Modernization of local public services in the Republic of Moldova

- Intervention area 2: Regional planning and programming -

Feasibility study

for the project „Improving water supply and wastewater services in Falesti rayon (town of Falesti, locality of Falestii Noi and locality of Calugar)"

Final report

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Acronyms and abbreviations

ADA	Austrian Development Agency
AMAC	Association “Moldova Apa-Canal”
ANRE	National Agency for Energy Regulation
ASAD	Active Sludge Aeration Tanks
ATU	Autonomous Territorial Unit
BAU	Business as Usual
BOD	Biochemical Oxygen Demand
CBA	Cost-Benefit Analysis
CCTV	Closed-circuit television
CNAS	National Social Insurance House (Casa Națională de Asigurări Sociale)
COD	Chemical Oxygen Demand
CzDA	Czech Development Agency
DMA	District Metering Area (zone for active leakage control)
DR	Development Region
DRC	Development Region Centre
DRN	Development Region North
DRS	Development Region South
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIM	Environmental Impact Assessment
ENPV	Economic Net Present Value
ERR	Economic Rate of Return
ESA	Environmental and Social Assessment
EU	European Union
EUR	Euro- official currency of the European Union's member states
FFE	Foreign Funded Enterprises
FIDIC	Fédération Internationale des Ingénieurs Conseils (frz.) - International Federation of Consulting Engineers (engl.)
FNPV(C)	Financial Net Present Value of the Investment
FNPV(K)	Financial Net Present Value of the Capital
FOPIP	Financial and Operational Performance Improvement Programme
FRR(C)	Financial Rate of Return of the Investment
FRR(K)	Financial Rate of Return of the Capital
FS	Feasibility Study
GD	Government Decision
GDP	Gross Domestic Product
GIZ	German Development Cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit
GPS	Global Positioning System
HDPE	High-density polyethylene
IFA	International Financing Agency
IFI	International Financial Institution
IFO	Institute of Financial Operations
IIC	International Insurance Company
IMF	International Monetary Fund
IPE	Individual Private Enterprise
IRR	Internal rate of return
IWA	International Water Association
JSC	Joint Stock Company
KfW	Kreditanstalt für Wiederaufbau (KfW German Bank for Development)

LGA	Local Government Association
LIP	Long-Term Investment Programme
LPA	Local Public Administration
LT	Long term
Ltd.	Limited Liability Company
MBBR	Moving Bed Biofilm Reactor
MDL	Moldovan Lei
ME	Municipal Enterprise
MLPS	Modernization of Local Public Services
MoE	Ministry of Environment
MRDC	Ministry of Regional Development and Construction
MT	Medium term
MWWPS	Main Waste Water Pumping Station
n/a	Not available
n/f	Not functional
NBS	National Bureau of Statistics
NDS	National Development Strategy
NEF	National Ecological Fund
NFRD	National Fund for Regional Development
NHIC	National Health Insurance Company
NIF	Neighbourhood Investment Fund
NIS	Network Information System
NP	Nominal Pressure
NPV	Net present value
NRW	Non-Revenue Water
OD	Outside Diameter (of pipe)
PAAS	Water Supply and Sanitation Plan
PAI	Project Area of Influence
PE	Population Equivalent
PE60	Population Equivalent based on 60 g BOD/capita/day
PH	Phase
PIP	Priority Investment Programme/Plan
PIU	Project Implementation Unit
PP	Poly-propylene
PPC	Possible Project Concept
PPP	Public-Private Partnerships
PS/WPS/WSPS	Water (Supply) Pumping Station
PVC	Polyvinyl chloride
PWG	Project Working Group
Qdmax	Maximum daily dry weather flow
QDWF	Maximum hourly dry weather flow
QSWF	Maximum hourly storm water flow
RDA	Regional Development Agency
RDS	Regional Development Strategy
RM	Republic of Moldova
ROA	Return on Assets
ROC	Regional Operating Company
ROE	Return on Equity
RPP	Regional Planning and Programming
RSP	Regional Sector Program
RtG	”Ready-to-go” Project

SCADA	Supervisory Control and Data Acquisition
SDI	State Design Institute
SEE	State Ecological Expertise
SEI	State Ecological Inspectorate
SGAP	Social and Gender Action Plan
SN	Sewerage network
SNiP	Norms and Rules in Construction
SoE	State-owned Enterprise
ST	Short term
TA	Technical Assistance
TC	Trading company
TP/WTP	Water Treatment Plant
USAID	United States Agency for International Development
VAT	Value-Added Tax
VPC	Viable Project Concept
WB	Word Bank
WDS	Water distribution networks
WSS	Water Supply and Sanitation
WT	Water Tower
WWPS	Waste Water Pumping Station
WWTP	Waste Water Treatment Plant

Glossary

The main definitions used in this document are following:

Aquifer – underground layer of rock or other types of geological layers with a porosity and permeability able to allow a significant the flow of underground water or to capture significant quantities of underground water.

Water transmission main – a part of water supply system, comprising pipelines included between water intake and public transportation or distribution networks.

Agglomeration – an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point *(definition according to Directive 91/271/EEC)*.

Water supply – overall activities and works carried out with the aim to capture treat, transport, store and distribute drinking water to the final consumers.

Raw water – Intake water before any treatment or use.

Water sold – authorised water consumption which is billed and generate revenue (also known as revenue water). It is equal to billed and metered water consumption plus the billed unmetered water consumption.

Non-revenue water (NRW) – is the difference between the total system input volumes of water and the billed authorized water consumption.

Drinking water –water intended for human consumption, to be used directly or indirectly, for a long period of time without affecting negatively the health, which is as follows:

- All water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a distribution network, from a tanker, or in bottles or containers;
- All water used in any food-production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption, unless the Ministry of Health and Ministry of Agriculture and Food Industry approved the use of water for technological purposes, showing that water used do not affect the quality and wholesomeness of the food stuff in their ready to use condition/state;
- Water from local sources, such as wells, springs, etc., used for drinking, cooking meals or other domestic purposes.

Treated water – water that is intended for human consumption and use, considered to be free of toxic substances and pathogenic bacteria, cysts and viruses; good drinking water that has been or will be further treated in order to improve the aesthetic quality and/ or reducing the content of undesirable minerals and other substances known or unknown, by one or more water treatment processes on the site where it is used.

Surface water – still water and flow water having contact with the soil surface.

Storm water – is pure rainwater plus anything the rain carries along with it and snow melting.

Groundwater – waters below the soil surface, in the zone of saturation and in contact with the soil or the subsoil.

Industrial wastewater – any waste water which is discharged from premises used for carrying on any trade or industry, other than domestic wastewater and run-off rain water.

Domestic wastewater – waste water from residential settlements and services which originates predominantly from the human metabolism and from household activities (definition according to EU Directive 91/271/EEC).

Urban wastewater – means domestic waste water or the mixture of domestic waste water with industrial waste water and/or run-off rain water.

Wastewater –waters that come from domestic, social and economic activities, containing pollutants or residues, this water being adversely affected in quality by anthropogenic influence, the physical, chemical and bacteriological baseline being changed.

Water service connection – a segment of the public water supply network, which provides the link between the water distribution network and internal piping of the buildings.

Service connection – the realisation by the operator of public water supply and sewerage networks of a permanent connection of the consumer's water and / or sewage facility to public water supply and / or sewerage networks.

Water tower – an elevated structure supporting a water tank constructed at a height sufficient to pressurize a water supply system for the distribution of drinking water, and to provide emergency storage for fire protection. The water tower is composed of a metal, reinforced concrete or varied shape bricks reservoir (usual spherical one) and pillar for support.

Manhole – underground construction designed for the protection and access to the flow control valve for water, drain, ventilation, etc.

Concentration – mass-volume ratio of the total volume of wastewater discharged within a certain timeframe.

Pipeline – assembly of pipes, by means of which the water is transported.

Pressure pipe – rising pipe for transportation under pressure of water or wastewater.

P.E. (population equivalent) - means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day.

Consumer – person or organization that uses water supply and wastewater services or commodities according to a contract with the operator.

Biochemical oxygen demand (BOD) – is the amount of dissolved oxygen needed (i. e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period or the concentration of dissolved oxygen, in the given conditions (t days at 20 degrees Celsius with or without nitrification inhibition) by biological oxidation of organic material and / or inorganic water.

Chemical oxygen demand (COD) – the concentration of the oxygen required to oxidize soluble and particulate organic matter in water.

Water quality indicators – pollutants values, based on scientific researches, developed and updated by competent national authority. The concentration criteria and rec-

ommended values, or narrative descriptions that should not be exceeded for a water body to protect aquatic life or human health.

Volume of water/water flow rate – is the volume of fluid which passes through cross-section pipe within a unit time.

Biological treatment – the biological treatment of wastewater using a biological process with a secondary settlement or another process, which complies with actual national standards.

Mechanical treatment – treatment of waste water by means of a physical process and/or chemical process, involving settlement of suspended solids or other processes in which the BOD_5 of the influent wastewater is reduced by at least 20%, and suspended solids at least 50%.

Tertiary treatment (advanced) – treatment process which results in a more advanced treatment than that obtained by mechanical and biological wastewater treatment or it is the additional process designed to improve the quality of purified water so that it can be discharged into the natural environment or re-used.

Septic tank – is an underground reservoir designed for wastewater obtained from a household. Bacteria from wastewater decompose organic waste and sludge deposits on the bottom of the tank. The effluent flows into the soil through the drainage channels.

Drinking water supplier – business entity, which supply drinking water to consumer on a centralised basis.

Spring – the place where the underground water, meeting the hydrogeological favourable conditions, is brought to the ground surface (if the water carrying permeable water bed which ends top-down at the ground level on an impermeable bed, the water bed can only reach the surface to form springs).

Underground dam – a watercourse (lake) embanked by a dam, levee, dam or other barrier. It is used for collecting and storing water to a future use.

Suspended solids (SS) – the concentration of solids in a liquid, usually determined by filtering or centrifuging and then drying under specified conditions.

Groundwater level – level under which the soil is saturated with water.

Real water consumption (specific water flow rate) – the volume of water consumed by one customer during 24 hours to meet the physiological and domestic needs under normal and exceptional operation conditions of the water supply system (l/c/d).

Sanitary and hygienic (quality) standards for drinking water – physical-chemical, microbiological and organoleptic indicators which drinking water must meet in order to endanger the health consumption; indicators are established in sanitations rules and standards approved by the Government.

Operator – a legal person operating and maintaining a public water supply and/or wastewater system providing the consumers with public water supply and/or wastewater services based on a direct contract.

Sludge - means residual sludge, whether treated or untreated, from urban waste water treatment plants.

Sludge dewatering - drying and sludge dewatering structure by removing water and evaporating it.

Apparent (water) losses/commercial losses - including all types of errors associated with consumer metering and data processing errors (meter reading and billing), plus unauthorized consumption (theft or illegal use).

Water loss - is a quantity of water, which leaks from installations or network because of poor tightness of pipe joints, emergencies and etc. Determinative factors are: pressure, deteriorated conduits, low quality of pipes materials and execution, soil characteristics, traffic loads, corrosion of pipelines (due to vagabond electric current), grade and type of measurement.

Real (water) losses/physical losses - involving leaks and spills from tanks/reservoirs, losses related to pipe connections up to counter and water transport and distribution pipes leaking up to the consumer's meter.

Water supply and sanitation program (WSSP) - is a document planning investments for the long term development of the water supply and sanitation infrastructure, worked out for a specific region, rayon or locality (municipality, city, village, commune), so as to perfectly fit the existing systems as well as the funds and constraints related to the local water sources and the provisions of the law in force.

Water intake structure - all construction structures and facilities which serve for the introduction of the necessary volume of water in the water transmission main (abstracted from a river, lake, reservoir, etc.) with the purpose of water supply or irrigation.

Sewer connections – sewer collector provides the connection between the indoor consumer sewer facility and public sewer collector.

Water resources - sources of water that are useful or potentially useful including surface waters, ground water and atmospheric precipitations/rainfall which fell on the territory of the Republic of Moldova.

Sewerage network - a system of underground pipelines and additional structures collecting and transporting urban and/or industrial wastewater.

Water distribution network - created from pipelines, armature and other structures which supplies water to consumers. It is the most expensive facility/object, because of lengths, service works and water losses.

Underground water reservoir - storage of water volume needed to: compensate the consumption per hour, emergency reserves and reserves required for firefighting.

Water supply system – a set of constructions and sites, operating installations/facilities, and specific endowments, by which the water captured from a natural source is treated, transported, stored and distributed to the consumers based on a stable pressure, according to the quantity and quality norms in force.

Wastewater system – a number of structures and facilities, networks, pumping stations, wastewater treatment plants etc. by which the evacuation, transportation, treatment and disinfection of wastewater and sludge management is carried out. Treated and disinfected wastewater is discharged into a water stream or other natural water body.

Drilled or shallow well - underground water intake construction/structure, which main dimension is developed by vertical line, aiming to reach the ground water resources; structure or installation/facility used with the purpose to obtain groundwater from an aquifer for an advantageous use.

Water quality standard - concentrations/ maximum admissible values recommended or mandatory for chemicals and microorganisms in drinking water. These amounts are

established for the water used by municipalities (provided by public water supply systems), industrial and agricultural enterprises, and entertainment areas.

Wastewater treatment plant - consisting of all wastewater treatment installations; their size and form varies according to the adopted methods of treatment; mechanical treatment consists in removing of suspended solids by physical processes from wastewater; the biological treatment uses the activities of microorganisms to oxidize and mineralize the organic substances in wastewater, which previously was subjected to a mechanical treatment.

Water pumping station - to ensure on demand the required pressure in the distribution network.

Wastewater pumping stations –the pumping stations to be provided and designed in cases when configuration of the relief does not give possibility to collect and transport wastewater gravitationally. In such cases wastewater is pumped by pressure pipelines.

Water treatment plant - used for enhancing the quality of raw water from the river to the water quality criteria necessary for human consumption.

Water supply source - water natural resource (surface water, groundwater, etc.) to be used (or could be used) with the purpose to abstract water in the water supply system.

Sludge Treatment - all stages of transformation of sludge with the purpose to be used or disposed which could include thickening, stabilizing, conditioning, thermal hydrolysis, dewatering, drying, disinfection, sludge incineration.

Pipe – unit/piece in the cylindrical form, hollow in interior, made of metal, plastic, etc. and used for the distribution and transport of water and wastewater.

Sanitary protection area – unique territory, which includes water sources, constructions and water supply installations/facilities, for water protection.

Executive summary

Since 2010, the Modernization of Local Public Services Project (MLPS), acting on mutual agreement between Moldovan and German governments, has supported Moldovan Local Public Administrations (LPAs) in extending and modernising service provision in water supply and wastewater, solid waste management, regional and local roads, and energy efficiency of public buildings sectors.

The MLPS Project has the objective to improve the local public service delivery by local planning and programming, improving local public services infrastructure, capacity development of local public administration and local public service providers. As part of a major planning and programming programme, MLPS committed to facilitate the development of pipeline of feasible, cost-effective investment projects in the aforementioned sectors.

This Feasibility Study (FS) Report proposes a structured phasing of the **Priority Investment Programme (PIP)** and creating necessary conditions for further implementation of the PIP in **Falesti Rayon**. The FS particularly focuses on implementation of the first phase of the PIP, covering period of 2015-2018 and further named **the Project**.

The PIP covers the area of the Falesti town as well as Falestii Noi and Calugar localities. The Project includes the town of Falesti only.

Main beneficiaries of this study are the inhabitants from the above-mentioned localities, which will have access to improved Water Supply and Sanitation (WSS) services.

Problem statement and Objective

The following major problems to be addressed in this feasibility study were identified during the preliminary project phases:

- Insufficient area coverage of the WSS services. Only parts of the town of Falesti benefit from the water supply, while the wastewater services are provided only to a limited urban area;
- Unsatisfactory levels of service, including:
  - Continuity of water and wastewater services. Although central part of Falesti Town is continuously provided with water, some marginalized parts of the town have often interruptions supply due to bursts, leakages and insufficient network pressure. Certain parts of the town continuously suffer of sewer blockages;
  - Currently, groundwater quality is not compliant with the National Standards. This Feasibility Study does not address this issue directly, while it is assumed that the surface water of drinking quality will be provided from the Prut-Falesti pipeline in the foreseeable future.

As for the operational efficiency, the main problems encountered by the company are, as follows:

- High non-revenue water (NRW) ratio. Increased level of NRW results (around 48% in 2015) results in higher energy consumption for water pumping and consequently increased water tariffs;
- High staff efficiency ratio, as a result of inefficient operation of facilities and overstaffing of the utility;

- Poor asset management and lack of preventive maintenance, resulting in obsolete pipelines and facilities.

The **objective** of the present feasibility study is the development of an affordable, least-cost and cost-effective phased investment programme for water and wastewater infrastructure to be rehabilitated and extended, as well as facilitation of regionalisation of the WSS services.

The aim of the PIP is to extend the coverage and connection rates of the population connected to the regionalised water supply services by 20% from 76% to 96% of coverage rate and by 14% from 49% to 63% of connection rate, as well as increase of coverage and connection rates to wastewater services by 67% from 27% to 94% of coverage rate and by 40% from 23% to 63% of connection rate.

The aim of the first phase (the Project 2015-2018) for the town of Falesti is to extend the access of the population to the water by 1% from 95% to 96% of coverage rate and by 1% from 61% to 62% of connection rate.

Legal aspects

In the process of regulating and developing the water supply and wastewater services sector the competences belong to the central public authorities; the establishment, organization and management of this service being the responsibility of local authorities and operators of public water supply and wastewater services.

The main sector policy document, Strategy for Water Supply and Sanitation (2014-2028) includes new approaches on structuring, financial planning and project identification, on which should be based sector development; institutional reforms in the sector; overcoming of the excessive fragmentation through regionalisation.

"Regionalisation" is the main aspect of the development policy of the water supply and wastewater services sector. This policy aims to improve sector performance through better management and professionalism, and benefiting from economies of scale as well.

Currently, the public water supply and wastewater services are organised and operated in the town of Falesti by Falesti Municipal Services Utility. In administrative-territorial units of Falestii Noi and Calugar the centralised water supply service is missing.

Taking into consideration the national WSS policy, and the positive aspects of regionalisation of WSS public services learnt from international experience, it is recommended to promote the joint operation and development of the services and infrastructure projects. This policy was supported unanimously by the local authorities in all administrative units: Falesti, Falestii Noi, Calugar.

The institutional model of regionalisation of water supply and wastewater public services in Falesti Rayon, developed under the current legislation, comprises two key elements:

- Regional Operator;
- Delegated management contract which regulates the relationship between regional operator and local authorities.

Regionalisation of water supply and wastewater services will involve the extension of service areas in all localities included in the feasibility study, initially in the urban areas, and afterwards in the rural areas. The existing organisational structure of the Falesti

Municipal Services Utility will require significant changes in order to cover the increasing demands of expanding service area.

Technical aspects and investment programme

The Investment Programme includes:

- Short-term;
- Medium-term;
- Long-term measures.

The short-term measures are referred to as Priority Investment Measures and are again sub-divided into two sub-phases as follows:

- Phase 1 – priority measures to be implemented until 2018;
- Phase 2 – priority measures to be implemented between 2018 and 2021 (depending on the availability of funds and the capacity of the implementing and operating agency this period might be extended).

Priority investment measures retained in Phase 1 are referred to as “The Project” for which further assessments have been carried out in this study (Option Analysis, Financial Analysis, Environmental Assessment, etc.).

Investment framework:

Water Supply:

Currently there are 10,258 inhabitants in the town of Falesti connected to the existing water supply system this is 61% of the population. There is no supply shortage for the service area of the Falesti Municipal Service Utility. However, NRW is high (48% of the production).

The water quality provided in the service area does not comply with the national standards for drinking water quality (exceedance of fluorine concentration). The LPA together with support from the GoM is in process to switch from the currently used local groundwater sources to treated surface water from the Prut River (water treatment plant is constructed, regional transmission main is in process)

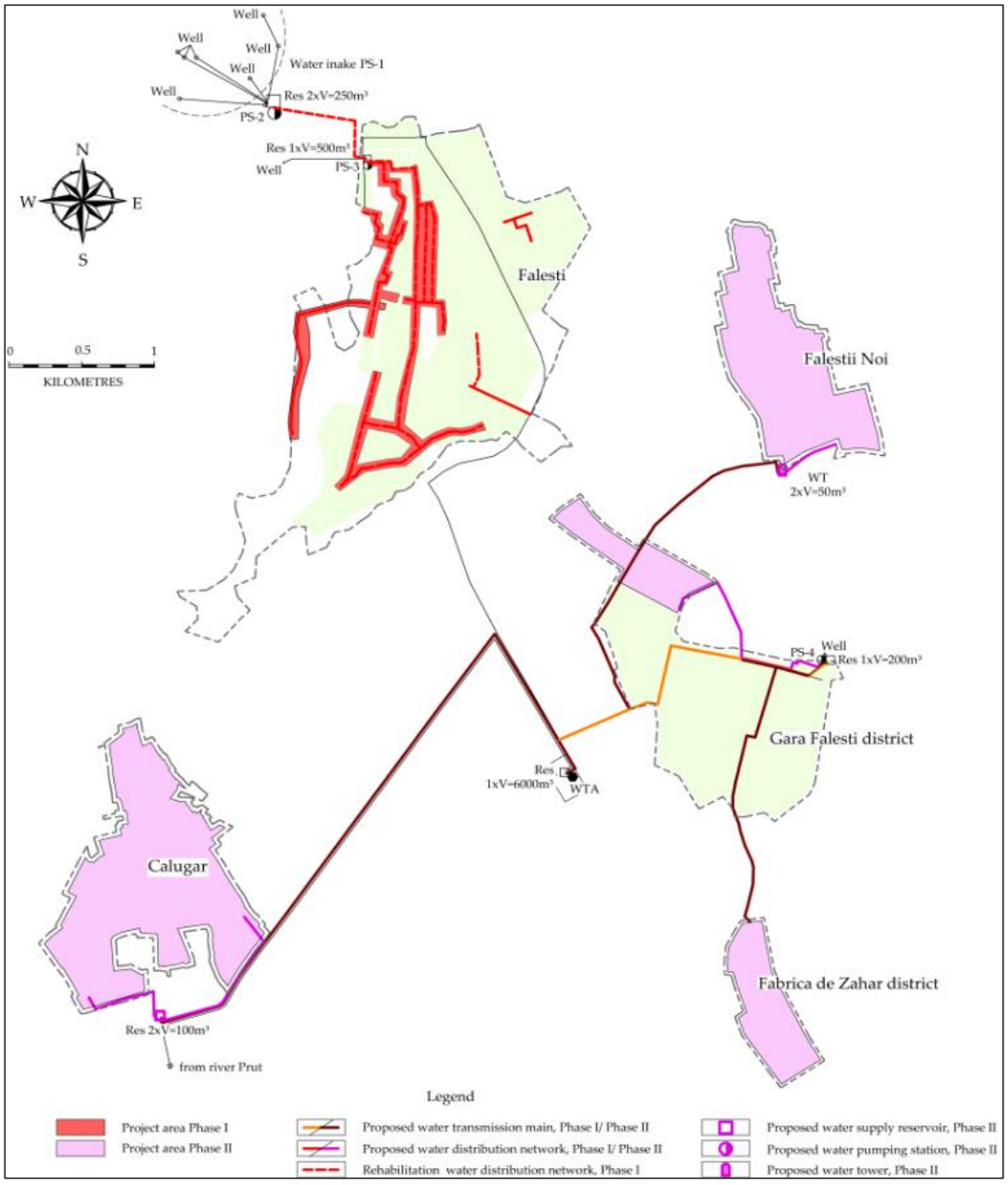
In order to increase the efficiency of the water supply system it is recommended to put in Phase 1 the focus on the reduction of NRW by rehabilitation of the existing water distribution network, and on operational improvements and to enlarge the service coverage area within the town of Falesti.

The localities of Falestii Noi and Calugar in the neighbourhood of the town of Falesti are currently not connected to the centralised water supply system of the town of Falesti but it is proposed connecting these localities in Phase 2, once the switch to the new water source (treated surface water from the Prut River) is implemented.

In order to cover the future water demand for the study area until 2045, additional water treatment capacities have to be developed starting with 2028.

In the medium-term, it is recommended to optimize the network operation, based on the results of the detailed investment plan to be prepared in the frame of the Water Supply Network Analysis and Water Loss Reduction Programme included in the technical assistance measures in Phase 1 of this project.

Figure 0-1: Scheme of the existing and proposed extensions of the water supply system in the town Falesti and the localities of Falestii Noi and Calugar



Wastewater:

Currently only the town of Falesti is partly endowed with an existing wastewater system. About 4,830 people (29%) are currently connected to the sewerage network. The treatment plant is in operation however, already quite outdated and can serve for the short-term only.

The localities of Falestii Noi and Calugar do not have any centralised wastewater facilities. It is proposed to organise wastewater collection and treatment for the localities of Falestii Noi and Calugar, once the centralised water supply is established.

It is proposed to give highest priority to the collection and treatment of wastewater in the town of Falesti (current population of 16,900) (in line with priorities defined in the

Urban Wastewater Treatment Directive 91/271/EEC). Therefore, an extension of the sewer network in the town of Falesti and the rehabilitation of the existing sewer network are proposed in order to increase the efficiency in the wastewater collection. The connection rate in the town of Falesti will reach about 66% after Phase 2) and will linearly increase to 95% in 2045 (Phase 2).

For the short-term (until 2021), it is recommended to continue using the existing WWTP in Falesti, the condition of the WWTP is poor but still adequate to be operated until the year 2021.

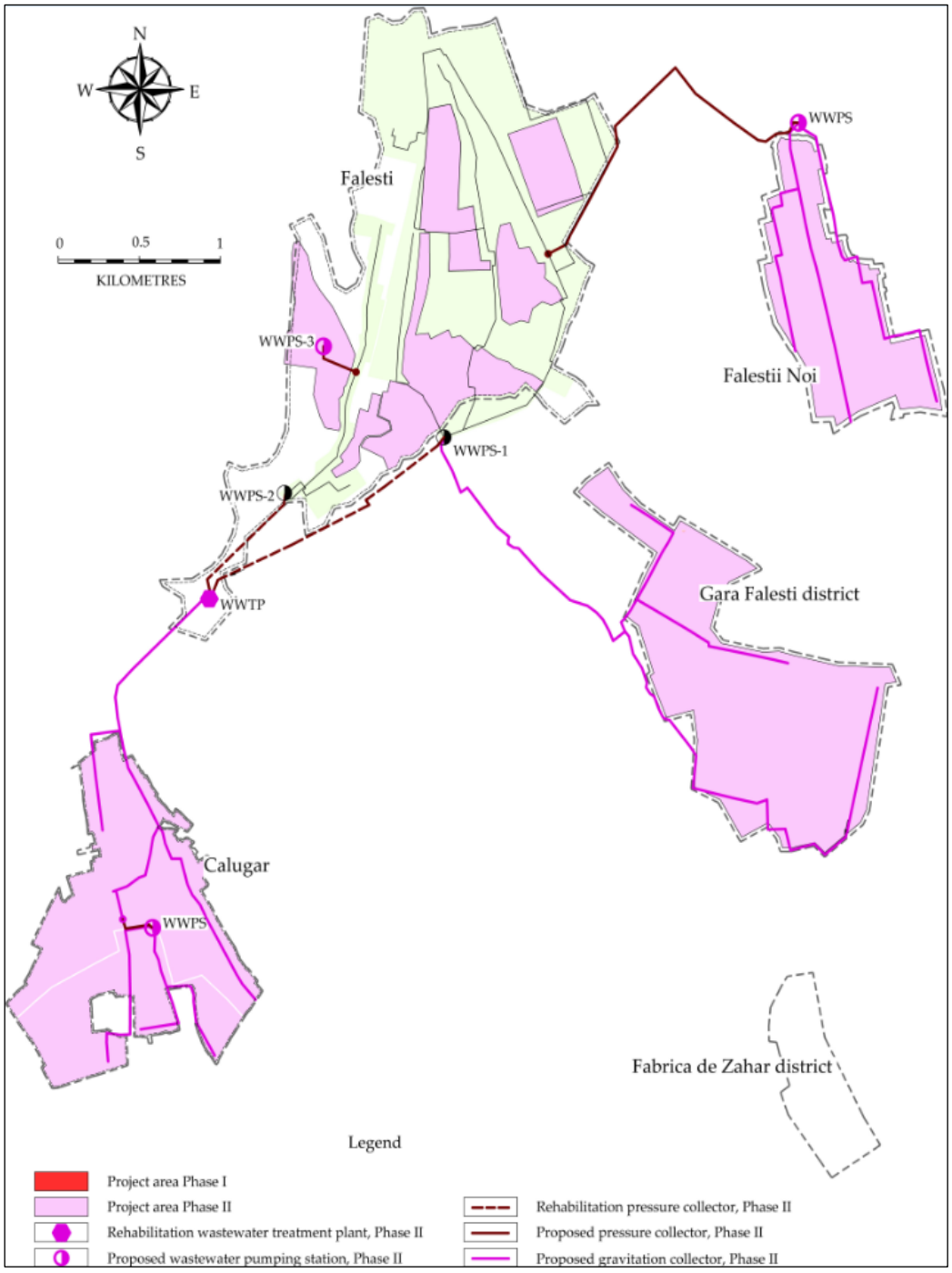
For the medium and long-term (starting with 2021) it is proposed to use a new WWTP for Falesti. The design capacity of the future WWTP will depend on the number of localities to be connected to the WWTP in Falesti in future. Therefore, the design capacity can only be roughly estimated at this stage. Further planning shall be based on the results of the technical assistance-study to be carried out in Phase 1 of this project. For the investment costs estimations in this study a WWTP of a capacity of about 19,000 P.E. for Falesti (treating wastewater for the entire study area) is calculated. This should not be understood as presumption of the result of the proposed analysis.

The localities of Falestii Noi and Calugar will be served in accordance with the results of the agglomeration analysis defined in the technical assistance-study. Due to the vicinity of the localities to the sewer network of the town of Falesti, preliminary assumption is to cover the localities of Falestii Noi and Calugar with sewer systems and to transmit the collected wastewater to the WWTP in Falesti (Phase 2).

The connection rate in these localities will reach about 50% after Phase 2 and will linearly increase to 90% in 2045 (details in Table below).

According the projections done in the study, the wastewater load generated in the town of Falesti and the two localities of Falestii Noi and Calugar will increase from currently 5,349 P.E. to 14,277 P.E. in 2021 and is projected then to increase to 19,802 P.E. in 2045.

Figure 0-2: Scheme of the existing and proposed extensions of the wastewater system in the town Falesti and the localities of Falestii Noi and Calugar



Priority Investment Plan:

The proposed Priority Investment Plan for Phase 1 and Phase 2 including capital investments, equipment and technical assistance as well as the benefit of the proposed measures is presented in the table below. The total cost for the measures in Phase 1 amount to about 2.2 MEUR and 16,135 people will benefit from the proposed measures. The total costs for measures proposed in Phase 2 amount to about 33.3

MEUR and 16,367 people will benefit from the measures. The total project costs for Phase 1 and Phase 2 amount to 35.5 MEUR.

Table 0-1: Proposed investment measures Phase 1 ("The Project")

N°	Measure	Costs [€]	Benefit
1	Capital Investment		
1.1	Rehabilitation of the water distribution network in the town of Falesti (11,555 m)	896,240	Level of service and efficiency improvement for all people covered with sanitation (5,563 in 2018)
1.2	Extension of the water distribution network in the town of Falesti (2,420 m)	190,476	Water supply coverage rate is increase from 95% to 96% (additional 87 people served)
1.3	Construction of water transmission main, (WTP Gara Falesti zone)	234,000	Enables the switch to a reliable water source (treated Prut River water, corresponding to national regulation)
1.4	Equipment and Tools for operational performance improvement	200,000	Level of service and efficiency improvement for all people covered by the water supply and wastewater system (16,135 in 2018)
ST-1	Sub-Total Capital Investment	1,520,716	
2	Technical Assistance	482,486	Level of service and efficiency improvement for all people covered by the water supply and wastewater system (16,135 in 2018)
3	Contingencies (10% of 1+2)	200,320	
GT-1	Total Costs for Phase 1	2,203,522	Additional 87 people will be served with water supply. In total 16,135 people will benefit from the water supply measures.

Source: GIZ/MLPS

Table 0-2: Proposed investment measures Phase 2

N°	Measure	Costs [€]	Benefit
1	Capital Investment		
1.1	Extension of the water distribution network (5,695 m) and water transmission mains (1,960 m) in town Falesti.	531,276	Water supply coverage rate is increase from 96% to 99% (additional 232 people served)
1.2	Rehabilitation of the water distribution network (9,960 m) in town Falesti.	608,905	Level of service and efficiency improvement for all people covered with water supply (16,367 in 2021)
1.3	Rehabilitation of the sewer network (6,822 m) and pressure mains (3,325 m) in town of Falesti	1,461,000	Level of service and efficiency improvement for all people covered with sanitation (16,367 in 2021)
1.4	Extension of the sewer network (43,000 m), construction of one wastewater pumping station and a wastewater treatment plant ((19,000 P.E.) in town Falesti.	15,843,200	Wastewater coverage rate increased from 33% to 96% in town Falesti (10,332 additional people served); Level of service and efficiency improvement for all people covered with sanitation in town Falesti (15,896 in 2021); Improved environmental performance; compliance with effluent standards.
1.5	Construction of the water supply networks (26,390 m), pressure mains (2,610 m), and two wastewater pumping stations in the localities of Falestii Noi and Calugar	2,747,970	Water supply coverage rate is increase from 0% to 88% (additional 3,656 people served)
1.6	Construction of the sewer networks (28,185 m), water trans-	5,863,544	Wastewater coverage rate increased from 0% to 88% in these two localities (3,594 ad-

N°	Measure	Costs [€]	Benefit
	mission mains (7,435 m), and two water storage facilities (100 m³ and 200 m³) in the localities of Falestii Noi and Calugar.		ditional people served); Improved environmental performance; compliance with effluent standards.
ST-1	Sub-Total Capital Investment	27,055,895	
2	Technical assistance	3,246,707	Level of service and efficiency improvement for all people covered with the water supply and wastewater system (20,030 in 2021)
3	Contingencies (10% of 1+2)	3,030,260	
GT-2	Total Costs for Phase 2	33,332,863	Additional 13,926 people will be served with sanitation and 3,888 with water supply. In total 20,030 people will benefit from the water supply and wastewater measures.

Source: GIZ/MLPS

Table 0-3: Summary of investment costs Phase 1 and 2

N°	Component	Costs Phase 1	Costs Phase 2	Costs Phase 1 & 2
		EUR	EUR	EUR
1	Water supply and wastewater, capital investments			
1.1	Water supply	1,320,716	3,888,151	5,208,867
1.2	Wastewater		23,167,744	23,167,744
1.3	Equipment and tools for operational performance improvement (water supply and wastewater)	200,000		
ST-1	Sub-total capital investments water supply and wastewater	1,520,716	27,055,895	28,576,611
2	Technical assistance	482,486	3,246,707	3,729,193
3	Contingencies	200,320	3,030,260	3,230,580
Total	**Total Costs Phase 1 & 2**	**2,203,522**	**33,332,863**	**35,536,385**

Source: GIZ/MLPS

Financial aspects

The financial and economic analysis was developed using the incremental analysis, which considers the differences in the costs and benefits between two alternatives. It compares the project scenario with the baseline scenario without the project or Business as Usual (BAU) scenario, which means ‘do-nothing’.

The financial and economic analysis is developed based on the macroeconomic assumptions which include the forecast of the principal macroeconomic figures such as: GDP per capita, the Real Wages increase, evolution of Electricity Prices etc.

In the last three years the Falesti Municipal Service Utility generated losses from operating activities between MDL 207.1 million to MDL 567.8, which reveals that the company encountered cash liquidity difficulties. In present the operator used the cash generated from depreciation to pay current liabilities, and no cash flow remains for investment purposes to rehabilitate and replace the fixed assets. As well, this means that the Falesti Municipal Service Utility has no creditworthiness capacity at the moment.

The investment costs of the project are estimated to amount of MDL 45.79 million or EUR 2.20 million. It is planned that the project will be implemented during a period of 3 years. In the first year it is planned that the project will be implemented in proportion of

10%, in the second year it is foreseen 50% to be covered and in third year - 40%. The Summary of the investment costs are presented in the table below.

Table 0-4: Summary of the investment cost (MDL mil)

Project investment outlays	2015 (MDL mil.)	2016 (MDL mil.)	2017 (MDL mil.)	Total (MDL mil.)
	10%	50%	40%	
Rehabilitation of water network	1.86	9.31	7.45	18.62
Extension of water network	0.40	1.98	1.58	3.96
Construction of water transmission main pipelines	0.49	2.43	1.95	4.86
Equipment and Tools	0.42	2.08	1.66	4.16
Detailed design and procurement	0.38	1.90	1.52	3.79
Technical assistance, supervision and capacity development	0.62	3.12	2.49	6.23
Contingency	0.42	2.08	1.67	4.16
Total	**4.58**	**22.90**	**18.32**	**45.79**

Source: GIZ/MLPS

The total investment outlays will be financed by: domestic and international donors; national sources (national development funds, local and central budgets, water operator sources) and citizens contribution.

