Water Research Institute
Nábrežie arm. gen. L. Svobodu 5, 812 49 Bratislava, Slovak Republic

Georgia's Environmental Outlook - GEO

DELINEATION OF AGGLOMERATIONS FOR COLLECTION AND TREATMENT OF URBAN WASTEWATER IN THE ALAZANI RIVER BASIN

Project SAMRS/2018/VP/01/07

August 2020

LIST OF ABBREVIATIONS AND ACRONYMS

BOD	Biochemical Oxygen Demand
EU	European Union
EUR	Euro
IAS	Individual or Appropriate Systems
MS	Member State
p.e.	Population Equivalent
UWWTD	Urban Waste Water Treatment Directive
UWWTP	Urban Waste Water Treatment Plant
WFD	Water Framework Directive
WWTP	Waste Water Treatment Plant

TABLE OF CONTENTS

1 INTRODUCTION

Approaches to wastewater disposal are based on the legislative and conceptual requirements of each country that specify the technical and technological procedures in the relevant technical standards, manuals and recommendations in more detail. For the member states of the European Union, a uniform policy in wastewater collecting and treatment waste water is guided by EU directives and regulations, which are transposed into national legislation. Candidate Countries for membership of the EU have an obligation to transpose EU legislation into their national legislation, thus respect uniform rules and requirements for the disposal and treatment of wastewater.

The process of wastewater disposal and treatment for agglomerations with more than 2 000 population equivalent in the EU is clearly determined by the Council Directive 91/271/EEC concerning urban waste water treatment (Urban Waste Water Treatment Directive - UWWTD) amended by Commission Directive 98/15/EC and Regulation (EC) No 1882/2003 of the European Parliament. The requirements of this Directive are complemented by the requirements of the relevant EU Directives and in particular Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy (Water Framework Directive). Fulfillment of the requirements arising from these directives achieves good status of all water bodies.

The processes of satisfying wastewater disposal and treatment is very financially, time, technically and technologically demanding. Countries are unable to implement these processes in a short time and without financial assistance. In this context, EU financially supports these countries before and after accession to the EU. The specific conditions of wastewater disposal and deadlines for their fulfillment are specified in Accession Treaty, which is binding for the states. Member States shall establish and submit to the Commission national programs for the implementation of this Directive.

Legislative, conceptual, environmental, technical, technological and economic aspects must be respected in the elaboration of the national strategy of wastewater disposal of the entire territory of the country. These aspects must consider local conditions such as the nature of development, demography, urban planning of the settlement, topology of development, availability of a suitable recipient, climatic conditions etc.

In general, the construction, completion or reconstruction of the largest sewerage networks and UWWTPs is a priority, with the lowest investment and operating costs per connected inhabitant and the highest benefits for environmental protection. The UWWTD also imposes obligation for wastewater disposal in all agglomerations (an area where the population or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban wastewater treatment plant) with populations with more than 2 000 p.e.

When drafting plans for development of sewer systems, each area of interest is assessed separately according to the relevant criteria and its specifics are taken into account. The proposed solution of wastewater disposal creates a basic framework proposal, which will be developed in the implementation project documentation and assessed in the process of approving the construction. The proposed plans for the development of sewer systems also serve as a basis for setting the priorities for development of sewer system, determining the necessary investment costs, documents for the proposal of measures within the river basin management, etc.

2 BRIEF CHARACTERISATION OF THE ALAZANI RIVER BASIN

The Alazani River Basin is situated partly in Georgia, partly in Azerbaijan and is surrounded by high mountains from three sides. It embraces an area of 11 455 km^2, of which 6 700 km^2 of the basin is located in Georgia and the rest belongs to Azerbaijan. The Alazani River is 391 km long and originates in the Greater Caucasus Mountains in Georgia, in the north-western part of the Akhmeta District and runs southeast. Large part of its path here constitutes a natural border between Georgia and Azerbaijan, before it meets the Kura at the Mingəçevir Reservoir. The Georgian part of the Alazani basin comprise three main parts: the mountainous part, the alluvial plain and marine sediments in the south-eastern part of the basin.

There are almost 300 settlements with a population of over 300 000 in the Alazani River Basin. Of these, 121 cities and villages with 217 156 (2014 population census data) inhabitants belong to delineated agglomerations with more than 2 000 p.e. Villages itself can be combined under one community but not always, it depends on number of population in those villages. In communities, there is one representative of settlement mayor's office. If village is big enough, it stands separately as a village and it also has a representative of mayor's office. Settlements are mainly located along the Alazani River or its right and left-side tributaries. Most of the settlements have rural character with the exception of bigger cities like Telavi with 19 629 inhabitants, Gurjaani with 8 024 inhabitants or Kvareli with 7 739 inhabitants. Major of population in the area is living on a right boarder of Alazani in southern part of the basin, along the main road and railway connecting the area with Tbilisi, capital city of Georgia. Settlements have common public amenities. Most of the population, more than 80 percent, are employed in agriculture sector.

Even in larger cities, after the collapse of the USSR, there was a significant loss of industrial markets and development, but the climate is ideal especially for many forms of agriculture and tourism. A common feature of most settlements is the relatively sparse built-up area with family houses including farmyard buildings, large gardens and courtyards where domestic animals are breaded. Especially cattle, sheep and pig breeding for meat and dairy products are important economic activities. Agriculture is significant for the development of the whole region, beside grape for wine industry, major cultivated crops include wheat, barley, corn and sunflower.

Domestic wastewater is a significant source of water pollution in the Alazani River Basin. Settlements are lacking a modern sewage system to collect and treat their wastewater, only the larger towns of Akhmeta, Dedoplistskaro, Gurjaani, Kvareli, Lagodekhi, Mukuzani, Signagi, Telavi and Tsnori are (partially) equipped with sewerage networks, without existing waste water treatment plants. In addition, existing infrastructure is obsolete, network is damaged, machines and mechanisms are amortized. Other sources of water pollution in the Alazani River Basin include agriculture, urban run-off and leachates from waste disposal sites.

In terms of the location of sewer networks, most of the individual streets are wide enough for laying sewerage networks, mostly with paved surface and standard engineering networks. Terrain relief of the settlements creates natural conditions for the construction of gravity sewer systems leading to recipients and the implementation of main collectors along watercourses. However, due to the undulating terrain and the location of the individual streets, it will be necessary (for streets with reverse slope) to consider also the wastewater pumping.

3 TYPES OF WASTEWATERS AND THEIR PRODUCTION

The composition and amount of produced wastewater depends on biosocial activities of population, size of settlements within the river basin, character, scope and type of existing services, public amenities, industrial and agricultural production, type of drinking water supply to the population, number of population supplied from public water supply systems, individual sources (house wells, small springs), etc.

Other important factor is the equipment of family houses and other buildings with sanitary appliances (distribution of drinking and service water, method of preparation of hot water, household equipment with toilet, bathroom with bath or shower, etc.) The study is based on the assumption that household equipment with sanitary and appliances is at a standard level.

Migration of the population for work and education has also a significant impact on amounts and composition of wastewater. In most settlements in the area there is no presence of central administrative offices, large schools, large hotel complexes, large cultural and social facilities, etc. which would fundamentally change the composition and amount of wastewater produced during the day, week or season.

Built-up area with prevailing family houses and farmyard buildings provides the primary characteristic of settlements situated in the river basin. It is assumed, that public amenities and services (offices, schools, social facilities, restaurants, small businesses, workshops, etc.) should have standard equipment and produced wastewater has similar composition to municipal wastewater. However, the sanitary environment does not always meet modern requirements.The main problem is the absence or obsolescence of collection systems and the fact that no functioning wastewater treatment plant has been built in the area. For this reason, a large amount of wastewater is discharged into the river without treatment. Other sources of pollution include agriculture, urban run-off and leachates from waste disposal sites.

Another common element for the most settlements in the basin is an intensive agricultural activity, in form of small farms and subsistence farming. From perspective of sewage disposal and wastewater composition, it is expected and also recommended to separate the wastewater from domestic animal breeding from sewage water. Slurry and other liquid waste should be accumulated in watertight cesspools and applied to agricultural land off the growing season, according to Good Agricultural Practice (GAP). Wastewater from the processing of agricultural products in households can be discharged together with sewage waters after rough mechanical pre-treatment.

Concentrated liquid waste (e.g. whey) should be used as fodder for domestic animals. The wastewater from industry and farms should be treated separately, eventually can be pre-treated to the quality level of municipal wastewater and discharged public sewer system. Amount and composition of wastewater must not threaten the operation and efficiency of the treatment plant.

There is only little information about industrial production in the Alazani River Basin. Major part of food industry is represented by wine industry. During the wine-making process like grape crush, bottling and barrel cleaning, large volumes of water are used and discharged, which result in wastewater with a high organic load. Wine making companies most often discharge their wastewater directly into to the rivers. Due to the seasonality of wastewater production, it is recommended to use separate treatment of wastewater from large winery farms. For smaller farms or family wine processing, it is recommended thorough separation of concentrated wastewater (e.g. wine yeast) and its controlled discharge into the public sewerage system (with consideration of specified requirements and procedures for sewer system).

