afeni	GPA0003
567006	4621953	MST_13	Gurjaani	GPA0006
594702	4625156	MST_14	Vardisubani	GPA0003
566232	4622860	MST_30	Gurjaani-Sports complex	GPA0006
553739	4633738	MST_31	Vachnadziani	GPA0006
551389	4634636	MST_32	Akura	GPA0005
574620	4636126	MST_15	Chikaani	GPA0003
592069	4622551	MST_16	Saqobo	GPA0003
591005	4617426	MST_17	Heretiskari	GPA0003
582403	4597468	MST_18	Gediqi-Arboshiki	GKI0004
582866	4592970	MST_19	Gamarjveba	GKI0004
546278	4603785	MST_44	Tulari	GPI0002
555564	4606675	MST_45	Kachreti	GPI0004
562408	4606036	MST_46	kvemo-melaani	GPI0004
544808	4605108	MST_47	Keshalo	GPI0002

Annex 2: Template for Characterisation of monitoring sites (wells or springs)

Identification	unit	Value
Monitoring site code		
Monitoring site name		
Monitoring site principle type		
Location		
GWB code		
GWB name		
Administrative unit code		
Protection zone		
Coordinate system		
Coordinate system – x coordinates		
Coordinate system – y coordinates		
Elevation of reference point above sea level	[m a.s.l.]	
Access description		
Sketch of the access route		
Location plan / site plan		
Owner		
Name of owner		
Street of owner		
Post code and city of owner		
Phone number of owner		
Email of owner		
Contact person		
Name of contact person		
Street of contact person		
Post code and city of contact person		
Phone number of contact person		
Email of contact person		
Life time cycle		
Information entered / updated by		
Date of collection of information	[DD.MM.YYYY]	
Start of monitoring	[MM.YYYY]	
End of monitoring	[MM.YYYY]	
Replacement of which site		
Replaced by which site		
Status of monitoring site		
Reason for closing		
Type of chemical monitoring		
Significant changes		
Technical specification of monitoring site		
Drilling profile available		
Drilling profile of the well		
Development plan available		
Development plan of the well		

Pressure type of groundwater		
Material of capture		
Material of pipes		
Characterisation of monitoring site		
Use of the monitoring site		
Purpose of monitoring site		
Sub type of monitoring site		
Remark to other type of monitoring site		
Construction year	[YYYY]	
Diameter of well	[mm]	
Sampling method		
Distance between abstraction and sampling	[m]	
Sampling depth	[m]	
Frequency of water abstraction		
Springs (further information)		
Spring recharge area identified		
Size of spring recharge area	[km²]	
Average elevation of spring recharge area above sea level	[m a.s.l.]	
Average residence time	[a]	
Precipitation monitoring		
Pressure situation		
Influence by industry and manufacturing		
Influence by old deposits / brownfield		
Influence by waste deposits		
Influence by transportation network		
Influence by sewer treatment and percolation		
Influence by oil and gas enterprises		
Influence by agriculture		
Other influences		
Monitoring		
Monitoring of quantity		
Monitoring frequency of quantity		
Monitoring of chemistry		
Monitoring frequency of chemistry		
Monitoring of drinking water quality		