The donor contribution was estimated to be approximately 86.4% of the total investment costs that constitutes about 1.90 MEUR, while the local sources' contribution is 13.6%, which is about 0.30 MEUR.

In the development of the financial forecast of the project was used the weighted average tariff for providing services. The proposed tariffs take into account the cost coverage principle and the tariff affordability level. The cost coverage principle means that the tariff should cover the operational costs and capital costs.

The weighted average tariff for delivering water services is proposed to get increased slowly in time, beginning from the actual tariff of 14.20 MDL/m^3 to approximately 26.00 MDL/m^3 in 2045. During the implementation period of the investment project, when capital costs increase significantly and water sale is limited, it is proposed that the depreciation cost do not be included in the tariff. The total costs (the operational costs and depreciation cost) will be covered by the mentioned tariff beginning with the year 2024.

The average tariff for water services will be about 15.00 MDL/m^3 in the period 2015-2020. After that, the tariff will increase gradually from 8.30 MDL/m^3 to 11.00 MDL/m^3 at the end of projection period. As well, the tariff for wastewater services will not include the full depreciation cost in the period 2016-2020, because of high depreciation cost of new assets realized due to the implementation of investment project. The total costs (the operational costs and depreciation cost) will be covered by the tariff beginning with the year 2021.

The tariff affordability rate in the whole projected period will be about 2.4%, which indicates that it is within the limits of accepted affordability threshold of 4%.

The cash flow projections for the entire reference period (30 years) reveal that the cumulative cash flow at the end of each year is positive. This is the basic financial figure that indicates that the project is **financially sustainable**. During the period of 30 years

the Falesti Municipal Service Utility will be able to generate cumulative cash flow amounted to MDL 42.14 million, which could be used for investments purposes.

The net present value (NPV) of the investment project calculated at a 5% discount rate for a 30-years operating period is negative (MDL – 35.37 million), which emphasize that the project does not generate a return and is financially unprofitable. The economic net present value (ENPV) of the investment project calculated at a 5% discount rate is MDL 12.34 million. Such as, the value of ENPV is higher than zero this indicates that from a public perspective the investment project should be implemented.

Procurement Plan:

In line with Moldova's policies and rules, the required public sector services and works contracts shall be awarded on the basis of open competitive tendering, which should assure a maximum of competition and transparency. The proposed procurement plan is presented in the table below.

Table 0-5: Procurement plan

N°	Description	Estimated contract value[1], EUR	Contract type	Procurement method
1	Design, engineering, supervision for Phase 1 investments	200,735	Consulting services	Competitive
2	Construction Works: Rehabilitation and extension of the water supply system in the town of Falesti and construction of a transmission main.	1,452,788	Works	Open
3	Supply of Equipment for operational performance improvement	220,000	Supply of goods	shopping
4	Technical assistance for: Corporate Development Programme, Stakeholder Participation Programme Water Supply Network Analysis and Water Loss Reduction Programme, Medium to Long-term Sanitation Study	330,000	Consulting services	Competitive
GT	**Total Amount**	**2,203,522**		

Source: GIZ/MLPS

Project implementation plan:

The implementation steps are based on having the funding arrangement concluded by end of 2015. The table below gives the project implementation plan for the proposed measures.

Table 0-6: Project implementation plan – milestones

N°	Item	Date
1	Contract award for consulting services	30.05.2016
2	Completion of consulting services	09.06.2019
3	Contract award for works contracts	31.03.2017
4	Completion of works contract	31.12.2017
5	End of defects liability period	31.12.2018

Source: GIZ/MLPS

[1] Including Contingencies

Environmental and social aspects

An Environmental Assessment (EA) was prepared in order to facilitate the implementation of the Project and to ensure that the envisaged Project objectives will comply with Moldova's environmental and social legislation, procedures and policies and international and EU conventions. In addition the EA Report addresses the environmental and social impacts, mitigation measures and management issues associated with the proposed objectives of the project.

According to the new law on environmental assessment (Law No. 86/29.05.2014 on Environmental Impact Assessment which is in force from beginning January 4, 2015) **none of the WSS objectives of the Project is subject to full scale EIA** on the national level.

For acquiring the environmental and construction permission it is required to prepare the documents for the SEE. This needs to be done in the design stage of the Project.

An assessment of the social and gender aspects was undertaken for Straseni feasibility study in May 2015 and its findings were integrated in the respective report. Given the scope of the proposed study ("no regret" measures to improve service provision) and taking into account that social and gender needs and characteristics do not differ much from a town/study to another, the conclusions reached during the field visit in Straseni are also applied to Falesti project. The tools applied in the field visit to Straseni were interviews with key stakeholders and focus groups disaggregated by gender with potential beneficiaries. Based on its findings a social and gender action plan was developed. The assessment of beneficiaries' needs and priorities by gender shows that the men and women have different needs and patterns in using the water and sanitation facilities. Therefore, these discrepancies and gaps need to be taken into consideration in the development and implementation of the Project.

1 Introduction

1.1 Preliminary and background

Since 2010, the Modernization of Local Public Services (MLPS) Project, acting on mutual agreement between Moldovan and German governments, has supported Moldovan Local Public Administrations (LPAs) in extending and modernising service provision in water supply and sanitation, solid waste management, regional and local roads, and energy efficiency of public buildings sectors.

The MLPS Project has the objective to improve the local public service delivery through local sector planning and programming, improving local public services infrastructure, and capacity development of local public administration and public service providers. As part of a major planning and programming effort, MLPS has assisted Moldovan partners to develop a pipeline of feasible, cost-effective investment projects in the aforementioned sectors.

Currently, the Water Supply and Sanitation (WSS) sector is characterised by an inadequate mid-term financial planning and a lack of a coordinated systemic approach to the development of a pipeline of priority projects. In typical practice in Moldova, investment projects are often developed based on insufficient grounds, which lead to an increased risk to project sustainability. In order to address this situation, a Water Supply and Sanitation Regional Sector Programme (WSS RSP) was developed considering all relevant international, national and sector policy documents, with the intention of contributing to the implementation of the national Water Supply and Sanitation Strategy (2014-2028). The WSS RSP includes an analysis of the current situation in the sector in the development region, a set of sectoral targets to be achieved over the medium to long-term, an action plan that identifies barriers that must be addressed in the sector in order for the investments to have their full impact and for conditions to improve in the sector, and the process, methods and criteria for identification of priority investment projects that contribute to change in the sector and the achievement of sectoral targets.

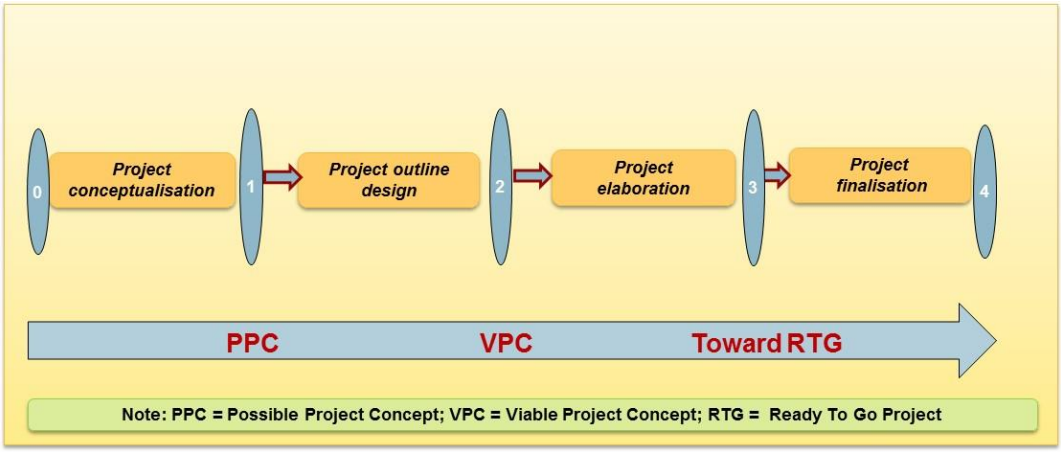
Based on the WSS sector development directions and criteria defined in the Programme, a list of possible project concepts was defined for further project development.

1.2 Project development pathway

This feasibility study is an integral part of a comprehensive and systematic project identification and development process, defined and promoted by the Ministry of Regional Development and Construction (MRDC) as the Project Development Pathway (PDP). The Pathway Approach is the framework for implementation of the project pipeline, which, in turn, is the instrument used to carry out the investment component of the WSS Regional Sector Programmes.

The **project pipeline is developed over five stages**. If and when financing is identified, the project can be finalized and become ready for implementation (“Ready-to-Go”).

Figure 1-1: Project pipeline process in overview



Source: GIZ/MLPS

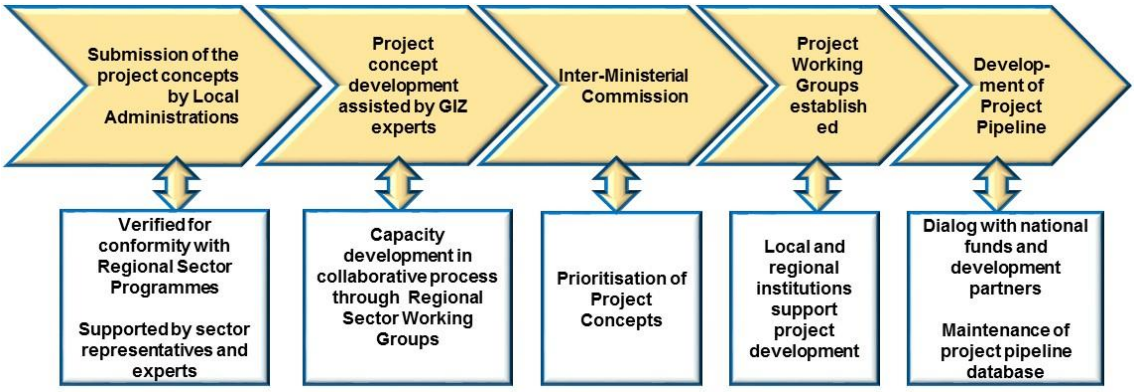
More specifically, the five stages of project development in MLPS are as follows:

- **Stage 0 – Development of Regional Sector Programmes – Identification of Project Idea**
  In each RSP, specific process, methods, and criteria by which possible projects are identified for their contribution to the targets set out in the RSP for the sector;
- **Stage 1 – Conceptualization (Possible Project Concept – PPC)**
  Possible project concepts are collected and screened for their compliance with and contribution to the targets of the RSP. Projects in this stage are termed "Possible Project Concepts";
- **Stage 2 – Project Outline Design (PPC to Viable Project Concept – VPC)**
  Project ideas that respond to a specific problem or set of problems are developed into possible project concepts and presented in brief reports outlining the objectives to be achieved by each project. Initial estimates for investment and operating costs are provided. Any potential barriers and risks to the development of the project are identified and assessed.
  Projects at the end of this stage are considered "Viable Project Concepts" and can be submitted to national and/or international agencies for further development and possible financing;
- **Stage 3 – Project Elaboration**
  Subject to availability of financial resources for further development, projects that contribute to the achievement of sectoral targets are further developed with a feasibility study, conceptual design, and EIA, as appropriate.
  Projects at the end of this stage are termed "Viable Project Concepts at Pre-final Stage" and can be submitted to national and/or international agencies for finalization and possible financing;
- **Stage 4 – Project Finalisation**
  For the projects that have some financing commitment in place, the remaining tasks related to preparation of tender dossier, including final technical design, can be completed. All issues related to permitting, land ownership/access must be concluded during this stage. The future organizational and institutional set-ups must be clear and agreed so that they are ready for implementation during the investment period. **Projects at the end of this stage are ready for implementation.**

These stages are somewhat fluid and vary from sector to sector. During the first PDP stages, RDAs along with the WSS sector working group identified 45 ideas for possible project concepts, out of which 31 PPCs have been identified as responsive to the WSS Sector policy documents. Further on, due diligence studies were conducted for the identified PPCs, and Inter-ministerial Commission identified 12 projects as most compliant to commonly agreed WSS sector development criteria, as project economic efficiency, contribution to achievement of sector goals, scale of regionalisation etc. A preliminary **Priority Investment Programme** (*further PIP, Programme*), covering period of 2015-2021, for each PPC was approved by the Inter-Ministerial Committee and was further developed in the feasibility study phase (Stage 3).

This collaborative process through which projects are developed is conceptualized in the following figure.

Figure 1-2: Project development and implementation



Source: GIZ/MLPS

This Feasibility Study (FS) Report constitutes the main output of Stage 3 of the PDP, proposing a structured phasing of the **Priority Investment Programme (PIP)** and creating necessary conditions for further implementation of the PIP in **Falesti Rayon**. The FS particularly focuses on implementation of the first phase of the PIP, covering period of 2015-2018 and further named *the Project*.

A Project Working Group (PWG), established by decision of the Rayonal Council and comprising members from the Regional Development Agency North (RDA North), the Falesti Local Public Administration (LPA) and GIZ/MLPS experts, was instituted to facilitate and coordinate the process of preparation and agreeing this feasibility study, in particular the scope of the proposed project. The same PWG will endorse the study for approval by the Falesti Rayon council.

1.3 PIP Service Area

The programme area was defined using, but not limited to, the following key sector development criteria set in the WSS RSP:

- **Regionalisation and scale of the project** – Only rayon capitals with associated localities, as well as urban/rural agglomerations over 10,000 people were considered. The integrated approach to WSS services development requires development of both water and wastewater services. As part of the EU-Moldova Association Agreement, the Government of Moldova is committed to harmonize National legislation and implement the provisions of the EU Directives, including the

Council Directive 91/271/EEC concerning urban wastewater treatment, requiring implementation of wastewater collection and treatment in the first place in localities over 15,000 people (10,000 in sensitive areas). Applying the logic of the integrated service, this condition for wastewater systems is extended over the water supply service as well;

- **Presence of source of treatable drinking water, including abstraction and treatment facilities.** Water quality is essential to consumers. Supplying customers with treated surface water is the prioritized strategic approach;
- **Presence of functioning wastewater collection systems with wastewater treatment facilities**. As stated the requirement of the UWWT Directive shall be considered and the proposed PIP shall tend to contribution to (at least) partial achievement of the requirements;
- **Agreement between beneficiaries and a sustainable WSS operator**. The inter-municipal cooperation between the potential project beneficiaries is a key to successful regionalisation of services. The current legal framework enforces the Local Public Administrations to adopt the most appropriate way of provision of WSS service in their respective localities, and therefore a strong willingness of the LPAs is required to organise a regionalised WSS service.

Also, one of the major WSS services development constraints identified in the WSS RSP is poor and inadequate operational capacity of the existing WSS companies. Taking into consideration current institutional and operational arrangements, the RSP recommended that strengthening of the water utility's capacities within the existing service area shall be supported in the first place and in the short-term followed by extension of services, not exceeding double the size of the water utility's existing service area. This was considered to prevent water operating companies from financial/operational/institutional collapse and set reasonable geographic boundaries for short-term regionalisation of the WSS services.

In Falesti Rayon, an agglomeration satisfying the WSS development criteria was identified in the area of the Rayon centre, **the Town of Falesti**, with the following Local Public Administrations, which expressed their willingness to cooperate and benefit from regional WSS services under the PIP:

- Locality of **Falestii Noi**;
- Locality of **Calugar**.

The above mentioned localities form the PIP service area for development of the regionalised WSS services in the Rayon of Falesti, which is expected to be gradually implemented in accordance with the proposed phasing of infrastructure investments during 2015-2021.

The first phase of the PIP (**the Project**) includes improvement of WSS services in **the town of Falesti**.

This FS Report covers the entire PIP area, having particular attention on the first phase investment Project area. In the longer term, the project service area is to be extended, with flexibility to include additional localities from the Falesti Rayon and other neighbouring areas, where deemed technically and economically feasible.

1.4 Identified problems

The following major problems to be addressed in the feasibility study were identified during the preliminary project stages:

- Insufficient area coverage of the WSS services. Only parts of the town of Falesti benefit from the water supply, while the wastewater services are provided only to a limited urban area;
- Unsatisfactory levels of service, including:
  - Continuity of water and wastewater services. Although central part of Falesti Town is continuously provided with water, some marginalized parts of the town have often interruptions supply due to bursts, leakages and insufficient network pressure. Certain parts of the town continuously suffer of sewer blockages;
  - Currently, groundwater quality is not compliant with the National Standards. This Feasibility Study does not address this issue directly, while it is assumed that surface water of drinking quality will be provided from the Prut-Falesti pipeline in the foreseeable future.

As for the operational efficiency, the main problems encountered by the company are, as follows:

- High non-revenue water (NRW) ratio. Increased level of NRW results (around 48% in 2015) results in higher energy consumption for water pumping and consequently increased water tariffs;
- High staff efficiency ratio, as a result of inefficient operation of facilities and overstaffing of the utility;
- Poor asset management and lack of preventive maintenance, resulting in obsolete pipelines and facilities.

Further sections of the feasibility study address the major problems identified in the preliminary stages and provide appropriate measures split into implementation phases.

1.5 Study objective

The objective of the present Feasibility Study is the development of an affordable, least-cost and cost-effective phased investment programme for water and wastewater infrastructure to be rehabilitated and extended, as well as facilitation of regionalisation of the WSS services and inter-municipal cooperation with strong social and environmental benefits, as part of the implementation of the provisions of the WSS Regional Sector Programme and Water Supply and Sanitation Strategy (2014-2028).

The proposed Priority Investment Programme (2015-2021) is expected to result in improved access to regional water supply and sanitation services for the Town of Falesti, as well as the localities of Falestii Noi and Calugar, and to contribute to the achievement of the regional WSS sector development indicators on access to water supply and wastewater services. The aim of the PIP is to extend the coverage and connection rates of the population connected to the regionalised water supply services by 20% from 76% to 96% of coverage rate and by 14% from 49% to 63% of connection rate, as well as increase of coverage and connection rates to wastewater services by 67% from 27% to 94% of coverage rate and by 40% from 23% to 63% of connection rate. Also, other major effect of the PIP is the rehabilitation and improvement of existing water

supply services for 59% of population connected and for 18% of population connected to wastewater services.

The aim of the first phase (the Project 2015-2018) for the town of Falesti is to extend the access of the population to water supply services by 1% from 95% to 96% of coverage rate and by 1% from 61% to 62% of connection rate and to rehabilitate and improve existing water supply services for 27% of population connected.

Table 1-1: Main service indicators

Indicator	Current connection rate	The first phase Project (2015-2018)		The second phase (2018-2021)		Priority Investment Programme (2015-2021)	
		Rehabilitation	Extention	Rehabilitation	Extension	Improvement	After PIP
Share of population directly benefitted from the rehabilitated and extended water supply services							
Urban	61%	27%	1%	32%	1%	61%	63%
Rural	0%	0%	0%	0%	61%	61%	61%
Share of population directly benefitted from the rehabilitated and extended wastewater supply services							
Urban	29%	0%	0%	18%	37%	55%	66%
Rural	0%	0%	0%	0%	51%	51%	51%
Non-Revenue Water Ratio, %	48%					8%	43%
Continuity of water service (hours/day)	24					24	24
Number of beneficiary localities covered by regional WSS services (urban/rural)	0/0	1/0	1/0	1/2	1/2		
Number of sustainable regional WSS operators instituted	0	1	1	1	1		

2 Socio-economic aspects

2.1 Coverage area

This Feasibility Study covers the area that includes the territory of the town of Falesti and the localities of Falestii Noi and Calugar, as shown in Figure 2-1.

Figure 2-1: Map of the feasibility study localities

Source: www.google.com/maps/place

2.1.1 Geographical Conditions of the coverage area

Falesti Rayon is situated in the north-wester part of Republic of Moldova, and also borders the following rayons of Glodeni to the north, municipality of Balti to the north-east, Singerei to the east, Ungheni to the south and Romania to the west. The rayon centre is the town of Falesti.

Table 2-1: Population and area of the localities covered in this feasibility study

N	Name of FS localities	Population	Area [km^2]
1	Falesti	16,900	14.8
2	Falestii Noi	2,076	1.04
3	Calugar	2,140	1.49
	Total	**21,116**	**17.33**

Source: GIZ/MLPS

Falesti Rayon covers an area of is about 1,072 km^2.

2.1.2 Geographical Conditions of the Feasibility Study area

Falesti Rayon comprises 76 localities, including 1 town, 32 communes and 43 localities.

Town of Falesti is situated in the north-western part of Republic of Moldova and in the center of Falesti Rayon, at a distance of about 126 km from the city of Chisinau and 28 km from the city of Balti, bordering with Falestii Noi, Calugar, Albinetul Vechi and Pinzareni localities.

The area of the town of Falesti is about 14.8 km^2. The mentioned surface includes two small lakes with total area of 0.48 km^2.

Commune of Falestii Noi (the localities of Falestii Noi and Pietrosul Nou) is situated at a distance of 4 km east from the town of Falesti and about 135 km from the city of Chisinau, bordered with Falesti, Egorovca and Hitresti localities. Falestii Noi has an area of about 1.04 km^2, with a perimeter of 4.81 km.

Commune of Calugar (the localities of Calugar, Frumusica, Socii Noi and Socii Vechi) is situated at a distance of about 4 km south-west from the town of Falesti and about 140 km from the city of Chisinau, bordered with Falesti, Sarata Veche and Albinetul Vechi localities. Calugar has an area of about 1.49 km^2, with a perimeter of 7.26 km.

2.2 Relief and climate conditions

Falesti Rayon is situated at an average altitude of 133 m above sea level, on the Northern Plain of Moldova. The relief consists of plains, hills and small hills located uneven, slightly affected by soil erosion and landslides. A flat landform with relative height up to 9 m prevails in this region.

The soil structure is diverse and differentiated into various types of soil. The most common type are typical and usual chernozem, representing 68% of all arable land. The others are brown soils - 14% and grey soils.

Hydrographic system of the rayon consists of the following rivers: Prut, Camenca, Sovatul Mare and Sovatul Mic, Girla Mare, Soltoi, Lucaceni, Obreja, Girlisor, Comatui, Ciulucul Mare and Ciulucul de Mijloc and Rautel. The surface of the hydrographic system of the district is 318.6 kilometers.

The climate of the Falesti rayon belongs to temperate - continental type, characterized by relatively warm winters with little snow and very hot and long summers. Rainfall varies between 500 and 600 mm annually.

The soil freezing depth is 0.8 m and the seismicity is 7-8 degrees.

2.3 Socio-economic data

The total official number of inhabitants of Falesti Rayon is about 90,320 persons; including an urban population of about 14,293 persons; rural population of about 74,349 people; with population density of 85.6 inhabitants per 1 km^2.

The ethnical structure of Falesti Rayon as follows: Moldovans – 76,169 people or 84.33%; Ukrainians - 10,711 persons or 11.86%; Russians – 3,064 persons or 3.39%; Bulgarians - 32 persons or 0.04%; Gagauzians – 39 persons or 0.04% and others - 222 or 0.25%.

The most recent vital statistics for the rayon are provided in the following table. The table exemplifies the slow growth occurring in the rayon, taking into account the birth and death rates. As discussed in the next section, however, outmigration is causing an overall population decline.

Table 2-2: Vital Statistics of Falesti Rayon for 2014, persons

	Locality	Born	Deceased	Natural Growth
1	Falesti Rayon	1,172	1,116	56
2	Falesti Town	219	172	47
3	Rural Localities	953	944	9

Source: National Bureau of Statistics, 2015, www.statistica.md

The Town of Falesti is the administrative centre of Falesti rayon, with a total population number of 16,900 inhabitants, of which men – 8,993 persons and women – 7,907 persons.

Currently, about 3,250 economic agents are active in Falesti town.

The educational system of town of Falesti includes three lyceums; one secondary school; two gymnasiums out of which one is carries its activities as a boarding school; one vocational school; six kindergartens and one children creativity centre.

Town of Falesti includes the following cultural institutions: two public libraries; one museum; one Palace of Culture and five other institutions.

Healthcare system consists of 12 institutions, including: a hospital; one centre of family doctors; one centre of medical assistants and midwives; one ambulance service unit and eight pharmacies.

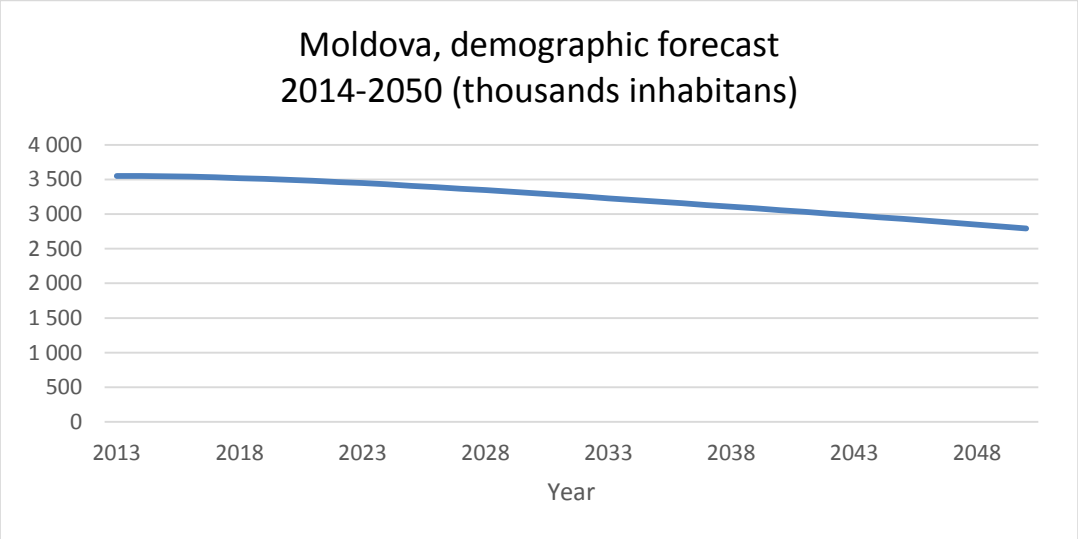
2.4 Population

Immediately upon gaining its independence in 1991, the Republic of Moldova faced economic hardships that severely affected demographic indicators. The main factors affecting demography are outmigration for economic reasons and a decline in the birth rate. These trends began with the military conflict in Transnistria in 1992, which prompted a wave of emigration from Moldova toward Russia and Ukraine, followed by migration towards current European Union Member States (mainly Italy, Poland, and Romania). These trends were exacerbated during the Russian financial crisis in 1998. The total outflow of emigrants comprises 17.3% of the total population residing in Mol-

dova in 1991, with some estimate reaching 25% (circa 1 million). For the purpose of this feasibility study, the authors considered as a baseline the prognosis of United Nations, which indicates a negative population growth as depicted in the figure below.

The scenario for demographic evolution is derived from the UNDP prognosis for the country up to the year of 2050.

Figure 2-2: United Nations Development Programme population forecast for Moldova



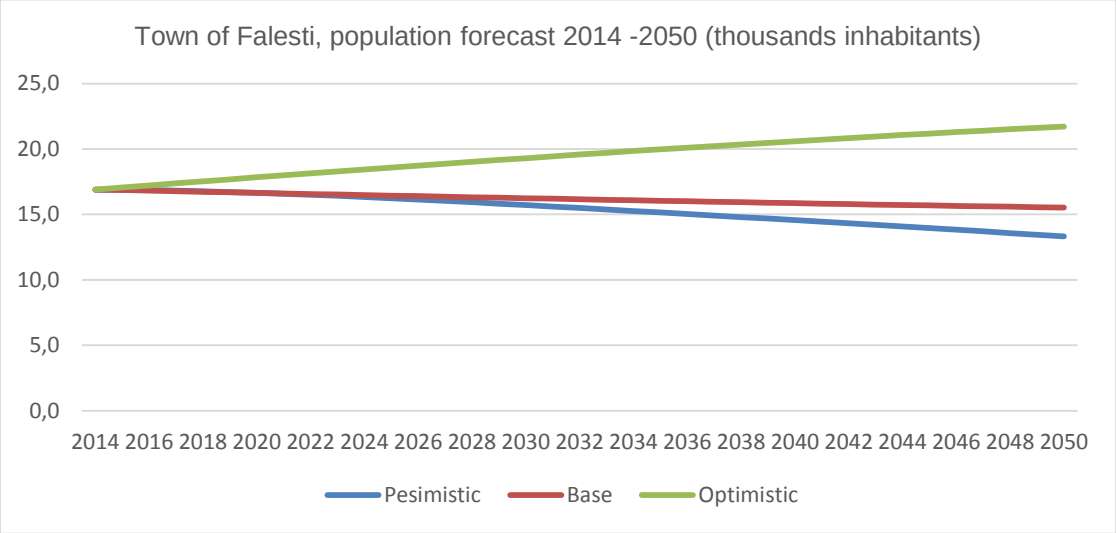
Source: UNDP, World Population prospects, 2013, internet: esa.un.org/wpp/

The feasibility study considers that the same national trend will apply uniformly to each rayon population.

Furthermore, the evolution of the demography for the rayons was compared to the evolution of the demography of the urban centres of the respective rayons for the last 10 years. Based on that, the internal migration rural-urban was calculated and three scenarios were derived:

- No internal migration: The rayon population and the rayon centre population follow the same national demographic trend (pessimistic scenario);
- The average migration of the last 10 years for each respective rayon for rural-urban migration (base scenario);
- The maximum migration rate from all the past 10 years for each respective rayon (optimistic scenario).

Figure 2-3: Population forecast for town of Falesti, 2014-2050

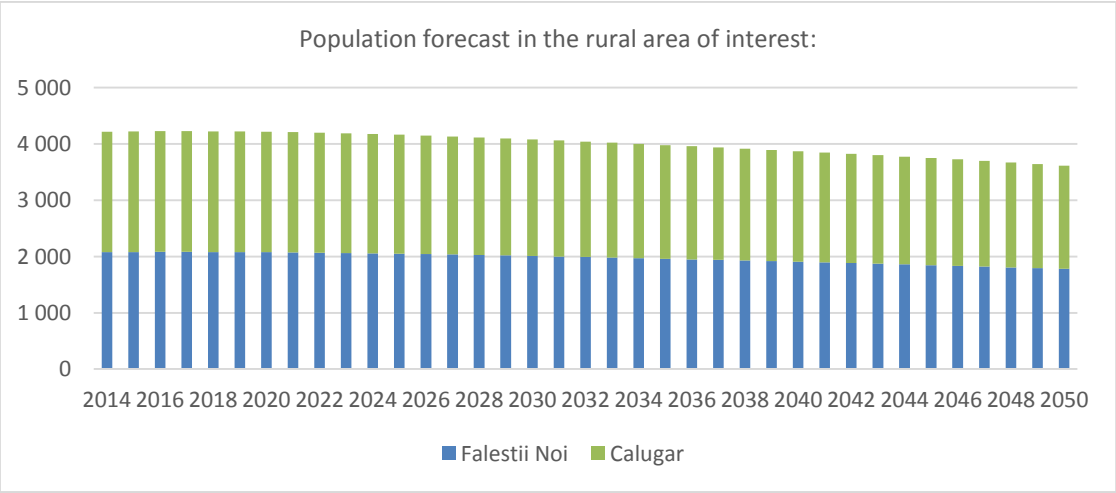


Source: GIZ/MLPS

Further in this feasibility study (year 2015, with the expectancy that the detailed design year will be executed in 2016), the population forecast uses the base scenario. It is expected that the population will decrease from 16,900 inhabitants in 2014 to 15,552 in 2050, almost similarly to the national trend, migration being the main factor affecting the demographic trend.

In regard to rural population, the population forecast reflects the national descendent trend and additionally, will be affected by the rural-urban migration. The area of interest of the project includes two localities: Calugar (current population 2,076, forecasted to decrease to 1,780 inhabitants by 2050) and Falestii Noi (current population 2,140, forecasted to decrease to 1,835 inhabitants by 2050). As it can be seen from the figure below, it is assumed that the rural population will decline at a steep rate.

Figure 2-4: Population forecast for rural area covered by the FS, 2014-2050



Source: GIZ/GOPA

2.5 Employment

Although in the last 15-20 years the major factories from Falesti, such as 'Urban utility vehicles' JSC, subsidiary of dairy factory 'Incomlac' JSC or state enterprise 'Selihoz-tehnica' have stopped their activity because of the economic crisis, the current situation of the employment in the town of Falesti stabilised and began to improve.

The number of registered unemployed persons registered in Falesti shows a constant decrease in the last 5 years, due to new businesses especially with foreign capital. The decreasing rate of unemployed can also be explained by migration.

Currently about 3,250 businesses are registered in the town of Falesti. The main branches of the local economy are light industry, machinery construction industry and food industry (food processing). Among the main enterprises in the town are sugar factory within the group of companies 'Sudzuker-Moldova' JSC, with 390 workers. Another important enterprise is factory 'MUS'JSC dealing with machinery construction with about 110 employees. Other important businesses in Falesti are: 'Protos' JSC - pipe producer, 'Mold-Nord' JSC – winery, 'Avicola-Nord' JSC - the poultry factory, etc.

Enterprises with foreign capital 'Marthatex' Ltd, 'Schleich Manufacturing' Ltd and 'Itex-Group' Ltd representing light industry became the largest employers for women in the town and surrounding localities, having a positive impact on the rate of migration. The pipe producer 'Protos' JSC and "Sammy Cablaggi" Ltd (automotive industry) maintain the industrial potential of the town, employing engineers and technicians from locality.

The objective of creating new jobs by attracting both local and foreign investments is reflected in the Integrated Sustainable Development Strategy of the town of Falesti for 2015 - 2020, which should enable the creation of new enterprises with application of updated technologies. It is important to mention the involvement of LPA and local companies in international projects, particularly infrastructure rehabilitation, which also contributes to reducing unemployment and creation of new jobs.

Overall, the unemployment rate of 4.7% in 2014 in the town of Falesti is slightly higher than that of Moldova (3.9% for 2014), but having a constant downward trend during the years 2011-2014 due to aforementioned factors.

Table 2-3: Unemployment rate in the town of Falesti (%)

Year	2011	2012	2013	2014
Town of Falesti	9.6	6.5	5.3	4.7

Source: Falesti rayon statistic department

Table 2-4: Number of active population in the town of Falesti

Year	2011	2012	2013	2014
Town of Falesti	6,919	7,295	7,461	7,545

Source: Falesti rayon statistic department

Table 2-5: Number of the unemployed persons in the town of Falesti

Year	2011	2012	2013	2014
Town of Falesti	665	477	394	352

Source: Falesti rayon statistic department

The largest employers are presented in the table below.

Table 2-6: The main employing companies in the town of Falesti

Company name	Company specialization
'Sudzucker-Moldova' JSC	Food industry
'Marthatex' Ltd	Light industry
'Schleich Manufacturing' Ltd	Light industry
'Itex-Group' Ltd	Light industry
'Protos' JSC	Machinery construction industry
'MUS' JSC	Machinery construction industry
'Sammy Cablaggi' Ltd	Machinery construction industry
'Mold-Nord' JSC	Agri-food industry (winemaking)
'Avicola-Nord' JSC	Agri-food industry
'Solconat' Ltd	Construction industry
'Adirem-Com' Ltd	Construction industry
'Atlant' Ltd	Construction industry
ME 'HCSWU' Falesti	Water supply and sanitation services

Source: Falesti rayon statistic department

2.6 Affordability

Affordability refers to the ability or willingness of household customers to pay for water supply and wastewater services. The typical measure of affordability is the ability to pay for services, as measured using a threshold percentage of household income devoted to paying for the cost of the water supply and sanitation services.

Therefore, the required information to estimate household affordability is disposable household income (typically, this is measured average household income; a better measure, however, is to examine various household income groups, such as in quintiles from lowest income to highest), average per capita water consumption, and unit cost per unit of consumption.

For the current analysis, average household income for Development Region North was used, based on available statistical data only (without taking into account additional income from the "grey economy" or remittances from abroad). The official income data for 2015 were adjusted according to the income forecasts of the Moldovan government.

The evolution of the average household disposable income is shown in the table below.

Table 2-7: Evolution of the household average income per capita/month by region (MDL)

Disposable income (MDL), prognosis				
Region	2012	2013	2014	2015
North	1,412.60	1,572.60	1,653.56	1,738.69
Centre	1,317.20	1,437.90	1,511.93	1,589.76
South	1,247.20	1,419.10	1,492.16	1,568.98

Source: National Bureau of Statistics

After 2015, household income is assumed to growth by 4% per year in real terms.

According to the National Bureau of Statistics, the average households income in Moldova in 1st quarter was 1,768.23 MDL/person/month (Quarterly bulletin, I, 2015) while in the North region it was 1,738.69 MDL/person/month.