The impact of industrial wastewater should be significantly lower in compare to domestic wastewater, due to the relatively small number of industrial production companies. Wastewater from industrial production must be individually assessed according to their composition for each producer and discharging conditions must be defined. Only those industrial wastewater that has the character of urban wastewater, do not damage collecting system and treatment plant and do not have a negative impact on efficiency and stability of the treatment process and the quality of the sewage sludge and can be discharged into the public sewer system.

4 APPROACH TO DELINEATION OF AGGLOMERATIONS

The scope of Directive 91/271/EEC covers agglomerations with more than 2 000 p.e., which are subject to all the obligations arising from it. UWWTD defines the term agglomeration as an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an UWWTP or to a final discharge point.

According to the UWWTD, agglomerations are divided into the following size categories:

- agglomerations with more than 10 000 p.e., where the wastewater collection and treatment according to the Directive is obligatory;
- agglomerations from 2 000 to 10 000 p.e., where the wastewater collection and treatment according to the Directive is obligatory;
- agglomerations with less than 2 000 p.e., where the wastewater collection and treatment according to the Directive is not applied and each country handles collection and treatment according to its own demands.
- A separate category is the „Big city“ with a generated load of more than 150 000 p.e. This category does not occurr in the Directive and was introduced to inform the population about major sources of pollution. This is irrelevant for the Alazani River Basin, because agglomeration of this size does not occur here.

One of the basic preconditions for the wastewater disposal in the area is proposal and delineation of agglomerations in relation to the requirements in question.

The criteria for the delineation of agglomerations are based on the EU guideline „Terms and Definition of the Urban Waste Water Treatment Directive 91/271/EEC“. The existence of an agglomeration is not conditioned from the existence of collecting system or UWWTP. It refers to a concentrated area for urban wastewater to be collected and conducted to a treatment plant.

The agglomeration is characterized by a sufficient concentration of the population, services and industry to justify economically, technically and ecologically the common capture, collection and treatment of wastewater from this area. Thus, the agglomeration also includes the areas where the collecting system has not been constructed yet.

4.1 Basic rules for delineation of agglomerations

When defining an agglomeration it is necessary to approach on a case-by-case according to the local conditions, while the decisive factors are concentration of population and economic activities.

Delineation of the agglomeration does not take into account the administrative division of settlements, but the population density, i.e. borders of agglomerations may or may not correspond with the borders of administrative units - several administrative units may form one agglomeration, respectively one administrative unit may form several agglomerations. The peripheral parts of settlements with scattered buildings, of which the connection to the sewerage system would not be economical, should not be included into an agglomeration.

One wastewater treatment plant can treat wastewater from one or several agglomerations, and also one agglomeration can have several wastewater treatment plants. Due to the geographical and demographic character of the area of interest, it is justified to connect several administrative units into an agglomeration with a common wastewater treatment plant, which will ensure higher operational stability of the UWWTP and the quality of treated water.

Requirements for the quality of treated wastewater are derived from the size of the agglomeration.

Another decisive moment is the determination of the distance (gap) between two areas with concentrated development which will be included into one agglomeration (e.g. two neighbouring settlements located close to each other, remote part of one settlement, etc.). The UWWTD does not define the distance between individual agglomerations. This gap is proposed by the responsible authorities of each country after consultation with the responsible EU authorities. Determination of this distance depends on the specific relevant conditions of each country. According to available information, these distances range from 300 m to more than 1 500 m. Too small distance between agglomerations ultimately reduces the urban waste water disposal requirements (member state commitments) and at larger distance the urban waste water disposal requirements increase. Based on the experiences from Slovakia, distance of 500 meters was proposed, which was also accepted by the EU authorities (this distance is not set by any European regulation and each country sets it separately depending on local conditions). This distance can have a major impact on the number and size of agglomerations, country obligations and the deadline of reaching compliance with UWWTD in wastewater disposal (building of sewerage systems, Art. 3) and treatment of wastewater from agglomerations (Art. 4 – biological treatment and Art. 5.2 – biological treatment with nutrients removal).

Size of the agglomeration depends on the amount of produced pollution from permanent inhabitants, temporary inhabitants, industry connected to the municipal collecting system, civic amenities, services, imported waste water, but also non-incoming waste water generated in the agglomeration. As the size of the agglomeration depends on amount of pollution produced in p.e., it should be revaluated regularly.

In delineation of agglomerations proposal, we will proceed from the assumption that one inhabitant equals one equivalent inhabitant (based on the experiences from Slovakia we know that the production of organic pollution per inhabitant does not reach the value of 60 g BOD/day as set by technical standard, but only around 50 g BOD/day). This reduced pollution production is supplemented by the pollution produced from public amenities up to 60 g BOD/day, which we otherwise would have to add. This fact was applied only to rural settlements.

Based on experience from Slovakia, in the first place it is appropriate to create the agglomerations (inclusion of settlements into agglomerations) in the country, according to the principles of the UWWTD and specific conditions of each country to fulfill obligations and then create a collecting system, where agglomerations and all the settlements will be included.

5 PROPOSAL OF DELINEATION OF AGGLOMERATIONS IN THE ALAZANI RIVER BASIN

In this proposal, approach to delineation of agglomerations for collection and treatment of urban wastewater was based on requirements of the Directive 91/271/EEC concerning urban waste water treatment.

Number and size of agglomerations are directly proportional to the amount of funding needed to comply with the UWWTD. The basic factors characterizing a specific agglomeration are the nature of the development of settlements, demography of the settlement, urbanism of the settlement, geomorphology of the settlement, recipient and topology of the development - type and character of development, etc.

Each country must carefully consider the approach to delineation of agglomerations and the financial possibilities for the implementation of sewerage and, on the other hand, the magnitude of environmental damage and restrictions on the development of settlement infrastructure. Extensive and expensive solutions are often required to protect the environment of a region, country, or neighbouring countries, but it is necessary to realistically evaluate the financial and time requirements to choose a compromise approach to setting priorities.

One of the variable factors, which impacts and consequences must be taken into account, is the mentioned distance between the concentrated built-up areas of two neighboring settlements, or their parts. For delineation of agglomerations proposal, we used a distance of 500 meters, which was also applied in Slovakia in past, and which was accepted by the EU authorities. In practice, it means that if the distance between the built-up areas of two settlements is more than (approximately) 500 meters, they should not belong to one agglomeration. However, in order to delineate agglomerations correctly, it is necessary to assess sensitively on a case-by-case basis.

Taking this and other conditions mentioned in Chapter 4 into account, 31 agglomerations over 2 000 p.e., falling within the scope of the UWWTD, have been delineated in the Alazani River Basin. The proposed delineation of agglomerations shows that 121 settlements (towns, settlements and parts of communities) with a population of 217 156 were included in agglomerations with more than 2 000 p.e.

Based on their size, four of the proposed agglomerations (Telavi, Gurjaani, Tsnori and Kabali) belongs in the category with more than 10 000 p.e. The settlements belonging to these four agglomerations have more than 84 000 inhabitants that represent about a quarter of the population of the Alazani River Basin and almost 40% of the population living in agglomerations with more than 2 000 p.e. In accordance with the requirements of the UWWTD, agglomerations larger than 10 000 p.e. can be considered the highest priority, because ensuring collecting and treatment of wastewater achieves the highest environmental protection effect with the lowest investment costs per p.e. For agglomerations in this category, there are also the strictest (shortest) deadlines for complying with the Directive, i.e. to ensure adequate collecting and treatment of wastewater produced in agglomeration.

The second priority is agglomerations in the size category from 2 000 to 10 000 p.e., which are also subject to the requirements of the UWWTD. The efficiency of the funds spent is slightly lower than in priority number 1, but the impact on the environment is high. The first and second priority groups are characterized by the fact that they have the largest share of the population and the population density is higher. Consequently, a shorter length of sewerage to connect one inhabitant and lower investment costs for the construction of a sewerage network and UWWTP for one (equivalent) inhabitant are needed.

The third priority group includes agglomerations below 2 000 p.e., which no longer fall under the UWWTD and the planning of the construction of sewerage networks and treatment plants is left to the discretion of each country. Exceptions may be specific sewage disposal and treatment requirements arising from other EU directives or in the interests of increased environmental protection. Some of the settlements belonging to this category will be suitable to be gradually connected by the sewerage feeders to the existing sewerage network of larger agglomerations. In places where the construction of sewers would not be beneficial for the environment or would require disproportionately high costs, it is appropriate to address the management of wastewater in individual ways, by accumulation in cesspools and their export to existing UWWTPs or treatment in small domestic treatment plants.

Classification of priorities for wastewater disposal and treatment in the Alazani River Basin is listed in Annex I.

Note: Agglomerations of less than 2 000 p.e. were not defined in this study.

Names of agglomerations were chosen according to the largest settlement in each agglomeration, i.e. the one with the largest population. Names of treatment plants were chosen either according to largest or nearest agglomeration, from which wastewater is treated at.

5.1 Agglomerations with more than 2 000 p.e. in the Alazani River Basin

Following agglomerations were delineated in the river basin:

Agglomeration Duisi – proposed agglomeration consists of 5 settlements: Birkiani, Duisi, Jokolo, Kvareltskali and Omalo. The size of the agglomeration was stated to 4 772 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Akhmeta.

Agglomeration Matani – proposed agglomeration consists only of Matani village. The size of the agglomeration was stated to 4 451 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Akhmeta.