The average bill for water and sewage, taking into account the average consumption of 60 litres per capita per day (lcd) and the current price in Falesti of 21.60 MDL / m^3, can be estimated as follows:

- 0.060 m^3/d x 30 days x 21.60 MDL / m^3 = 38.88 MDL;

Comparing this figure to the average household income of 1,738.69 = 4,172.86 MDL, the affordability ratio reaches 2.2%. The United Nations Development Programme has recommended a 3% affordability limit, the Organization for Economic Co-operation and Development (OECD) 4% for poor families in Eastern Europe, Caucasus, and Central Asian countries, and the Asian Development Bank 5%. Taking into account the mentioned above, it can be stated that the population can support a further increase in tariff, as a result of the newly proposed infrastructure investments

3 Legal and institutional framework

3.1 The legislative framework regulating water supply and wastewater services sector

3.1.1 European legislation on water supply and wastewater services

The water sector is one of the most regulated areas in the EU, in order to ensure the careful use of water resources and to minimize adverse impacts of water production and consumption on water quality.

Directive 2000/60/EC establishing a framework for Community action in the field of water is a keystone in the history of water policies in Europe. It establishes a common framework for sustainable and integrated management of all water bodies and requires that all impact factors and economic implications as well to be considered. Waters in the European Union are under increasing pressure, given the continued growth in demand for good quality water in sufficient quantities for a range of uses. The aim of this Directive is to protect and improve water quality by providing rules for stopping the deterioration of all water bodies in the European Union and achieve "good status" of rivers, lakes and groundwater in Europe.

Another regulation in the European Union, intended to protect human health by establishing strict standards for drinking water quality, is Directive 98/83/EC on the quality of water intended for human consumption, which amends Directive 80/778/EEC of 15 July 1980. The objectives of the Directive are to protect public health from the effects of any type of contamination of drinking water by ensuring quality. In order to ensure those the Directive requires the establishment of a program of measures to improve water quality. Member States have to monitor drinking water quality and take the necessary measures to ensure compliance with the standards.

In turn, the wastewater produced by the population and industry is an important source of pollution that can affect the quality of drinking and bathing waters, hampering the achievement of goals set out by Water Framework Directive.

Directive 91/271/EEC concerning urban wastewater treatment aims to protect surface waters, including those from the coastal territories, by regulating collection and treatment of urban wastewater and discharge of the biodegradable industrial wastewater (coming mainly from the agri-food industry). The Directive is often considered expensive, but proposes solutions to overcome these challenges that mean tremendous benefits for our health and the environment. Like other legislative acts of EU regarding water, the Directive provides clear and binding targets, while being very flexible in the means of achieving them. The Directive allows alternative solutions and encourages innovation, concerning both wastewater collection and treatment.

3.1.2 Transposition and implementation of the community environmental acquis

By signing the Association Agreement, the Republic of Moldova committed to implement the relevant environmental legislation of the European Union (including that regarding water quality and resources management) into its national legal system by adopting or changing national legislation, regulations and procedures.

The Republic of Moldova has to align national legislation with community environmental acquis in terms (3-8 years from the entry into force, starting September 1, 2014) and conditions listed in Annex. XI Chapter 16 (Environment) of the Association Agreement Republic of Moldova - European Union[2].

Fulfilment of the assumed obligations started with the adoption of Government Decision no. 808 of 10.07.2014 regarding the approval of the National Action Plan for the implementation of the Association Agreement Moldova - European Union in 2014-2016.

These measures concern in particular the following tasks: completing the process of developing a mechanism to implement the Water Law; initiating assessment of the situation in the field of urban wastewater collection and treatment and identifying sensitive and less sensitive areas; drafting law on drinking water quality in accordance with Directive 98/83/EC on the quality of water intended for human consumption, as amended by Regulation (EC) no. 1882/2003; drafting Government Decision on the approval of sanitary regulations for small drinking water systems; and drafting Government Decision on the approval of sanitary regulations for drinking water quality monitoring.

Given these ambitious goals, Moldova has started to transpose and implement the Directives of the European Parliament and the European Council into Moldovan legislation by adopting the following legislation and regulations:

- Water Law no. 272 of 12.23.2011 is partially harmonized with Council Directive no. 91/271/ EEC of 21 May 1991 on urban wastewater treatment and no. 91/676 EEC of 12 December 1991 on waters protection against pollution caused by nitrates from agricultural sources, with European Parliament and Council Directives no. 2000/60/EC of 23 October 2000 on establishing a framework for the Community action in the field of water policy; no. 2006/7/EC of 15 February 2006 concerning the management of bathing water quality; no. 2007/60/EC of 23 October 2007 on the assessment and management of flood risks; no. 2008/105/EC of 16 December 2008 on environmental quality standards in the field of water, creates the legal framework, necessary for water management, protection and use;
- Regulations on requirements for wastewater collection, treatment and discharge into the sewage system and/or in water receiving bodies for urban and rural areas, approved by Government Decision no. 950 of 11.25.2013, partially transposes the provisions of Council Directive. 91/271/EEC of 21 May 1991 on urban wastewater treatment;
- Regulations on conditions for wastewater discharge into water receiving bodies, approved by Government Decision no. 802 of 10.09.2013, transposes art. 2 and 3 of Directive 2009/90/EC of Commission of 31 July 2009 on establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, technical specifications for chemical analysis and monitoring of water status; Annex III of Directive 91/271/EC of 21 May 1991 of Council regarding urban waste water treatment; Annex VIII of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water.

[2] www.parlament.md

3.1.3 National legislation for water supply and wastewater public services

The legal and normative framework in force which governs water supply and wastewater services sector, although harmonized only to a small extent with European legislation, represents the legal basis for the establishment, organization, management, financing and monitoring of the functioning of these services.

The legal regulation of decentralised water supply and wastewater services is not a subject to a single legislative act, these being reflected in many laws and regulations, which are listed in Annex 3.

However, the framework act for this sector is the Law on water supply and wastewater public services no. 303 of December 13, 2013, which defines the legal framework for the establishment, organization, management, regulation and monitoring of the functioning of the public service on raw and drinking water supply; public service on wastewater and industrial and domestic wastewater treatment in terms of accessibility, availability, reliability, continuity, competitiveness, transparency, compliance with quality, security and environmental protection.

The new law regulates public authorities (central and local public administrations) competences in water supply and wastewater services sector; the establishment of the National Agency for Energy Regulation as the regulator in water supply and wastewater services sector; service management, where local authorities can opt either for direct management or for delegated management; delegated management contract on water supply and wastewater services provision, as the only legal act that can establish rights and obligations of the parties; terms for delegating services provision based on public tender organised under the law; operator licensing under conditions of competition; endorsement and approval of tariffs for this service etc.

Adoption of Law 303 of 13 December 2013 started the process of amendment of the existing legislation, which is to be followed by putting into practice these regulations.

3.2 Administrative framework

3.2.1 At national level:

The Ministry of Environment, Ministry of Regional Development and Construction, Ministry of Health and Ministry of Finance and State Chancellery with are competent authorities in the regulation and development of the water supply and wastewater services sector.

The Ministry of Environment is the main state institution, responsible for the development of national policies, legislative and regulatory framework and the subsequent implementation of the provisions of the policy documents, including the programming and implementation of investment needed in water supply and wastewater infrastructure. Additionally, the Ministry of Environment manages the National Ecological Fund.

The Ministry of Regional Development and Construction is responsible for the planning and development of water supply and sanitation at regional level and substantially involved in planning and infrastructure development through the three Regional Development Agencies. Additionally, the Ministry of Construction and Regional Development administers the National Fund for Regional Development. Together with the national Ecological Fund, these funds are the most important sources of national funding in the water supply and wastewater services sector.

The Ministry of Health oversees the population’s health and sets up priorities related to public health; promote provisions regarding health aspects into all public policies and

supports their effective implementation in other sectors to maximize health gains. The Ministry of Health establishes and monitors all aspects of water quality in the field of water supply and wastewater services sector.

The Agency ‘Apele Moldovei’ under the Ministry of Environment is charged with implementing national policy in water management, hydro-reclamation and water supply and wastewater services sector.

The Agency for Geology and Mineral Resources under the Ministry of Environment is responsible for implementing state policy on geological research, and use and protection of soil and groundwater. Hydrogeological Expedition "EHGeoM" is under the Agency for Geology and Mineral Resources, providing services related to drilling artesian wells.

The National Agency for Energy Regulation is the regulator of water supply and wastewater services in terms of approving regulations and the tariffs for these services, giving licenses to the operators working in the field of energy supply and monitoring its activity.

At the national level, there are two main non-governmental associations, namely Water Operators Association of Republic of Moldova ‘Moldova Apa-Canal’ and the Congress of Local Authorities in Moldova.

Data on water supply and wastewater services sector are regularly collected and processed by the National Bureau of Statistics.

Moreover, it should be noted that besides the competent authorities indicated above, a series of other authorities play, directly or through their subsidiaries, more or less significant role in the monitoring and supervision of the water supply and wastewater services sector. These are, in particular:

3.2.2 At local level

In Republic of Moldova, the local government is organised on two levels: level 2 is the rayon public authorities, while the level1I is the public authorities in towns and localities. The water supply and wastewater public services are set up, organised and managed under the direction, coordination, supervision and responsibility of local public administrations of level 1, represented by local councils, as deliberative authorities, and mayors as executive authorities.

About 35 operators in Moldova provide water supply and wastewater services in urban areas, with the legal form of joint-stock companies or municipal enterprises. Of these, seven can be considered as regional operators, because they provide water supply and wastewater services in towns and neighboring administrative-territorial units. In rural areas, services are provided either by local administrations, under the direct management or by sole proprietorships, limited liability companies or water user associations, under delegated management

3.3 National policies in water supply and wastewater services sector

Up to 2013, there was essentially no planning in the WSS sector at national, regional and local level. Since then, a new sectoral strategy and regional sector programmes have been completed. Thus, the development of water supply and wastewater services sector is based on its principal document which is Water Supply and Sanitation Strategy (2014-2028) and other development policies of the Republic of Moldova, including the National Regional Development Strategy (2013-2015). This framework aims to improve national policies and harmonize the legal framework with the community acquis

and European standards. The National Regional Development Strategy sets out a number of directions of water supply and wastewater services sector development, including national targets for achieving the Millennium Development Goals.

The Water Supply and Sanitation Strategy has new approaches for structuring, financial planning and project identification, on which sector development should be based.

The strategy proposed institutional reforms of the sector, including a new authority as sector regulator - the National Agency for Energy Regulation which would be responsible to develop pricing and regulating policy for operators based on performance indicators.

The strategy also states the need to develop inter-municipal cooperation in the development and provision of water supply and wastewater services by regional operators. Services provision can be ensured by means of public services delegated management contract concluded between local authorities and regional operator, before the implementation of investment projects in infrastructure.

'Regionalisation' is a key aspect of development policy in water supply and wastewater services sector. This policy aims to improve sector performance through better management and economies of scale.

Regionalisation of water supply and wastewater services, which intends to overcome excessive fragmentation of the sector, is aimed at concentrating water supply and wastewater services around strong regional operators, set up and developed by merging local operators.

Thus, it is foreseen that municipal enterprises will be reorganised into commercial companies and will extend the water supply and wastewater services area to other administrative-territorial units, with the aim of becoming economically viable regional operators.

The Strategy also places emphasis on the need to prepare Water Supply and Sanitation Development Plans (equivalent to so-called Master Plans) and feasibility studies in order to attract investments in the sector. Actions indicated in the Strategy will require a major financial commitment that goes beyond the national sources that are available.

In 2014, the Regional Development Councils from North, Centre and South approved Regional Sector Programmes (RSP) in the WSS sector. The RSP is an operational tool that links local and regional priorities with the national strategy within the WSS sector. Based on an analysis of the current situation in the respective region and national sectoral targets, the RSP provides the process, methods and criteria by which priority projects are identified for further development and implementation.

3.4 Organization of water supply and wastewater services in the administrative-territorial units covered in the feasibility study

3.4.1 Organization and management of water supply and wastewater services

As stated, this study covers the town of Falesti; commune of Falestii Noi with its localities Falestii Noi and Pietrosul Nou and commune of Calugar with its localities Calugar, Frumusica, Socii Noi and Socii Vechi.

To date, in the town of Falesti has organised water supply and wastewater services, organised and managed under the leadership, coordination, control and responsibility of the Falesti local public administrations, represented by the Falesti Local Council as deliberative authority, and Falesti mayor's office, as executive authority.

The water supply and sanitation services in the town of Falesti are provided by the Falesti Municipal Services Utility and this is intended to remain in the future.

In general, Municipal Services Utility provides different municipal services, including water supply, wastewater collection and treatment, heating, town cleaning and improvement etc.

The communes of Falestii Noi and Calugar do not have centralised water supply systems, using dug wells.

The tariffs for water supply and wastewater services are approved by the local council, in accordance with legislation in force.

3.4.2 Ownership

Public water and wastewater systems, including all technological and functional structures covering entire technologic cycle from raw water abstraction to discharge of treated wastewater into receiving body, are the property of Falesti administrative-territorial unit.

The town of Falesti has delegated the management and operation rights of the water supply and wastewater systems to the Falesti Municipal Services Utility.

No water supply systems are owned by individuals or private legal entities.

3.5 Organisation and management of the Municipal Enterprise 'Falesti Municipal Services Utility'

Falesti Municipal Services Utility was established by decision of the local public administration, and shall carry out activities for an unspecified period of time starting with the date of registration by State Registration Chamber.

The company has a Director, who is responsible for coordination of all company activities and conducting regular coordination with Falesti mayor's office, being personally responsible to the company's board for meeting the performance indicators.

Six specialists report directly to Director:

- Chief engineer, responsible for the management of production sectors, elaboration of proposals for development, development of technical conditions for connection to water supply and sewerage network;
- Chief Accountant, responsible for accounting records management and working out of the accounting reports;
- Chief Economist, in charge with analysis of financial and economic situation, calculation of tariffs and development of production program;
- Manager of marketing department - responsible for sales, control and accounting of the consumers' payments and keeping their records;
- Lawyer, responsible for ensuring compliance with legislation and contracts concluding;
- Human resources officer/assistant, in charge with staff tracks keeping, public relations and correspondence keeping.

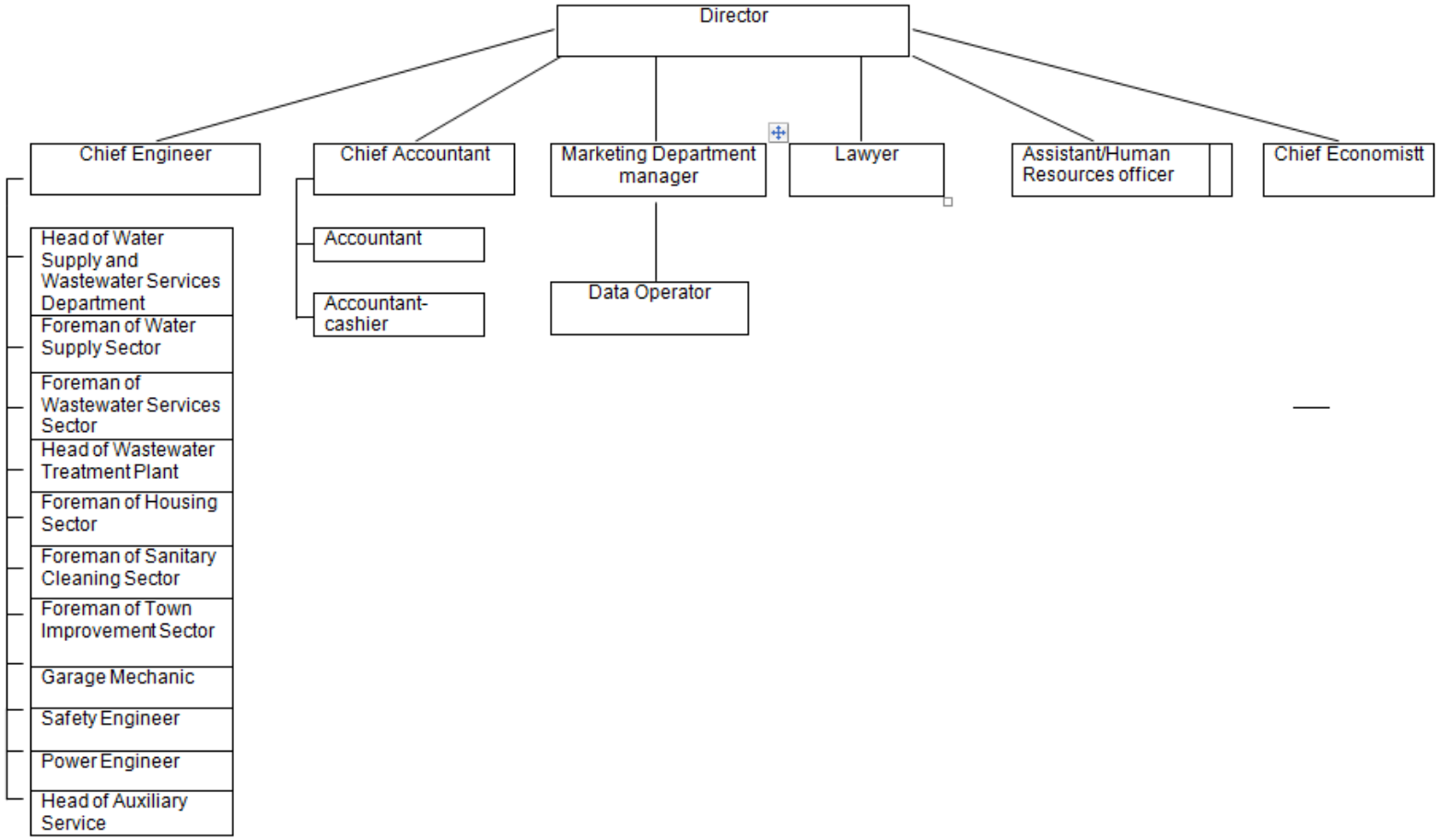
Under chief engineer, who is the manager for technical teams, are 11 specialists of following units:

- Head of Water Supply and Wastewater Services Department;

- Foreman of Water Supply Sector;
- Foreman of Wastewater Services Sector;
- Head of Wastewater Treatment Plant;
- Foreman of Housing Sector;
- Foreman of Sanitary Cleaning Sector;
- Foreman of Town Improvement Sector;
- Power Engineer;
- Safety Engineer;
- Garage Mechanic;
- Head of Auxiliary Service.

The organisational structure of the Falesti Municipal Services Utility is showed below:

Figure 3-1: Falesti Communal Service Utility (organisation chart)



Source: LPA Falesti, Falesti Municipal Services Utility

3.6 Company staff and training needs

The organisational structure of the company includes 137 positions (according to the staff list) and actual 129 employees. The actual number of employees within the company enables compliance with the actual schedule and workload.

Thus, the occupancy rate within the company is high at 94%, while the staff turnover rate decreasing from 63% to about 46% over the past three years, being so high especially because of low qualification employees' turnover.

Currently, only 52 out of 129 staff members are directly involved in water and wastewater operations, while 59 persons deal with the other services and 18 persons provide support and admin services to all activities of the Falesti Municipal Services Utility.

The years of service at the company of the technical a financial staff shows a stable situation. Almost one third of staff members (38 or 30% of the total) have more than 15 years of employment in the position, with an average of cca 10 years. Three key persons in the company (the company director, chief engineer, head of Water Supply and Wastewater Services department) have higher educations in water supply and sanitation, with work experience in the company of more than 15 years, and the relevant qualification for their duties. In general, 8% of the staff has a higher education, 33% - specialised secondary education; the rest have graduated from vocational schools.

Company management reports that it experiences difficulties in finding specialists and workers with the proper skills for the specificities of the WSS sector. This is due to the lack of skilled local labour in the town and neighboring localities.

Falesti Municipal Services Utility does not have any strategic or planning document that includes a set of measures designed to increase staff capacities.

The table below lists the main topics that should be addressed in a human resources training programme, as identified during field visits to the utility and discussions with its management.

Table 3-1: Municpal Enterprise 'Falesti Communal Service Utility' staff training needs

Training topic	Beneficiary
Strategic planning	Director; chief engineer; economist
Investment planning and analysis of investment projects	Director; chief engineer; heads of departments; economist; chief accountant
Human resources planning and development	Director; human resources officer; economist
Performance indicators and staff motivation	Director; chief engineer; heads of departments; head of human resources department
Customer service management, public relations	Marketing department employees
Tariffs and costs calculation	Economist; chief accountant; head of marketing department
Financial planning	Accounting department employees
Management and maintenance of equipment	Chief engineer; heads of the related departments
Wastewater treatment and sludge management	Production director; heads of the related departments
Water supply and sewerage networks management	Chief engineer; heads of the related departments
Energy management in water supply and wastewater systems operation	Chief engineer; heads of relevant departments
Quality management in water supply and wastewater systems operation	Chief engineer; heads of relevant departments
Meter checking and reading	Head of marketing department; controllers
Job retraining on 'Operation of water supply and wastewater systems', specialty 'Intervention and	Plumbers/operators

Training topic	Beneficiary
reconstruction works'	
Project management	Director; production director
Legislative aspects and standards in water supply and sanitation	Director; production director; lawyer
Economic analysis in the field of water supply and sanitation	Economist; accounting department employees
Integrated accounting software use	Accounting department employees
Drawing up reports (statements) and annual financial statements regarding income tax	Economist
International Financial Reporting Standards	Economist
Cost management control and management reporting	Economist

Source: LPA Falesti, Falesti Municipal Services Utility

4 Technical aspects - existing situation

4.1 General information

The assessment of the existing water supply and wastewater situation in the town of Falesti and localities (Falestii Noi and Calugar) has been conducted by the GIZ/MLPS experts in collaboration with members of Project Working Group (PWG, described in Chapter 1).

For assessment of existing situation, the necessary information was obtained from the following sources:

- Water supply and wastewater questionnaires prepared and distributed by GIZ/MLPS experts, and completed by local public administrations (LPAs) and the municipal services utilities;
- Project Working Group (PWG) meetings;
- Site visits conducted by GIZ/MLPS experts to verify the collected information and to inspect the existing water supply and sanitation facilities;
- Available pre-feasibility and feasibility studies, existing and implemented technical designs, topographic surveys (site plans) related to water supply and wastewater infrastructure indicating existing WSS facilities, as provided by the PWG.

4.2 Water supply and wastewater service area

Water supply and wastewater services in the town of Falesti are provided by a single operator - Falesti municipal services utility.

General information about service areas in the feasibility study localities is provided in Table 4-1 below.

Table 4-1: General information about service area localities

No.	Locality	Population	Current situation and on-going activities - water supply	Population served by centralised water supply service		Current situation and ongoing activities - wastewater	Population served by centralised wastewater service	
				Covered	connected		Covered	connected
1.	Falesti	16,900	The coverage area of water supply system is about 95%. The connection rate is 61%.	16,048	10,258	The coverage area of wastewater system is about 33%. The connection rate is about 29%.	5,620	4,836
2.	Falestii Noi	2,076	No centralised water supply system	0	0	No centralised wastewater system	0	0
3.	Calugar	2,140	No centralised water supply system	0	0	No centralised wastewater system	0	0

Source: LPA Falesti, Falesti Municipal Services Utility, LPA Falestii Noi Commune, LPA Calugar Commune

General information about public institutions in the feasibility study localities is provided in Table 4-2. Detailed information about public institutions in the town of Falesti and localities of Falestii Noi and Calugar, is provided in Annex 4.

Table 4-2: Public institution in the feasibility study localities

No.	Locality/Public institution name	No. of institutions	Pupils/ children / places/ beds	No. of employ ployees	Connected to water supply system	Connected to centralised wastewater system
1.	Falesti					
	Kindergarten	5	783	131	yes	yes
	Schools	10	2,297	337	yes	yes
	Healthcare institutions	2	280	430	yes	yes
2.	Falestii Noi	3	393	62	n/a	n/a
3.	Calugar	3	398	46	n/a	n/a

Source: LPA Falesti, Falesti Municipal Services Utility, LPA Falestii Noi Commune, LPA Calugar Commune

The business entities in the feasibility sudy localities are listed in table below (Table 4-3). More detailed information about business entities in the town of Falesti and localities of Falestii Noi and Calugar is provided in Annex 4.

Table 4-3: Business entities in the feasibility study localities

No.	Locality/Type of business entity	No. of business entities	No. of employees	Connected to water supply system	Connected to centralised wastewater system
1.	Falesti				
	Commerce	17	807	yes	yes
	Baking services	5	74	yes	yes
	Services	8	261	yes	yes
2.	Falestii Noi	5	521	no	n/a
3.	Calugar	4	151	no	n/a

Source: LPA Falesti, Falesti Municipal Services Utility, LPA Falestii Noi Commune, LPA Calugar Commune

4.3 Water supply system

4.3.1 Water supply system in the town of Falesti

Water is supplied 24 hours/day in the town of Falesti. Water supply services are provided to about 10,258 consumers out of 16,900 inhabitants (61%).

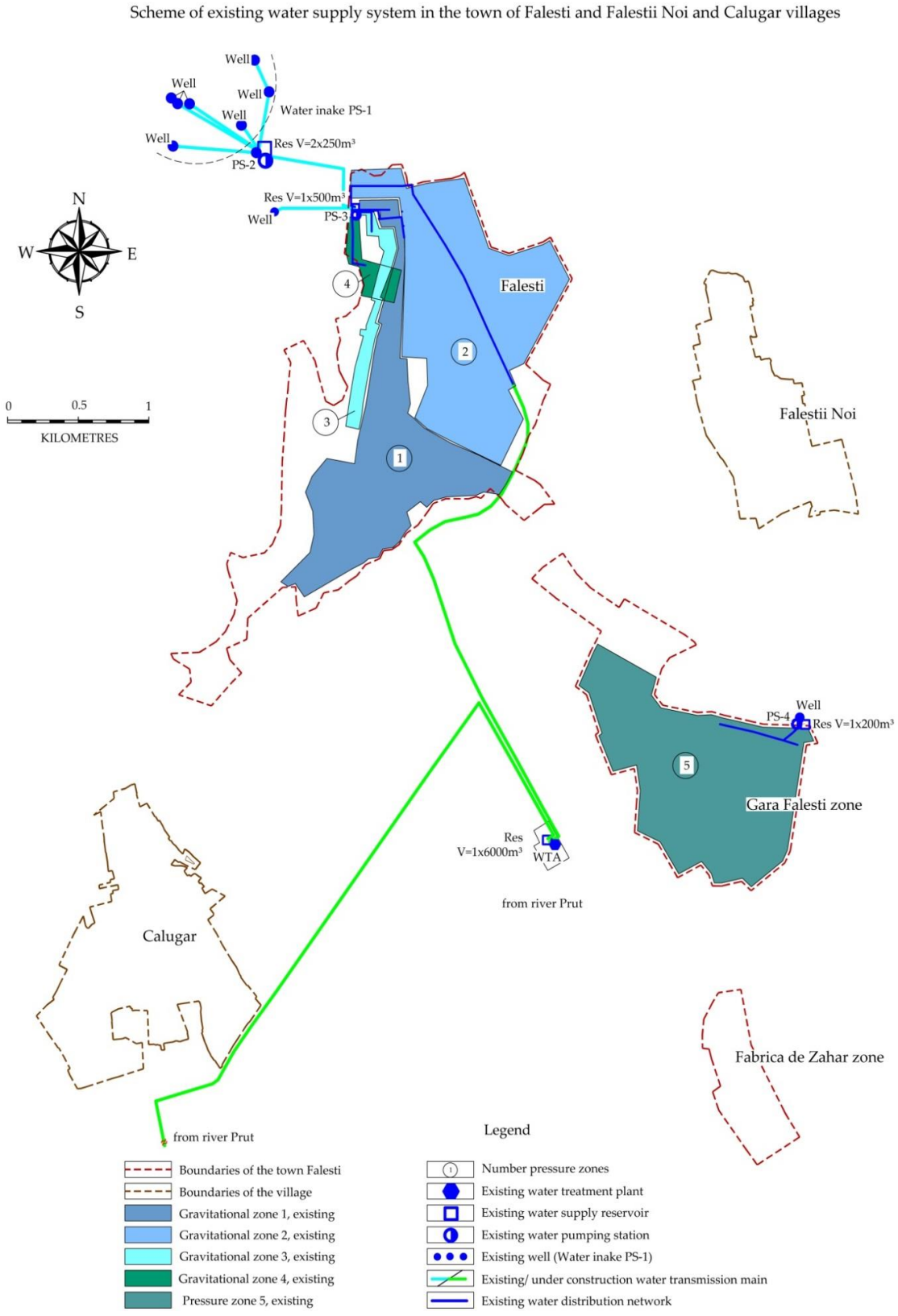
The water supply system in the town of Falesti represents a hydro-technical system and comprises the following key components:

- Water source (water intake and individual deep wells) and first level pumping station (PS-1);
- Transportation of water, from water intake to the underground water reservoirs and further from reservoirs to the water distribution network (raw and drinking water transmission main);

- Underground water reservoirs with a volume of 250 m^3 each and one (1) underground reservoir with a volume of 200 m^3 designed for the storage of a volume of water necessary in such cases as following: water reserve in case of network failure, compensation of hourly consumption and water reserve necessary for firefighting purposes;
- Second level pumping station (PS-2 and PS-4) and booster pumping station (PS-3), to ensure the required pressure in the water distribution network;
- Looped water distribution network, combined with branched one;
- Underground water reservoir with a volume of 500 m^3.

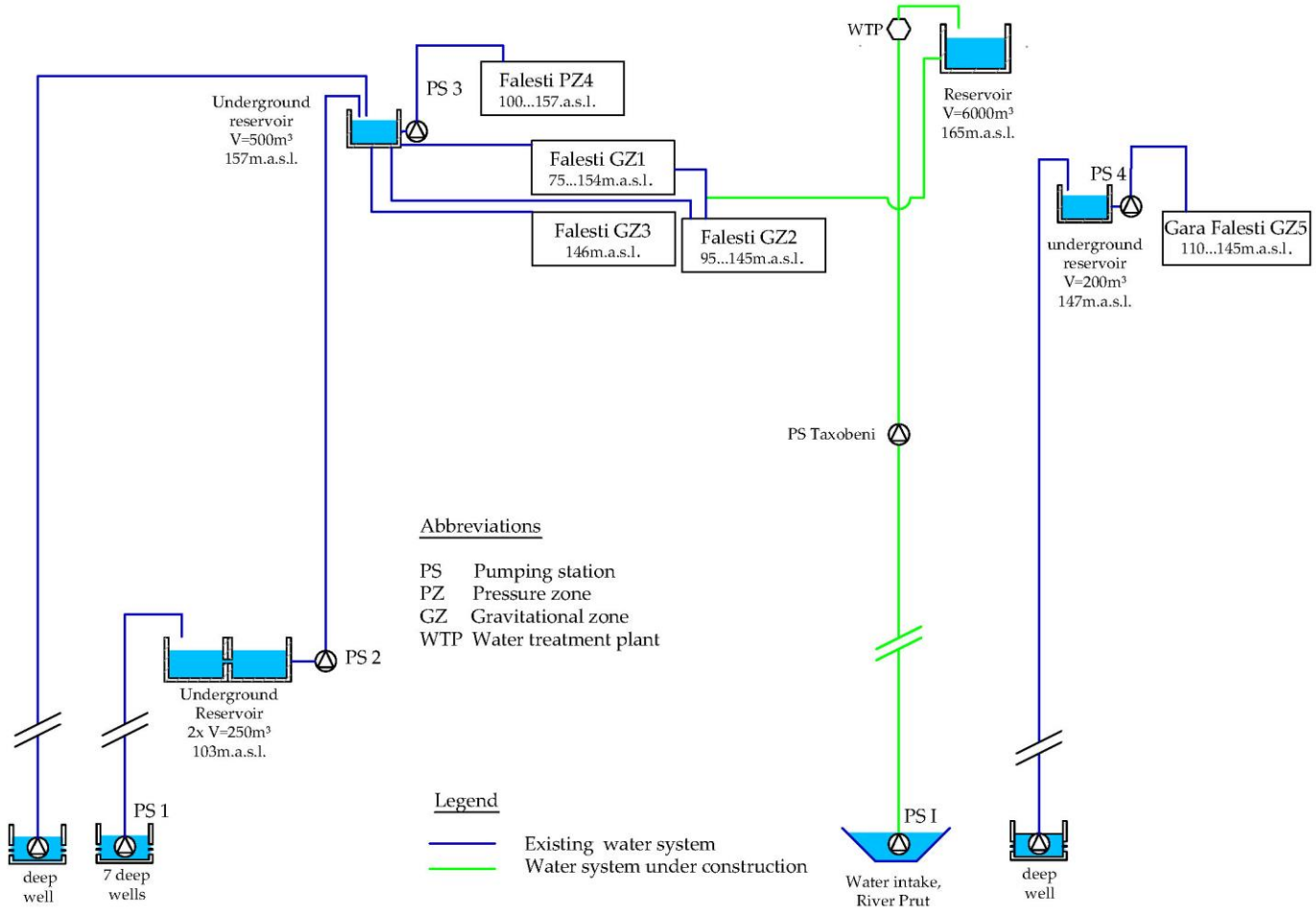
The existing water supply system in the town of Falesti is represented in Figure 4-1. More detailed information about the water supply system in the town of Falesti is provided in Annex 11.

Figure 4-1: Water supply scheme of the town of Falesti



Source: GIZ/MLPS

Figure 4-2: Technological scheme of water supply system in the town of Falesti



Source: GIZ/MLPS

4.3.1.1 Water source

In the town of Falesti and the Gara Falesti district, the wellfield includes twenty two (22) deep wells drilled at an average depth of 200 m, of which nine (9) wells are in operation. At the time of the site visits conducted by GIZ/MLPS experts, the lack of fence in the strict regime sanitary protection areas has been found out.

The main technical parameters of deep wells in operation are presented in Table 4-4.

Table 4-4: Available water sources at the existing wellfield

No.	Year of installation	Well no. in technical passport	Well depth (m)	Hydrostatic water level (m)	Hydrodynamic water level (m)	Yield capacity (l/s)	Condition
1.	1976	3698	185	96	104	2.70	in operation
2.	1971	909	246	86	106	2.00	in operation
3.	1973	1219	180	96	56	2.50	in operation
4.	1975	1301	180	90	102	2.30	in operation
5.	1975	1291	181	90	102	4.50	in operation
6.	1986	19	185	133	153	2.60	in operation
7.	1986	20	193	133	153	2.50	in operation
8.	1968	470	250	107	114	2.40	in operation
9.	1969	183	200	95	98	2.70	in operation

Source: Falesti Municipal Services Utility

Figure 4-3: Deep wells

Source: GIZ/MLPS

According to the obtained data, the quality of the raw water at the well /intake does not comply with actual standards of the Republic of Moldova (Government Decision no.934 of 15.08.2007 on the establishment of Automated Information System "State register of natural mineral water, drinking water and bottled non-alcoholic beverages") for following indicators: ammonia NH_4 and fluorides. The analysis of the raw water quality provided by the Falesti municipal services utility is presented in Table 4-5.

Table 4-5: Water quality indicators (21 January, 2015)

No.	Indicator	Unit	Max. concentration acc. to G.D. No 934	Raw water concentration (deep well no. 9a)
1.	Smell	degree	acceptable for customers	-
2.	Taste	degree	acceptable for customers	-
3.	Colour	degree	acceptable for customers	-

No.	Indicator	Unit	Max. concentration acc. to G.D. No 934	Raw water concentration (deep well no. 9a)
4.	Hydrogen Index pH		≥ 6.5 ≤9.5	8.0
5.	Turbidity	degree	5	0
6.	Ammonia NH_4	mg/l	0.5	2.87
7.	Nitrites (NO_2)	mg/l	0.5	<0.003
8.	Nitrates (NO_3)	mg/l	50	0.75
9.	Total hardness	degree	5 German degree	2
10.	Total dissolved solids	mg/l	1,500	1.320
11.	Chlorine	mg/l	250	34.5
12.	Sulphates	mg/l	250	225.3
13.	Fluorides	mg/l	1.5	2.8
14.	Iron	mg/l	0.3	0.36
15.	Copper	mg/l	1	<0.02

Source: Falesti Municipal Services Utility

4.3.1.2 Water abstraction

Water abstraction facilities comprise:

- Deep wells and first level pumping station (PS-1);
- Water storage reservoirs.

For the town of Falesti, the raw water from seven (7) deep wells is pumped through submersible pumps (first level pumping station (PS-1)), by individual pressure pipes and stored in two (2) underground water reservoirs with a volume of 250 m^3 each installed on the second level pumping station PS-2 area.

For the Gara Falesti district, the raw water from two (2) deep wells is pumped through submersible pumps (first level pumping station (PS-1)), by individual pressure pipes and stored in one (1) underground water reservoir with a volume of 200 m^3 installed on the fourth level pumping station area PS-4.

Nominal parameters of submersible pumps are presented in Table 4-6.

Table 4-6: Nominal parameters of submersible pumps

No.	No. in technical passport	Type	Flow rate (m^3/h)	Head (m)	Power (kW)	Energy specific consumption [kwh/m^3]
1.	3698	ЭЦВ 6-10-185	10	185	8	7.50
2.	909	ЭЦВ 6-10-185	10	185	8	7.50
3.	1219	ЭЦВ 6-10-185	10	185	8	7.50
4.	1301	ЭЦВ 6-10-185	10	185	8	7.50
5.	1291	ЭЦВ 8-25-150	25	150	16	7.50
6.	19	ЭЦВ 6-10-185	10	185	8	7.50
7.	20	ЭЦВ 6-10-185	10	185	8	7.50
8.	470	ЭЦВ 6-10-235	10	185	11	7.50
9.	183	ЭЦВ 6-10-185	10	185	8	7.50

Source: Falesti Municipal Services Utility

4.3.1.3 Water pumping stations

Water is pumped by the second level pumping station PS-2 and is stored in one (1) underground water reservoirs with a volume of 500 m^3, located on the third level pumping station PS-3, and further distributed by gravity to the water distribution network for following districts:

- Baltului district;
- Dacia district;
- Centre district (perimeter of 31 august 1989 str. and Stefan cel Mare Street).

Water for Victoria district is pumped to the water distribution network by the third level pumping station PS-3.

Water for Gara Falesti district is delivered directly to the water distribution network by the second level pumping station (PS-4).

Nominal parameters of water pumping stations are presented in Table 4-7.

Table 4-7: Nominal parameters of water pumping stations

N°	PS name	Year of installation	Type	Flow rate (m^3/h)	Head (m)	Power (kW)	Energy specific consumption [kwh/m^3]
1.	PS-2	1963	1D315/71	200	70	55	53
2.	PS-3	1961	KM 65-50-160	50	50	5.5	5
3.	PS-4	1968	KM 65-50-160	50	50	5.5	5

Source: Falesti Municipal Services Utility

Figure 4-4: Water pumping station PS-2. Water pumping station PS-3

Source: GIZ/MLPS

Figure 4-5: Water pumping station PS-4

Source: GIZ/MLPS

4.3.1.4 Water disinfection

The raw water is disinfected by injecting lime solution in the underground water reservoir with a volume of 250 m^3 each installed at the second level pumping station PS-2 area.

4.3.1.5 Water storage facilities

Main technical data on the existing underground water reservoirs are provided in Table 4-8.

Table 4-8: Main technical parameters of the existing underground water reservoirs

No.	PS name	Year of construction	Type of reservoir	Capacity (m^3)	Quantity/No. of chambers	Condition
1.	PS-2	1978	rectangular	250	2	unsatisfactory
2.	PS-3	1978	circular	500	1	unsatisfactory
3.	PS-4	1972	rectangular	200	1	unsatisfactory

Source: Falesti Municipal Services Utility

Figure 4-6: Underground water reservoir with a volume of 250 m^3 (PS-2 area)

Source: GIZ/MLPS

Figure 4-7: Underground water reservoir with a volume of 250 m^3 (PS-3 area). Underground water reservoir with a volume of 250 m^3 (PS-4 area)

Source: GIZ/SPL

4.3.1.6 Water distribution network

In the town of Falesti, the water distribution network consists of steel, cast iron, asbestos-cement and high density polyethylene (HDPE) pipes with diameters of between 50 mm and 300 mm. The total length of water distribution network is about 44,311 m. Main technical parameters of water distribution network are provided in Table 4-9. The length of water distribution network for different diameters expressed as a percentage, is provided in Table 4-10.

Table 4-9: Main technical parameters of water distribution network

N^o	Materi-al	Length (m) / diameter (mm)							Length (m)	Pipe age (years)	Total length (m)
		50	76	100	150	200	250	300			
1.	Steel	359		9,870	330	3,070		3,498	17,127	35-40	44,311
2.	Cast iron			5,908	1,270		312	8,803	16,293	35-40	
3.	Asbes-tos-cement			3,284	4,687				7,971	35-40	
4.	HDPE	2,000	600	320					2,920	12	

Source: Falesti Municipal Services Utility

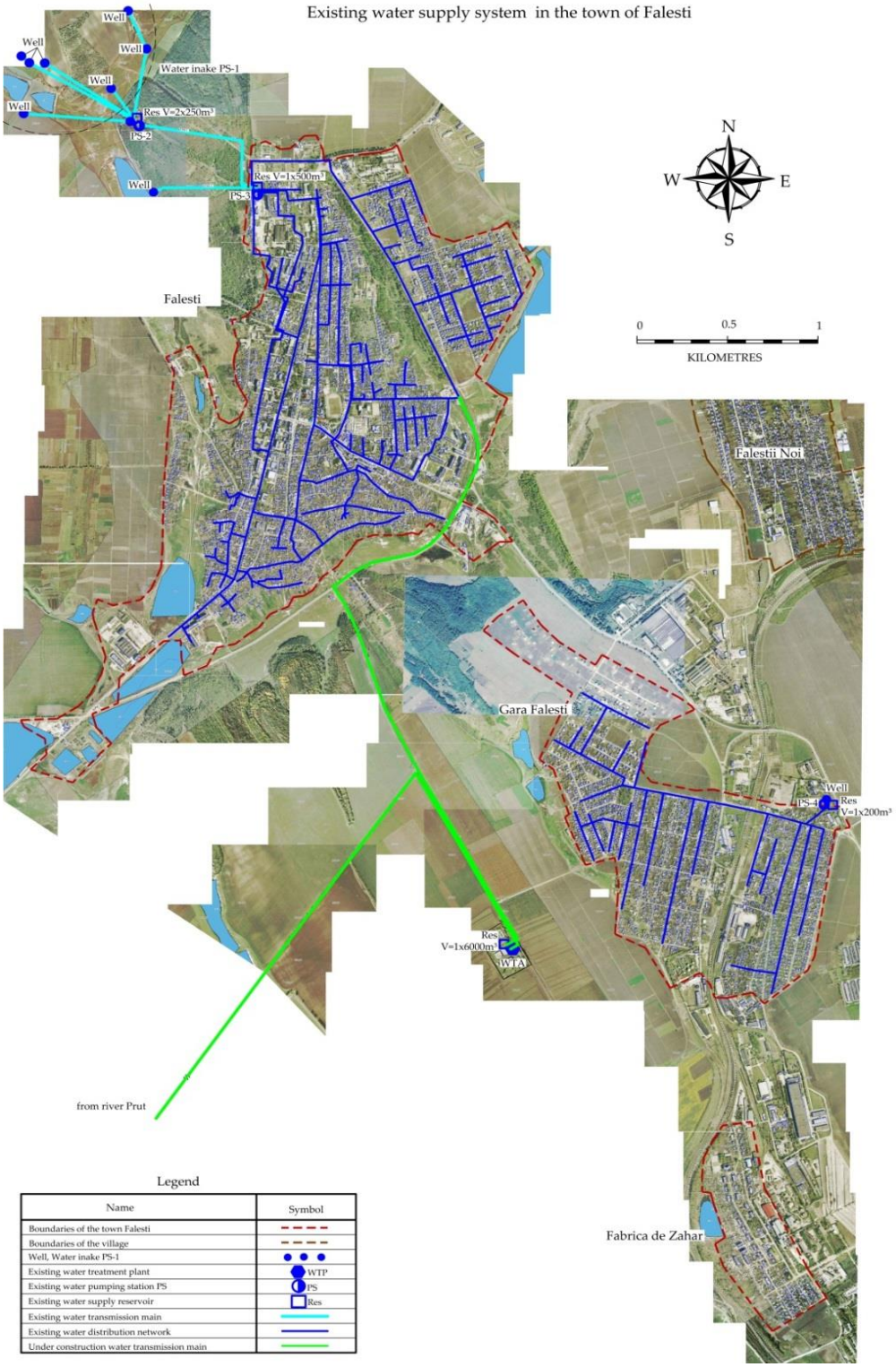
Table 4-10: Percentage of water distribution network by diameter size

No.	Material	Network length (m) by diameter size (mm)			Length (m)	Age (years)	Total (%)
		300 – 200 mm	160 – 75 mm	50 mm			
1	Steel	6,568	10,200	359	17,127	35-40	39
2	Cast iron	9,115	7,178		16,293	35-40	37
3	Asbestos-cement		7,971		7,971	35-40	18
4	HDPE		920	2.000	2,920	12	7
	Total	**15,683**	**26,269**	**2,359**	**44,311**		**100**

Source: Falesti Municipal Services Utility, GIZ/MLPS assessments

The water distribution network in the town of Falesti is provided in Figure 4-8. More detailed information about water distribution network in the town of Falesti is provided in Annex 11.

Figure 4-8: Water distribution network in the town of Falesti

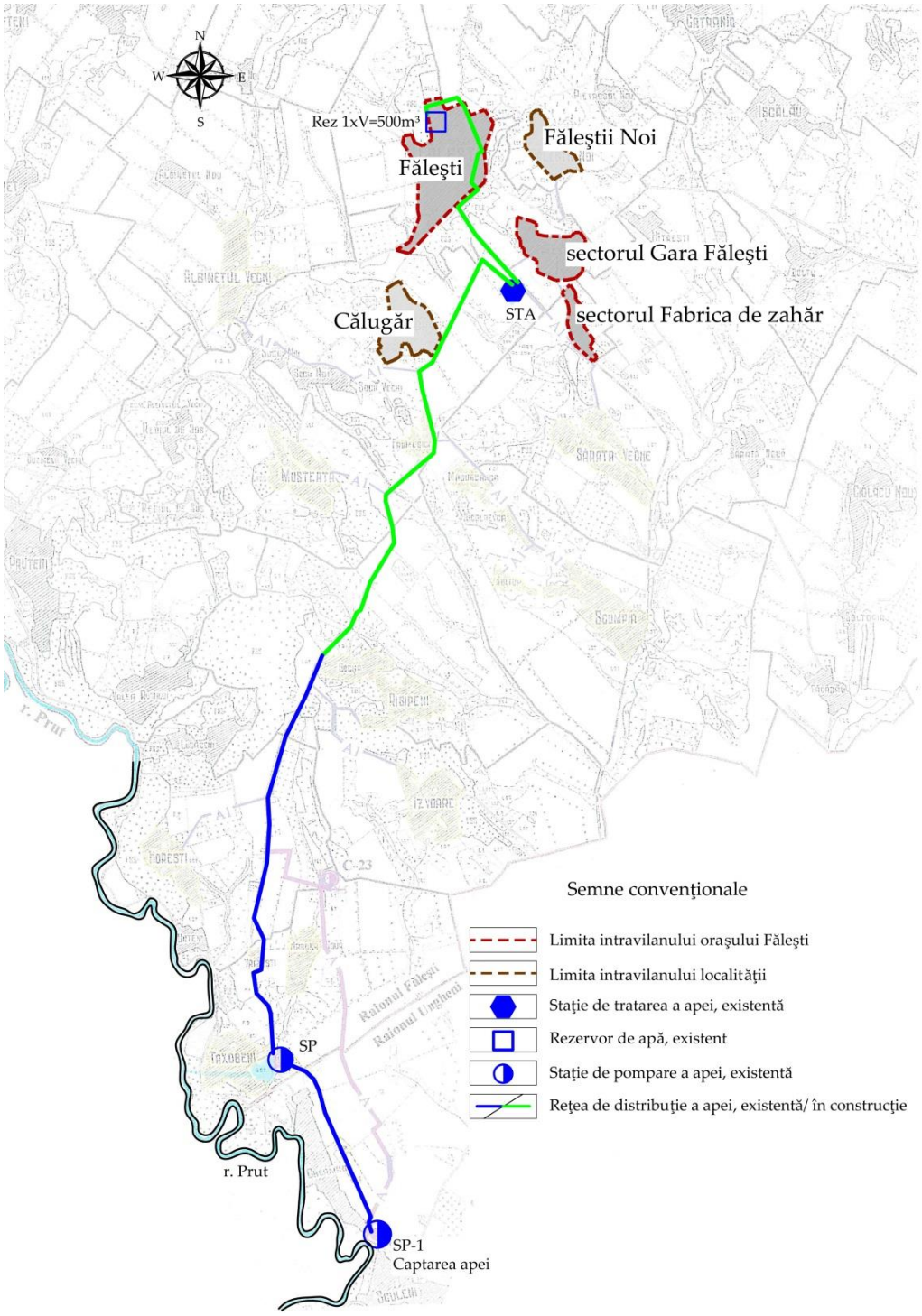


Source: www.geoportal.md, Falesti Municipal Services Utility, GIZ/MLPS

At the time of the site visits conducted by GIZ/MLPS, construction-installation works of the water treatment plant have been underway according to the technical design "Water supply in the town of Falesti from the Prut River" – financed by National Ecological

Fund, as provided in Figure 4-9. The water treatment plant was constructed in the Gara Falesti district with a design capacity of 2,400 m^3/day.

Figure 4-9: Scheme of water transmission main Prut-Falesti



Source: Falesti Municipal Services Utility, GIZ/MLPS

Also, in the Bocsa locality, the construction-installation works of the water treatment plant and water distribution network in the localities of Bocsa and Risipeni – financed by North RDA have been underway.

4.3.2 Water supply system in Falestii Noi and Calugar localities

There is no centralised water supply system in the localities of Falestii Noi and Calugar. The inhabitants of above mentioned localities are supplied from individual shallow wells.

4.4 Water balance

The data necessary for water balance calculation were provided by the Falesti municipal services utility and included the following details: monthly volume of the abstracted raw water, monthly volume of water sold to domestic customers, monthly volume of water sold to public institutions and business entities.

Following the real water consumption, the non-revenue water rate for water supply system of town of Falesti was determined.

4.4.1 The monthly volume of the abstracted raw water

According to the information provided by the Falesti municipal services utility, the monthly volume of the abstracted raw water is determined according to the water meters data from the rising pipe located at the first level pumping station (PS-1), as provided in Table 4-11.

4.4.2 Water consumption

The water demand per month is the monthly volume of water sold to the domestic customers, public institutions and business entities.

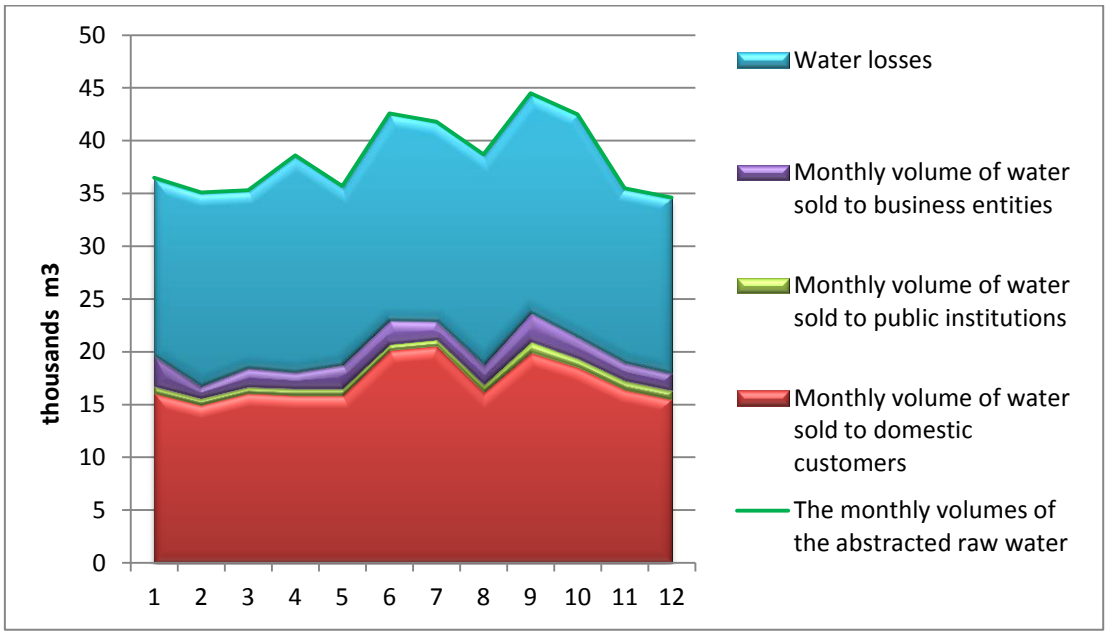
Operational indicators for 2014, presented by the Falesti municipal services utility, are provided in Table 4-11.

Table 4-11: Operational indicators for 2014

No.	Month	Schedule of water supply (hours/24 hours)	Monthly volume of the abstracted raw water (m^3)	Volume of water sold, m^3		
				Domestic customers (m^3)	Public institutions (m^3)	Business entities (m^3)
1.	January		36,500	16,100	640	2,960
2.	February		35,100	15,000	630	1,170
3.	March		35,300	16,100	590	1,810
4.	April		38,600	15,900	630	1,570
5.	May		35,700	15,900	640	2,260
6.	June		42,600	20,100	550	2,350
7.	July		41,800	20,500	570	1,830
8.	August		38,700	16,200	710	1,890
9.	September		44,500	19,900	1,010	2,790
10.	October		42,500	18,500	830	2,070
11.	November		35,500	16,400	860	1,740
12.	December		34,600	15,500	840	1,660
	Total		**461,400**	**206,100**	**8,500**	**24,100**

Source: Falesti Municipal Services Utility

Figure 4-10: Operational indicators



Source: Falesti Municipal Services Utility, GIZ/MLPS

4.4.3 Real water consumption

The real water consumption is the volume of water consumed by one customer during 24 hours to meet the physiological and domestic needs under normal operation conditions of the water supply system (l/c/d). The real water consumption for customers is the ratio of daily water sold by the utility divided by the number of consumers (domestic, public institutions and business entities), as provided in Table 4-12.

Table 4-12: The real water consumption

No.	Indicator	Unit of measurement	Year		
			2012	2013	2014
1.	Number of domestic customers	pers.	9,529	10,175	10,258
2.	The annual volume of abstracted raw water	m³	450,500	441,900	461,400
3.	Total water sold by the utility, of which: • Domestic consumers • Public institutions and business entities	m³ m³ m³	218,300 184,600 33,700	235,400 201,300 34,100	238,700 206,100 32,600
4.	Real water consumption (based on daily sold water)	l/c/d	63	63	64
5.	Real water consumption (based on daily water sold to domestic consumers)	l/c/d	53	54	55

Source: Falesti Municipal Services Utility, GIZ/MLPS assessments

4.4.4 Non-revenue water (NRW)

Annual non-revenue water is the difference between the annual volume of abstracted raw water and annual water sold to domestic customers, to public institutions and business entities.

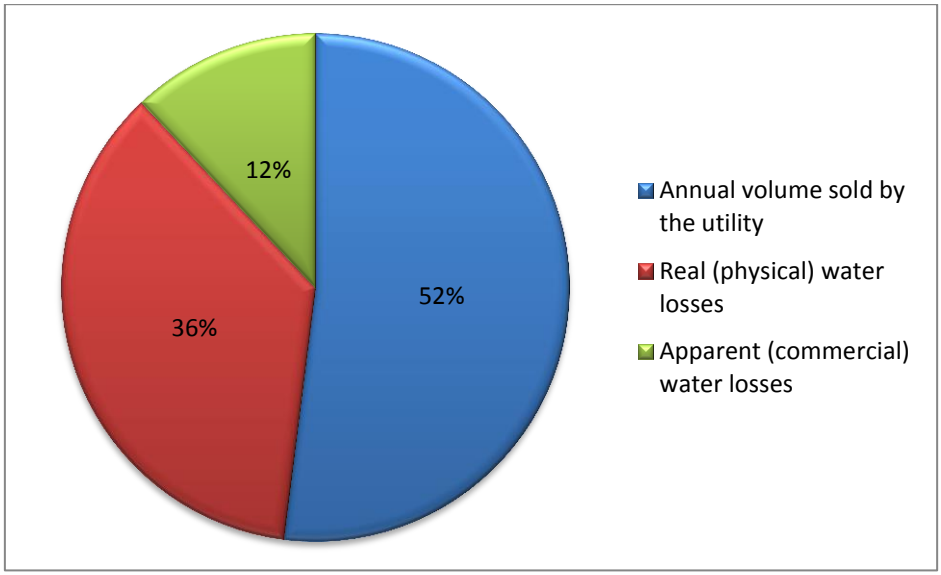
The water balance for water supply system in the town of Falesti is provided in Table 4-13.

Table 4-13: The water balance for water supply system in the town of Falesti

No.	Indicator	Unit of measurement		2014	
1.	Number of domestic consumers	pers.		10,258	
2.	Annual volume of abstracted raw water	m³		461,400	
3.	Annual volume of cold water	m³		238,700	
4.	The annual volume of NRW, including: • Real (physical) water losses (60% of NRW) • Apparent (commercial) water losses (40% of NRW)	m³ m³ m³	% % %	222,700 167,025 55,675	48 36 12

Source: Falesti Municipal Services Utility, GIZ/MLPS assessments

Figure 4-11: Water balance



Source: Falesti Municipal Services Utility, GIZ/MLPS assessments

In order to reduce real (physical) losses of water it is recommended to:

- Identify the condition of pipes during operational or capital repairs (taking note of the material, interior and outer diameter, as well as interior and exterior condition);
- Identify the network sections with an advanced degree of wear or damage;
- Rapidly detect hidden water losses;
- Maintain records related to damages/ leaks and their quick remedy.

The measures related to apparent (commercial) water loss reduction can be identified by effective management of water supply system in the town of Falesti. With the purpose to reduce apparent (commercial) water losses it is recommended to:

- Install high precision water meters;

- Identify and replace defective water meters;
- Water meters installed to public institutions and business entities must be subjected to metrological control after two (2) years of usage and as appropriate to be replaced.

4.4.5 Water metering

During the period 2009-2010, in the town of Falesti, a water metering programme was implemented, resulting in a metering rate of about 98 - 99% of domestic consumers, 100% of public institutions and business entities. The installed water meters are of class "A"and "B".

4.4.6 Equipment and facilities

The Falesti municipal services utility owns and operates the following equipment and facilities:

- Emergency truck “Apeduct” (two (2) units);
- Excavator ЭО 2621 (one (1) unit);
- Welding machine SAC (one (1) unit);
- Generator 12 kW (one (1) unit);
- Water pumps (two (2) units);
- Drainage truck (one (1) unit);
- Ford truck for cleaning and unblocking of network (one (1) unit);
- Compressor (one (1) unit);
- Asphalt cutting machine (one (1) unit);
- MTZ -80 tractor (one (1) unit).

4.5 Technical and operational analysis of the water supply system

4.5.1 Non-revenue water (NRW)

Non-revenue water has a negative impact on operating costs (high level of electricity consumption for pumping, costs for current and capital repairs, etc.) and revenues (apparent losses). Both the operating costs and revenues are important factors for sustainable development in water supply sector.

At this time, the degree of wear of existing pipelines is very high, causing large leaks in the water supply system in the town of Falesti. The statistics on damages and repairs in the period 1 January 2014 – 31 December 2014 are provided in Tables 4-14 and 4-15.

Table 4-14: Statistics on pipe damage, 1 Jan-31 Dec, 2014

No.	Location	Pipeline breakdowns
1.	On water transmission main	34
2.	On distribution network	168

Source: Falesti Municipal Services Utility

Table 4-15: Statistics on repairs made, 1 Jan-31 Dec 2014

No.	Type of repair	Repairs made
1.	Current repairs	186
2.	Capital repairs	16 (2.43 km)

Source: Falesti Municipal Services Utility

4.6 Wastewater system

4.6.1 Wastewater system in the town of Falesti

About 4,836 domestic consumers out of 16,900 inhabitants from the town of Falesti are connected to the centralised wastewater system, connection rate for wastewater services is about 29%.

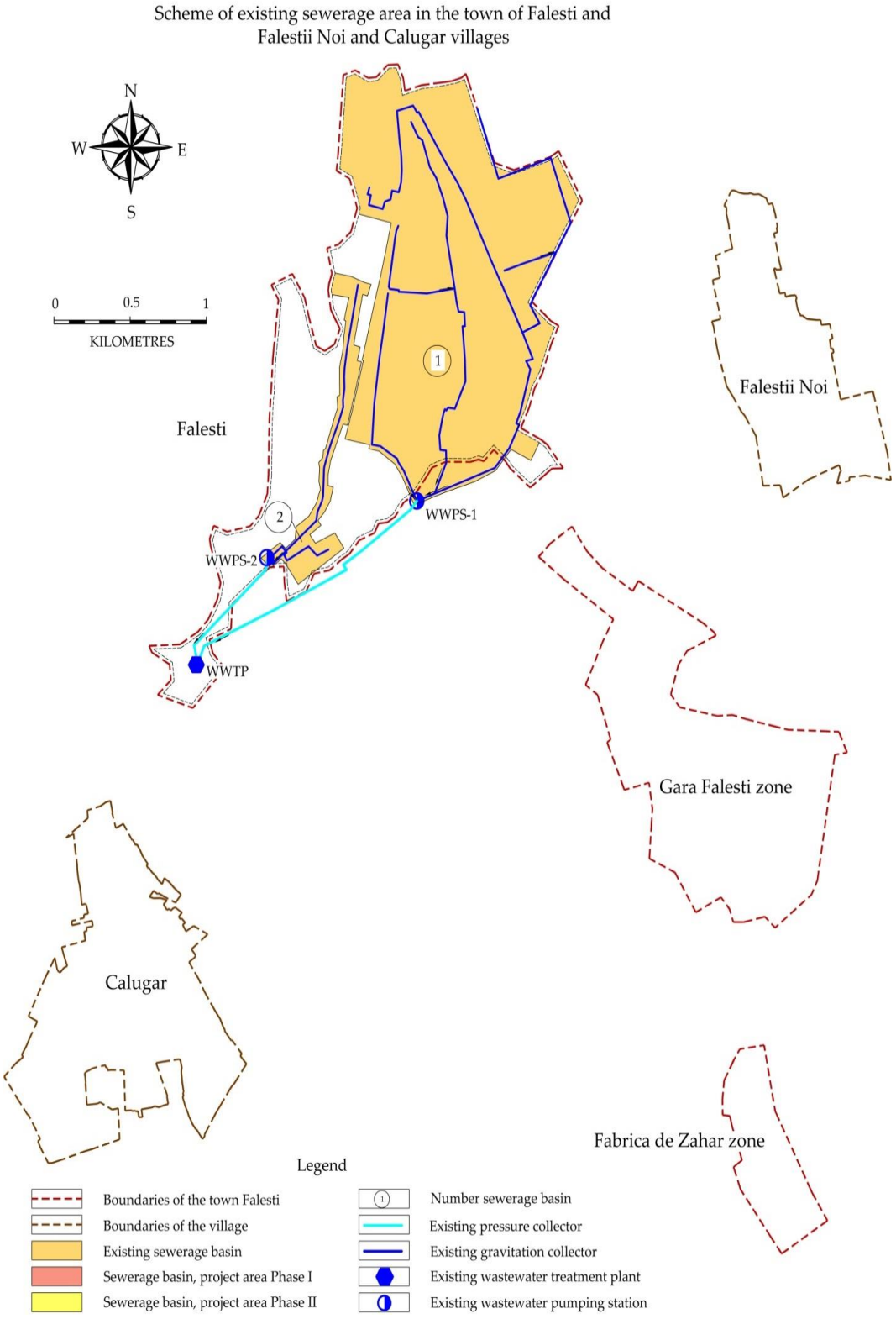
The wastewater system of the town of Falesti consists of 2 separate sewerage networks that collects and disposes through two networks the domestic wastewater, industrial wastewater and storm water. The main facilities of the wastewater system in the town of Falesti are the following:

- Gravity and pressure sewerage networks;
- Wastewater pumping stations located in Padurilor street (WWPS-1) and wastewater pumping station located in Stefan cel Mare street one (1) local wastewater pumping station (WWPS-2);
- Wastewater treatment plant (WWTP).

A scheme of wastewater system is presented in Figure 4-12. More detailed information about wastewater system in the town of Falesti is provided in Annex 11.

The drainage area represents a defined territory, from which the wastewater is collected to a sewerage network.

Figure 4-12: Scheme of wastewater system in the town of Falesti



Source: Falesti Municipal Services Utility, GIZ/MLPS

The wastewater from existent drainage area no.1 is collected by gravity to the wastewater pumping station (WWPS-1) located in the town's lower sector or in Padurilor street and further pumped by a pressure pipe with a diameter of 300 mm to the wastewater treatment plant (WWTP) located in the town of Falesti.

The wastewater from existent drainage area no.2 is collected by gravity to the wastewater pumping station (WWPS-1) located in Stefan cel Mare street and further pumped by a pressure pipe with a diameter of 100 mm to the wastewater treatment plant (WWTP) from the town of Falesti.

4.6.1.1 Sewerage network

The total length of gravity sewerage network is about. 24,204 m. The main technical parameters of gravity sewerage network are provided in Table 4-16. The total length of pressure sewerage network is about. 7,571 m. The length of water distribution network for different diameters expressed as a percentage is provided in Table 4-17. The main technical parameters of the pressure sewerage network are provided in Table 4-18.

Table 4-16: Main technical parameters of gravity sewerage network

No.	Material	Length (m) / diameter (mm)				Length (m)	Pipe age (years)	Total length (m)
		100	150	200	300			
1.	Steel				1,400	1,400	35	24,202
2.	Ceramic		922	2,951	10,731	14,604	33	
3.	Cast iron		640	2,533		3,173	32	
4.	Asbestos-cement			1,044	2,519	3,563	33	
5.	PVC	400		1,062		1,462	4	

Source: Falesti Municipal Services Utility

Table 4-17: Percentage of sewerage network by diameter size

No.	Material	Sewerage network length (m) by diameter size (mm)		Length (m)	Age (years)	Total (%)
		300 – 200 mm	160 – 75 mm			
1	Steel	1,400		1,400	35	6
2	Ceramic	13,682	922	14,604	33	60
3	Cast iron	2,533	640	3,173	32	13
4	Asbestos-cement	3,563		3,653	33	15
5	PVC	1,062	400	1,462	4	6
	Total	**22,240**	**1,962**	**24,202**		**100**

Source: Falesti Municipal Services Utility, GIZ/MLPS assessments

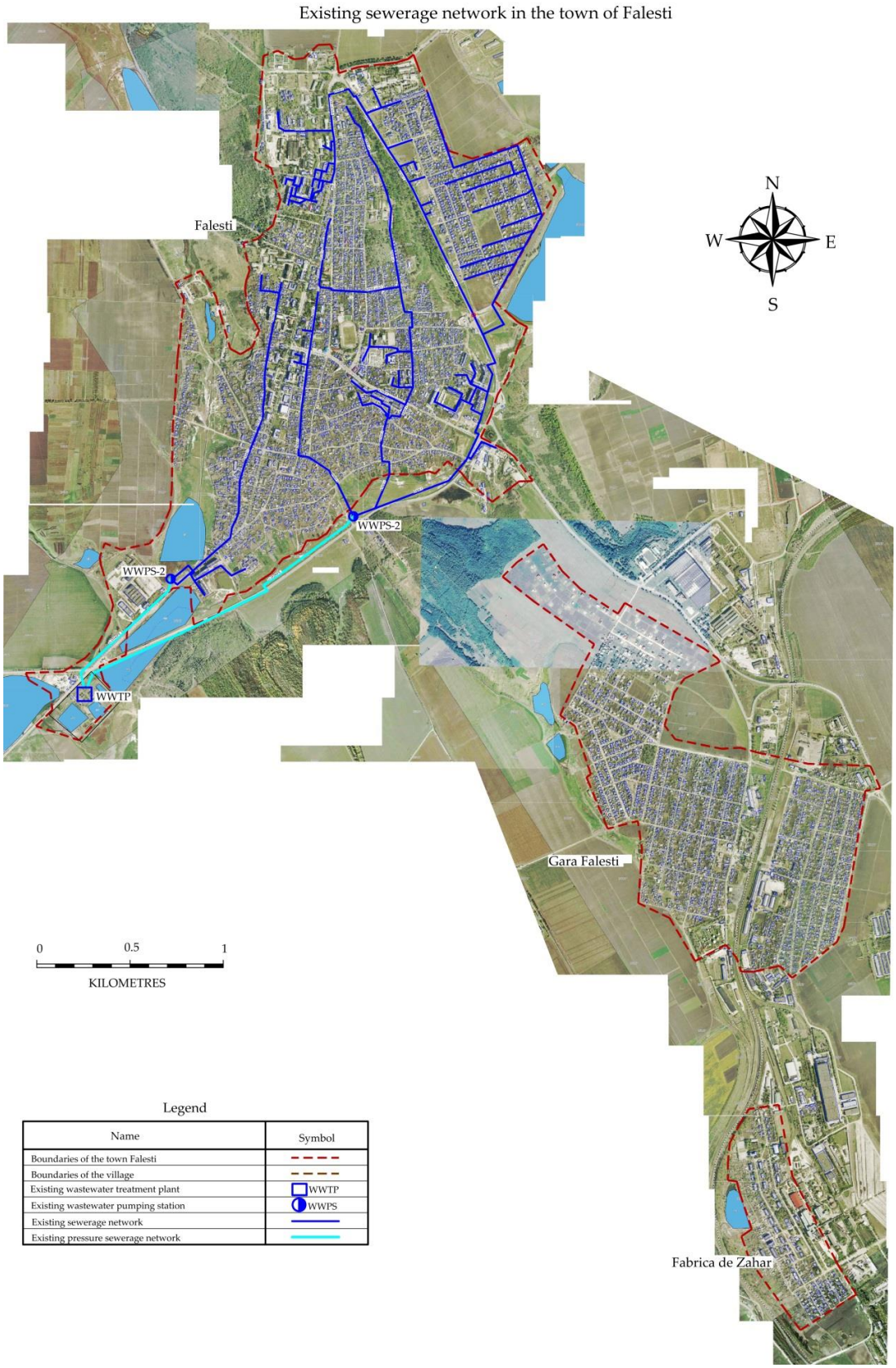
Table 4-18: Main technical parameters of pressure sewerage network

No.	Material	Length (m) / diameter (mm)			Length (m)	Pipe age (years)	Total length (m)
		100	300				
1.	Asbestos-cement		6,541		6,541	25	7,571
2	Steel	1,030			1,030	17	

Source: Falesti Municipal Services Utility

The sewerage network in the town of Falesti is represented in Figure 4-13. More detailed information about sewerage network in the town of Falesti is provided in Annex 11.

Figure 4-13: Sewerage network in the town of Falesti



Source: www.geoportal.md, Falesti Municipal Services Utility, GIZ/MLPS

4.6.1.2 Wastewater pumping stations

The wastewater pumping stations are located in the lower part of drainage area, when the gravity wastewater collection is impossible because of the topography in the area.

The technical parameters of the wastewater pumping stations and pumps, are provided in Table 4-19.

Table 4-19: Technical parameters of pumping equipment

No.	PS name/location	Year of installation	Pump type	Pump flow rate (m^3/h)	Head (m)	Pump power (kW)	Pump energy specific consumption (kwh/m^3)
1.	WWPS-1, Stefan cel Mare str.	1991	FG 144-10,5	144	10.5	15	15
2.	MWWPS, Padurilor str.	1989	FG 144-10,5	144	10.5	15	15

Source: Falesti Municipal Services Utility

Figure 4-14: Main wastewater pumping station MWWPS

Source: GIZ/MLPS

4.6.1.3 Wastewater treatment plant

The wastewater treatment plant is located 3 km. in the southeast from the Falesti town centre and was put into operation in 1981, with a capacity of 10,000 m³/day. In 1995, the wastewater treatment plant was rehabilitated and the current capacity of wastewater treatment plant is 500 m³/day.

The wastewater treatment includes following processes: mechanical treatment, biological treatment, tertiary treatment and disinfection level.

The technological scheme of wastewater treatment includes the following facilities:

- Energy dissipater;
- Horizontal grit chambers (2 units);
- Primary settlers (2 units);
- Activated sludge aeration tanks (ASAT) (2 units);
- Mineralisation system (2 units);
- Secondary settlers (2 units);

- Sludge drying beds (4 units);
- Biological ponds;
- Contact tanks;
- Chlorination plant (out of operation), the disinfection process is carried out by injection of lime solution;
- Sludge pumping station and blower station;
- Warehouse and workshop.

The energy dissipater (or contact chamber) is designed to reduce the flow rate of pumped wastewater and the transition in gravity flow through open channels to treatment facilities.

The **mechanical treatment** or primary treatment is designed to remove suspended solids from wastewater by physical processes.

Gross solids and other constituents removal is carried out through screens as a mandatory operation to be performed at the inlet of the wastewater treatment plant.

Figure 4-15: Wastewater Treatment Plant. Energy dissipater. Screens

Source: GIZ/MLPS

The horizontal grit chambers are designed for removal of mineral particles bigger than 0.2 mm from the wastewater, especially sand particles and particles considered non-decayed. The technological scheme includes two (2) horizontal grit chambers.

The sand trapped sludge (dredged sludge) is non-decayed and it is subjected to dewatering on the sludge drying beds, which are not foreseen in the technological scheme.

The primary settlers are designed to gravity sedimentation of particles smaller than 0.2 mm, especially of organic suspended solids. The technological scheme includes two (2) primary settlers.

Figure 4-16: Wastewater treatment plant. Horizontal grit chamber. Primary settlers

Source: GIZ/MLPS

Biological treatment or secondary treatment uses the biological activity of microorganisms in order to oxidise and mineralise the organic matter from wastewater, which previously had been subjected to the primary treatment. The removal of organic matter dissolved in the wastewater is carried out by its absorption on the cell area, microorganisms, especially bacteria. As a result, the new bacteria cells and so-called metabolites (carbon dioxide, mineral salts) are formed.

The technological scheme includes two (2) activated sludge aeration tanks.