Agglomeration Akhmeta – proposed agglomeration consists only of the city of Akhmeta. The size of the agglomeration was stated to 7 105 p.e. In the city of Akhmeta, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Akhmeta.

Agglomeration Kistauri – proposed agglomeration consists of 7 settlements: Akhalsheni, Akhshaani, Akhshnis Velebi, Arashenda, Kistauri, Kojori and Sachale. The size of the agglomeration was stated to 2 706 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Kistauri.

Agglomeration Zemo Alvani – proposed agglomeration consists of a single settlement Zemo Alvani. The size of the agglomeration was stated to 3 306 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Kvemo Alvani.

Agglomeration Kvemo Alvani – proposed agglomeration consists of a single settlement Kvemo Alvani. The size of the agglomeration was stated to 2 489 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Kvemo Alvani.

Agglomeration Pshaveli – proposed agglomeration consists of 2 settlements: Laliskuri village and Pshaveli. The size of the agglomeration was stated to 2 123 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Pshaveli.

Agglomeration Napareuli – proposed agglomeration consists of 3 settlements: Jugaani, Napareuli village and Saniore. The size of the agglomeration was stated to 2 916 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Pshaveli.

Agglomeration Ruispiri – proposed agglomeration consists of 4 settlements: Atskuri, Ikalto village, Ruispiri and Zemo Khodashani. The size of the agglomeration was stated to 5 753 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Karajala.

Agglomeration Karajala – proposed agglomeration consists of 2 settlements: Akhalteli and Karajala village. The size of the agglomeration was stated to 5 162 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Karajala.

Agglomeration Eniseli – proposed agglomeration consists of 4 settlements: Almati, Eniseli village, Gremi and Sabue. The size of the agglomeration was stated to 5 753 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Shilda.

Agglomeration Shilda – proposed agglomeration consists only of Shilda village. The size of the agglomeration was stated to 3 927 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Shilda.

Agglomeration Telavi – proposed agglomeration consists of 4 settlements: Kurdghelauri village, Shalauri village, Telavi city and Vardisubani village. The size of the agglomeration was stated to 28 423 p.e. In the city of Telavi, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Telavi.

Agglomeration Kondoli – proposed agglomeration consists only of Kondoli village. The size of the agglomeration was stated to 2 188 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Telavi.

Agglomeration Tsinandali – proposed agglomeration consists of 5 settlements: Akura village, Busheti village, Kvemo Khodasheni village, Tsinandali village and Vanta village. The size of the agglomeration was stated to 7 848 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Telavi.

Agglomeration Kvareli – proposed agglomeration consists only of the city of Kvareli. The size of the agglomeration was stated to 7 739 p.e. In the city of Kvareli, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Kvareli.

Agglomeration Vazisubani – proposed agglomeration consists of 4 settlements: Kalauri village, Shashiani village, Vachnadziani and Vazisubani. The size of the agglomeration was stated to 8 709 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Velistsikhe.

Agglomeration Velistsikhe – proposed agglomeration consists of 4 settlements: Akhasheni village, Mukuzani, Velistsikhe village and Zegaani. The size of the agglomeration was stated to 8 290 p.e. In the town of Mukuzani, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Velistsikhe.

Agglomeration Gavazi – proposed agglomeration consists only of Gavazi village. The size of the agglomeration was stated to 2 945 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Gavazi.

Agglomeration Akhalsopeli – proposed agglomeration consists of 2 settlements: Akhalsopeli and Tivi. The size of the agglomeration was stated to 5 162 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Akhalsopeli.

Agglomeration Gurjaani – proposed agglomeration consists of 8 settlements: Bakurtsikhe village, Dzirkoki village, Gurjaani city, Gurjaani village, Chandari village, Chumlaki, Kolagi village and Vejini village. The size of the agglomeration was stated to 24 766 p.e. In the city of Gurjaani, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Gurjaani.

Agglomeration Apeni – proposed agglomeration consists of 21 settlements: Apeni, Areshperani, Bagdati, Balgojiani village, Balta, Beburiani, Giorgeti, Gvimriani, Chabukiani, Kevkhiani, Khoshatiani, Kvemo bolkvi, Kvemo Nashovari, Lapniani, Leliani, Meore Leliani, Mirskiseuli, Onanauri, Podaani, Verkhvis Mindori, Zemo Nashovari. The size of the agglomeration was stated to 8 843 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Apeni.

Agglomeration Tsnori – proposed agglomeration consists of 8 settlements: Anaga village, Jugaani, Kardenakhi village, Mashnaari, Sakobo, Tibaani village, Tsnori city and Vakiri village. The size of the agglomeration was stated to 19 678 p.e. In the city of Tsnori, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Tsnori.

Agglomeration Bodbiskhevi – proposed agglomeration consists only of Bodbiskhevi village. The size of the agglomeration was stated to 2 665 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Tsnori.

Agglomeration Zemo Machkhaani – proposed agglomeration consists of 2 settlements: Mirzaani village and Zemo Machkhaani. The size of the agglomeration was stated to 4 485 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Tsnori.

Agglomeration Kabali – proposed agglomeration consists of 8 settlements: Baisubani, Dona, Ganjala, Kabali, Karajala, Kvemo Mskhalgori, Uzuntala and Zemo Mskhalgori. The size of the agglomeration was stated to 11 185 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Lagodekhi.

Agglomeration Kartubani – proposed agglomeration consists of 3 settlements: Bolokiani, Kartubani and Natsiskvilari. The size of the agglomeration was stated to 2 964 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Lagodekhi.

Agglomeration Vardisubani – proposed agglomeration consists of 7 settlements: Chaduniani, Mshvidobiani, Sheerteba, Svideba, Tamariani, Tsodniskari and Vardisubani. The size of the agglomeration was stated to 4 086 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Lagodekhi.

Agglomeration Lagodekhi – proposed agglomeration consists of 3 settlements: Kavshiri, Lagodekhi city and Shroma. The size of the agglomeration was stated to 7 650 p.e. In the city of Lagodekhi, there is partially-constructed sewerage network from which wastewater is discharged without treatment.According to the proposal, wastewater from the agglomeration should be treated at UWWTP Lagodekhi.

Agglomeration Dedoplistskaro – proposed agglomeration consists of 3 settlements: Dedoplistskaro city, Khornabuji and Samreklo village. The size of the agglomeration was

stated to 9 821 p.e. In the city of Dedoplistskaro, there is partially-constructed sewerage network from which wastewater is discharged without treatment. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Lagodekhi.

Agglomeration Zemo Kedi – proposed agglomeration consists of 3 settlements: Arkhiloskalo village, Kvemo Kedi village and Zemo Kedi village. The size of the agglomeration was stated to 3 959 p.e. According to the proposal, wastewater from the agglomeration should be treated at UWWTP Zemo Kedi.

As mentioned above, agglomerations with more than 2 000 p.e. do not include all settlements located in the Alazani River Basement (especially very sparsely populated settlements). It will also be necessary to ensure the sewage disposal in the settlements which are not included in those agglomerations in the short or distant time. Thus, it is necessary to create a concept for the future sewage disposal for these settlements.

The proposal was limited by the fact that some of the data required for a more detailed assessment and recommended solutions, such as the information about current state of wastewater infrastructure or economic activities, were not available at the time of preparation of this study.

The list and schematic illustration of delineated agglomerations with the proposed drainage and treatment of wastewater are listed in Annexes II and III.

6 APPROACH TO PROPOSAL OF LOCATING SEWAGE NETWORKS AND URBAN WASTEWATER TREATMENT PLANTS IN AGGLOMERATIONS IN THE ALAZANI RIVER BASIN

The approach to preparation of the sewage disposal concept of the area of interest must respect the real conditions of each settlement, which are permanent, as well as existing state of urban development and settlement level, which are variable in time. Requirements for collecting system and wastewater treatment are defined in legislative standards, conceptual and strategic materials, technical standards and guided by various subject manuals. EU requirements must also be taken into account at national level as EU candidate states are obliged to transpose the EU legislation into national legislation so that uniform rules and requirements for waste waters collection and treatment.

Agglomerations with more than 2 000 p.e. are considered as a priority, with a set deadline (specified in the agreement between EU and MS) for the solution of sewage disposal. In agglomerations with less than 2 000 p.e., a lower degree of urgency is placed on sewer systems and it is proposed to build them continuously.

The framework proposal for wastewater disposal in the Alazani River Basin was approached in accordance with the principles described in the "Guidelines on Establishment of Agglomerations in the Pilot River Basin". In the first step of the proposal, agglomerations in the size category above 2 000 p.e. were identified, based on the definition of agglomeration as described in the UWWTD (see Chapter 4). Settlements that were not included in agglomerations with more than 2 000 p.e. automatically fall into the size category below 2 000 p.e. Since the solution of sewage disposal of these agglomerations was outside the scope of this project, gradual construction of sewerage system connected to an existing UWWTP or the construction of a joint treatment common for several agglomerations is generally recommended. Where the establishment of a collecting system is not justified either because it would produce no environmental benefit or because it would involve excessive cost, individual systems or other appropriate systems (IAS) that achieve the same level of environmental protection shall be used.