The secondary settlers are designed to remove the grown microorganisms from wastewater, (usually as biological membrane) in the active sludge aeration tanks. Sedimented sludge is partially used for seeding aeration tanks with activated sludge, and the excess is stored on the sludge drying beds for dewatering, which aims to reduce humidity from 93-98% up to 70 – 80%. The technological scheme includes two (2) secondary settlers.

Figure 4-17: Wastewater treatment plant. Activated sludge aeration tank. Secondary settlers

Source: GIZ/MLPS

The sludge dewatering or humidity reduction can be carried out through natural processes as evaporation and/or drainage. The sludge drying beds are designed to sludge dewatering and consists of in-ground impoundment area or concrete/reinforced fence. The drying beds are made open-air. The technological scheme includes two (2) sludge drying beds.

The **tertiary treatment** includes biological ponds, which represents open underground basins. The functioning of biological ponds is based on microbial cultures (usually aerobic). The necessary oxygen for aerobic treatment process which occurs in ponds, is taken from wastewater, organic compounds (sulphates; nitrates), and the atmosphere as a result of algae photosynthesis in the pond. The treatment in the biological ponds is ensured due to long period of wastewater retention, which is enough for development of natural self-treatment processes. The photosynthesis process is the main mechanism on which natural ponds are based. Regarding the design of ponds, their size depends on the required treatment, wastewater quality, climatic conditions (particularly temperature and brightness) and the depth of the pond. In ponds with a depth of 1.0 m occurs also anaerobic processes, on the bottom sludge, producing offensive odours. The technological scheme includes two (2) biological ponds.

The artificial biological treatment do not always ensure the elimination of all microbes, bacteria and pathogenic viruses. The **disinfection level** is foreseen to avoid the spread of infectious diseases at the wastewater discharge and it includes following units:

- Chlorination plant (out of operation), the disinfection process is carried out by injection of lime solution;
- Contact tank.

Figure 4-18: Wastewater treatment plant. Sludge drying beds. Contact tanks

Source: GIZ/MLPS

In the town of Falesti, the existing facilities for wastewater treatment have a high degree of wear.

According to obtained data, the quality of effluent wastewater does not comply to the actual standards of the Republic of Moldova (Law no.950 of 25.11.2013 on Approval of the Regulations on the conditions of collection, treatment and wastewater evacuation into sewage and /or water bodies for rural and urban localities), and corresponding treatment, for following indicator: ammonia nitrogen (NH_4+). Quality indicators of influent and effluent wastewater were presented by the Falesti municipal services utility, as provided in Table 4-20.

Table 4-20: Wastewater quality indicators

No.	Indicator	Unit	Influent concentration	Effluent concentration	Maximum allowed effluent concentration acc. to GD no. 950
1.	Hydrogen ion concentration (pH)		7.90	7.70	6.5 – 8.5
2.	Suspended solids	mg/l	231.0	29.5	35.0
3.	Biochemical oxygen demand (BOD_5)	mgO_2/l	161.25	24.73	25.0
4.	Chemical oxygen demand (COD)	mgO_2/l	300.0	120.0	125.0
5.	Ammonia Nitrogen (NH_4+)	mg/l	36.46	13.13	2.0
6.	Synthetical detergents biodegradable active anions	mg/l		-	0.5

Source: Falesti Municipal Services Utility

The treated wastewater is discharged into the Sovatul de Jos River. The monthly volume of treated wastewater is provided in Table 4-21.

Table 4-21: Monthly volume of treated wastewater for 2014

Month	Monthly volume of treated wastewater (m^3)
January	13,100
February	11,700
March	13,500
April	12,200
May	12,400
June	14,100
July	14,600
August	13,600
September	15,300
October	14,600
November	13,200
December	12,300
Total	**160,600**

Source: Falesti Municipal Services Utility

4.6.2 Wastewater system in Falestii Noi and Calugar localities

There is no centralised wastewater system in the localities of Falestii Noi and Calugar.

4.7 Available pre-feasibility and feasibility studies and technical documentation

During the elaboration of this feasibility study; available studies, feasibility studies and existing technical designs have been consulted, as provided in Table 4-22.

Table 4-22: Available studies and existing technical documentation

No.	Project Name	Type of document	Financing Agency
1.	Elaboration of drinking water supply and wastewater collection scheme for the localities of Falesti Rayon, town of Falesti, "Ecologie-Expert"	Feasibility study	N.A.

No.	Project Name	Type of document	Financing Agency
	Ltd. (2009)		
2.	Elaboration of drinking water supply and wastewater collection scheme for the localities of Falesti Rayon, Falesti Noi commune, “Ecologie-Expert” Ltd. (2009)	Feasibility study	N.A.
3.	Elaboration of drinking water supply and wastewater collection scheme for the localities of Falesti Rayon, Calugar commune, “Ecologie-Expert” Ltd. (2009)	Feasibility study	N.A.
4.	Design of sewerage network for “Dacia” micro-district in town of Falesti, SOROM PROIECT Ltd.	Technical design	N.A.
5.	Water supply of Falestii Noi locality, M.E. “PROTELCO GEOCAD” Ltd. (2012)	Technical design	N.A.
6.	Water supply of the town Falestii, Falesti rayon S.W.D.I. “ACVA” ACVAPROIECT (2008)	Implemented tech-nical design	NEF
7.	Construction of 3,780 m of sewerage pipeline in “Dacia” microdistrict, town of Falesti – Phase I (2014)	Implemented tech-nical design	NEF
8.	Wastewater services provision in Falestii Noi locality, “APCAN PROIECT” S.R.L. (2015)	Technical design	N.A.

Source: Falesti Municipal Services Utility

4.8 Conclusions

The identified issues of water supply and wastewater systems in the feasibility study area are following:

- In Falesti Town the coverage rate of water supply services is 95% and connection rate of about 61%;
- High real (physical) and apparent (commercial) water losses (annual NRW is about 48%) in the town of Falesti;
- High degree of wear of existing pipelines (the pipe age exceeds years of useful life) causes leakages in the water supply system in some sectors of the town of Falesti;
- According to the obtained data, provided by Falesti municipal services utility, the quality of the raw water at the well /intake does not comply with the standards of the Republic of Moldova (Government Decision no. 934 of 15.08.2007 on the establishment of Automated Information System "State register of natural mineral water, drinking water and bottled non-alcoholic beverages") for following indicators: ammonia, fluorides;
- The water from the underground water reservoir with a volume of 500 m³, installed on the third level pumping station PS-3 area, is delivered by gravity in the water distribution network for Baltului, Dacia and Centre districts and pumped in the water distribution network for Victoria district without disinfection; thus, the installation of a water disinfection unit before the above mentioned reservoir is required;
- No centralised water supply systems in Falestii Noi and Calugar localities;
- In Falesti Town the coverage rate of wastewater services is 33% and connection rate of about 29%;

- High degree of wear of existing pipelines (the pipe age exceeds years of useful life) causes frequent sewerage blockages and emergency driven maintenance.
- According to presented data by Falesti municipal services utility, the quality of effluent wastewater does not comply to the actual standards of the Republic of Moldova (Law no.950 of 25.11.2013 on Approval of the Regulations on the conditions of collection, treatment and wastewater evacuation into sewage and/or water bodies for rural and urban localities), and corresponding treatment, for following indicator: ammonia nitrogen (NH_4+);
- No centralised wastewater systems in Falestii Noi and Calugar localities.

5 Investment programme

5.1 General

The objective of this chapter is to prepare an Investment Programme to set the general direction for sector development in the feasibility study area and to identify the investment needs that will lead to increased coverage of population with water supply and wastewater services, improved service quality and efficiency improvements.

The subject Investment Programme has been developed in partnership system between the MLPS experts as well as local and regional partners[3] based on the following.

The subject Investment Programme has been prepared by the Consultant based on the following:

- Existing pre-feasibility, feasibility studies and detailed designs (see Chapter 4.7);
- WSS Regional Sector Programme (RSP) and Possible Project Concept (PPC) for Falesti developed in the framework of the program “Modernization of local public services in the Republic of Moldova”;
- Analysis of the existing situation (see Chapter 4);
- The comparison of results and assessment of initial conditions with Regional Sector Programme, Water Supply and Sanitation Strategy 2014-2028 (GD nr.199 of 20.03.2014);
- Strategies, goals and priorities defined by the Mayor’s Office of the town of Falesti and the Falesti Municipal Services Utility (see Chapter 5.2-Development strategy for the water supply and wastewater services);
- Identified problems and objectives based thereon;
- Water demand and wastewater flow projection (see Chapter 5.4).

The Investment Programme includes:

- Short-term;
- Medium-term;
- Long-term measures.

The short-term measures are referred to as Priority Investment Measures and are again sub-divided into two sub-phases as follows:

- Phase 1 – priority measures to be implemented until 2018;
- Phase 2 – priority measures to be implemented between 2018 and 2021 (depending on the availability of funds and the capacity of the implementing and operating agency this period might be extended).

[3] A Project Working Group (PWG), established by decision of the local council and comprising members from the Regional Development Agency Centre (RDA North), the Local Public Administration (LPA) and GIZ/MLPS experts, was instituted to facilitate and coordinate the process of preparation and agreeing this feasibility study, in particular the scope of the proposed project. The same PWG will endorse the study for approval by the Falesti local council.

The main reason for the sub-division of the short-term measures into two phases is that the capacity of the implementing and operating agencies should not be overloaded. Further, the objective is to identify “no-regret” measures which can be implemented immediately after completion of this feasibility study and which neither require further studies or investigations nor might be in contradiction to other regional projects under development. Priority investment measures retained in Phase 1 are considered as “The Project” for which further assessments have been carried out (Option Analysis, Financial Analysis, Environmental Assessment, etc.) in this study.

The identified investment measures are presented in this chapter in the following sections:

- In Chapter 5.7 all identified measures are described (irrespective of their phasing);
- In Chapter 5.8 the identified measures will be prioritised and phased (grouping into the above-mentioned phases);
- In Chapter 5.9 an Option analysis for the priority investment measures retained for Phase 1 has been carried out;
- In Chapter 5.10 a Priority Investment Plan (PIP) including investment cost estimates for Phase 1 and Phase 2 measures has been presented.

5.2 Development strategy for the water supply and wastewater services

In general, the main drivers for developing the Investment Programme in the water supply and wastewater sector are:

- Strategic goal;
- Urban development;
- Service objectives;
- Water demand projection;
- Metering policy;
- Tariff policy.

Strategic goal

The general strategic goal of the Mayor Office and the Municipal Service Utility is to achieve a viable and high quality management of the centralised water supply and wastewater systems. In order to further improve the efficiency of the services and to make use of economies of scale, neighbouring localities should be integrated into the services area of the Falesti Municipal Services Utility.

The local and regional strategies are therefore aligned to this national objective since the local strategy foresees the regionalisation of water supply and wastewater (WSS) services whilst the Regional Sector Programme (RSP) provides the framework for improving the conditions of local operators so that they can expand services and provide a viable partner for any future regional transmission main should it be found to be the most feasible solution.

Urban development

According to the analysis of demographic development and despite the decrease of national population in recent years, the population of Falesti remains stable, even a slight future increase is expected (see Chapter 2.4 - Population).

The positive development of the local economy like light industry, machinery construction industry and food industry offers employment opportunities and is positively contributing to the forecasted demographic evolution scenario. The trend of slight increasing of the number of active population in past 5 years and decreasing the number of unemployed are explained in particular by increasing the number of jobs due to the attracting investments (see Chapter 2.5 - Employment). In addition to that, with the location on the road between Balti (whose free economic zone is the largest one in Republic of Moldova) and border with Romania and the connection to the railway network, Falesti is well connected to the transportation infrastructure that is another driver for economic development.

Concerning potential extension of residential areas in the town of Falesti no major plans for large scale extensions in the near future are foreseen, although there is a possibility that the town will expand administrative and will connect the neighbouring localities Falestii Noi and Calugar.

Service objectives

The overall service objective is to provide the population with safe, reliable and continuous water supply and wastewater services. To achieve this, the Mayor Office and the Falesti Municipal Services Utility should consider (see assumptions and targets presented in Chapter 5.3-Design parameters and assumptions) the following specific objectives:

- Provide water compliant with the national drinking water standards to all parts of the service area;
- Maintain the current level of service by providing water 24 hours per day;
- Provide water of sufficient quantity to all customers;
- Extend the water supply and sewerage service area in the town of Falesti;
- Treat effluents from the sewer system in compliance with the current national legislation and in the future in compliance with the respective EU legislation (Urban Wastewater Treatment Directive);
- Reduce non-revenue water to an acceptable level of a maximum 25% by 2045;
- Improve efficiency of service provision by enhancing operation and maintenance practices for the Mayor Office and the Falesti Municipal Services Utility;
- Reduce operating costs and provide sufficient funds for adequate maintenance, repair and capital renovation of the system in order to ensure sustainability of service provision;
- Improve environmental protection;
- Ensure affordability of the tariffs for water supply and wastewater services.

Water demand projection

The trend of the decrease in the water consumption particularly due to the decline of the industry in the past decades is now rather stagnating. The largest agricultural producers ‘Sudzuker-Moldova’ JSC, the ’Avicola-Nord’ JSC and the winery ‘Mold – Nord’

JSC have constantly increased their business activities during the last 10 years and represent the biggest water consumers in Falesti.

The existing economic activities as well as the mentioned potential for further future activities are clear indicators for an increase of the water demand from the industry in future.

The domestic water demand is expected to increase due to an increase of the per capita consumption as well as the increase of the number of connected population to the water supply system, facilitated by the planned system extensions.

The Development of the water demand including water losses and wastewater flow projection is presented in the following chapter.

Metering policy

Customer metering:

In general, the current status of water metering in the town of Falesti is at high level. About 99% of the individual households (private houses) and 98% of the apartments are metered. The multi-story apartment buildings are not endowed yet with master water meters (meter at the entrance of the building), this issue being on the agenda of the operator as a priority to be solved in the near future. All non-domestic customers (enterprises and social institutions) are metered as well.

For domestic water meters, the precision is low due to the fact that meters in most of apartments and private houses are of “A” and “B” accuracy class (the lowest ones). For non-domestic customers, meters are checked and replaced if needed once every 2 years and therefore accuracy of water meters is satisfactory.

Water production metering:

Currently meters are installed at the outflow of the pumping stations; these meters are in good technical condition. There are no meters at water sources/wells and reservoirs. Installed meter‘s accuracy is at medium level since meters were calibrated by Moldovan authorized body.

According to the information provided by Municipal Service Utility, the highest priority is to replace all meters at water sources/wells (production meters) which will allow assessing the level of water losses and illegal consumption (Non-Revenue Water).

Improvement of the system knowledge (water flow, pressure and water losses) is of utmost importance and will be given high priority in the investment plan. The measures should reduce water wastage in the households and at the same time will increase water sales due to reduction of commercial water losses.

Tariff policy

Water tariff policy and strategy (level of average tariff and tariff structure) has a significant impact on:

- Water consumption (demand elasticity results in reduction of consumption when tariffs increase);
- Revenue stream and consequently capacity of the operator to maintain the WSS system adequately (sustainability).

Capacity building measures should be foreseen to develop an appropriate tariff policy and to ensure sustainability of the proposed Priority Investment Plan. Reference is made to Chapter 6 – Financial and Economic analysis.

5.3 Design parameters and assumptions

The development of water demand is determined by the parameters and assumptions defined as follows:

5.3.1 Domestic water consumption and wastewater generation

- Population forecast and its assumptions as presented in Chapter 2.4- Population;
- The development of the **service connection rate (water and wastewater)** for domestic customers considers the following:
  - Existing population connected;
  - Additional population connected due to on-going projects (completed before 2018);
  - Population connected due to network extension foreseen in Phase 1 by 2018;
  - Population connected due to network extension foreseen in Phase 2 by 2021;
  - Maximum target connection rate within the planning horizon is assumed to be reached in 2030 for urban localities and in 2045 for rural localities;
  - It is further assumed that the coverage rate (population which can potentially be connected to the network) is different from the connection rate (population which actually is connected to the network) and the following applies: Data for the existing situation regarding coverage and connection rate are applied if available (see chapter 4); if data are not available it is assumed that the connection rate is 30% less than the coverage rate for water supply and 40% less than the coverage rate for wastewater. The difference between coverage rate and connection rate will then decrease linearly and will be zero in the year when the target connection rate is defined (e.g. water supply coverage rate for urban areas will reach 100% in 2030 and will be equal to the water supply connection rate in 2030). The respective targets are presented in Table 5-1.
- **Per capita domestic water consumption** (volume of water sold) is currently very low as presented in Chapter 4.4 - Water balance, mainly due to two reasons (i) absence of part of the registered customers and (ii) apparent water losses (water theft, metering inaccuracy). Due to measures proposed in this feasibility study (Chapter 5.7.6. Technical Assistance) aimed at drastically reducing apparent (commercial) losses it is assumed that per capita water sales are projected to increase to the maximum of 110 l/c/d in urban areas and 80 l/c/d in rural areas due to economic development until the year 2045. It is noteworthy, that the demand projection model refers to “water sales” and not to “real water consumption4”, which explains the difference to the suggested per capita consumption figures in the Regional Sector Programme (RSP);
- The **wastewater generation factor** (share of wastewater discharged to the wastewater system out of water consumed) for domestic customers is assumed to be 100% (factor of 1).

[4] The difference between water sales and real water consumption are the „apparent or commercial losses” due to meter under registration, meter tampering, etc. and partly also due to consumption from private individual wells.

5.3.2 Non-domestic water consumption and wastewater flow

- **Industrial consumption**[5]: During the last decades, the economy in the project area has slowed down and many industries closed, which resulted in a decline in industrial water consumption. For the purpose of this study, it is assumed that industrial water consumption will slightly increase (from a very low level) linearly to 15 l/c/d until 2030, and will then remain constant until the end of the planning horizon. It is assumed that industrial consumption only applies to urban localities;
- **Institutional water consumption**: It is assumed that institutional water consumption will increase/decrease from current consumption level[6] linearly to 10 l/c/day until 2030 and will then remain constant until the end of the planning horizon. It is assumed that institutional consumption applies to urban and rural localities;
- **The wastewater generation** factor for non-domestic customers (share of wastewater discharged to the wastewater system out of water consumed) is assumed to be 100% for commercial and institutional customers (factor 1);
- **Industrial wastewater** flow from customers not connected to the water supply system (own wells) but discharging to the sewer system is unknown and cannot be determined based on the provided data). For future development it is assumed that this volume is insignificant and will not be taken into consideration for wastewater flow projection.

5.3.3 Extension of water supply system to localities in the neighbourhood of the town of Falesti

The Falesti Municipal Services Utility is going to extend the services to the localities of Calugar and Falestii Noi in the vicinity of the town of Falesti. These localities are currently endowed neither with a water supply network nor with a sewerage network. However, there are ongoing activities to connect these localities to the central water supply system of the town of Falesti. Transmission mains and water storage facilities are already constructed, supply networks within the localities are planned to be completed in the coming years. It is expected that the water supply system will be completed by 2018. For the study it is assumed that all localities will be served with water supply from the Falesti Municipal Services Utility by 2018, no activities for the water supply for these localities are planned within this study. Investments for a wastewater system for the localities of Calugar and Falestii Noi are considered in Phase 2 of this study.

5.3.4 Water losses

Currently non-revenue water (NRW) in the water supply system of the town of Falesti is comparatively high. Reduction of NRW is therefore one of the main goals in order to increase efficiency of the WSS system. The following assumptions have been made with regard to reduction of NRW for the network:

- *Apparent Losses*[7] *(commercial losses)* are assumed to decrease linearly to 5% (unavoidable apparent losses) until the year 2045 due to technical assistance measures for reduction of commercial losses included in Phase 1;

[5] Including all commercial entities

[6] According to data from the Municipal Service Utility sales department.

[7] Including unbilled authorised consumption

- *Real losses (physical losses)* are assumed to decrease linearly to 20% until the end of the planning horizon in 2045. This target is assumed to be achieved by implementing (i) investment measures for renovation of the existing water supply system and (ii) Technical assistance measures and equipment aiming to reduce water losses (including training in water loss reduction e.g. leakage detection and pressure management; improvement of revenue collection[8]) proposed in Phase 1 of the subject investment plan. Further, in the long-term it is assumed that continuous renovation of the network[9] will further reduce real water losses;
- Overall, NRW is therefore assumed to decrease to 25% until the year 2045.

5.3.5 Sewerage infiltration rate

The sewerage infiltration rate (as % of total water discharged to the wastewater system) is assumed to decrease if measures for rehabilitation of the sewer network are foreseen. The development of this parameter is based on expert assessment, separate for each sewer network, depending on:

- The condition of the sewer network;
- The share of new and old sewer network;
- The type of sewer (separate or combined system);
- Information about groundwater table if available;
- Data of wastewater concentration at the outflow of the sewer system if available.

There is no information on the current infiltration rate available for Falesti sewer network (see Chapter 4) and therefore a typical[10] infiltration rate for sewer networks in the region has been applied in the model (see table below). It is assumed that the infiltration rate will decrease after implementation of measures for rehabilitation of sewer network or extension of the sewer network in accordance with the ratio of "new sewer network[11]" and "old sewer network[12]" (see Table 5-1). Thereafter, it is assumed that the sewer infiltration rate will linearly decrease due to measures for sewer network rehabilitation (financed by additional funds generated by the Falesti Municipal Services Utility as a result of the technical assistance measures included in Phase 1) until the end of the planning horizon[13].

5.3.6 Wastewater flow and load

The following assumptions have been made regarding wastewater flow and load development:

[8] Commercial improvements will result in availability of funds for regular renovation of the water network

[9] Financed from additional revenues generated by the Municipal Service Utility as a result of technical assistance measures included in Phase 1.

[10] Outworn and obsolete sewer system

[11] Infiltration rate of 10% is assumed for new sewer networks

[12] An infiltration rate of 50% is assumed for old sewer networks (e.g. above 30 years)

[13] It is assumed that without major investments after Phase 2 the infiltration rate cannot be further reduced. However, regular replacement of sewer network by the Falesti Municipal Services Utility will maintain the infiltration rate at constant level (increasing of the infiltration rate can be avoided by regular repairs and rehabilitation).

- Specific domestic wastewater load: 60 $gBOD_5$/capita/day for design of WWTP;
- Specific non-domestic wastewater load: Wastewater flow at a max. admissible BOD_5 concentration of 225 mg/l to discharge into the sewer network;
- Peak Storm Water Factor: 1.3 for allowance for storm water entering into the sewer network from "unacceptable[14]" rainwater connections or rainwater entering into manholes during storm water run-off (applicable for separate systems).

All design parameters are in line with the national regulation and with international standards. The main design parameters are presented in the Table 5-1 (reference is made to explanations in the previous chapter).

Table 5-1: Design parameter

N°	Design Parameter	Unit	2014[15]	2018[16]	2021[17]	2030	2045
0	Service coverage rate for domestic customers, disaggregated for total, urban and rural localities						
0.1	Water - total	%	76	77	96	98	100
0.2	Wastewater - total	%	27	27	94	97	98
0.3	Water supply – urban	%	95	96	99	100	100
0.4	Water supply – rural	%	0	0	87	92	100
0.5	Wastewater - urban	%	33	33	96	100	100
0.6	Wastewater - rural	%	0	0	85	87	90
1	Service connection rate for domestic customers, disaggregated for urban and rural localities						
1.1	Water - total	%	49	49	63	95	100
1.2	Wastewater - total	%	23	23	63	85	94
1.3	Water supply – urban	%	61	62	63	100	100
1.4	Water supply – rural	%	0	0	61	76	100
1.5	Wastewater - urban	%	29	29	66	90	95
1.6	Wastewater - rural	%	0	0	51	66	90
2	Volume of water sold for domestic consumers						
2.1	In urban localities	l/c/d	55	62	67	83	110
2.2	In rural localities	l/c/d	0	0	30	49	80
3	Volume of water sold for non-domestic consumer (industry, commercial…), disaggregated for urban and rural localities						
3.1	Ind. and commercial - urban	l/c/d	6.4	8.6	10.2	15.0	15.0
3.2	Ind. and commercial - rural	l/c/d	0.0	0.0	0.0	0.0	0.0
3.3	Institutional entities - urban	l/c/d	2.3	4.2	5.7	10.0	10.0
3.4	Institutional entities - rural	l/c/d	0.0	0.0	5.0	10.0	10.0
4	Wastewater generation as factor of the water demand						
4.1	Domestic customers	factor	1	1	1	1	1
4.2	Non-domestic customers	factor	1	1	1	1	1
5	Non-Revenue Water (NRW) as share from the water production						
5.1	Total NRW	%	48	40	33	28	25
5.2	Apparent losses	%	12	10	8	5	5
5.3	Real losses (physical losses)	%	36	30	25	23	20

[14] It is best practice to avoid any connection from rainwater drains (e.g. from roofs or streets). However, practically a certain amount of rainwater entering the sewer network cannot be avoided.

[15] Existing situation

[16] 1st year of operation phase 1 investments

[17] 1st year of operation phase 2 investments

N°	Design Parameter	Unit	2014[15]	2018[16]	2021[17]	2030	2045
6	Sewer Infiltration rate as share of total water discharged to the wastewater system						
6.1	Sewerage infiltration rate	%	50	40	20	18	15
7	Water demand variation factors (in compliance with SNIP)						
7.1	Daily variation factor	factor	1.1				
7.2	Hourly variation factor Water supply	factor	1.4				
7.3	Hourly variation factor wastewater	factor	1.9				
7.4	Peak storm water factor	factor	1.3				
8	Wastewater flow and load parameters for domestic and non-domestic sources						
8.1	Specific Domestic wastewater Load	$gBOD_5/c/d$	60				
8.2	Specific Non-domestic Wastewater Load - maximum admissible BOD_5 concentration for sewer discharge	mg/l	225				

Source: GIZ/MLPS

The assumptions for water demand projection related to financial projections require differentiating between two scenarios: (1) Business as usual and (2) after project implementation (Phase 1 measures). The results of the financial projections are presented in Chapter 6 – Financial and Economic Analysis. While the assumptions presented in the table above represent "Scenario 2 – With Project", the main assumptions to differentiate between the two scenarios are presented as follows:

- Real (physical) water losses are assumed to remain constant *without* implementing the project measures in Phase 1 (reduction of water losses due to technical assistance measure (e.g. active leakage management, pressure management, etc.);
- Apparent (commercial) water losses are assumed to remain constant *without* implementation of the technical assistance measures (Revenue and metering improvement program).

5.4 Water demand and wastewater flow projection

The water demand projection (volume of water sold, non-revenue water and water production) is presented in the Table 5-2 (a detailed table is presented in Annex 5.1). As can be seen, the projected water production needs are highest in the year 2045, which will be the basis for design calculation.

Table 5-2: Water demand projection

N°	Parameter	Unit	2014[18]	2018[19]	2021[20]	2030	2045
1	Population in the project area served with water						
1.1	Total population serviced	N°	10,258	10,329	13,058	19,318	19,438
1.2	In urban localities	N°	10,258	10,329	10,499	16,237	15,687

[18] Existing situation

[19] 1st year of operation phase 1 investments

[20] 1st year of operation phase 2 investments

N°	Parameter	Unit	2014[18]	2018[19]	2021[20]	2030	2045
1.3	In rural localities	N°	0	0	2,559	3,081	3,751
2	Volume of water sold in total and disaggregated for different consumers						
2.1	Total volume sold	m³/y	238,700	282,443	351,857	708,560	896,185
2.2	Domestic customers	m³/y	206,100	234,261	286,507	549,151	739,352
2.3	Industrial customers	m³/y	24,100	32,338	39,021	88,897	85,886
2.4	Institutional customers	m³/y	8,500	15,844	26,329	70,512	70,948
3	Total water sold disaggr. for urban and rural areas						
3.1	Urban Localities	m³/y	238,700	282,443	319,164	642,486	772,970
3.2	Rural localities	m³/y	0	0	37,635	71,102	123,215
4	Non-Revenue Water (NRW) volume disaggregated for total NRW, apparent losses, and real losses						
4.1	Total NRW	m³/y	222,700	188,295	173,303	277,263	298,728
4.2	Apparent losses	m³/y	55,675	47,074	42,013	49,291	59,746
4.3	Real losses (physical losses)	m³/y	167,025	141,222	131,290	227,972	238,983
5	The water demand figures considering the demand variation factors						
5.1	Yearly water demand/production	m³/y	461,400	470,738	525,160	985,823	1,194,913
5.2	Average daily water demand	m³/d	1,264	1,290	1,439	2,701	3,274
5.3	Maximum daily water demand	m³/d	1,330	1,367	1,535	2,895	3,519
5.4	Average hourly water demand	m³/h	53	54	60	113	136
5.5	Max. hourly water demand	m³/h	69	73	83	160	196

Source: GIZ/MLPS

Wastewater flow and load projections are presented in the table below (a detailed table is presented in Annex 5.2). As can be seen, the highest wastewater flow and the highest wastewater load occur in the year 2045, and the highest wastewater load occurs in the year 2045, which will be the basis for design calculation of sewer network and wastewater treatment plant (if applicable).

Table 5-3: Wastewater flow and load projection

N°	Parameter	Unit	2014[21]	2018[22]	2021[23]	2030	2045
1	Population in the project area served with sewerage						
1.1	Total population serviced	N°	4,836	4,787	13,132	17,297	18,278
1.2	In urban localities	N°	4,836	4,787	10,976	14,613	14,903
1.3	In rural localities	N°	0	0	2,156	2,684	3,376
2	Volume of wastewater charged in total and disaggregated for different customers						
2,1	Total volume of wastewater	m³/y	160,600	168,211	429,081	655,586	845,215
2,2	by domestic customers	m³/y	110,700	120,243	317,625	512,443	696,908
2,3	by industrial customers	m³/y	42,958	38,446	81,131	80,008	81,591
2,4	by Institutional customers	m³/y	6,942	9,522	30,324	63,135	66,716
3	Total wastewater charged disaggregated for urban and rural areas						
3,1	in urban localities	m³/y	160,600	168,211	401,535	598,030	734,322
3,2	in rural localities	m³/y	0	0	27,546	57,556	110,893
4	The sewer infiltration water based on the determined infiltration rate						
4.1	Sewer infiltration water	m³/y	80,300	67,284	85,816	118,825	126,782

[21] Existing situation

[22] 1st year of operation phase 1 investments

[23] 1st year of operation phase 2 investments

N°	Parameter	Unit	2014[21]	2018[22]	2021[23]	2030	2045
5	The wastewater generation figures considering variation factors						
5.1	Average wastewater flow (dry weather)	m³/y	240,900	235,495	514,897	774,411	971,997
5.2	Max, daily dry weather flow (Qdmax)	m³/d	704	691	1,528	2,301	2,895
5.3	Maximum hourly dry weather flow (QDWF)	m³/h	47	48	112	170	216
5.4	Maximum hourly storm water flow (QSWF)	m³/h	62	62	146	221	281
6	Population equivalents in total and disaggregated for different customers						
6.1	Total population equivalent	PE60	5,349	5,280	14,277	18,768	19,802
6.2	by domestic customers	PE60	4,836	4,787	13,132	17,297	18,278
6.3	by Industrial and instit, customers	PE60	513	493	1,145	1,471	1,524
7	Pollution load – BOD in total and disaggregated for different customers						
7.1	The total BOD_5 load	kg/d	321	317	857	1,126	1,188
7.2	by domestic customers	kg/d	290	287	788	1,038	1,097
7.3	by industrial and institutional customers	kg/d	31	30	69	88	91

Source: GIZ/MLPS

5.5 Water demand projection versus available water resources and production capacities

As presented in Chapter 4-Technical Aspects-Existing Situation, the currently used wells in Falesti do not provide water which meets the national drinking water standards. Due to substances like fluoride, the treatment of the water would be just possible with high sophisticated technologies. This does not allow for sustainable water service provision as the operation costs (specifically energy) would be very high and the necessary experience with such technologies is not available in Moldova.

That is why the LPA aims for a long time to switch their water supply system to a reliable water source. Just recently a water transmission main from the Prut River to Falesti and a water treatment located closed to Falesti have been implemented. It is the plan to connect the localities in the study area, Falesti, Falestii Noi, and Calugar to this system. Thus, the future water source for Falesti, Falestii Noi and Calugar will the Prut River, provided through this regional water supply system.

The available production capacities of the regional system for the project area is are 2,400 m³/d.

The long-term water demand projection for the town of Falesti (see Chapter 5.4-Water demand and wastewater flow projection) shows an increase of the water demand with the peak water demand in the year 2045.

Table 5-4: Water demand projection versus currently available production capacities

N°	Parameter	Unit	Quantity
1	Currently available water resources (Production capacity of the newly installed WTP)	m³/d	2,400
2	Water demand in the project area in 2028	m³/d	2,398
3	Peak water demand (Qdmax) in year 2045	m³/d	3,274
4	Additionally required water production capacities (long-term)	m³/d	874

Source: GIZ/MLPS

This projected water demand can be covered with the newly installed WTP until the year 2028. In order to cover the water demand in the following period on a long-term (until 2045) the capacity of the WTP needs to be increase stepwise for another 900 m³/d.

5.6 Unit costs

The prices are based on cost estimation from other studies, tendered projects which are implemented in Moldova and international experience.

5.6.1 Unit costs water supply

The Table 5-5 shows the unit costs for the relevant water supply components applied for the cost estimations for the investment measures proposed for the Phase 1 and Phase 2.

Table 5-5: Unit costs for water supply facilities

N°	Item	Dimension		Investment costs	
				Unit	Unit cost
1	Water network, distribution or transmission pipe, PE100, SDR17, PN10, Incl. all earth, works, installation works, pipes and fittings				
1.1	Pipe	OD	75	EUR/m	60
1.2	Pipe	OD	90	EUR/m	62
1.3	Pipe	OD	110	EUR/m	65
1.4	Pipe	OD	125	EUR/m	67
1.5	Pipe	OD	140	EUR/m	70
1.6	Pipe	OD	160	EUR/m	75
1.7	Pipe	OD	180	EUR/m	82
1.8	Pipe	OD	200	EUR/m	90
1.9	Pipe	OD	225	EUR/m	97
1.10	Pipe	OD	250	EUR/m	104
1.11	Pipe	OD	280	EUR/m	124
1.12	Pipe	OD	315	EUR/m	139
1.13	Pipe	OD	355	EUR/m	154
1.14	Pipe	OD	400	EUR/m	174
2	Manhole for distribution system, Incl. all earth works, installation works and fittings				
2.1	Manhole	Dia. mm	1500	EUR/pc	423
3	House connection, Incl. all earth works, installation works, pipes and fittings				
3.1		pc	1	EUR/pc	250
4	Disinfection facility, Investment costs: incl. Container or small building, technical equipment, electric installations				
4.1	Device	m³/d	100	EUR	20,000
4.2	Device	m³/d	200	EUR	23,000
4.3	Device	m³/d	500	EUR	30,000
4.4	Device	m³/d	1,000	EUR	40,000
4.5	Device	m³/d	2,500	EUR	55,000
4.6	Device	m³/d	5,000	EUR	65,000
4.7	Device	m³/d	6,000	EUR	70,000
5	Submersible pumps, Pumps, technical equipment, electric installations, control system				
5.1	Submersible pump	l/s/ m	19.5/100	EUR	15,000
6	Water Supply Reservoirs				
6.1	Underground Reservoirs				
6.1.1	Reservoir Volume	m³	100	EUR	60,000
6.1.2	Reservoir Volume	m³	150	EUR	85,000
6.1.3	Reservoir Volume	m³	200	EUR	110,000
6.1.4	Reservoir Volume	m³	250	EUR	140,000

N°	Item	Dimension		Investment costs	
				Unit	Unit cost
6.1.5	Reservoir Volume	m³	500	EUR	200,000
6.1.6	Reservoir Volume	m³	1,000	EUR	320,000
7	Pressure reducing valves (material incl. installations)				
7.1	For pipe diameter	OD	100	EUR/PC	3,500
7.2	For pipe diameter	OD	150	EUR/PC	5,300
7.3	For pipe diameter	OD	200	EUR/PC	6,830
7.4	For pipe diameter	OD	250	EUR/PC	8,770
7.5	For pipe diameter	OD	300	EUR/PC	10,670
7.6	For pipe diameter	OD	400	EUR/PC	18,295
7.7	For pipe diameter	OD	500	EUR/PC	26,020
7.8	For pipe diameter	OD	600	EUR/PC	37,440

Source: GIZ/MLPS

5.6.2 Unit costs wastewater

The Table 5-6 shows the unit costs for the relevant wastewater components applied for the cost estimations for the investment measures proposed for Phase 1 and Phase 2.