6.1 Basic principles for the design of sewerage systems and UWWTPs

Combinations of possible solutions with regard to natural, demographic and economic factors of the given area are applied in the design of sewage disposal. In the first step, the location of the UWWTP was approximately determined, so that this UWWTP is situated at a suitable recipient, into which it is possible to discharge the treated wastewater. If possible, it should be located near the road, with access to utilities (electricity, water), outside the protection zones. It must be positioned in such a way that it won’t be flooded at large waters.

Due to the requirements of the UWWTD, which relate to wastewater treatment, it is recommended to build a UWWTP in the site with the following stages and treatment technology:

In sensitive areas:

- for agglomerations with more than 10 000 p.e. – mechanical-biological UWWTP with N and P removal (chemical precipitation is recommended in cases when biological phosphorus removal won’t be sufficient);
- for agglomerations from 2 000 to 10 000 p.e. – mechanical-biological UWWTP with N removal

In normal (not sensitive) areas:

- for agglomerations with more than 10 000 p.e. – mechanical-biological UWWTP with N removal
- for agglomerations from 2 000 to 10 000 p.e. – mechanical-biological UWWTP with N removal (N removal is not required according to directive in terms of wastewater treatment, but is recommended due to the reduction of operating costs for oxygen supply)

In agglomerations with less than 2 000 p.e. only mechanical-biological treatment with aerobic sludge stabilization is proposed.

Sludge management for wastewater treatment plants larger than 25 000 p.e. is designed on the principle of anaerobic sludge treatment with congregational units and mechanical sludge dewatering. In UWWTPs smaller than 25 000 p.e. on the principle of aerobic stabilization of sludge with mechanical dewatering.

It is advantageous to build a UWWTP on several lines (2 or 3) in order to enable the gradual connection of the population, or for the purpose of increased need for treatment, e.g. during the agricultural season it is possible to operatively use another line. For this reason, it is recommended to assess the seasonality of wastewater production from the processing of wine and other products and their impact on the capacity of the treatment plant. Wastewater disposal from industrial production to municipal UWWTPs should be assessed individually.

The hydraulic capacity of the main feeders should be built for the whole system so that it meets the conditions after its completion and the expected prospective condition.

Settlements from agglomerations located above the site of the proposed UWWTP must be assessed on the basis of a comparison of investment costs for the construction of a feeder and a new UWWTP. If the investment costs for the sewerage network (feeder) between two neighbouring settlements will be lower than the construction of a UWWTP for a higher located settlement, then it is proposed to connect the higher settlement to a joint WWTP for both municipalities. By respecting this principle, common wastewater disposal will be ensured for more settlements at a lower total costs.

Experience in designing sewerage systems in Slovakia shows that with a sewerage system with the length of 15-20 km, wastewater discharge to one common UWWTP is more optimal in the terms of long-term operation and costs.

The location of sewerage network and UWWTP should take into consideration the local topography aiming to minimise the need for expensive pumping of wastewater. It is recommended to design a gravity sewerage network as a matter of priority. In localities where gravity wastewater disposal is not possible, it is necessary to pump wastewater. The construction of a pumping station should be designed only in those localities where a sewage system with small elevations difference is built, as it is recommended to pump rainwater only in exceptional cases. It is also necessary to make maximum use of the existing sewerage infrastructure.

The conceptual design of sewers must also take into account the protection level of significant drinking water sources, mineral and healing waters from the possibility of their contamination, by discharging waste water into a larger, reliably operated UWWTP in the lower situated area and discharging them into a more suitable section of the recipient.

6.2 Impact of character of the terrain and area development on the method of wastewater from agglomerations disposal

For urban-type agglomerations and rural-type agglomerations with concentrated buildings a centralized wastewater disposal system is predestined. A **combined sewer system** (joint disposal of sewage and surface runoff) is recommended for urban development, single sewage system is used in the peripheral parts of towns and villages of the rural type. Drainage of water from surface runoff in small agglomerations in the case of functional and seamless disposal by surface gutters is often left in its original state, respectively by reconstruction of this system. The application of **separate sewer system** (separated disposal of municipal wastewater and water from surface runoff) is usually the result of technical-technological, economic and especially ecological assessment.

In the case of separate parts of the settlement, consisting of several properties or scattered nature of the development, it is reasonable to consider a decentralized method of wastewater disposal and treatment. Individual wastewater treatment with discharge into surface waters or infiltration into groundwater is applied in very sparse development (dispersed) or for solitary houses. The management of wastewater from scattered development with permanent residents is usually solved in individual ways. The solution is possible by accumulation in cesspools and their export to an existing UWWTP (it is necessary to consider the costs of removal, availability of terrain, capacity of potential treatment plant, etc.).

For individual dwellings or group of dwellings it is suitable to build domestic or small WWTPs with the discharge of treated wastewater into the surface stream or infiltration into the subsoil. Intensive treatment processes (industrially produced WWTPs on the principle of activation, biofilters, biodisks) are suitable for permanently inhabited farms with regular production of wastewater. Extensive treatment processes (most often septic tank with root WWTP, soil filter, etc.) are suitable for recreational and cottage type of dwellings and facilities with irregular inflow of wastewater.

6.3 Brief description of the level of wastewater infrastructure in the Alazani River Basin

Settlements which are located in the Alazani River Basin are usually not equipped with sewage systems. Inhabitants make extensive use of pit latrines, and only the larger towns of Akhmeta, Dedoplistskaro, Gurjaani, Kvareli, Lagodekhi, Mukuzani, Signagi, Telavi and Tsnori are (partially) equipped with sewage systems.

However, reliable information about their status, extent, number of connected inhabitants and water quality monitoring data is very limited. On the basis of available information, it can be assessed that the existing sewerage network is generally not in good condition and will possibly require in-depth examination of its status and extensive rehabilitation. There is currently no functioning wastewater treatment plant in this area, all wastewater is discharged through discharge points directly into recipients with periodically low flow and therefore burdens the environment heavily.

The sewage system in Telavi, the largest city in the Alazani river basin (19 629 inhabitants), has been in operation for 60 years. The network is more than 72 km long, and consists mainly of asbestos-cement and ceramic pipes with a diameter from 150 to 300 mm. Due to the fact that network was continuously expanded in relation to the growth of the population and the gradual connection of other households and production facilities to the original collector, it has currently insufficient capacity. In addition, a large part of the total length of the collectors is non-functional, so it is necessary to rehabilitate these sections.

WWTP, originally designed to serve the reinforced concrete factory, was built in 1976 and its operation was terminated in 1988. The planned new UWWTP, which has to treat wastewater from Telavi, is under construction. Approximately 70-80% of the population is connected to the sewerage network, while the total production of wastewater consists mainly of sewage from households, as there is no significant industrial producer of wastewater in the territory of Telavi.

Another town with a built sewerage network is Gurjaani with 8 024 inhabitants. The total length of the sewerage system is more than 35 km and consists of a gravity centralized sewerage system, an internal network and an unfinished main collector. The sewer network is not built in the whole town, it is estimated that another 3 km of the network must be built to drain wastewater from all inhabitants. In addition to completion of new sewerage network, an extensive replacement of damaged pipes throughout existing network and collectors, connection of eight uncleaned discharge points, repair of inspection shafts, etc. are also required. The existing sewer network consists mainly of cast-iron, in less extent asbestos-cement pipes with diameters of 100 - 400 mm.

Wastewater treatment plant built in 1970s was mainly used to collect wastewater from distilleries, wine and canning factories and for a small part of the households. As in the case of Telavi, the treatment plant has been out of operation since the late 1980s, and the construction of a planned new one has been stopped in the same period. Wastewater is therefore discharged without any treatment. Wastewater are mainly of households in origin, share of wastewater from industrial enterprises is only small.

It is assumed that comparable conditions also apply in other towns which have sewerage systems, i.e. that these are usually old, built in the 60's and 70's, without required maintenance, therefore technically and morally obsolete, poor designed, leaking, with frequent failures and insufficient capacity, from which wastewater is discharged without treatment. In addition to the construction of a UWWTP and the expansion of the sewer network, its extensive reconstruction is also required. Given the fact that due to the poor technical condition and insufficient capacity it is not always possible to use existing collectors, the total cost of complete reconstruction may be higher which may ultimately be more expensive than building a new sewer on a "green field".

There is an information on two upcoming projects related to the construction or reconstruction of sewers. In the town of Kvareli the project for rehabilitation of sewerage system and construction of the wastewater treatment plant is being developed (approximately 14 km sewer system is constructed) and 90 km is pallned to be built, and in Telavi city construction of the treatment plant is underway.

Construction of Sighnaghi waste water collection (canalization) network (presently 13 km is built) and treatment plant (Technical assignment is being prepared as well as project procurement is planned) is in progress.

There are already sewer systems in Akhmeta (36.4 km), Dedoplistskaro (7.7 km) and Lagodekhi (26.7 km). However, it is expected that such system will be enlarged to cover the agglomeration, not only the main city.