Table 5-6: Unit costs for wastewater facilities

N°	Item	Dimension		Investment costs	
				Unit	Unit cost
1	Sewer network, collection pipe, PVC, Incl. all earth works, installation works, pipes and fittings				
1.1	Pipe	OD	110	EUR/m	88
1.2	Pipe	OD	125	EUR/m	92
1.3	Pipe	OD	160	EUR/m	140
1.4	Pipe	OD	200	EUR/m	150
1.5	Pipe	OD	250	EUR/m	165
1.6	Pipe	OD	315	EUR/m	185
2	Manhole for collection system, Incl. all earth works, installation works and fittings				
2.1	Manhole	dia. mm	1,000	EUR/pc	1,030
3	House connection, Incl. all earth works, installation works, pipes and fittings				
3.1		pc	1	pc,	500
4	Wastewater pumping stations, Incl. all electro- mechanical equipment, pipes, fittings, housing and installation works				
4.1	Facility	N° of pop.	500	EUR	28,000
4.2	Facility	N° of pop.	1,000	EUR	32,000
4.3	Facility	N° of pop.	2,000	EUR	40,000
4.4	Facility	N° of pop.	5,000	EUR	50,000
4.5	Facility	N° of pop.	10,000	EUR	63,000
4.6	Facility	N° of pop.	15,000	EUR	75,000
4.7	Facility	N° of pop.	20,000	EUR	83,000
5	Wastewater Treatment Plant, according to the EC Directive for urban wastewater treatment incl. primary treatment, secondary treatment (e.g. low load trickling filters, Low load activated sludge process, aerated pond system, constructed wetlands), all construction and installation works, electro- mechanical equipment.				
5.1	Plant	P.E.	1,000	EUR/P.E.	500
5.2	Plant	P.E.	2,500	EUR/P.E.	390
5.3	Plant	P.E.	5,000	EUR/P.E.	340
5.4	Plant	P.E.	10,000	EUR/P.E.	300
5.5	Plant	P.E.	20,000	EUR/P.E.	260
5.6	Plant	P.E.	30,000	EUR/P.E.	250
5.7	Plant	P.E.	35,000	EUR/P.E.	240

Source: GIZ/MLPS

5.7 Proposed investment measures

5.7.1 General

In order to achieve the local development objectives and goals (see Chapter 5.2-Development strategy for the water supply and wastewater services) as well as the targets in line with the Regional Sector Programme (RSP), a number of investment measures have been identified and are presented in this chapter. These measures are based on the measures identified in previous assessments ("Possible Project Concept" - PPC) and the findings from this study (reference is made to Chapter 4 – Technical aspects-Existing Situation and Chapter 5.4. Water demand and wastewater flow projection).

This chapter contains:

- The main drivers for development of the investment framework;
- A detailed description of the proposed investment measures;
- A prioritisation and phasing of investment measures;
- An option analysis for priority investment measures Phase 1;
- The priority investment plan including cost estimates for each of the investment phases.

5.7.2 Investment framework

Based on the assessments within this study, the local WSS objectives and the RSP, the main drivers for development of the investment framework have been identified and are presented as follows:

5.7.2.1 Water supply

- Currently there are 10,258 inhabitants in the town of Falesti connected to the existing water supply system (61% connection rate, see Table 5-7 below and Chapter 4 - Techincal Aspects – Existing Situation). There is no supply shortage for the service area of "the Municipal Service Utility. The current production capacity is sufficient to cover the water demand of the serviced area. However, NRW is high (48% of the production) and the water quality is poor;
- The water quality provided in the service area does not comply with the national standards for drinking water quality (excess of fluorine concentration). As treatment of fluorine is very costly (high investment and operation costs), there is no immediate solution, which can be proposed within the investment plan of this study. The LPA together with support from the GoM is in process to switch from the currently used local groundwater sources to treated surface water from the Prut River (water treatment plant is constructed, regional transmission main is in process);
- In order to increase the efficiency of the water supply system it is recommended to put the focus on the reduction of NRW by rehabilitation of the existing water distribution network, which is in large parts older than 35 years, and on operational improvements;
- Enlargement of the service coverage area within the town of Falesti by extension of the water distribution network and construction of transmission mains to the Gara Falesti zone and further to the Fabrica de Zahar zone;

- The localities of Falestii Noi and Calugar in the neighbourhood of the town of Falesti are currently not connected to the centralised water supply system of the town of Falesti but the Falesti Municipal Services Utility envisages connecting the localities in the near future (by 2021), once the switch to the new water source (treated surface water from the Prut River) is implemented:
  - For the locality of Falestii Noi a distribution network, a transmission main to connect to the new water source (treated Prut River water) and a water tower is recommended;
  - For the locality of Calugar a distribution network, a transmission main to connect to the new water source (treated Prut River water) and a water reservoir is recommended.
- In order to cover the future water demand for the study area until 2045, additional treatment capacities have to be developed (increase by 37%). It is proposed to extent the capacity of the new WTP stepwise, starting with 2028;
- In the medium-term, it is recommended to optimise the network operation, based on the results of the detailed investment plan to be prepared in the frame of the Water Supply Network Analysis and Water Loss Reduction Programme included in the technical assistance measures in Phase 1(reference is made to Chapter 5.7.6 -Technical Assistance). These measures might inter alia include:
  - Replacement of the remaining water supply network older than 30 years in the medium-term;
  - Establishment of adequate system operation and control comprising pressure zoning, district metering and leakage monitoring with installation of permanent and temporary measure and control spots incl. chambers, measuring and control equipment, valves etc.;
  - Installation of a SCADA system.

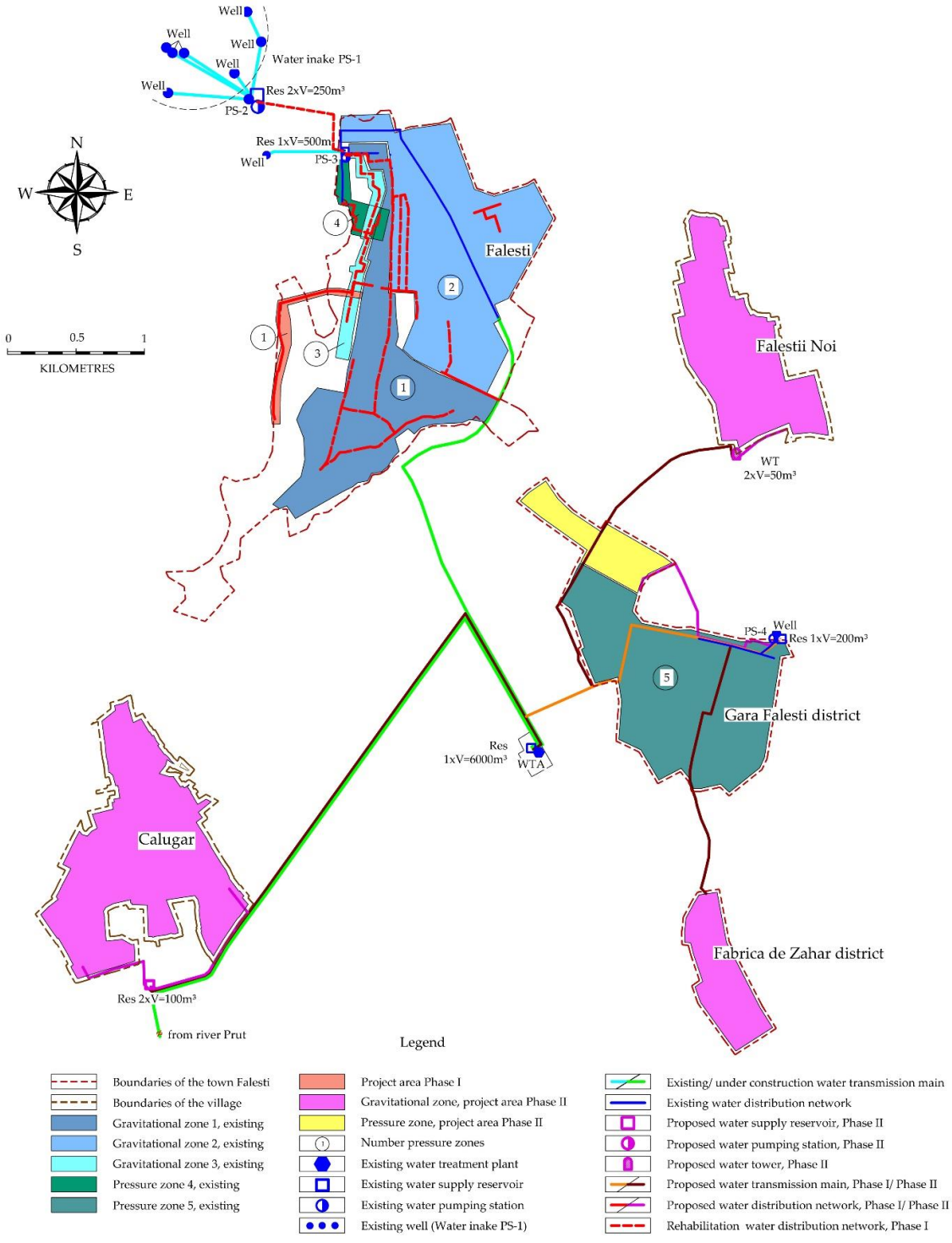
The Table 5-7 shows the development of service connections for the water supply network (existing situation and additional connections for the year 2018 and 2021 as well as for 2030 and 2045). For more detailed projection tables reference is made to Annex 5.3 and Annex 5.4.

Table 5-7: Development of connection rates water supply

Code	Locality	Population connected to the water supply system									
		2014		2018		2021		2030		2045	
		n°	%	n°	%	n°	%	n°	%	n°	%
1	Falesti	10,258	61	10,329	62	10,499	63	16,237	100	15,687	100
2	Falestii Noi	0	0	0	0	1,283	62	1,531	76	1,847	100
3	Calugar	0	0	0	0	1,276	60	1,550	75	1,904	100
TOT	**Total**	**10,258**	**49**	**10,329**	**49**	**13.058**	**63**	**19,318**	**95**	**19,438**	**100**

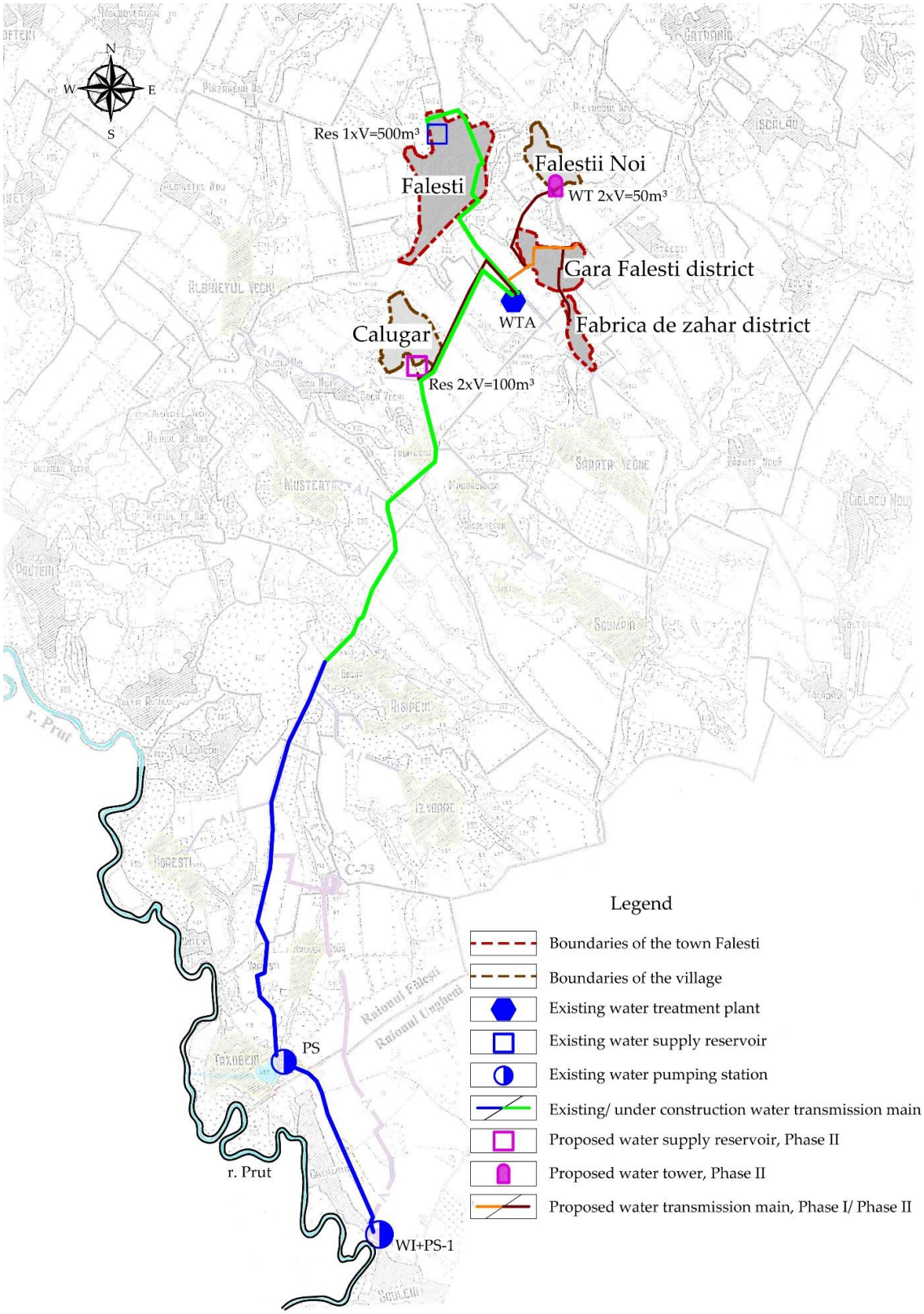
Source: GIZ/MLPS

Figure 5-1: Scheme of the existing water supply system and the proposed extensions in the town of Falesti



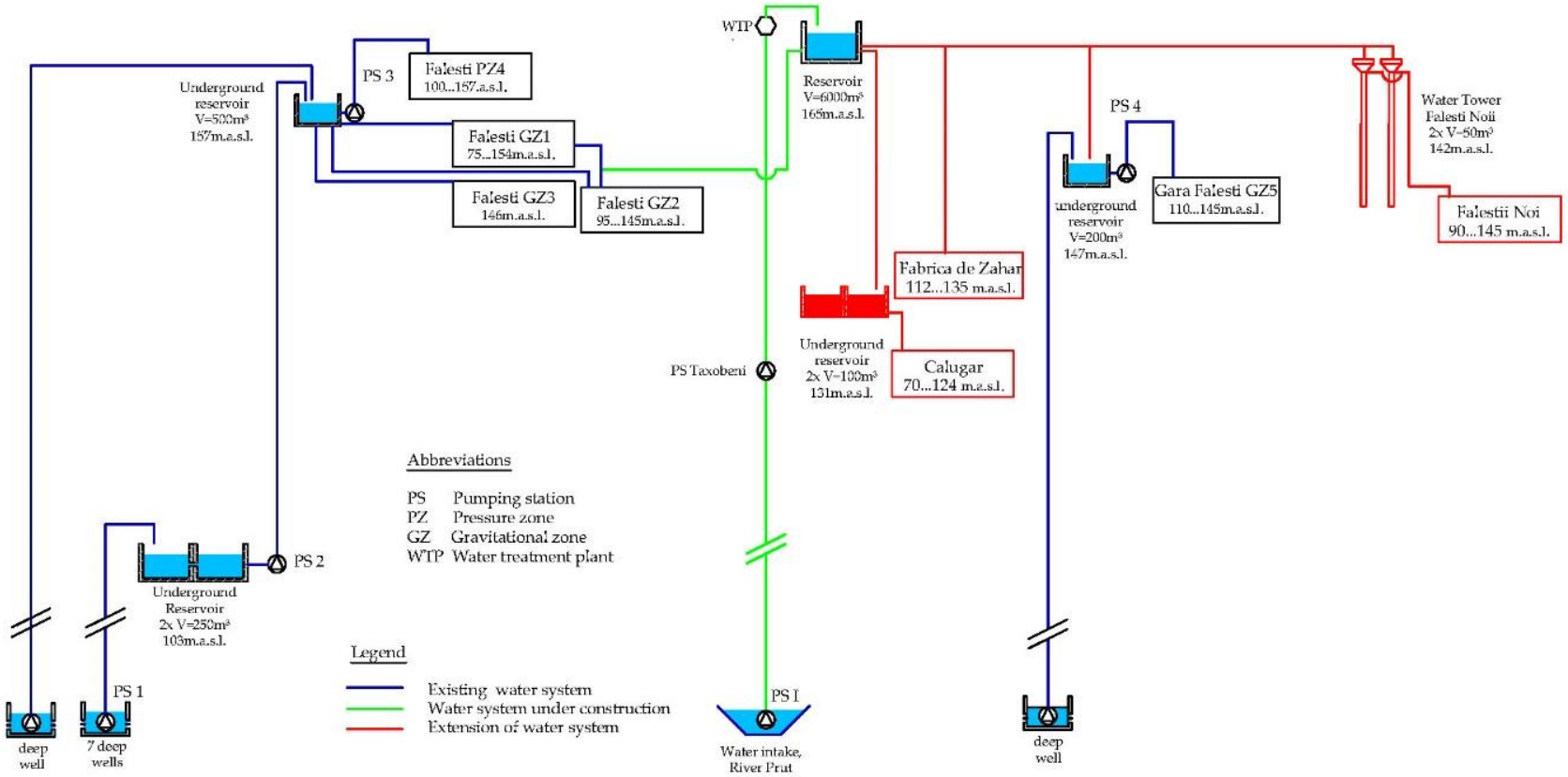
Source: GIZ/MLPS

Figure 5-2: Scheme of the existing water transmission main Prut-Falesti and the proposed extensions



Source: GIZ/MLPS

Figure 5-3: Hydraulic scheme of existing water supply system and the proposed extensions in the town of Falesti



Source: GIZ/MLPS

5.7.2.2 Wastewater

- Currently only the town of Falesti is partly endowed with an existing wastewater system (sewer network and wastewater treatment plant are described in Chapter 4-Technical Aspect-Existing situation of this report). About 4,830 people (29%) are currently connected to the sewerage network (see Table 5-8). The LPA plans to extent the sewer system in the town of Falesti. The wastewater treatment plant is in operation however, already quite outdated and can serve for the short-term only;
- The localities of Falestii Noi and Calugar do not have any centralised wastewater facilities. However, it is planned to organise wastewater collection and treatment for the localities of Falestii Noi and Calugar;
- In order to develop the wastewater infrastructure in the rayon, agglomerations (as per EU-definition "an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point") have to be defined for the entire rayon. Further, an assessment (option analysis) will be necessary to decide which of these agglomerations should be grouped to be connected to a Wastewater Treatment Plant (WWTP). It is recommended to include this analysis in a technical assistance component to be implemented in Phase 1 (see Chapter 9.2 – Procurement strategy and implementation plan). The localities in the vicinity of the town of Falesti will be served in accordance with the results of the agglomeration analysis defined in this Technical assistance component (see above) and possibly with the dates to be negotiated in the EU-accession treaty. Compliance of these localities with EU-environmental regulations (Urban Wastewater Treatment Directive 91/271/EEC) will require grouping the agglomerations into localities (i) below 2,000 P.E., (ii) between 2,000 P.E. and 10,000 P.E., and (iii) above 10,000 P.E. Among the agglomerations in the project area (outside of the town of Falesti) 3 localities (all of them below 2,000 P.E. and thus not subject to the requirements defined in the Urban Wastewater Treatment Directive 91/271/EEC) are to be either endowed with a sewer network and connected to a WWTP in the medium and long-term, or alternative wastewater systems (on-site sanitation) have to developed in order to ensure adequate wastewater treatment;
- To the collection and treatment of wastewater in the town of Falesti (current population of 16,900) should be given highest priority (in line with priorities defined in the Urban Wastewater Treatment Directive 91/271/EEC):
  - Therefore, an extension of the sewer network in the town of Falesti is proposed. In order to convey the collected wastewater to the WWTP, one WWPS (WWPS-3) and a pressure line will be necessary as presented in the Figure 5-3;
  - Further the existing sewer (30% of the sewer older than 30 years) as well as pressure lines will be rehabilitated in order to increase the efficiency in the wastewater collection;
  - In the short term (until 2021), it is recommended to continue using the existing WWTP Falesti which has sufficient capacity to treat the wastewater flow from the drainage areas of the existing network and proposed network extensions. The Consultant's assessment reveals that the condition of the WWTP is poor but still adequate to be operated until the year 2021;
  - The connection rate in the town of Falesti will reach about 66% after Phase 2 (details in Table 5-8) and will linearly increase to 95% in 2045.

- The localities of Falestii Noi (current population of 2,076) and Calugar (current population of 2,140) will be served in accordance with the results of the agglomeration analysis defined in the technical assistance component (see above). Possible options are:
  - Option 1: Separate collection system and separate WWTP for each of the localities;
  - Option 2: Separate sewer collection system for each locality and discharge of wastewater to the sewer network in the town of Falesti or transport of sewerage by trucks to the WWTP of the town of Falesti;
  - Option 3: On-site sanitation (no collection system).
- Due to the vicinity of the localities to the sewer network of the town of Falesti, preliminary assumption is to cover the localities of Falestii Noi and Calugar with sewer systems and to transmit the collected wastewater with collectors to the sewer network of the town of Falesti (in case of Falestii Noi) and to the WWTP in Falesti (in case of Calugar);
- The connection rate in these localities will reach about 50% after Phase 2 and will linearly increase to 90% in 2045 (details in Table 5-8);
- Wastewater generated in the town of Falesti and the two localities of Falestii Noi and Calugar will increase from currently 5,349 P.E. to 14,277 P.E. in 2021 and is projected then to increase to 19,802 P.E. in 2045 (see Chapter 5.4 Water Demand and Wastewater Flow Projection);
- For the medium and long term (starting with 2021) it is proposed to use a new WWTP for Falesti (and neighbouring localities according the proposed analysis);
- The design capacity of the future WWTP will depend on the above mentioned agglomeration analysis, depending on the number of localities to be connected to the WWTP in Falesti the design capacity could be from 12,000 P.E. (only the town of Falesti) up to 20,000 P.E. in 2045 in case the localities shall be connected to a centralised WWTP. Therefore, the design capacity can only be roughly estimated at this stage. Further planning shall be based on the results of the technical assistance-study to be carried out in Phase 1. For the investment costs estimations in this study a WWTP of a capacity of about 19,000 P.E. for Falesti (treating wastewater for the entire study area) is calculated. This should not be understood as presumption of the result of the proposed analysis.

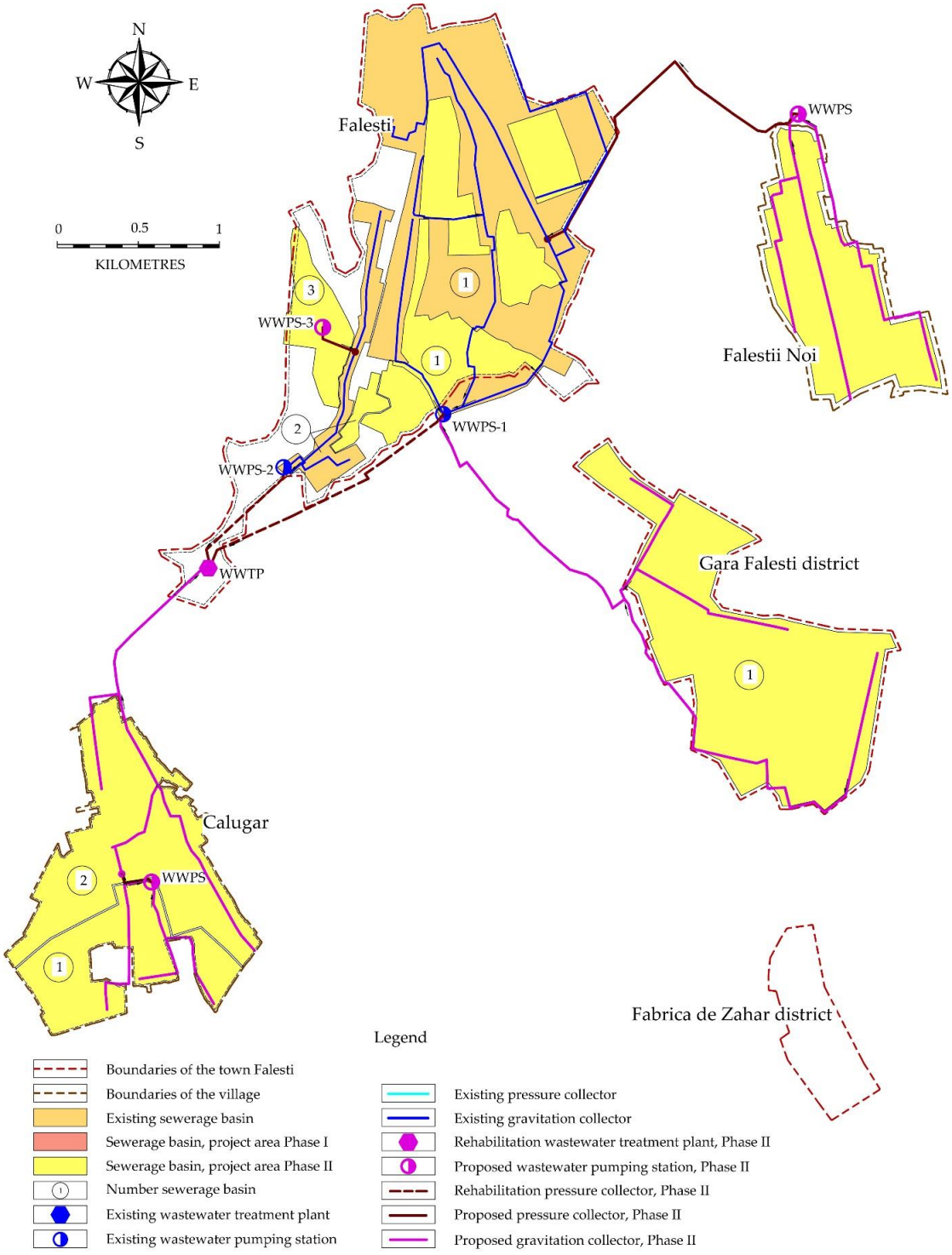
The Table 5-8 shows the development of service connections for the wastewater network (existing situation and additional connections for the years 2018 until 2045). For more detailed projection tables reference is made to Annex 5.5 and Annex 5.6.

Table 5-8: Development of connection rates wastewater

Code	Locality	Population connected to the waste water system									
		2014		2018		2021		2030		2045	
		n°	%	n°	%	n°	%	n°	%	n°	%
1	Falesti	4,836	29	4,787	29	10,976	66	14,613	90	14,903	95
2	Falestii Noi	0	0	0	0	1,092	53	1,340	67	1,662	90
3	Calugar	0	0	0	0	1,064	50	1,344	65	1,713	90
TOT	**Total**	**4,836**	**23**	**4,787**	**23**	**13,132**	**63**	**17,297**	**85**	**18,278**	**94**

Source: GIZ/MLPS

Figure 5-4: Scheme of existing sewer system and the proposed extension in the town of Falesti and the localities of Falestii Noi and Calugar



Source: GIZ/MLPS

5.7.3 Investment measures - water supply system

5.7.3.1 General description of proposed system

The main deficiencies in the water supply system are as following (see also Chapter 4-Technical aspects Existing Situation of this Study):

- Low connection rate of about 61% in the town of Falesti;
- Localities in the vicinity of the town of Falesti (localities of Falestii Noi and Calugar) are not yet endowed with a water supply system;
- High real and apparent Water losses (NRW of 48%);
- High number of pipe bursts due to old and obsolete water supply network in parts of the town;
- Water does not comply with national standards (switch to reliable water source is in progress);
- Inadequate metering of water production and distribution as well as inadequate operational equipment.

In order to remediate the above-mentioned deficiencies, the following improvements have been proposed in the water supply sector:

- Extension of the water distribution network in the town of Falesti;
- Rehabilitation of the existing water distribution network in the town of Falesti;
- Construction of new water supply system in the localities of Falestii Noi and Calugar;
- Water metering and equipment for operational improvement.

5.7.3.2 Proposed investment measures

Extension of the water distribution network in the town of Falesti

It is proposed to further extend the existing water supply system in order to reach full service coverage in the town of Falesti. Following extensions are therefore planned:

- Extension of the water supply system to the western outskirts of the town of Falesti as part of the supply zone 1. The total network length for this extension area is 2,420 m, including 105 service connections (Phase 1);
- Installation of a transmission main of 2,600m in order to connect the existing system of the Gara Falesti zone to the new WTP in order to allow switching to the new and reliable water source of treated Prut River water (Phase 1);
- Extension of the water supply system in the Gara Falesti zone and Fabrica de Zahar zone. The total network length for this extension area is 5,695 m, including 150 service connections, plus a transmission main of 1,960 m to connect the Fabrica de Zahar zone trough the Gara Falesti zone with the new water source (Phase 2).

The water supply connection rate in the town of Falesti will be increased from 61% to 63% and the connection to the new water source (treated Prut River water) will be ensured by these measures; the coverage rate will reach 100%.

Rehabilitation of the water distribution network in the town of Falesti

Due to high water losses in the distribution network the operation costs are high and supply security is low (frequent supply interruptions due to pipe repair). Further, total water losses (NRW) in the town of Falesti are estimated to be in the range of 48% of the water production. About 90% of the existing network of 44.3 km is more than 35 years old. Therefore, is it proposed to replace 11,555 m of the pipe network (Diameter between 75 and 315 mm), indicated by the Municipal Service Utility as most outworn, in Phase 1 and 9,960 m in Phase 2. Further replacements are proposed for the medium- and long-term.

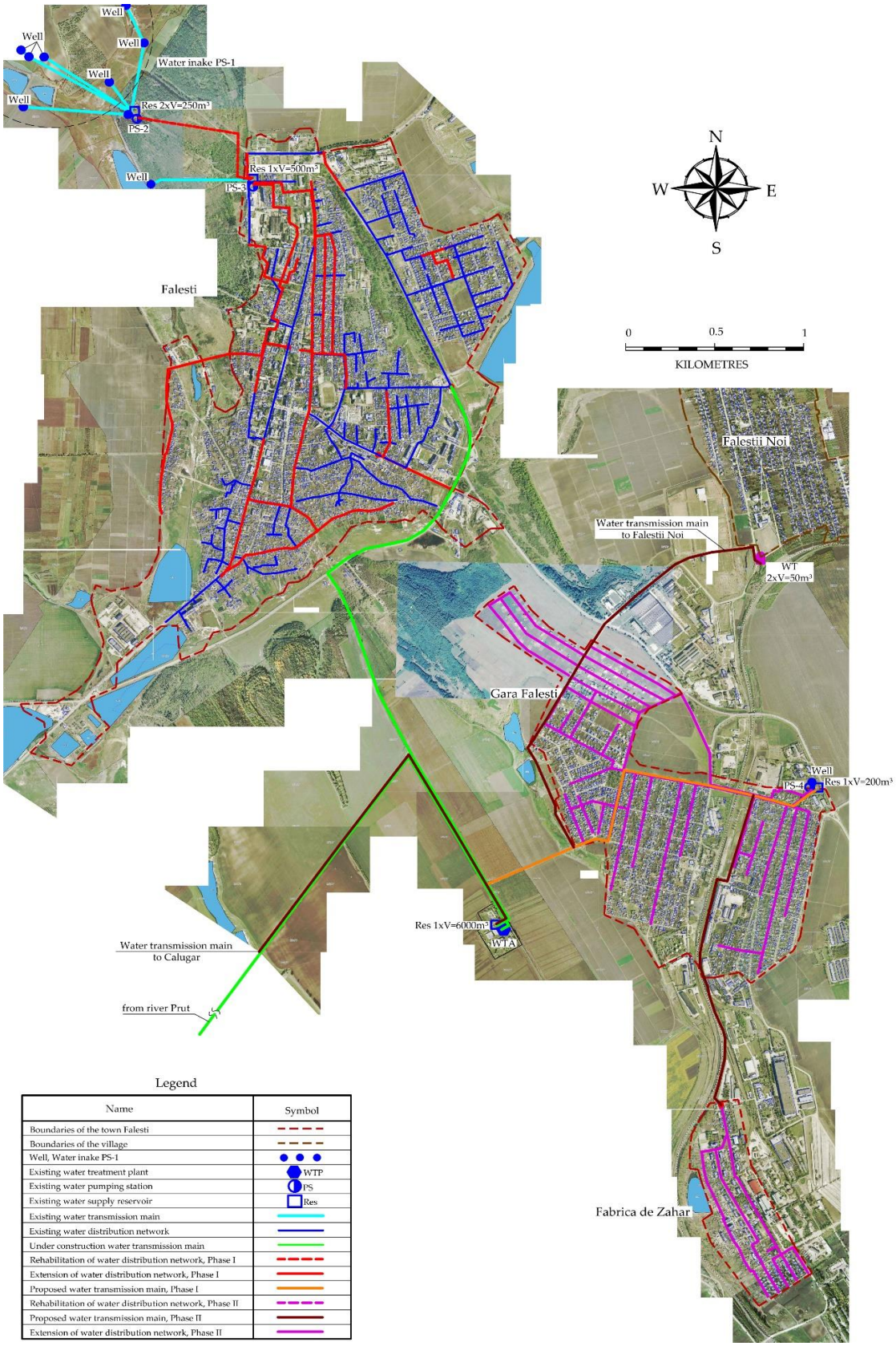
Construction of new water supply systems in the localities of Falestii Noi and Calugar

The localities of Falestii Noi and Calugar are not endowed with a centralised water supply system so far. Therefore, it is proposed to construct water supply systems and connect them to the centralised water supply system of the town of Falesti. To do so, following investments are needed:

- Construction of a new water supply system in the locality Falestii Noi including 11,645 m water supply network, including 765 service connections, one water tower of 100 m³, and a transmission main of 2,585 m to make the connection to the town of Falesti (at Gara Falesti zone). These measures will effect an increase of the connection rate in the locality from 0% to 62% (1,283 people) and ensures the connection to the new water source (treated Prut River water);
- Construction of a new water supply system in the locality Calugar including 16,540 m water supply network, including 761 service connections, one water reservoir of 200 m³, and a transmission main to connect to the newly constructed WTP. These measures will effect an increase of the connection rate in the locality from 0% to 60% (1,276 people) and ensures the connection to the new water source (treated Prut River water).

The existing water supply systems and the proposed extension of the water supply systems in the town of Falesti and the localities of Falestii Noi and Calugar are presented in the Figures 5-5, 5-6, 5-7. More detailed maps are provided in Annex 11.