6.4 Conceptual approach for the design of sewerage systems and UWWTPs in the Alazani River Basin

The framework proposal for wastewater disposal in the Alazani River Basin depends on available data and is based on a generally applicable philosophy of possible solutions of agglomerations connections to sewerage systems and joint wastewater treatment. The sewerage

system forms the skeleton of the main feeders between the individual agglomerations, which will be prospectively connected to a common wastewater treatment plant. Priority should be given to building UWWTPs and sewerage networks in agglomerations with more than 2 000 p.e. Subsequently, in the future, settlements with less than 2 000 p.e. will also be connected to this sewerage system. Classification of priorities for wastewater disposal and treatment in the Alazani River Basin is listed in Annex I.

In Alazani River Basin, 31 agglomerations were delineated where it is proposed to build new centralised collection systems and UWWTPs along with extension and renewal of existing sewerage networks. With regard to the relief and development, the basin was divided into three parts:

1. Western part of the Alazani River Basin

2. Central part of the Alazani River Basin (further subdivided into right and left bank)

3. South-eastern part of the Alazani River Basin

Western part of the area represents the most mountainous part of the river basin, the elevation is within 3 200 and 500 m. In higher altitudes, small settlements with a low population density are usually unevenly distributed, often not permanently inhabited throughout the year. Bigger settlements are situated along the Alazani River in an area where the river flows from steep slopes of the mountain ranges of Greater Caucasus into the narrow valley region Pankisi Gorge.

In this area, 3 agglomerations with more than 2 000 p.e. were delinated (Duisi, Matani and Akhmeta) and other settlements were set aside, for which the connection to the sewerage system leading to a single UWWTP Akhmeta is considered in the future.

It is proposed to build a sewerage system from the Akhmeta UWWTP to the north with the connection of the agglomerations of Akhmeta, Matani and Duisi. Given the slope conditions, it is appropriate to build a gravity sewer system, assuming that in the agglomerations of Matani and Akhmeta it will be necessary to pump part of the wastewater. Due to the density of built-up areas in individual agglomerations/settlements, we propose to build a separate sewer system in the peripheral parts of larger cities and in places with low building density and in the centres of larger densely built-up areas we propose joint disposal of sewage and surface runoff through combined sewer system. Water from surface runoff from sparsely built-up localities should be solved with surface gutters.

Central part of the area is approximately 90 km long and 10 - 30 km wide and it contains 26 of the total 31 proposed agglomerations. In terms of its large extent, the alluvial plain is relatively flat, with sloping valleys type of relief and elevation from 700 to 100 m MSL. Due to the nature of the development, this area can be divided into two parts: the left bank and right bank.

The right bank is characterized by dense development of larger and smaller towns and villages, which practically form a continuous dense border along the state road below the Tsiv-Gombori Mountain Range. Considering the terrain configuration and population density, 12 agglomerations were delineated in this part of the basin (Kistauri, Ruispiri, Karajala, Telavi, Kondoli, Tsinandali, Vazisubani, Velistsikhe, Gurjaani, Tsnori, Bodbiskhevi and Zemo Machkhaani). In relation to the recipients and the slope of the terrain, 6 UWWTPs situated by the river Alazani or its tributaries were proposed.

The general location of the UWWTP took into account the slope of the terrain, individual treatment plants were situated mainly in the valleys of river tributaries in order to reduce the need for economically and technically demanding pumping and to use the possibility of building gravity systems in the agglomerations. In the area, we propose several separate treatment plants in order to minimize the number of pumping stations. In terms of operation and functioning of the sewerage system, it is also more advantageous to consider dividing the sewerage system into several smaller, partial parts, where the gravity sewer network is used as much as possible compared to a large system. This way, number of pumping stations and operational costs are minimized and operational safety is increased.

The area of the left bank is located closer to the river Alazani and has a more dispersed character of development compared to the right bank, with a lower population and population density. The settlements Alazani are located mainly in areas where the Greater Caucasus Mountain Range meets the alluvial plain, with the largest population density situated in the area around the town of Lagodekhi in the north-eastern part of the basin. Smaller development is typical here, there are several settlements situated near the mountains with greater distances between the villages and the steeper terrain of the area due to the main stream and its tributaries. On the left bank of the area, 14 agglomerations were delineated (Zemo Alvani, Kvemo Alvani, Pshaveli, Napareuli, Eniseli, Shilda, Kvareli, Gavazi, Akhalsopeli, Apeni, Kabali, Kartubani, Vardisubani and Lagodekhi) and the construction of 8 new UWWTP was proposed.

In relation to the morphology of the terrain and the accessibility to the recipient, a larger number of smaller sewerage systems was chosen compared to the right bank, in order to reduce costs required for pumping of wastewater. In the larger agglomerations of Kvareli, Kabali and Lagodekhi it is up to the designer to consider and assess whether, given the density of development in the city centres or agglomeration, the construction of a combined sewerage system is justified. For other agglomerations with the rural character of development with a low population density, it is appropriate to build only sewage and surface gutters for surface runoff water from localities with sparse buildings

Only a few settlements are situated in the **south-eastern part of the area**, which is caused mainly due to the dry, desert and semi-desert steppe nature of the area and lower soil fertility. The highest population density in this area is around the town of Dedoplistskaro and in smaller villages near the state border with Azerbaijan. The area consists mostly of flat valleys, in this part of the basin the elevation is within 900 and 100 m MSL. In this part of Alazani River Basin, 2 agglomerations (Dedoplistskaro and Zemo Kedi) were delineated and the construction of 2 new UWWTPs was proposed.

It is recommended to consider the suitability of the recipient for the location of the UWWTP. Due to the lack of input information, it is necessary to consider whether it is possible to locate the UWWTP near the agglomeration, or whether it will be necessary to build a feeder to a more distant place, to a suitable water recipient.

In case of agglomeration Zemo Kedi, there is also a hilly area between the agglomeration and the recipient. According to the available information the Alazani River appears to be a suitable recipient. When designing the sewerage system, it will therefore be necessary to choose the optimal route of the sewerage discharge to the UWWTP with regard to the terrain, in case it would be situated by the Alazani River.

In this proposal, approach to delineation of agglomerations for collection and treatment of urban wastewater was based on requirements of the UWWTD. Agglomerations with more than 2 000 p.e. are considered as a priority, with a set deadline (specified in the agreement between

EU and MS) for the solution of sewage disposal. In agglomerations with less than 2 000 p.e., it is proposed to build the sewerage continuously. Individual settlement can connect to a joint UWWTP gradually (depending on the construction of sewers). The capacity of joint treatment plant which serves several agglomeration can be gradually expanded depending on the construction of sewer networks in agglomerations.

Inside of some agglomerations (usually small areas), a situation where the construction of sewerage system is not justified for economic reasons may occur. Then there can be implemented IAS - cesspools or small domestic treatment plants, but the same level of environmental protection must be reached as if the wastewater was treated at a common UWWTP and chosen technical solution cannot lead to a reduction in the scope and quality of treated wastewater. Closed systems like cesspools are considered as satisfying if they are not permeable and all accumulated water is treated to the required level according to the requirements of the agglomeration where they were produced.

The submitted proposal has been prepared with the lack of input information, deeper knowledge of locality and more detailed analysis of the situation, therefore it should be considered only as a set of promising recommendations for the development of wastewater disposal in the Alazani River Basin.

The list and schematic illustration of delineated agglomerations with the proposed drainage and treatment of wastewater are listed in Annexes II and III.

7 CONCLUSION

The presented proposal for the wastewater collecting system of the Alazani River Basin creates a framework for guiding the preparation, planning and implementation of collecting systems and urban wastewater treatment plants. The direction of this proposal is to meet the requirements of national and European legislation in the field of public wastewater collecting and treatment system. During preparation of this framework proposal, all available information were taken into account to guide the development of public wastewater sewer systems in the river basin for the future.

The proposal for delineation of agglomerations in the Alazani River Basin and sewage disposal of the area was relied on the provided documents of the Georgian partner and experiences gained in the processing of conceptual and strategic materials in the process of construction of sewer networks and UWWTPs in the Slovak Republic.

During its preparation, criteria and requirements resulting from national requirements and relevant EU legislation, technical standards and environmental criteria were applied. Data on population demography, character of settlement development, urban planning, geomorphology of settlements, natural conditions and accessibility of the recipient were taken into account and evaluated.

Based on the results from the delineation of agglomerations in the Alazani River Basin, following can be concluded and recommended:

The Alazani River Basin has good conditions for construction gravity sewer systems.

Overall 31 agglomerations with more than 2 000 p.e. were delineated in the Alazani River Basin, in two size categories:

- **4 agglomerations with more than 10 000 p.e,**. where the wastewater collection and treatment according to Council Directive 91/271/EEC is obligatory;
- **27 agglomerations from 2 000 to 10 000 p.e.**, where the wastewater collection and treatment according to Council Directive 91/271/EEC is obligatory.

Based on the above mentioned criteria and information, an indicative locality for 17 new UWWTPs which should serve delineated agglomerations was also proposed.

Agglomerations with more than 2 000 p.e. do not include all settlements located in river basement. In remaining settlements, it is proposed to build the sewerage system continuously, or to use individual and appropriate systems, thus it is necessary to create a concept for the future sewage disposal for these settlements.

8 REFERENCES

Pilot River Bain Management Plan for the Alazani river basin, Georgia, EPTISA Servicios De Ingenieria S.L., Spain & CES Consulting Engineers Salzgitter GmbH, Denmark, October 2011.

Delineation of Agglomerations in the Lapusna River Basin, Water Research Institute, Slovak Republic, April 2016.

Prefeasibility Evaluation: Water, Wastewater and Solid Waste for Telavi, Georgia, Development Alternatives, Inc., Georgia, May 2004.

Prefeasibility Evaluation: Water, Wastewater and Solid Waste for Gurjaani, Georgia, Development Alternatives, Inc., Georgia, August 2003.

Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment, Official Journal of the European Communities, May 1991.

Terms and Definitions of the Urban Waste Water Treatment Directive 91/271/EEC, January 2007.

9 ANNEXES

Annex I: Classification of priorities for wastewater disposal and treatment in the Alazani River Basin

Priority no. 1 - settlements included in agglomerations with more than 10 000 p.e.

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Anaga	Signagi	2 002	no	included in the agglomeration Tsnori
Baisubani	Lagodekhi	888	no	included in the agglomeration Kabali
Bakurtsikhe	Gurjaani	2 574	no	included in the agglomeration Gurjaani
Dona	Lagodekhi	61	no	included in the agglomeration Kabali
Dzirkoki	Gurjaani	1 120	no	included in the agglomeration Gurjaani
Ganjala	Lagodekhi	2 243	no	included in the agglomeration Kabali
Gurjaani (City)	Gurjaani	8 024	yes	included in the agglomeration Gurjaani
Gurjaani (Village)	Gurjaani	3 738	no	included in the agglomeration Gurjaani
Chandari	Gurjaani	1 678	no	included in the agglomeration Gurjaani
Chumlaki	Gurjaani	3 651	no	included in the agglomeration Gurjaani
Jugaani - Jugaani Community	Signagi	2 107	no	included in the agglomeration Tsnori
Kabali	Lagodekhi	3 238	no	included in the agglomeration Kabali
Karajala - Kabali Community	Lagodekhi	2 012	no	included in the agglomeration Kabali
Kardenakhi	Gurjaani	3 873	no	included in the agglomeration Tsnori
Kolagi	Gurjaani	1 046	no	included in the agglomeration Gurjaani
Kurdghelauri	Telavi	3 962	no	included in the agglomeration Telavi
Kvemo Mskhalgori	Lagodekhi	444	no	included in the agglomeration Kabali
Mashnaari	Signagi	483	no	included in the agglomeration Tsnori
Sakobo - Sakobo Community	Signagi	2 662	no	included in the agglomeration Tsnori
Shalauri	Telavi	2 186	no	included in the agglomeration Telavi
Telavi*	Telavi	19 629	yes	included in the agglomeration Telavi
Tibaani	Signagi	1 786	no	included in the agglomeration Tsnori
Tsnori	Signagi	4 815	yes	included in the agglomeration Tsnori
Uzuntala	Lagodekhi	1 786	no	included in the agglomeration Kabali
Vakiri	Signagi	1 950	no	included in the agglomeration Tsnori
Vardisubani (Village)	Telavi	2 646	no	included in the agglomeration Telavi
Vejini	Gurjaani	2 935	no	included in the agglomeration Gurjaani
Zemo Mskhalgori	Lagodekhi	513	no	included in the agglomeration Kabali

* - construction of the UWWTP is underway

Priority no. 2 - settlements included in agglomerations from 2 000 to 10 000 p.e.

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Akhalsheni	Akhmeta	337	no	included in the agglomeration Kistauri
Akhalsopeli	Kvareli	4 158	no	included in the agglomeration Akhalsopeli
Akhasheni	Gurjaani	2 420	no	included in the agglomeration Velistsikhe
Akhateli	Telavi	271	no	included in the agglomeration Karajala
Akhmeta	Akhmeta	7 105	yes	included in the agglomeration Akhmeta
Akhshaani	Akhmeta	236	no	included in the agglomeration Kistauri
Akhshnis Velebi	Akhmeta	227	no	included in the agglomeration Kistauri
Akura	Telavi	1 869	no	included in the agglomeration Tsinandali
Almati	Kvareli	565	no	included in the agglomeration Eniseli
Apeni	Lagodekhi	1 555	no	included in the agglomeration Apeni
Arashenda - Kistauri Community	Akhmeta	123	no	included in the agglomeration Kistauri
Areshperani	Lagodekhi	278	no	included in the agglomeration Apeni
Arkhiloskalo	Dedoplistskaro	980	no	included in the agglomeration Zemo Kedi
Atskuri	Akhmeta	554	no	included in the agglomeration Ruispiri
Bagdati	Lagodekhi	316	no	included in the agglomeration Apeni
Balgojiani	Kvareli	719	no	included in the agglomeration Apeni
Balta	Lagodekhi	85	no	included in the agglomeration Apeni
Beburiani	Lagodekhi	480	no	included in the agglomeration Apeni
Birkiani	Akhmeta	564	no	included in the agglomeration Duisi
Bodbiskhevi	Signagi	2 665	no	included in the agglomeration Bodbiskhevi
Bolokiani	Lagodekhi	783	no	included in the agglomeration Kartubani
Busheti	Telavi	1 090	no	included in the agglomeration Tsinandali
Dedoplistskaro	Dedoplistskaro	5 940	yes	included in the agglomeration Dedoplistskaro
Duisi	Akhmeta	2 354	no	included in the agglomeration Duisi
Eniseli	Kvareli	1 424	no	included in the agglomeration Eniseli
Gavazi	Kvareli	2 945	no	included in the agglomeration Gavazi
Giorgeti	Lagodekhi	607	no	included in the agglomeration Apeni
Gremi	Kvareli	791	no	included in the agglomeration Eniseli
Gvimriani	Lagodekhi	246	no	included in the agglomeration Apeni
Chabukiani	Lagodekhi	541	no	included in the agglomeration Apeni
Chaduniani	Lagodekhi	729	no	included in the agglomeration Vardisubani
Ikalto	Telavi	2 034	no	included in the agglomeration Ruispiri
Jokolo	Akhmeta	737	no	included in the agglomeration Duisi
Jugaani - Saniore Community	Telavi	178	no	included in the agglomeration Napareuli
Kalauri	Gurjaani	1 976	no	included in the agglomeration Vazisubani
Karajala (Village)	Telavi	4 891	no	included in the agglomeration Karajala
Kartubani	Lagodekhi	1 802	no	included in the agglomeration Kartubani
Kavshiri	Lagodekhi	433	no	included in the agglomeration Lagodekhi
Kevkhiani	Lagodekhi	117	no	included in the agglomeration Apeni

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Khornabuji	Dedoplistskaro	2 095	no	included in the agglomeration Dedoplistskaro
Khoshatiani	Lagodekhi	129	no	included in the agglomeration Apeni
Kistauri	Akhmeta	1 729	no	included in the agglomeration Kistauri
Kojori	Akhmeta	19	no	included in the agglomeration Kistauri
Kondoli	Telavi	2 188	no	included in the agglomeration Kondoli
Kvareli**	Kvareli	7 739	yes	included in the agglomeration Kvareli
Kvareltskali	Akhmeta	295	no	included in the agglomeration Duisi
Kvemo Alvani	Akhmeta	2 489	no	included in the agglomeration Kvemo Alvani
Kvemo bolkvi	Lagodekhi	132	no	included in the agglomeration Apeni
Kvemo Kedi	Dedoplistskaro	1 153	no	included in the agglomeration Zemo Kedi
Kvemo Khodasheni	Telavi	1 277	no	included in the agglomeration Tsinandali
Kvemo Nashovari	Lagodekhi	456	no	included in the agglomeration Apeni
Lagodekhi	Lagodekhi	5 918	yes	included in the agglomeration Lagodekhi
Laliskuri	Telavi	499	no	included in the agglomeration Pshaveli
Lapniani	Lagodekhi	118	no	included in the agglomeration Apeni
Leliani	Lagodekhi	578	no	included in the agglomeration Apeni
Matani	Akhmeta	4 451	no	included in the agglomeration Matani
Meore Leliani	Lagodekhi	416	no	included in the agglomeration Apeni
Mirskiseuli	Lagodekhi	377	no	included in the agglomeration Apeni
Mirzaani	Dedoplistskaro	433	no	included in the agglomeration Zemo Machkhaani
Mshvidobiani	Lagodekhi	532	no	included in the agglomeration Vardisubani
Mukuzani	Gurjaani	919	yes	included in the agglomeration Velistsikhe
Napareuli	Telavi	2 003	no	included in the agglomeration Napareuli
Natsiskvilari	Lagodekhi	379	no	included in the agglomeration Kartubani
Omalo - Khalatsani Community	Akhmeta	822	no	included in the agglomeration Duisi
Onanauri	Lagodekhi	447	no	included in the agglomeration Apeni
Podaani	Lagodekhi	730	no	included in the agglomeration Apeni
Pshaveli	Telavi	1 624	no	included in the agglomeration Pshaveli
Ruispiri	Telavi	2 297	no	included in the agglomeration Ruispiri
Sabue - Sabue Community	Kvareli	1 163	no	included in the agglomeration Eniseli
Sachale	Akhmeta	35	no	included in the agglomeration Kistauri
Samreklo	Dedoplistskaro	1 786	no	included in the agglomeration Dedoplistskaro
Saniore	Telavi	735	no	included in the agglomeration Napareuli
Shashiani	Gurjaani	2 342	no	included in the agglomeration Vazisubani
Sheerteba	Lagodekhi	233	no	included in the agglomeration Vardisubani
Shilda	Kvareli	3 927	no	included in the agglomeration Shilda
Shroma	Lagodekhi	1 299	no	included in the agglomeration Lagodekhi
Svideba	Lagodekhi	230	no	included in the agglomeration Vardisubani
Tamariani	Lagodekhi	694	no	included in the agglomeration Vardisubani
Tivi	Kvareli	327	no	included in the agglomeration Akhalsopeli
Tsinandali	Telavi	2 675	no	included in the agglomeration Tsinandali