Figure 5-5: The existing water supply system and the proposed extensions, town of Falesti



Source: GIZ/MLPS

Figure 5-6: The existing water supply system and the proposed extensions in the locality of Falestii Noi

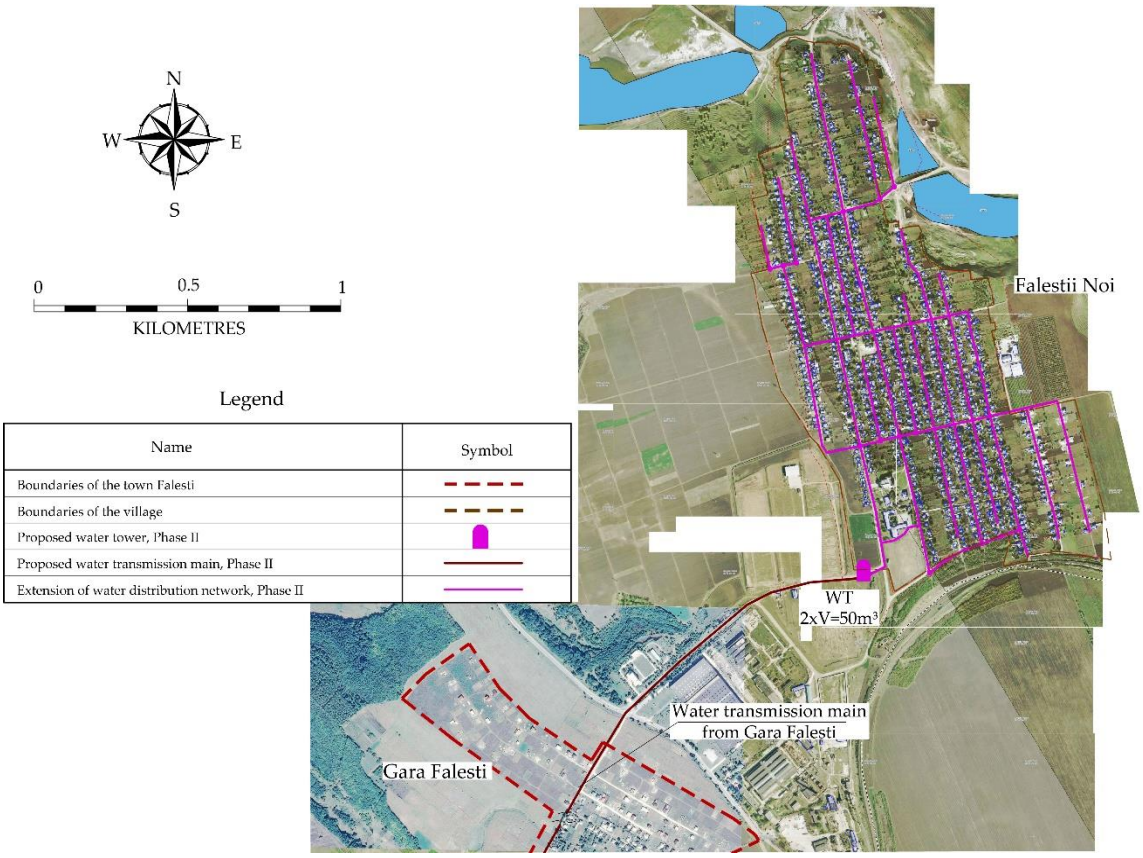
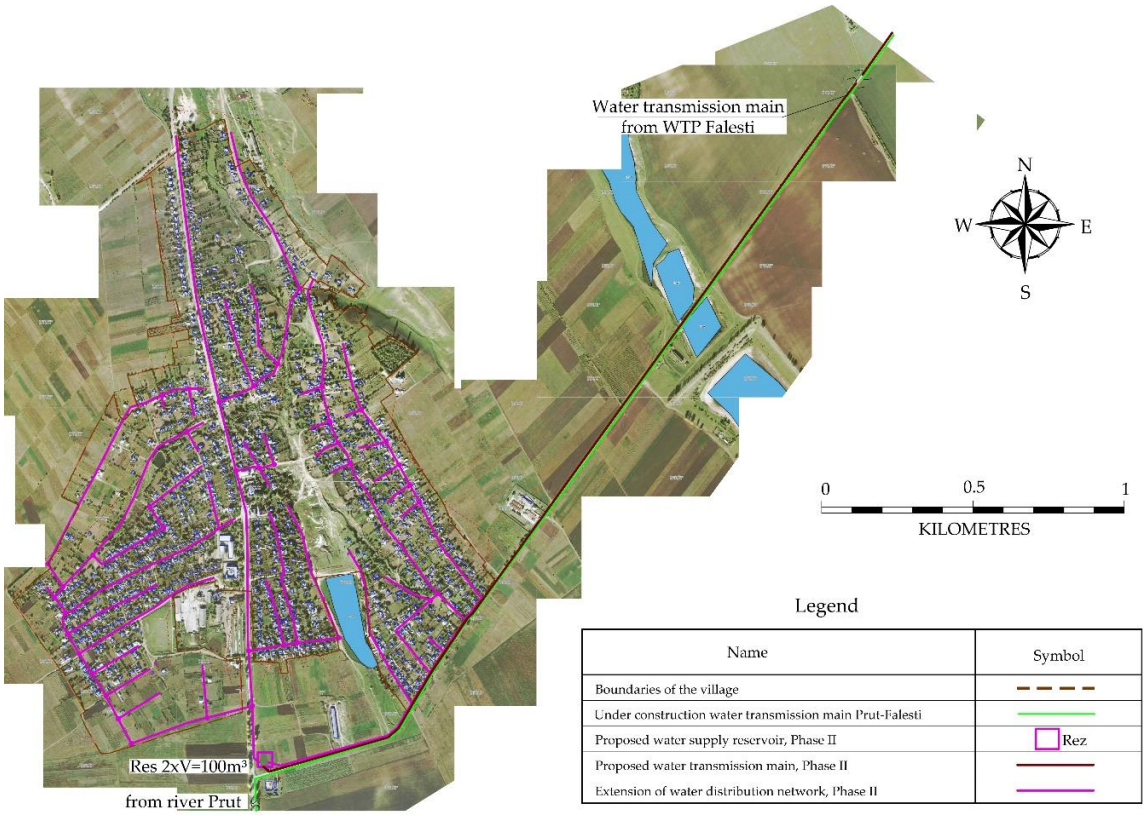


Figure 5-7: The existing water supply system and the proposed extensions in the locality of Calugar



Source: Source: GIZ/MLPS

5.7.4 Investment measures - wastewater system

5.7.4.1 General description of proposed system

The main deficiencies in the wastewater system are as follows (see also Chapter 4-Technical Aspects-Existing Situation of this Study):

- Low connection rate of about 29% in the town of Falesti;
- The existing sewer system in the town of Falesti is already older than 30 years and is in poor condition, which leads to frequent sewer blockages and emergency driven maintenance;
- The wastewater treatment plant in the town of Falesti is already quite outdated and can serve for the short-term only (until 2021);
- The localities in the vicinity of the town of Falesti (localities of Falestii Noi and Calugar) are not yet endowed with wastewater systems.

In order to remediate the above-mentioned deficiencies, the following improvements have been proposed in the wastewater sector:

- Extension of the sewer network in the town of Falesti;
- Rehabilitation of the existing sewer network in the town of Falesti;
- Construction of sewer systems in the localities of Falestii Noi and Calugar;
- Construction of new WWTP in the town of Falesti.

5.7.4.2 Proposed investment measures

Extension of the sewer network in the town of Falesti:

In order to increase the service coverage for the town of Falesti to 96% by 2021 (connection rate of 66%) is proposed for Phase 2 to extend the wastewater system for about 43,000 m (OD 200 – 250 mm), 4,400 new service connections, one wastewater pumping station (WWPS-3), and a pressure main of 290 m. Due to the topography of the service area, the sewer system is subdivided into several wastewater collection areas (see the Figure 5-3 and 5-8). The extensions will be operated as follows:

- The wastewater from the central part of the town (drainage area 1 & 2) will be collected by a combination of the existing and a new sewer system at the existing wastewater pumping stations (WWPS-1 & WWPS-2). From there the wastewater will be pumped through two existing pressure main to the WWTP;
- The wastewater from the extension area in the western outskirts of the central part of the town of Falesti (drainage area 3) will be collected by a new sewer system by gravity at the new wastewater pumping stations (WWPS-3). From there the wastewater will be pumped through a pressure line to drainage area 2 and further through the WWPS-2 to the WWTP;
- In the Gara Falesti zone, located in the south of Falesti, the wastewater will be collected by gravity with a new sewer system and will then be transmitted with a collector (by gravity) to the WWPS-1 and further to the WWTP.

Rehabilitation of the existing sewerage network and pressure lines in the town of Falesti:

Due to the age of the existing sewer system (over 30 years) and frequent problems in the operation, high priority has been given by the Falesti Municipal Services Utility to the rehabilitation of the existing sewer network. It is recommended to conduct a CCTV inspection of the sewer network in Phase 1 (see Chapter 5.7.6 Technical Assistance) and based on its result to identify the sections of the sewer network that need rehabilitation most urgently. For the purpose of cost estimation in this study, it is assumed that about 30% of the sewer network older than 30 years (6,822 m) be rehabilitated in the short term (Phase 2) and the remaining 70% in the medium and long-term as they reached the end of their service period.

Further the rehabilitation of the existing pressure lines of a length of 3,325 m between WWPS 1 & 2 and the WWTP is proposed for Phase 2.

These measures will improve service quality (less sewer blockages), reduce the operation costs and may reduce infiltration to the sewer network.

Construction of sewer networks in the localities of Falestii Noi and Calugar:

As explained above, this is a tentative proposal for Phase 2 in order to estimate investment cost, which needs to be confirmed by a thorough sanitation study in Phase 1 (technical assistance measures):

- A new sewer network of 10,820 m, including 760 service connections, is proposed to collect the wastewater from the locality Falestii Noi by gravity. It is then pumped through a new wastewater pumping station and a pressure main of 2.380 m to the existing drainage area 2 of the town of Falesti. From there the wastewater goes to the existing WWPS-2 and will be further transmitted to the WWTP in Falesti;

- The wastewater from the locality Calugar will be collected by a new sewer network of 15,570 m, including 740 service connections, one wastewater pumping station, and a pressure main of 230 m. The wastewater will be transported by a collector (by gravitation) to the WWTP in Falesti.

Construction of a new WWTP in the town of Falesti

A new WWTP is proposed to be constructed in Phase 2 on the spot of the existing WWTP and shall be operated from 2021 onwards. The design capacity and technology of the future WWTP will depend on the results of the sanitation study included in Phase 1, specifically depending on the number of neighbouring localities to be connected to the new WWTP in Falesti. Preliminary assumption is a capacity of about 19,000 P.E.

The wastewater investment measures described above are summarized for each locality as follows:

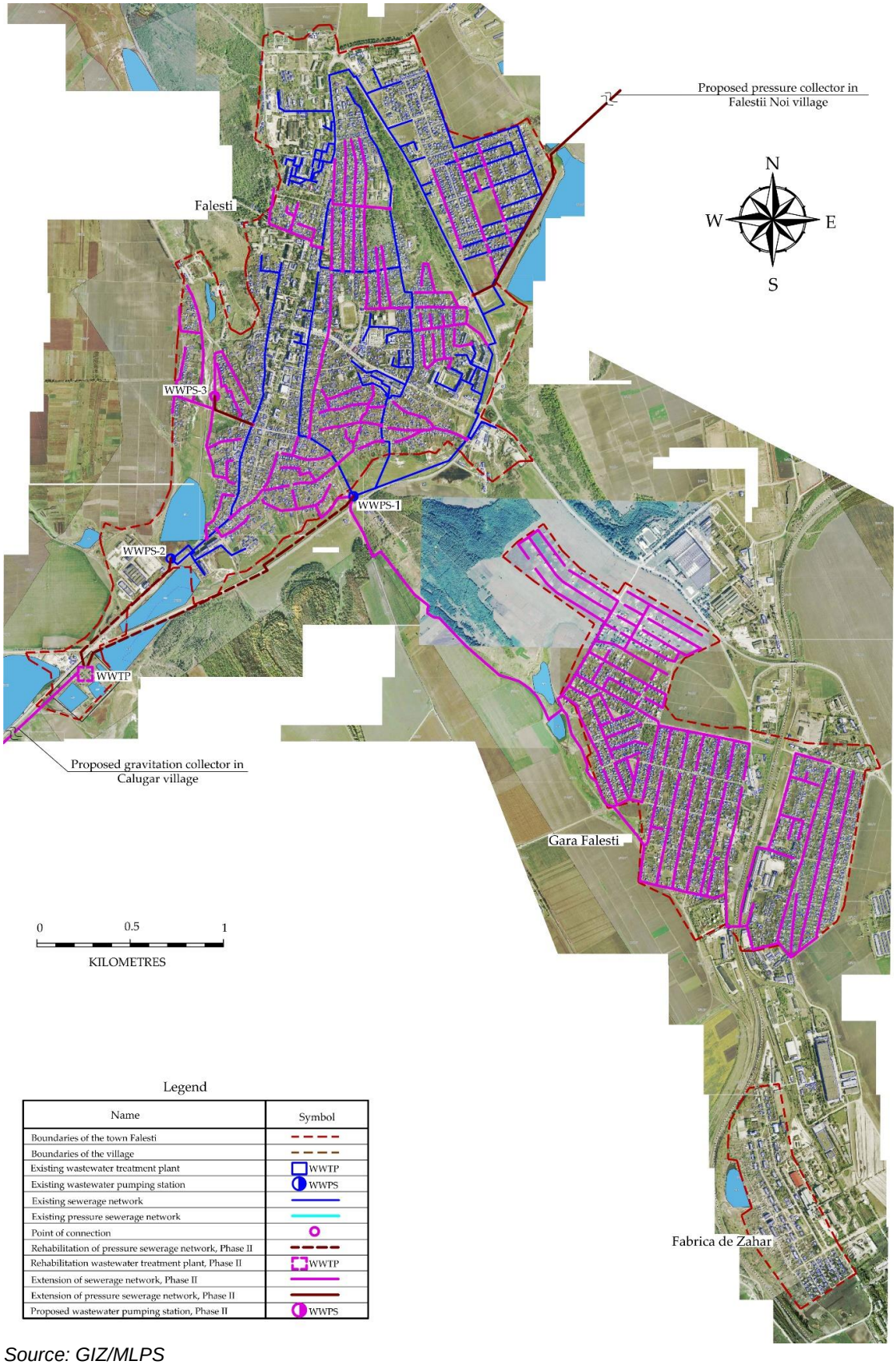
- **Town of Falesti**:
  - Extension of the existing sewer network in the town of Falesti by construction of 43,000 m of PP/PVC[24] sewer collectors with diameters between 200 mm and 250 mm, including 4,400 service connections in the central and southern part of the town;
  - Construction of a new wastewater pumping station (WWPS 3) and a pressure main (290 m OD 90 – 110 mm) aiming to pump wastewater from the new drainage area 3 to drainage area 2 and further to the WWTP;
  - Rehabilitation of 6,822 m sewer network (based on the assumption that 30% of the sewer network above 30 years will have to be replaced in the short term and the remaining 70% in the medium and long-term as they reached the end of their service period);
  - Rehabilitation of 3,325 m of existing pressure mains;
  - Construction of a new wastewater treatment plant (WWTP) in the town of Falesti of a capacity of about 19,000 P.E. (be confirmed by a thorough sanitation study in Phase 1).
- **Falestii Noi Locality**:
  - Implementation of a new sewer network in Falestii Noi and construction of 10,820 m of PP/PVC[25] sewer collectors with diameters between 200 mm and 250 mm, including 760 service connections;
  - Construction of a new wastewater pumping station (WWPS) and a pressure main (2,380 m OD 90 – 110 mm).
- **Calugar Locality**:
  - Implementation of a new sewer network in Calugar and construction of 15,570 m of PP/PVC14 sewer collectors with diameters between 200 mm and 250 mm, including 740 service connections;
  - Construction of a new wastewater pumping station (WWPS) and a pressure main 230 m (OD 90 – 110 mm).

[24] Material to be defined in the detailed design phase

[25] Material to be defined in the detailed design phase

The existing sewer systems and the proposed extension of the sewer systems in the town of Falesti and the localities of Falestii Noi and Calugar are presented in the Figures 5-8, 5-9, 5-10. More detailed maps are provided in Annex 11.

Figure 5-8: The existing sewer system and the proposed extensions in the town of Falesti

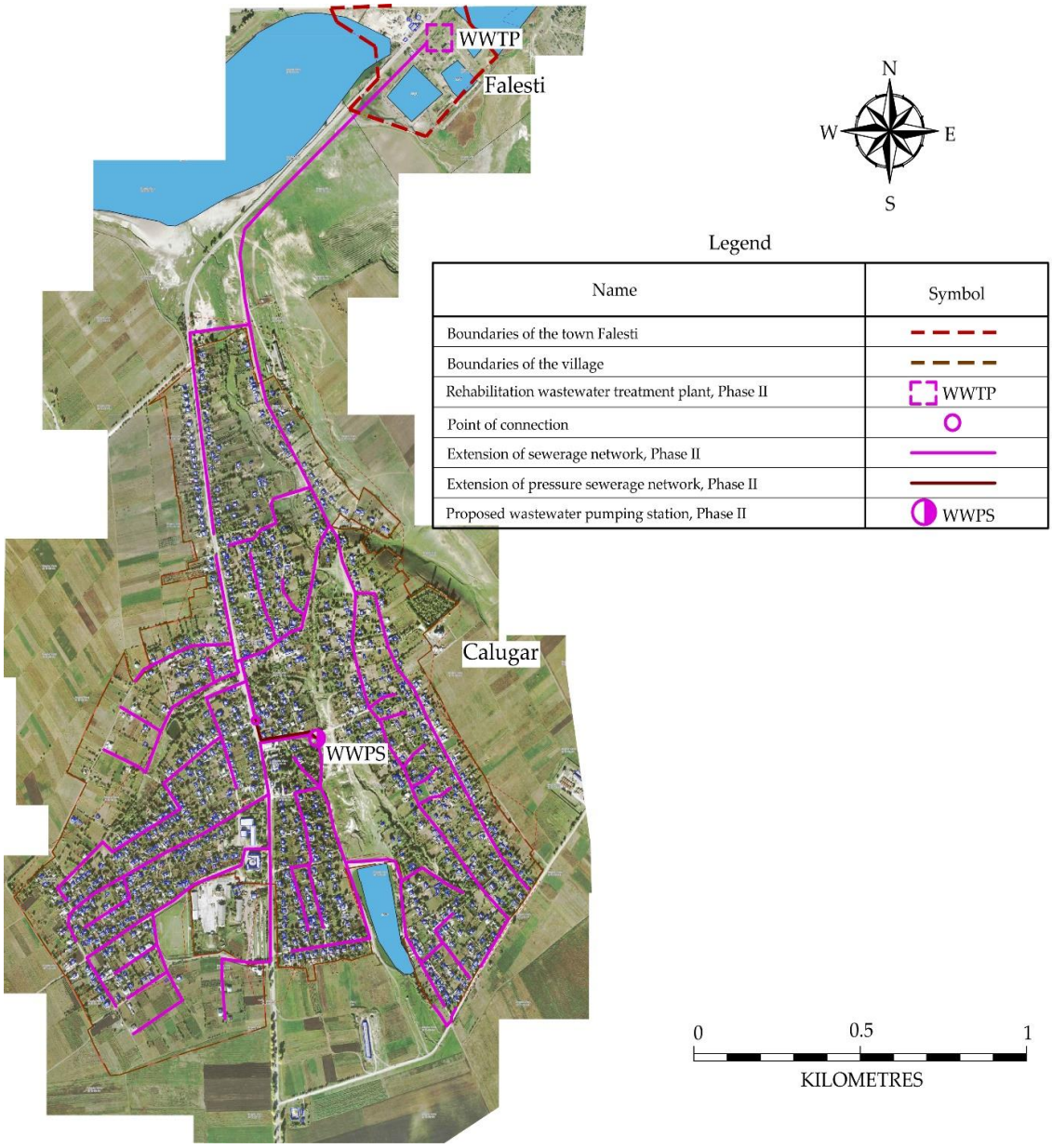


Source: GIZ/MLPS

Figure 5-9: The existing sewer system and the proposed extensions, locality of Falestii Noi

Source: GIZ/MLPS

Figure 5-10: The existing sewer system and the proposed extensions, locality of Calugar



Source: GIZ/MLPS

5.7.5 Operational improvement

Operational improvements in water and wastewater services presume knowledge about the condition of the facilities and a minimum of monitoring of the operation. Therefore, a tentative list of equipment (confirmation by the Falesti Municipal Services Utility during the detailed design stage needed) is considered for the Phase 1.

In order to assess the condition of the facilities and to ensure adequate Operation and Maintenance (O&M) for the wastewater system, procurement of the following equipment is proposed:

- Laboratory equipment for measuring key parameters (BOD_5, COD, Nitrogen, Phosphor, Suspended solids, etc.) and flow meter. It is recommended to meas-

ure quality and volume of wastewater effluents at the outlet of the existing main collector during dry and wet weather conditions in order to ensure that sufficient data are available for designing the new WWTP;

- Sewer cleaning and other equipment needed in order to maintain the sewer network according to best practice;
- CCTV inspection equipment in order to assess in detail the condition of the sewer network and based on these results to plan sewer rehabilitation works.

For improvement of the operational performance in the water supply system, the following equipment should be procured:

- Portable ultrasonic flow meter and installed flow meters;
- Manometers and pressure loggers;
- Leak detection equipment including pipe locator and acoustic detection equipment and correlator;
- Pipe repair equipment (excavator, trucks…);
- Other equipment to be specified during the detailed design study (e.g. hardware and software, maintenance tools, water meter calibration unit, etc.).

5.7.6 Technical assistance

Technical assistance (TA) measures will be necessary aimed at:

- Improving operational performance in the water and wastewater sector;
- Assessing in detail the required investment in the wastewater sector (agglomeration analysis and option analysis);
- Assessing in detail the investment needs for sewer network rehabilitation;
- Ensuring high quality standard for implementation of works (detailed designs[26], tender documents and supervision of works).

The scope of work for the technical assistance measures should include inter alia the following:

Table 5-9: Scope of work for the technical assistance measures

Component	Objectives	Measures
Design and Engineering for Phase 1 investments	To ensure high quality and timely implementation of works and technical assistance measures through support of the Project Implementing Agency[27] (i) in preparing all necessary documentation for tendering of the works for Phase 1 Investment measures, (ii) in	A) **Preparation of Detailed Design and Tender Documentation** for Phase 1 investment measures including (i) works contracts, (ii) equipment, (iii) design built contracts (if applicable), service contracts for follow-up TA measures. The services should also include (i) topographic survey and geotechnical investigations, (ii) all necessary measurements to prepare detailed designs and to confirm and justify the investment measures (e.g. flow measurements at transmission mains, water quality, etc.). The Con-

[26] In case of works contracts based on FIDIC Red-book.

[27] Reference is made to Chapter 9.3 – Project Implementation Plan (Set-up of a Project Implementation Structure)

Component	Objectives	Measures
	tendering procedures, (iii) during the implementation period in project management, works supervision and monitoring of technical assistance measures	sultant should further prepare all necessary documentation for obtaining required permits in accordance with the national legislation. B) Support during **tendering** of contracts including (i) preparation of reports and minutes of meetings (ii) communication, (iii) support in contract negotiations and preparation of contracts. C) Support of **Project Implementing Agency** in Project Management during contract implementation period (construction and defects liability period) including (i) establishment of adequate project management structures, (ii) preparation of detailed layout designs, construction designs (structural designs, shop drawings, etc.) and detailed pipeline routings, (iii) supervision of works, (iv) preparation of all necessary reports requested by the donor and the Project Implementing Agency (e.g. cash-flow reports, etc.), (v) training in project management and other areas identified as capacity weakness.
Corporate Development Program	To improve the corporate planning capacity and to become a self-sustaining entity with commercially sustainable operations through improvement of the operational, financial and environmental performance of the operator.	• Corporate Development including improvements in (i) human resource development, (ii) service agreement with municipality and customers, (iii) strategy development, (iv) information system, (v) asset management; • Financial Performance Improvement including improvements in (i) accounting budgeting and cash management, (ii) billing system and revenue collection procedures, (iii) reporting procedures, (iv) reduction of apparent (commercial) water losses; • Operational Performance Improvement including (i) staff efficiency, (ii) water loss reduction, (iii) energy efficiency, (iv) operation and maintenance procedures; • Environmental Management including (i) preparation of Environmental and Social Action Plan and support in implementing the action plan (ii) improve overall environmental procedures; • Prepare a Capacity Building Programme for all areas of improvement.
Stakeholder Participation Program	To ensure that all stakeholders are committed to the investment project and are involved during preparation and implementation phase. In particular, the measures aim at enhancing public ownership by encouraging water conservation, increasing public participation in the provision of water services (service quality, rehabilitation activities, tariffs integrating poverty and social issues) and raising public awareness on issues related to the project implementation and wa-	Raise customer awareness through education campaigns: • Identification of information needs; • Prepare Information campaign Plan and support the implementation. Facilitation of dialogue between clients and the Company: • Creation of and support to information exchange platform for customers; • Creation of an Advisory Committee comprising all major stakeholders; • Encourage transparency in decision-making; • Sustainability of dialogue.

Component	Objectives	Measures
	ter use	
Water Supply Network Analysis and Water Loss Reduction Programme	To improve the knowledge of water supply networks as a basis for preparation of a sound medium and long-term investment plan. To reduce water losses in the system through planning and implementing a comprehensive (i) strategy, (ii) action plan, (iii) capacity building programme.	A) **Network analysis**: Carry out comprehensive network analysis including (i) flow measurements at defined locations in the network (water intake, reservoirs, etc.), (ii) pressure measurements, (iii) analysis of system failures (pipe break data), (iv) analysis of pipe material, (v) preparation of Network Information System (NIS) including field data collection for mapping, (vi) hydraulic modelling and zoning, (vii) detailed investment plan for medium and long term development of the network (replacement, zoning, metering, etc.), (viii) training of operator's staff in applying the NIS and hydraulic modelling software tools. B) **Water loss reduction**: Prepare a water loss reduction strategy (in accordance with IWA best practice) including (i) recommendations for improvement of the organisation structure of the operator (e.g. set-up a water loss reduction department within the operator's organisation, recruitment of staff, etc.); (ii) prepare water balance (analyse components of the water balance in accordance with IWA standard procedures), (iii) recommend strategy and policy for reduction of water losses (e.g. pressure management, DMA/active leakage control, etc.), (iv) prepare detailed action plan for water loss reduction and leakage control including financial requirements, staff capacities required, time steps, methodology, etc.), (v) prepare a capacity building program to support the operator in implementing the action plan.
Medium to Long-term Sanitation Study	To prepare a medium to long-term rayon investment plan for wastewater (Master Plan for Sanitation) and define number and capacity of WWTPs.	To assess in detail the required medium and long-term investment needs in the wastewater sector based on (i) detailed assessment of wastewater system including flow and load measurements for sewerage treatment and wastewater network analysis[28], (ii) definition of agglomeration borders in the rayon (as defined in EU Urban Wastewater Treatment Directive), (iii) preparation of option analysis for collection and treatment of wastewater (grouping of agglomerations to a wastewater treatment plan), (iv) preparation of strategy for localities not suitable for collection of wastewater (on-site sanitation, alternative systems, etc.), (v) preparation of wastewater treatment process options, (vi) preparation of a wastewater sludge management strategy and plan (vii) preparation of a medium to long-term investment plan for wastewater systems (collection, treatment and on-site sanitation), (viii) environmental and social impact assessment and (ix) economic and financial analysis. In particular, the study should contain an option analysis for the localities of Calugar and Falestii Noi (at least the following 3 options should be assessed:

[28] Procurement strategy for CCTV inspection of sewer network should be prepared under this assignment including comparison of an option with procurement of own equipment and staffing and outsourcing of all works to the contractor. For the retained option a detailed action plan and draft specifications for a work contract should be prepared.

Component	Objectives	Measures
		• Option 1: Separate collection system and separate WWTP for each of the localities; • Option 2: Separate sewer collection system for each locality and discharge of wastewater either through a pressure main to the sewer network in the town of Falesti or transport of sewerage by trucks to the WWTP Falesti; • Option 3: On-site sanitation (no collection system); • Further, the study should assess if other localities in the vicinity of the town of Falesti should be connected to the WWTP of the town of Falesti. Finally, based on the above agglomeration analysis, the study should define the necessary capacity and propose a staged development (including the feasibility of an extension of the existing WWTP)

5.8 Prioritisation and phasing of investment measures

5.8.1 Criteria for phasing

The proposed investment measures described above in Chapter 5.7 have been grouped into:

- Short-term;
- Medium-term;
- Long-term measures.

The short-term measures are referred to as Priority Investment Measures and are again sub-divided into two sub-phases (Phase 1 and Phase 2).

The investment measures were phased according to the following criteria:

- Technical criteria (logical steps / order for implementation, robustness of investment measure (no-regret measures);
- Capacity of operator to implement and operate the system;
- Affordability;
- Available budget for investment expenditures;
- Contribution to health and environmental targets.

The main result of this phasing exercise is to identify priority measures which can be implemented immediately after completion of this feasibility study and which should be completed by end of 2017 (first year of operation in 2018). These measures are grouped in Phase 1 and constitute "*The Project*".

5.8.2 Justification for phasing

The following qualitative approach was used to apply the criteria presented in the previous section.

Table 5-10: Proposed investment measures and phasing

N°	Investment Measures	Proposed Phase[29]	Justification for phasing
1	Water Supply	PH 1 and PH2	High priority due to all criteria: (i) Water supply has to be implemented before wastewater system[30] (ii) Improvement of system's efficiency (reduction of losses etc.); (iii) high contribution to public health improvement (switch to reliable water source - corresponding with drinking water standards - is supported with the investments)
1.1	Rehabilitation of the water distribution network in the town of Falesti	PH 1 and PH2	About 41.4 km (93%) out of 44.3 km of the existing network is at the end of its service life and needs to be replaced and the short and medium term (see Chapter 4-Technical Aspects-Existing situation). The Falesti Municipal Services Utility has identified 11.55 km as highest priority to be replaced in Phase 1. Further 9.96 km will be replaced in Phase 2. The measure will reduce the number of pipe bursts and water losses. Further, the service quality for the population will be improved (less supply interruptions).
1.2	Renovation of water supply network in the town of Falesti	MT	It is recommended to further optimize network operation, based on the results of the detailed investment plan to be prepared in the frame of the water Supply Network Analysis and Water Loss Reduction Programme included in the technical assistance measures in Phase 1. These measures might inter alia include (i) Replacement of the remaining water supply network older than 30 years, (ii) Establish adequate system operation and control, (iii) installation of SCADA. These measures require substantial input from the operator (high investment needs and complexity of measures). In order to avoid overloading of the operator during the relatively short project period, a gradual development in the medium term (stretched over several years) is proposed.
1.3	Extension of the water distribution network in the town of Falesti (central part)	PH 1	High priority is given to this measure in order to increase the coverage rate for the town of Falesti. The implementation of 2,420 m of water network including 105 service connections and a transmission main of 2,600 m is proposed for Phase 1.
1.4	Extension of the water distribution network in the town of Falesti (Gara Falesti, and Fabrica de Zahar zones)	PH2	In Phase 2 further 5,695 m of water network, including 150 service connections and a transmission mains of 1,960 m is proposed in order to achieve full service coverage in the town of Falesti
1.5	Construction of new water supply system in the localities of Falestii Noi and Calugar	PH 2	It is proposed to construct the water supply system in the localities in parallel to the proposed wastewater network (reduction of costs). Further, due to the relatively high per capita costs and to avoid overloading of the operator's capacities, it is proposed to implement this investment measure in Phase 2.
1.6	Equipment for	PH 1	High priority to reduce real water losses (e.g. leak detection

[29] PH 1: Phase 1, PH 2: Phase 2, MT: Medium Term, LT: Long-Term

[30] Without functioning water supply system, the wastewater system cannot be functional

N°	Investment Measures	Proposed Phase[29]	Justification for phasing
	operational performance improvement		and flow meters, hydraulic modelling software and hardware, etc.) and commercial water losses (billing hard- and software, etc. The equipment shall be procured in parallel to the implementation of technical assistance measures in order to ensure its effectiveness.
2.	Wastewater System	PH 2	As a reliable and efficient water supply system is the basis for a reliable wastewater system, the most urgent rehabilitation and extension measures for the water supply system are proposed for Phase 1. Further additional studies (e.g. agglomeration study as mentioned above in Chapter 5.7.2-Investment framework) will be necessary to design the proposed investment components for wastewater. This is also included in technical assistance component of Phase 1. Therefore, a reasonable basis for the rehabilitation and extension of the wastewater system is provided only in Phase 2. Following measures are proposed for Phase 2: • High Priority for the wastewater system is given to the rehabilitation of the existing sewer network in the town of Falesti in order to ensure adequate functioning of the overall system and to reduce environmental impact; • Extensions of the sewer network for the town of Falesti are proposed in order to achieve almost full service coverage in the town of Falesti; • New WWTP in the town of Falesti; • New sewer systems (network and WWTP) for localities of Calugar and Falestii Noi.
2.1	Extension of sewer network in central part of The town of Falesti (drainage area 1,2 & 3) and the Gara Falesti zone (south of the central part)	PH 2 MT	Due to the size of the agglomeration (above 10,000 P.E.) The Falesti Municipal Services Utility gives priority for extension of the sewer network in the town of Falesti. The central part of the town (drainage area 1,2 &3) and to the south part of the town – Gara Falesti zone -in order to reach the target of full coverage rate. Extension of this network is planned for Phase 2 and needs 43,000 m of new sewer system and a new WWPS. Extension of the sewer system to the Fabrica de Zahar zone is proposed for the medium term.
2.2	Extension of the sewer network in the localities of Calugar and Falestii Noi	PH 2	The need for extensions and the optimal technical solutions in the localities should be assessed thoroughly in the proposed Sanitation Study (technical assistance in Phase 1). Therefore, the measure should be implemented in Phase 2 (based on the results of the Sanitation Study).
2.3	Rehabilitation of the existing sewer network	PH 2 MT/LT	Based on the results of CCTV inspection (proposed in technical assistance measures in Phase 1) a phased rehabilitation of the existing sewer network is proposed. In Phase 2, the rehabilitation of about 6,822 m of the existing sewer network is proposed, which is 30% of the sewer network older than 30 years. The rehabilitation of the remaining parts is proposed for the medium- and long-term. Further the rehabilitation of the old transmission mains of a length of 3,325 m is proposed in Phase 2.
2.4	Construction of a new WWTP in the town of Falesti	Ph 2	A new WWTP is proposed to be constructed on the spot of the existing WWTP and shall be operated from 2021 onward. The design capacity and technology of the future WWTP will depend on the results of the sanitation study included in Phase 1, specifically depending on the number of neighbour-

N°	Investment Measures	Proposed Phase[29]	Justification for phasing
			ing localities to be connected to the new WWTP in Falesti. Preliminary assumption is a capacity of about 19,000 P.E.
2.5	Equipment for operational performance improvement	PH 1	Procurement of equipment has high priority for operational performance improvement and preparation of sanitation study (wastewater flow and load measurement should be available during the study in order to improve reliability of the applied design values for the WWTP). CCTV inspection and sewer cleaning trucks have been identified as high priority equipment by the Falesti Municipal Services Utility in order to improve operational performance and to prepare sewer rehabilitation programmes.
3.	Technical Assistance		
3.1	Design and Engineering for Phase 1 investments	PH 1	Mandatory for implementation of works contracts for phase 1.
3.2	Corporate Development Program	PH 1	Should start as early as possible (in Phase 1) in order to increase the capacity of the operator and to generate additional revenues for implementing long-term investment measures (e.g. pipe replacements).
3.3	Stakeholder Participation Program	PH 1	Should be implemented before and in parallel to the works contracts of Phase 1 (start as early as possible during design phase)
3.4	Water Supply Network analysis and Water Loss Reduction programme	PH 1 (PH 2)	Should be carried out in parallel to the design stage of phase 1 investment measures in order to ensure that part of its results are available for designing phase 1 investments. In case of insufficient budget, this measure could be split into two phases (follow up in phase 2 in order to determine long-term network development needs).
3.5	Medium to long-term Sanitation Study	PH 1	Should be implemented as soon as possible (in Phase 1) in order to ensure that all wastewater investment measures (in particular design and construction of WWTP) can be implemented in Phase 2.

Source: GIZ/MLPS

5.9 Option analysis for investment measures

Possible options for the priority investment measures proposed to be implemented in Phase 1 were identified and analysed (if applicable), while for measures in Phase 2 the options have been identified but will be analysed in subsequent studies (see technical assistance measures above). Detailed options (such as pipe materials, type of pumps, zoning options, etc.) will be carried out in the subsequent detailed design stage (Table 5-9. Technical assistance measure 3.1 and 3.4).

Option analysis for Phase 1:

In Phase 1 rehabilitation and extension of the existing water supply network and the extension of the network in the town of Falesti are proposed.

For urban areas like the town of Falesti, no other systems than the already established centralised water supply system could be identified. Regarding the proposed project measures, there is no other option than to put priority on the rehabilitation of the exist-

ing water supply system in order to make the system stable and more efficient (reduction of losses, etc.).

The proposed first water network extension in Phase 1 will improve living conditions for the population and will help to make use of economies of scale in the water supply which again contributes to the system's efficiency.

The proposed improvements for the water supply system directly support the planned switch from the currently used water source (not corresponding with the drinking water standards) to the treated Prut River water and contribute to the public health.

Measures in the wastewater sector are not considered as an option for Phase 1 as a functioning water supply system is the basis for a wastewater system. Improvements and extensions in the wastewater system are planned for Phase 2.

Therefore, no other options are considered and analysed for Phase 1.

Identified options for Phase 2:

Rehabilitation of the existing sewer network and extension of sewer network in the town of Falesti

In Phase 2 the rehabilitation of the existing sewer system and the extension of the sewer network in the town of Falesti are proposed. Other systems for wastewater collection in urban areas than the extension of the already established centralised sewer system are not considered. Therefore, no other option for wastewater collection is considered and analysed.

Construction of a new WWTP in the town of Falesti

In order to define the required capacity of the WWTP (extensions) an assessment of the agglomerations (localities in the vicinity of the town of Falesti) to be connected to the central WWTP in Falesti has to be carried out. This assessment includes an options analysis comparing central versus decentralised options for each of the agglomerations/localities. Hence, for each agglomeration the assessment reveals if the preferred option will be a connection to the WWTP in the town (centralised option) or if a decentralised solution is the least cost option (e.g. separate WWTP for each locality). Further, the agglomeration boarders have to be assessed, defining clearly, which part of the service area should be connected to a central sewer network and which part of the service area should better be served through on-site sanitation (e.g. septic tanks, etc.). This assessment should be carried out at least at rayon level (or even beyond administrative borders) and should include all localities in a defined study area (typically at master plan level). As the scope of this feasibility study is limited to the preselected urban localities (towns) and localities in the immediate vicinity of this town, this study has to be carried out within the scope of the subsequent technical assistance measure in Phase 1 (see above).

Establishment of the sewer network and wastewater treatment in the localities of Calugar and Falestii Noi

In order to identify the most suitable and sustainable solutions for wastewater collection and treatment in the localities of Calugar and Falestii Noi, the Sanitation Study should in particular assess the following options (see Chapter 5.7.2 Investment framework and Chapter 5.7.4 Investment measures – wastewater system).

For Calugar (2,140 inhabitants in 2014) and Falestii Noi (2,076 inhabitants in 2014), located in the south and the east of the town of Falesti, following options for wastewater collection and treatment are possible and shall be analysed:

- Option 1: Separate collection system and separate WWTP for each of the localities;
- Option 2: Separate sewer collection system for each locality and either discharge of wastewater through a pressure main to the sewer network in the town of Falesti or transport of sewerage by trucks to the WWTP of the town of Falesti;
- Option 3: On-site sanitation (no collection system).

5.10 Proposed investment plan

The phased investment plan is presented in the tables below. The total investment costs for Phase 1 have been estimated at € 2.2 MEUR and for Phase 2 at € 33,3 MEUR (see Tables 5-11, 5-12 and 5-13).