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Tsodniskari	Lagodekhi	632	no	included in the agglomeration Vardisubani
Vachnadziani	Gurjaani	1 529	no	included in the agglomeration Vazisubani
Vanta	Telavi	937	no	included in the agglomeration Tsinandali
Vardisubani - Vardisubani Community	Lagodekhi	1 036	no	included in the agglomeration Vardisubani
Vazisubani	Gurjaani	2 862	no	included in the agglomeration Vazisubani
Velistsikhe	Gurjaani	4 508	no	included in the agglomeration Velistsikhe
Verkhvis Mindori	Lagodekhi	156	no	included in the agglomeration Apeni
Zegaani	Gurjaani	443	no	included in the agglomeration Velistsikhe
Zemo Alvani	Akhmeta	3 306	no	included in the agglomeration Zemo Alvani
Zemo Kedi	Dedoplistskaro	1 826	no	included in the agglomeration Zemo Kedi
Zemo Khodashani	Akhmeta	868	no	included in the agglomeration Ruispiri
Zemo Machkhaani	Dedoplistskaro	1 826	no	included in the agglomeration Zemo Machkhaani
Zemo Nashovari	Lagodekhi	360	no	included in the agglomeration Apeni

** - the project for rehabilitation of sewage system and construction of the WWTP is being developed

Priority no. 3 - settlements that should belong to agglomerations with less than 2 000 p.e.

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Ageurta	Akhmeta	0	no	recommended use of IAS
Akhaldaba	Akhmeta	11	no	recommended use of IAS
Alaverdi	Akhmeta	141	no	recommended use of IAS
Alisgori	Akhmeta	0	no	recommended use of IAS
Arboshiki	Dedoplistskaro	1 138	no	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Argokhi	Akhmeta	224	no	construction of the sewerage system with possible treatment at the UWWTP Kvemo Alvani is prospectively recommended
Artana	Telavi	819	no	construction of the sewerage system with possible treatment at the UWWTP Pshaveli is prospectively recommended
Babaneuri	Akhmeta	137	no	construction of the sewerage system with possible treatment at the UWWTP Kvemo Alvani is prospectively recommended
Bakilovani	Akhmeta	71	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Baso	Akhmeta	0	no	recommended use of IAS
Begela	Akhmeta	0	no	recommended use of IAS
Bikiurta	Akhmeta	0	no	recommended use of IAS
Bochorna	Akhmeta	...	no	recommended use of IAS
Bughaani	Akhmeta	...	no	recommended use of IAS
Bukhrebi	Akhmeta	0	no	recommended use of IAS

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Bukhurta	Akhmeta	0	no	recommended use of IAS
Dadikurta	Akhmeta	0	no	recommended use of IAS
Dakiurta	Akhmeta	0	no	recommended use of IAS
Dano	Akhmeta	0	no	recommended use of IAS
Dartlo	Akhmeta	0	no	recommended use of IAS
Davitiani	Lagodekhi	291	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Dedisperuli	Akhmeta	31	no	recommended use of IAS
Diklo	Akhmeta	0	no	recommended use of IAS
Dochu	Akhmeta	0	no	recommended use of IAS
Dumasturi	Akhmeta	286	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Dzibakhevi	Akhmeta	104	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Dzveli Anagi	Signagi	1 465	no	recommended use of IAS
Erisimedi	Signagi	317	no	recommended use of IAS
Etelta	Akhmeta	0	no	recommended use of IAS
Gamarjveba	Dedoplistskaro	1 010	no	construction of the sewerage system with possible treatment at the UWWTP Dedoplistskaro is prospectively recommended
Ganatleba	Lagodekhi	376	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Gelati	Lagodekhi	205	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Girevi	Akhmeta	0	no	recommended use of IAS
Gogrulta	Akhmeta	0	no	recommended use of IAS
Grdzeli Chala	Kvareli	28	no	recommended use of IAS
Gudaanta	Akhmeta	0	no	recommended use of IAS
Gujareti	Lagodekhi	27	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Gulgula	Telavi	1 108	no	construction of the sewerage system with possible treatment at the UWWTP Karajala is prospectively recommended
Hego	Akhmeta	0	no	recommended use of IAS
Heretiskari	Lagodekhi	509	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Chabinaani	Akhmeta	143	no	construction of the sewerage system with possible treatment at the UWWTP Kistauri is prospectively recommended
Chachkhriala	Akhmeta	35	no	recommended use of IAS
Chala	Akhmeta	0	no	recommended use of IAS

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Chalaubani	Gurjaani	897	no	recommended use of IAS
Chantliskure	Kvareli	455	no	construction of the sewerage system with possible treatment at the UWWTP Gavazi is prospectively recommended
Charekauli	Akhmeta	...	no	recommended use of IAS
Chartala	Akhmeta	15	no	recommended use of IAS
Cheremi	Gurjaani	28	no	recommended use of IAS
Chero	Akhmeta	0	no	recommended use of IAS
Chesho	Akhmeta	0	no	recommended use of IAS
Chiauri	Lagodekhi	1 044	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Chiglaurta	Akhmeta	0	no	recommended use of IAS
Chigo	Akhmeta	...	no	recommended use of IAS
Chikaani	Kvareli	1 928	no	construction of the sewerage system with possible treatment at the UWWTP Gavazi is prospectively recommended
Choeti	Dedoplistskaro	124	no	construction of the sewerage system with possible treatment at the UWWTP Dedoplistskaro is prospectively recommended
Chontio	Akhmeta	0	no	recommended use of IAS
Iliurta	Akhmeta	0	no	recommended use of IAS
Indurta	Akhmeta	0	no	recommended use of IAS
Ingeti	Akhmeta	0	no	recommended use of IAS
Intsukhi	Akhmeta	0	no	recommended use of IAS
Iptskhori	Akhmeta	0	no	recommended use of IAS
Jaburi	Akhmeta	0	no	recommended use of IAS
Jvarboseli	Akhmeta	0	no	recommended use of IAS
Kakhipari	Gurjaani	171	no	construction of the sewerage system with possible treatment at the UWWTP Velistsikhe is prospectively recommended
Kalkva	Lagodekhi	124	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Karagaji	Signagi	155	no	recommended use of IAS
Kasristskali	Dedoplistskaro	214	no	recommended use of IAS
Khakhabo	Akhmeta	0	no	recommended use of IAS
Khevistchala	Akhmeta	24	no	recommended use of IAS
Khirsa	Signagi	359	no	recommended use of IAS
Khiso	Akhmeta	0	no	recommended use of IAS
Khiza	Lagodekhi	75	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Khizabavra	Lagodekhi	94	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Khorbalo	Akhmeta	45	no	recommended use of IAS

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Khorkheli	Akhmeta	267	no	construction of the sewerage system with possible treatment at the UWWTP Kistauri is prospectively recommended
Khornabuji	Signagi	135	no	recommended use of IAS
Khveliandro	Akhmeta	...	no	recommended use of IAS
Kisiskhevi	Telavi	1 916	no	construction of the sewerage system with possible treatment at the UWWTP Telavi is prospectively recommended
Kitaani	Gurjaani	271	no	construction of the sewerage system with possible treatment at the UWWTP Velistsikhe is prospectively recommended
Kobadze	Telavi	58	no	recommended use of IAS
Koghoto	Akhmeta	415	no	construction of the sewerage system with possible treatment at the UWWTP Karajala is prospectively recommended
Koklata	Akhmeta	0	no	recommended use of IAS
Koreti	Akhmeta	238	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Kuchatani	Kvareli	467	no	construction of the sewerage system with possible treatment at the UWWTP Kvareli is prospectively recommended
Kumelaurta	Akhmeta	0	no	recommended use of IAS
Kutsakhta	Akhmeta	81	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Kvavlo	Akhmeta	...	no	recommended use of IAS
Kvemo Gurgeniani	Lagodekhi	357	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Kvemo Chopchauri	Akhmeta	0	no	recommended use of IAS
Kvemo Khalatsani	Akhmeta	134	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Kvemo Khechili	Lagodekhi	160	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Kvemo Machkhaani	Signagi	609	no	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Kvemo Pona	Lagodekhi	133	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Lapankuri	Telavi	620	no	recommended use of IAS
Lechuri	Telavi	88	no	recommended use of IAS
Magraani	Akhmeta	411	no	construction of the sewerage system with possible treatment at the UWWTP Kvemo Alvani is prospectively recommended

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Matsimi	Lagodekhi	618	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Mtisdziri	Kvareli	723	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Nadikvari	Telavi	69	no	recommended use of IAS
Naduknari	Akhmeta	12	no	recommended use of IAS
Naendrovali	Lagodekhi	95	no	recommended use of IAS
Namesrali	Lagodekhi	68	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Nasamkhrali	Telavi	576	no	construction of the sewerage system with possible treatment at the UWWTP Telavi is prospectively recommended
Natsikhari	Akhmeta	0	no	recommended use of IAS
Ninigori	Lagodekhi	502	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Nukriani	Signagi	1 935	no	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Omalo - Tusheti (Omalo) Community	Akhmeta	37	no	recommended use of IAS
Ortsikhe	Akhmeta	0	no	recommended use of IAS
Osiauri	Akhmeta	0	no	recommended use of IAS
Ozaani	Dedoplistskaro	833	no	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Ozhio	Akhmeta	680	no	construction of the sewerage system with possible treatment at the UWWTP Karajala is prospectively recommended
Pantiani	Telavi	...	no	recommended use of IAS
Parsma	Akhmeta	0	no	recommended use of IAS
Patara Gori	Lagodekhi	436	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Pichkhisbogiri	Lagodekhi	84	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Pichkhovani	Akhmeta	286	no	construction of the sewerage system with possible treatment at the UWWTP Kvemo Alvani is prospectively recommended
Pirosmani	Dedoplistskaro	569	no	recommended use of IAS
Ratchisubani	Lagodekhi	68	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Sabatlo	Dedoplistskaro	391	no	recommended use of IAS
Sabue - Shakhvetila Community	Akhmeta	13	no	recommended use of IAS

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Sagirta	Akhmeta	0	no	recommended use of IAS
Sachigolo	Akhmeta	0	no	recommended use of IAS
Sakobiano	Akhmeta	435	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Sakobo - Vardisubani Community	Lagodekhi	504	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Samtatskaro	Dedoplistskaro	1 037	no	construction of the sewerage system with possible treatment at the UWWTP Zemo Kedi is prospectively recommended
Sanavardo	Kvareli	840	no	construction of the sewerage system with possible treatment at the UWWTP Kvareli is prospectively recommended
Satskhene	Kvareli	23	no	recommended use of IAS
Serodani	Telavi	...	no	recommended use of IAS
Shakhvetila	Akhmeta	99	no	recommended use of IAS
Shakriani	Kvareli	377	no	recommended use of IAS
Shenako	Akhmeta	...	no	recommended use of IAS
Shorokhi	Kvareli	350	no	construction of the sewerage system with possible treatment at the UWWTP Akhalsopeli is prospectively recommended
Shtrolta	Akhmeta	0	no	recommended use of IAS
Shua Khalatsani	Akhmeta	161	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Signagi	Signagi	1 485	yes	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Tavtskaro	Dedoplistskaro	80	no	construction of the sewerage system with possible treatment at the UWWTP Dedoplistskaro is prospectively recommended
Tbatana	Akhmeta	0	no	recommended use of IAS
Tela	Lagodekhi	779	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Tetritsklebi	Telavi	93	no	recommended use of IAS
Tkhilistskaro	Kvareli	122	no	recommended use of IAS
Tsaro	Akhmeta	...	no	recommended use of IAS
Tsinubani	Akhmeta	336	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Tsiplistskaro	Lagodekhi	101	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Tsitelgori	Lagodekhi	164	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended

Settlement	District	Population	Existing sewage system (yes/no)	Proposal
Tsitskanaantseri	Kvareli	419	no	construction of the sewerage system with possible treatment at the UWWTP Kvareli is prospectively recommended
Tsokalta	Akhmeta	0	no	recommended use of IAS
Tushetis Sabue	Akhmeta	0	no	recommended use of IAS
Vakisdziri	Akhmeta	0	no	recommended use of IAS
Vedzebi	Akhmeta	...	no	recommended use of IAS
Vedziskhevi	Akhmeta	0	no	recommended use of IAS
Verkhovani	Akhmeta	0	no	recommended use of IAS
Vestmo	Akhmeta	0	no	recommended use of IAS
Vestomta	Akhmeta	0	no	recommended use of IAS
Zemo Bodbe	Signagi	424	no	construction of the sewerage system with possible treatment at the UWWTP Tsnori is prospectively recommended
Zemo Bolkvi	Lagodekhi	272	no	construction of the sewerage system with possible treatment at the UWWTP Apeni is prospectively recommended
Zemo Gurgeniani	Lagodekhi	444	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Zemo Khalatsani	Akhmeta	89	no	construction of the sewerage system with possible treatment at the UWWTP Akhmeta is prospectively recommended
Zemo Khechili	Lagodekhi	47	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Zemo Pona	Lagodekhi	92	no	construction of the sewerage system with possible treatment at the UWWTP Lagodekhi is prospectively recommended
Zhvelurta	Akhmeta	0	no	recommended use of IAS
Ziari	Gurjaani	44	no	recommended use of IAS
Zinobiani	Kvareli	337	no	construction of the sewerage system with possible treatment at the UWWTP Gavazi is prospectively recommended

Annex II: Summary list of proposed agglomerations and UWWTPs

Agg. ID	Agglomeration name	Size of agglomeration (p.e.)	Settlements in agglomeration	UWWTP ID	Name of UWWTP to which WW is discharged
1	**Duisi**	4 772	Birkiani, Duisi, Jokolo, Kvareltskali, Omalo - Khalatsani Community	1	Akhmeta
2	**Matani**	4 451	Matani	1	Akhmeta
3	**Akhmeta**	7 105	Akhmeta	1	Akhmeta
4	**Kistauri**	2 706	Akhalsheni, Akhshaani, Akhshnis Velebi, Arashenda - Kistauri Community, Kistauri, Kojori, Sachale	2	Kistauri
5	**Zemo Alvani**	3 306	Zemo Alvani	3	Kvemo Alvani
6	**Kvemo Alvani**	2 489	Kvemo Alvani	3	Kvemo Alvani
7	**Pshaveli**	2 123	Laliskuri, Pshaveli	4	Pshaveli
8	**Napareuli**	2 916	Jugaani - Saniore Community, Napareuli, Saniore	4	Pshaveli
9	**Ruispiri**	5 753	Atskuri, Ikalto, Ruispiri, Zemo Khodashani	5	Karajala
10	**Karajala**	5 162	Akhalteli, Karajala (Village)	5	Karajala
11	**Eniseli**	3 943	Almati, Eniseli, Gremi, Sabue - Sabue Community	6	Shilda
12	**Shilda**	3 927	Shilda	6	Shilda
13	**Telavi**	28 423	Kurdghelauri, Shalauri, Telavi, Vardisubani (Village)	7	Telavi
14	**Kondoli**	2 188	Kondoli	7	Telavi
15	**Tsinandali**	7 848	Akura, Busheti, Kvemo Khodasheni, Tsinandali , Vanta	7	Telavi
16	**Kvareli**	7 739	Kvareli	8	Kvareli
17	**Vazisubani**	8 709	Kalauri, Shashiani, Vachnadziani, Vazisubani	9	Velistsikhe
18	**Velistsikhe**	8 290	Akhasheni , Mukuzani, Velistsikhe, Zegaani	9	Velistsikhe
19	**Gavazi**	2 945	Gavazi	10	Gavazi
20	**Akhalsopeli**	4 485	Akhalsopeli, Tivi	11	Akhalsopeli
21	**Gurjaani**	24 766	Bakurtsikhe, Dzirkoki, Gurjaani (City), Gurjaani (Village), Chandari, Chumlaki, Kolagi, Vejini	12	Gurjaani
22	**Apeni**	8 843	Apeni, Areshperani, Bagdati, Balgojiani, Balta, Beburiani, Giorgeti, Gvimriani, Chabukiani, Kevkhiani, Khoshatiani, Kvemo bolkvi, Kvemo Nashovari, Lapniani, Leliani, Meore Leliani, Mirskiseuli, Onanauri, Podaani, Verkhvis Mindori, Zemo Nashovari	13	Apeni
23	**Tsnori**	19 678	Anaga, Jugaani - Jugaani Community, Kardenakhi, Mashnaari, Sakobo - Sakobo Community, Tibaani, Tsnori, Vakiri	14	Tsnori
24	**Bodbiskhevi**	2 665	Bodbiskhevi	14	Tsnori
25	**Zemo Machkhaani**	2 259	Mirzaani, Zemo Machkhaani	14	Tsnori
26	**Kabali**	11 185	Baisubani, Dona, Ganjala, Kabali, Karajala - Kabali Community, Kvemo Mskhalgori, Uzuntala, Zemo Mskhalgori	15	Lagodekhi
27	**Kartubani**	2 964	Bolokiani, Kartubani, Natsiskvilari	15	Lagodekhi
28	**Vardisubani**	4 086	Chaduniani, Mshvidobiani, Sheerteba, Svideba, Tamariani, Tsodniskari, Vardisubani - Vardisubani Community	15	Lagodekhi
29	**Lagodekhi**	7 650	Kavshiri, Lagodekhi, Shroma	15	Lagodekhi
30	**Dedoplistskaro**	9 821	Dedoplistskaro, Khornabuji , Samreklo	16	Dedoplistskaro
31	**Zemo Kedi**	3 959	Arkhiloskalo, Kvemo Kedi, Zemo Kedi	17	Zemo Kedi

Annex III: Schematic illustration of proposed agglomerations and UWWTPs