Table 5-11: The investment plan for Phase 1

N°	Component	Units	Quantity	Unit costs	Total cost
				EUR	EUR
1.	Water supply				
1.1	Rehabilitation of the water distribution network in the town of Falesti				
1.1.1	water distribution network HDPE pipe OD 315	m	445	139	61,855
1.1.2	water distribution network HDPE pipe OD 250	m	1,600	104	166,400
1.1.3	water distribution network HDPE pipe OD 200	m	2,300	90	207,000
1.1.4	water distribution network HDPE pipe OD 160	m	940	75	70,500
1.1.5	water distribution network HDPE pipe OD 110	m	1,375	65	89,375
1.1.6	water distribution network HDPE pipe OD 90	m	3,705	62	229,710
1.1.7	water distribution network HDPE pipe OD 75	m	1.190	60	71,400
ST-1.1	Subtotal 1.1 Rehabilitation of the water distribution network				896,240
1.2	Extension of the water distribution network in the town of Falesti				
1.2.1	water distribution network HDPE pipe OD 200	m	465	90	41,850
1.2.2	water distribution network HDPE pipe OD 75	m	1,955	60	117,300
1.2.3	Manholes, ϕ 1500	pcs	12	423	5,076
1.2.4	Service connections	pcs	105	250	26,250
ST-1.2	Subtotal 1.2 Extension of the water distribution network				190,476
1.3	Construction of water transmission main, HDPE pipe OD 200 (WTP - Reservoir Gara Falesti zone)	m	2,600	90	234,000
ST-1.3	TOTAL Water supply (1.1+1.2+1.3)				1,320,716
2	Equipment and tools for operational performance improvement (water supply and wastewater)	LS	1	200,000	200,000
ST-1&2	Sub-Total (1+2)				1,520,716
3.	Technical Assistance				
3.1	Design, engineering, supervision (12% of investment costs)				182,486
3.2	Technical Assistance (Corporate Development Programme, Stakeholder Participation Programme, Water Supply Network Analysis and Water Loss Reduction Programme, Medium to Long-term Sanitation Study)	LS	1	300,000	300,000
ST-3	Sub-TOTAL Technical Assistance (3.1+3.2)				482,486

N°	Component	Units	Quantity	Unit costs	Total cost
				EUR	EUR
4.	Contingencies (10% of 1+2+3)				200,320
GT	Total Costs for Falesti Phase 1 (1+2+3+4)				2,203,522

Source: GIZ/MLPS

Table 5-12: The investment plan for Phase 2

N°	Component	Units	Quantity	Unit costs	Total cost
				EUR	EUR
A	Falesti Town				
1	Water supply				
1.1	Construction of water transmission main, HDPE pipe OD 160 (Gara Falesti - Fabrica de Zahar Zone)	m	1,960	75	147,000,00
1.2	Extension of the water distribution network in the town of Falesti (Gara Falesti and Fabrica de Zahar Zone)				
1.2.1	water distribution network HDPE pipe OD 75	m	5,695	60	341,700
1.2.2	Manholes, ϕ 1,500	pcs	12	423	5,076
1.2.3	Service connections	pcs	150	250	37,500
ST-1.2	Subtotal 1.2 Extension of the water distribution network				384,276
1.3	Rehabilitation of the water distribution network in the town of Falesti (Gara Falesti)				
1.3.1	water distribution network HDPE pipe OD 125	m	1,155	67	77,385
1.3.2	water distribution network HDPE pipe OD 90	m	1,610	62	99,820
1.3.3	water distribution network HDPE pipe OD 75	m	7,195	60	431,700
ST-1.3	Subtotal 1.3 Rehabilitation of the water distribution network				608,905
	Subtotal Water Supply(1.1+1.2+1.3)				1,140,181
2.	Wastewater				
2.1	Rehabilitation of the pressure main in the town of Falesti				
2.1.1	Pressure main HDPE pipe OD 280	m	1,755	124	217.620
2.1.2	Pressure main HDPE pipe OD 160	m	1,570	75	117,750
ST-2.1	Subtotal 2.1 Rehabilitation of the pressure mains				335,370
2.2	Rehabilitation of sewer network in the town of Falesti* (OD 200-250)	m	6,822	165	1,125,630
2.3	Extension of the sewer network in the town of Falesti (Falesti and Gara Falesti zone)				
2.3.1	Sewer network PP/PVC pipe OD 200-250	m	43,000	165	7,095,000
2.3.2	Manholes, ϕ 1,000	pcs	860	1,030	885,800
2.3.3	Pressure main PE OD 90-110	m	290	62	17,980
2.3.4	Service connections	pcs	4,400	500	2,200,000
ST-2.3	Subtotal 2.3 Extension of the sewer network				10,180,800
2.4	Wastewater pumping station				
2.4.1	Wastewater pumping station	LS	1	32,000	32,000
ST-2.4	Subtotal 2.4 Extension of the sewer network				32,000
2.5	Construction of a WWTP (for Falesti, Falestii Noi, Calugar))	P.E.	18,768	300	5,630,400
ST-2	Subtotal Wastewater (2.1+2.2+2.3+2.4+2.5)				17,304,200
GT	Total Costs for Falesti Town Phase 2				18,444,381
B	Falestii Noi locality				

N°	Component	Units	Quantity	Unit costs	Total cost
				EUR	EUR
1	Water Supply				
1.1	Construction of water transmission main, HDPE pipe OD 90	m	2,585	60,00	155,100
1.2	Construction of the water distribution network in the Falestii Noi locality				
1.2.1	water distribution network HDPE pipe OD 90	m	9,605	62	595,510
1.2.2	water distribution network HDPE pipe OD 75	m	2,040	60	122,400
1.2.3	Manholes, ϕ 1,500	pcs	45	423	19,035
1.2.4	Service connections	pcs	765	250	191,250
ST-1.2	Subtotal 1.1 Construction of the water distribution network				928,195
1.3	Construction of water tower (2X50m^3)	LS	2	25,000	50,000
ST-1	Subtotal Water Supply (1.1+1.2+1.3)				1,133,295
2	Wastewater				
2.1	Construction of the sewer network in the Falestii Noi locality				
2.1.1	Sewer network PP/PVC pipe OD 200-250	m	10,820	165	1,785,300
2.1.2	Manholes, ϕ 1,000	pcs	216	1,030	222,892
2.1.3	Service connections	pcs	760	500	380,000
2.1.4	Pressure main PE OD 90-110	m	2,380	62	147,560
ST-2.1	Subtotal 2.1 Construction of the sewer network				2,535,752
2.2	Construction of wastewater pumping station	LS	1	40,000	40,000
ST-2	Subtotal Wastwater (2.1+2.2)				2,575,752
GT	Total Costs for Falestii Noi locality Phase 2				3,709,047
C	Calugar locality				
1	Water Supply				
1.1	Construction of water transmission main, HDPE pipe OD 90	m	4,850	60	291,000
1.2	Construction of the water distribution network in the Calugar locality				
1.2.1	water distribution network HDPE pipe OD 90	m	3,110	62	192,820
1.2.2	water distribution network HDPE pipe OD 75	m	13,430	60	805,800
1.2.3	Manholes, ϕ 1,500	pcs	35	423	14,805
1.2.4	Service connections	pcs	761	250	190,250
ST-1.2	Subtotal 1.2 Extension of the water distribution network				1,203,675
1.3	Construction of drinking water reservoir (2X100m³)	LS	2	60,000	120,000
ST-1	Subtotal Water Supply (1.1+1.2+1.3)				1,614,675
2	Wastewater				
2.1	Construction of the sewer network in the Calugar locality				
2.1.1	Sewer network PP/PVC pipe OD 200-250	m	15,570	165	2,569,050
2.1.2	Manholes, ϕ 1,000	pcs	311	1030	320,742
2.1.3	Service connections	pcs	740	500	370,000
2.1.4	Pressure main PE OD 90-110	m	230	62	14,260
ST-2.1	Subtotal 1.2 Construction of the sewer network				3,259,792
2.2	Construction of wastewater pumping station	pcs	1	28,000	28,000
ST-2	Subtotal Wastwater (2.1+2.2)				3,287,792
GT	Total Costs for Calugar locality Phase 2				4,902,467
SUM	Summary for Total Investment Costs for all localities				
1	Falesti Town				
1.1	Water Supply				1,140,181
1.2	Wastewater				17,304,200
ST-1	Sub-total capital investment costs Falesti Town				18,444,381

N°	Component	Units	Quantity	Unit costs	Total cost
				EUR	EUR
2	Falestii Noi locality				
2.1	Water Supply				1,133,295
2.2	Wastewater				2,575,752
ST-2	Sub-total capital investment costs Falestii Noi locality				3,709.047
3	Calugar locality				
3.1	Water Supply				1,614,675
3.2	Wastewater				3,287,792
ST-3	Sub-total capital investment costs Calugar locality				4,902,467
TOT	Total capital Investment cost all localities (1+2+3+4)				27,055,895
T1	Water Supply				3,888,151
T2	Wastewater				23,167,744
TOT	Total capital Investment cost all localities				27,055,895
TA	Technical Assistance				
	Design and engineering (12% of investment costs)				3,246,707
CON	Contingencies (10% of Investment costs and TA)				3,030,260
GT II	**Grand TOTAL for Phase 2 (Investment costs + TA + Contingencies)**				**33,332,863**

Source: GIZ/MLPS

Table 5-13: Summary of the investment plan for Phase 1 and Phase 2

N°	Component	Costs Phase 1	Costs Phase 2	Costs Phase 1 & 2
		EUR	EUR	EUR
1	Water supply and wastewater, capital investments			
1,1	Water supply	1,320,716	3,888,151	5,208,867
1,2	Wastewater		23,167,744	23,167,744
1,3	Equipment and tools for operational performance improvement (water supply and wastewater)	200,000		
ST-1	Sub-total capital investments water supply and wastewater	1,520,716	27,055,895	28,576,611
2	Technical assistance	482,486	3,246,707	3,729,193
3	Contingencies	200,320	3,030,260	3,230,580
Total	**Total Costs Phase 1 & 2**	**2,203,522**	**33,332,863**	**35,536,385**

Source: GIZ/MLPS

6 Financial and economic analysis

6.1 Assumptions for financial and economic analysis

The financial model is structured in nominal Moldovan lei (MDL), the base year is 2014 and forecast begins in 2015.

The financial and economic analysis was based on macroeconomic assumptions on a forecast of GDP per capita, wages increase and electricity prices described below (Macroeconomic forecast).

The financial and economic analysis was prepared using incremental analysis, which considers the differences in the costs and benefits between the 'do something' alternative(s) and a single counterfactual without the project, that is, in principle, the BAU[31] scenario[32], in reference to the EU Guide to Cost-Benefit Analysis (further EU guide) of investment projects.

The project was prepared using following assumptions:

- The water supply service area will be extended with 105 households in Falesti in 'with project' scenario and no extension of the service area is forecasted for the BAU scenario;
- The wastewater service area will not be extended and will be the same in both scenarios;
- The connection rate increases in the existing service area to 100% as the targets was set by 2030 and for the new area (new connected localities) to the 100% in 2045;
- Apparent losses (Commercial losses) will decrease up to the target set of 5% until 2030;
- Physical losses will decrease up to the target set 25% until 2021 and up to 5% in 2045;
- Fixed costs and depreciation do not change, except increases in salaries as described in the macroeconomic forecast;
- Variable costs are proportional to the unit water consumption.

The details of the financial and economic analysis are presented in Annex 6, Tables 1-25 as follows:

- Table 1. Macroeconomic forecast;
- Table 2. Investment costs for water supply;
- Table 3. Depreciation rates for water supply;
- Table 4. Summary of investment costs for water supply;
- Table 5. Depreciation for water supply;
- Table 6. Gross value of new assets for water supply;

[31] Business as Usual

[32] In fact, the BAU scenario is an adjusted "do-minimum" scenario used as the reference solution. This is because in some cases, the BAU (do-nothing) scenario cannot be considered acceptable because it produces catastrophic effects.

- Table 7. Net assets for water supply;
- Table 8. Depreciation costs for water supply;
- Table 9. Variable costs – summary;
- Table 10. Fixed costs;
- Table 11. Total costs;
- Table 12. Calculation of the water and wastewater tariff;
- Table 13. Tariff affordability;
- Table 14. Profits and losses - with project;
- Table 15. Profits and losses - without project;
- Table 16. Working Capital - with project;
- Table 17. Working Capital - without project;
- Table 18. Balance sheet - with project;
- Table 19. Balance sheet - without project;
- Table 20. Cash flow - with project;
- Table 21. Cash flow - without project;
- Table 22. Financial analysis on profitability of the investment;
- Table 23. Calculation of NPV on own capital;
- Table 24. Economic analysis;
- Table 25. Sensitivity analysis.

The financial analysis was prepared in an annual presentation and covers a time horizon of 30 years. Calculation of NPV was conducted for a 30-year reference period as the most appropriate infrastructure investments in the WSS sector and also advised by EU guide for water and environment (Table 2.2 of the guide which provides reference time horizon in years).

Historical financial data for 2012, 2013 and 2014 are used as the basis for the financial model. Data from 2014 is used as basis for the current costs structure.

The exchange rate used for the analysis represents the average exchange rate for the 2015 (the period from 1 January to 1 November) and is 1 EUR = 20.78 MDL. (Source: (https://www.bnm.md/en/content/official-exchange-rates).)

6.1.1 Macroeconomic forecast

Gross domestic product (GDP) is the monetary value of all the finished goods and services produced within a country's borders in a specific time period. GDP is usually calculated on an annual basis. The major source for the GDP forecast is the Poverty Reduction Strategy[33].

The National Development Strategy (NDS)—known as 'Moldova 2020'—was approved by the Parliament of the Republic of Moldova on July 11, 2012 and officially published on November 30, 2012. The Strategy is not only a policy guide for the Government of Moldova but also the base for relations with IMF and other IFOs. The Strategy sets the priorities for country development for the time horizon 2012-2020. At the same time the

[33] http://www.imf.org/external/pubs/cat/longres.aspx?sk=40895.0

Strategy assumes two development scenarios: base case scenario and scenario Moldova 2020.

The base case scenario, which regards a continuation of trends of the last decade, assumes that Moldova will develop as it has done to date, with the same economic, social, political phenomena, with rising remittances and the same pace of reforms. The base case scenario estimates an average annual GDP growth of 4.7% during 2012-2020.

The implementation of the Strategy's priorities, considering the direct and quantifiable effects of each priority, supplements this annual growth rate by more than 1.2% annually, thus forming the alternative scenario Moldova 2020, which in this study is called the optimistic scenario. The annual supplement to the additional GDP growth will emerge gradually, but will accelerate rapidly and sustainably, from 1.1% (2015) to 2.1% (by 2020), continuing beyond the analysis horizon used in this study. The difference is small at first glance, but in developed economies an annual GDP growth difference of 2% is sometimes the difference between stagnation and growth, or the difference between normal growth and economic boom. Hence, the alternative scenario assumes that, due to effects only, in 2020 the GDP will be 12% higher compared to the base case scenario and, with each year beyond 2020, this difference will grow significantly. Along with the implementation of these priorities, the annual income per capita by 2020 will be on average 12% higher compared to the base case scenario and 79% higher compared to 2011.

Taking into account that the National Development Strategy 2012-2020 also serves as the Poverty Reduction Strategy (PRS) and is the official basis for internal programming and for bilateral relations between the Government of the Republic of Moldova and the IMF and other international financial institutions, it may be concluded that the annual percentage changes in GDP presented in the Strategy can serve as a reference for the feasibility study projections.

Table 6-1: Gross Domestic Product annual percentage of change based on the information provided by Poverty Reduction Strategy (%)

Scenario/ Years	2015	2016	2017	2018	2019	2020
Base case scenario, %	4,70	4,60	4,65	4,70	4,65	4,70
Moldova 2020 scenario (optimistic), %	5,80	5,90	6,40	6,50	6,40	6,70
Pessimistic scenario, %	2,35	2,30	2,33	2,35	2,33	2,35

Source: GIZ/MLPS

The base case scenario in the Poverty Reduction Strategy assumes that in the period 2012 – 2020, the annual GDP growth rate will be on average 4.70%. The Moldova 2020 scenario assumes that GDP will be higher than in the base case scenario in 2015 by 1.10% and in 2020 by 2.10%. Table 6-1 presents GDP growth estimates from 2015-2020 based on the assumptions and figures provided in the PRS. This study includes also a third scenario, pessimistic, where growth is half of that in the base scenario.

During the development of this feasibility study, the World Bank and IMF changed their GDP forecasts for the Republic of Moldova, due to social and political events that recently took place in region and the country itself. In this context, the World Bank has revised its GDP forecast downward, as shown in the following table.

Table 6-2: Gross Domestic Product projection by World Bank (%)

Scenario/ Years	2015	2016	2017
Base case scenario, %	-2.0	1.5	4.00

Source: http://www.worldbank.org/content/dam/Worldbank/GEP/GEP2015b/Global-Economic-Prospects-June-2015-Europe-and-Central-Asia-analysis.pdf

Applying the same methodology used in the Poverty Reduction Strategy, the GDP growth for all three scenarios has been estimated and is presented in the table below.

Table 6-3: GDP annual percentage of change in the feasibility study (%)

Scenario/ Years	2015	2016	2017	2018	2019	2020
Base case scenario, %	-2,0	1,5	4,0	4,0	4,0	4,0
Optimistic scenario, %	-2,0	3,0	4,5	5,0	5,0	5,0
Pessimistic scenario, %	-2,0	0,8	2,0	2,0	2,0	2,0

Source: GIZ/MLPS

Extending the GDP projections beyond 2020, it is assumed that the high growth of 4% annually will continue until 2035 as a result of structural reforms. However, in the later years the GDP growth will gradually slow, achieving the growth of 3% in the period of 2035-2044. The GDP growth forecasts for the period 2025-2045, estimated according to the above assumptions are presented in Table 6-4. In the optimistic scenario, the GDP growth will remain higher, while in the pessimistic scenario there will be stagnation.

Table 6-4: GDP annual percentage of change projection 2025-2045 (%)

Scenario/ Years	2025	2030	2035	2040	2045
Base case scenario, %	4.0	4.0	3.0	3.0	3.0
Optimistic scenario, %	5.0	5.0	5.0	5.0	5.0
Pessimistic scenario, %	2.0	2.0	1.5	1.5	1.5

Source: GIZ/MLPS

The base case scenario was used further in the financial analysis and financial calculations.

6.1.2 Wages forecast

According to the National Bureau of Statistics of the Republic of Moldova, the gross average monthly salary was MDL 4,172.0 in 2014, which was higher by 10.8% compared to the gross average salary in 2013. For the period 2009-2014, the average salary growth rate was 8.7%. The table below presents the gross average salaries and the salary growth rate for the period 2005 – 2014.

Table 6-5: Gross average monthly salary (MDL)

Indicator / Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gross average monthly salary, MDL	1,319	1,697	2,065	2,530	2,748	2,972	3,194	3,478	3,765	4,172
Salary growth rate, %	19.5	28.7	21.7	22.5	8.6	8.2	7.5	8.9	8.3	10.8

Source: (http://statbank.statistica.md/pxweb/Dialog/varval.asp?ma=SAL0108_en&ti=Gross+average+monthly+salary+by+economic+activities+and+sectors%2C+2004-2010&path=../Database/EN/03%20SAL/SAL01/serii%20anuale/&lang=3)

The gross average salary for the next four years (2015-2018) is described on the macro economic forecast of the Moldovan Ministry of Economy. The table below presents the gross average salaries and the salary growth rate for 2015 – 2018.

Table 6-6: The forecast of gross average monthly salary for the next years (MDL)

Indicator / Years	2015	2016	2017	2018
Gross average monthly salary, MDL	4,500	4,925	5,400	5,900
Nominal growth rate, %	7.9	9.4	9.6	9.3

Source: (http://www.mec.gov.md/ro/documents-terms/situatia-macroeconomica-prognozare-macroeconomica)

The base case scenario, which regards a continuation of trends of the last decade, assumes that Moldova will develop as it has done to date, with the same economic, social, political phenomena.

The base case scenario estimates an average monthly salary growth of 9.0% during 2012-2020.The optimistic scenario (Moldova 2020) assumes that gross monthly salary will be higher than in the base case scenario in 2015 - 2020 by 2.0%. The pessimistic scenario assumes that the salary growth will be half of the provided by base scenario.

Table 6-7 presents gross monthly salary growth estimates for the period 2015-2020 based on the assumptions and figures provided by the Moldovan Ministry of Economy.

Table 6-7: The forecast of gross average monthly salary growth for the next years (%)

Scenario/Years	2015	2016	2017	2018	2019	2020
Base Case scenario, %	7.9	9.4	9.6	9.3	9.3	8.5
Pessimistic scenario, %	3.95	4.70	4.80	4.65	4.66	4.26
Optimistic scenario, %	9.9	11.4	11.6	11.3	11.3	10.5

Source: GIZ/MLPS

Extending the projections of gross average monthly wages beyond 2020, it is assumed that the high growth of about 6.3% annually will continue until 2025 as a result of structural reforms and the growth of the economy. For the period 2025-2035, the growth will slow down up to approximately 4.3% annually. In later years, it is estimated that growth will gradually slow, achieving the rate of 3% in the period of 2035-2044.

The gross average monthly salary forecast for the period 2020-2045 is presented in the table below.

Table 6-8: The forecast of gross average monthly salary growth, 2020-2045 (%)

Scenario/Years	2020	2025	2030	2035	2040	2045
Base Case scenario, %	8,5	5,6	4,3	3,6	3,0	2,7
Pessimistic scenario, %	4,26	2,78	2,17	1,8	1,5	1,35
Optimistic scenario, %	10,5	7,6	6,3	5,6	5,0	4,7

Source: GIZ/MLPS

The base case scenario was used in this feasibility study.

6.1.3 Households income forecast

According to National Bureau of Statistics of the Republic of Moldova the disposable household income was (in 2014), in person per month: MDL 2,292.6 in Chisinau, MDL 1,697.2 in the North, MDL 1,564.3 in the Centre and MDL 1,526.6 in the South Region[34].

In 2014 the disposable household income was MDL 1,767.5 on average at national level, MDL 2,111.1 in urban and MDL 1,505.7 in rural areas.

The forecast for disposable household income was estimated based on disposable household income per capita per month from 2014 and increased according to the assumptions for the annual real wage growth. The following tables present the forecast for disposable household income for the period 2015-2020 and 2020-2045.

Table 6-9: Forecast of disposable household income, 2015-2020[35]

Scenario/Years	2015	2016	2017	2018	2019	2020
Base Case scenario, MDL	1,730	1,781	1,863	1,944	2,021	2,102
Pessimistic scenario, MDL	1,730	1,756	1,796	1,835	1,871	2,066
Optimistic scenario, MDL	1,730	1,816	1,936	2,058	2,161	2,837

Source: GIZ/MLPS

Table 6-10: Forecast of disposable household income, 2020-2045[36]

Scenario/Years	2020	2025	2030	2035	2040	2045
Base Case scenario, MDL	2,102	2,558	3,112	3,786	4,389	4,940
Pessimistic scenario, MDL	1,909	2,107	2,327	2,569	2,767	2,937
Optimistic scenario, MDL	2,269	3,008	3,838	4,899	6,252	7,600

Source: GIZ/MLPS

6.1.4 Electricity prices forecast

Electricity prices have a significant influence on costs of providing services and therefore on the tariffs that customers should pay.

[34] http://statbank.statistica.md/pxweb/Dialog/view.asp?ma=NIV0103_EN_t&ti=Disposble+incomes+average+monthly+per+capita+by+Years%2C+Sources+of+income%2C+Unit+and+Zones&path=./quicktables/EN/04%20NIV/NIV01/&lang=3

[35] Per capita per month (MDL)

[36] Per capita per month (MDL)

While electricity prices in Moldova are below the European average, they are among the highest when compared to disposable household income. Thus, the following factors will affect electricity prices:

- Regulation and government policy keeping prices low;
- Regional price of gas as a major fossil fuel used in the power generation in Moldova;
- Demand for the electricity in the region;
- Situation in Transnistria, from where Moldova imports electricity at a low price due to subsidized gas prices in Transnistria;
- Development of grid connections to Romania and Ukraine;
- General growth of the country's GDP and increase in disposable household income, which may provide the government with the possibility of relaxing control on electricity prices.

Based on these factors, the feasibility study makes following assumptions:

- By 2020, the real increase in electricity prices will be limited to 1% annually, with the exception of 2016, when according to Administrative Board Decision of National Agency for Energy Regulation of the Republic of Moldova no. 153 of July 18, 2015, the electricity price was increased by 37%;
- In years 2020-2030, it will be proportional to the half of GDP increase;
- After 2030, it will be proportional to the GDP increase;
- In the pessimistic scenario, it will be proportional to half of GDP increase by 2020 and then it will be proportional to the GDP increase;
- In the optimistic scenario, there will be annual real growth of 1%.

The following table summarizes the assumed future electricity price increases:

Table 6-11: Increase of electrify prices (%)

Scenario/ Years	2015	2016	2017	2018	2019	2020	2030	2040
Base case scenario, %	0.0	37.0	1.0	1.0	1.0	1.0	2.0	4.0
Pessimistic scenario, %	0.0	37.0	2.3	2.4	2.3	2.4	4.0	3.0
Optimistic scenario, %	0.0	37.0	1.0	1.0	1.0	1.0	1.0	1.0

Source: GIZ/MLPS

The base case scenario is used in the feasibility study and further in the financial analysis and financial calculations.

6.2 Evaluation of the financial capacity of the Operator

6.2.1 Analysis of the current financial situation of the Operator

6.2.1.1 Analysis of the Balance Sheet

The WSS operator's Balance Sheet reveals a decrease of equity (see Table 6-12).

Table 6-12: Balance Sheet of Falesti Municipal Services Utility

Balance Sheet	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
ASSETS				
LONG-TERM FIXED ASSETS				
Intangible assets	010	27,056	27,056	27,056
Accumulated Depreciation-Intangible Assets	020	-15,972	-15,957	-21,103
Intangible assets' book cost	030	11,084	11,099	5,953
Incomplete fixed assets	040	1,419,943	1,504,559	1,452,170
Fixed Assets	060	63,731,262	65,252,289	61,386,668
Depreciation of long-term fixed assets	080	-19,477,552	-19,908,688	-19,846,326
Long-term fixed assets' book cost	090	45,673,653	46,848,160	42,992,512
Total Non-Current Assets	180	45,684,737	46,859,259	42,998,465
CURRENT ASSETS				
Stocks of goods and materials				
Raw materials	190	470,123	686,527	762,642
Inventory	210	604,601	642,735	738,713
Goods for sale	240	6,499	4,107	
Stocks of goods and materials	250	1,081,223	1,333,369	1,501,355
Short-term receivables				
Trade accounts receivables	260	384,970	329,922	567,987
Advances	290			
Receivables related to budget	300			
Receivables from staff	320	51,181	39,981	26,801
Deferred income	330	49,186	10,598	
Other short-term receivables	340	1,196,501	1,139,188	959,076
Short-term receivables	350	1,681,838	1,519,689	1,553,864
Cash				
Settlement Account	400	264	172	597
Cash	410	185,058	118,516	208,651
Currency accounts	420			
Other cash and equivalents	430			
Cash and equivalents	440	185,322	118,688	209,248
Other current assets	450	80,682	81,129	138,700
Total Current Assets	460	3,029,065	3,052,875	3,403,167
TOTAL - ASSETS	470	**48,713,802**	**49,912,134**	**46,401,632**
LIABILITIES AND OWN EQUITY				
EQUITY				
Share capital and capital surplus				
Share capital	480	3,662,889	3,662,889	3,662,889
Capital surplus	490	170,995	170,995	170,995
Share capital and capital surplus	520	3,833,884	3,833,884	3,833,884
Other provisions	550	31,551,008	28,764,600	25,598,093
Retained profit (uncovered loss) of previous years	580			-1,547,321
Net income (loss) of the reporting period	590	-2,786,408	-1,547,321	-92,798
Retained earnings (uncovered loss)	610	-2,786,408	-1,547,321	-1,640,119
Total Equity	650	32,598,484	31,051,163	27,791,858
LONG-TERM LIABILITIES				
Long-term financial liabilities				
Special purpose funding and receipts	720	1,769,021	1,769,021	1,491,943
Long-term accrued liabilities	760	1,769,021	1,769,021	1,491,943
Total Long Term Liabilities	770	1,769,021	1,769,021	1,491,943
SHORT-TERM LIABILITIES				
Short-term financial liabilities				

Balance Sheet	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
Short-term loans	790	14,045	11,645	2,400
Other short-term financial liabilities	810	8,713	5,861	
Total short-term financial liabilities	820	22,758	17,506	2,400
Short-term accounts payables				
Commercial account payables	830	328,385	309,885	292,188
Payables to related parties	840	3,773	3,773	3,773
Short-term accounts payables	860	332,158	313,658	295,961
Wages owed	870	141,433	202,543	195,613
Other employee liabilities	880	722	3,920	130
Insurance	890	69,831	118,064	126,107
Insurance	900	55,618	91,318	94,949
Debts to the founders and others	930	13,623,835	16,250,872	16,385,321
Other current liabilities	950	99,942	94,069	89,350
Short-term accrues liabilities	960	13,991,381	16,760,786	16,891,470
Total Short Term Liabilities	970	14,346,297	17,091,950	17,189,831
TOTAL – EQUITY and LIABILITIES	**980**	**48,713,802**	**49,912,134**	**46,401,632**

Source: Falesti Municipal Services Utility

The following conclusions results from the Balance Sheet analysis:

- The largest assets category is long-term assets, which constituted 92.7% of the total in 2014. It should be mentioned that the operator's assets decreased from MDL 48.7 million in 2012 to MDL 46.4 million in 2014;
- Liabilities show that the operator is financed mainly from permanent capital;
- The share of short-term debts in 2014 is 37.0% from total liabilities. Operator pays its current and long-term liabilities in due time and does not have at the moment any loans or credits.

6.2.1.2 Analysis of the Profit and Losses Statement

The Profit and Losses Statement for the period 2012-2014 is shown in the following Table 6-13.

Table 6-13: Profit and Losses Statement of Falesti Municipal Services Utility

Income Statement	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
Income from sales	010	7,796,051	8,581,568	10,143,900
Cost of sales	020	6,495,453	6,943,830	7,847,975
Gross profit (gross loss)	030	1,300,598	1,637,738	2,295,925
Other operating income	040	124,297	125,999	139,971
Commercial expenses	050			
General and administrative expenses	060	1,990,430	2,319,394	2,632,622
Other operating expenses	070	2,248	8,950	10,328
Result from operating activities: profit (loss)	080	-567,783	-564,607	-207,054
Result from investing activities: profit (loss)	090	-2,218,625	-982,714	354,289
Result from financial activities: profit (loss)	100			-240,033
Result from financial and economic activities: profit (loss)	110	-2,786,408	-1,547,321	-92,798
Extraordinary result: profit (loss)	120			

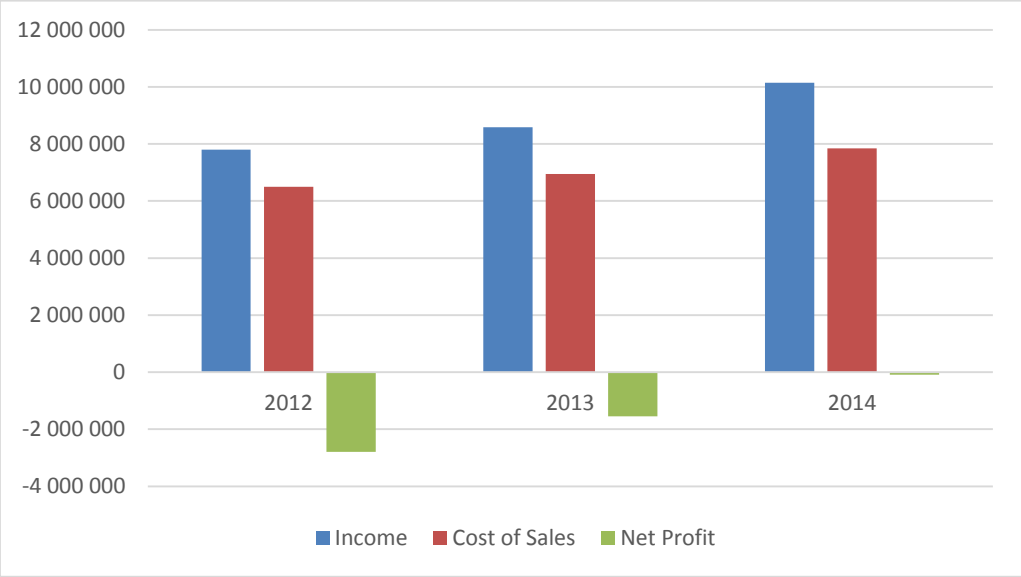
Income Statement	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
Profit (loss) before tax	130	-2,786,408	-1,547,321	-92,798
Income tax	140			
Net profit (net loss)	150	-2,786,408	-1,547,321	-92,798

Source: Falesti Municipal Services Utility

The operator has losses from operating activities in 2012-2014, which had a negative effect in the accumulation of reserves.

The evolution of the operator's income, cost of sales and net profit for the period of 2012-2014 is presented in the Figure 6-1.

Figure 6-1: Operator's income, cost of sales and net profit (MDL)



Source: GIZ/MLPS

6.2.1.3 Cash flow analysis

The Cash Flow Statement for the period 2012-2014 is shown in the following Table 6-14.

Table 6-14: Cash Flow Statement of Falesti Municipal Services Utility

Cash Flow Statement	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
Operating activities				
Cash inflows from sales	010	6,764,749	7,785,606	8,681,116
Cash paid to suppliers and contractors	020	4,399,564	4,919,714	4,726,956
Cash payments to employees and social security contributions	030	2,971,764	3,606,652	4,301,017
Interest payments	040			
Income tax payments	050	113,463	154,043	199,784
Other cash receipts	060	2,341,318	2,550,372	2,251,123
Other cash payments	070	1,620,207	1,722,203	1,613,922
Net cash flow from operating activities	080	1,069	-66,634	90,560

Cash Flow Statement	Row Code	2012 (MDL)	2013 (MDL)	2014 (MDL)
Financing activities				
Other cash receipts (payments)	200			
Net cash flow from financial activity	210			
Net cash flow before extraordinary items	220	1,069	-66,634	90,560
Cash proceeds (payments) from extraordinary items	230			
Net cash flow	240	1,069	-66,634	90,560
Positive (negative) foreign exchange differences	250			
Cash balance at the beginning of the year	260	184,253	185,322	118,688
Cash balance at the end of the reporting period	270	185,322	118,688	209,248

Source: Falesti Municipal Services Utility

6.2.1.4 Financial indicators

A series of indicators derived from the financial statements were calculated based on the data collected (see Table 6-15).

Table 6-15: Financial Indicators

No	Financial Indicators	2012	2013	2014	Indicators limits
1	Current Liquidity Ratio	0.21	0.18	0.20	1.0 – 2.0
2	ROE, %	-8.5	-5.0	-0.3	
3	ROA, %	-5.7	-3.1	-0.2	
4	Operating Profitability, %	-7.3	-6.6	-2.1	> 0
5	Debts Service Converge Ratio	0.67	0.62	0.60	<1.2
6	Financial Ratio	0.33	0.38	0.40	
7	Accounts Receivable Turnover, days	79	68	55	< 30
8	Accounts Payable Turnover, days	19	34	14	< 30

Source: GIZ/MLPS

- Profitability indicators (2, 3, 4) have negative values for 2012-2014. This means that the operator does not cover its current costs;
- Debt ratio indicators (5, 6) show a reduced weight of debt for the short-term period, promoting a short-term self-financing strategy;
- Liquidity indicator (1) shows a constant capacity of paying in the short-term period, however it is the case to mention the low level of the indicator;
- The collection of receivables shows a decrease in the collection period from 79 days in 2012 to 55 days in 2014. The accounts payable period decreased from 19 days in 2012 to 14 days in 2014.

6.2.1.5 Revenue analysis

The revenues from the provision of water and wastewater services are presented in Table 6-16.

Table 6-16: Revenues from water supply and wastewater services of Falesti Municipal Services Utility, 2014

Consumers	Revenues		Volumes	
	(MDL)	(%)	(m^3)	(%)
WATER SUPPLY	3,321,742	100.0	235,736	100.0
Population	2,232,103	67.2	204,780	86.9
Budgetary Consumers	325,569	9.8	9,249	3.9
Private Entities	764,070	23.0	21,707	9.2
WASTEWATER SERVICES	2,703,193	100.0	167,195	100.0
Population	1,173,769	43.4	109,698	65.6
Budgetary Consumers	184,657	6.8	6,942	4.2
Private Entities	1,344,767	49.7	50,555	30.2

Source: Falesti Municipal Services Utility

The operator differentiates tariffs by customer groups and tariffs are approved by the Local Council (see Table 6-17).The tariffs are indicated without VAT.

Table 6-17: Evolution of tariffs, 2013-2015

Tariffs for consumers	2013 (MDL / $1m^3$)	2014 (MDL / $1m^3$)	2015 (MDL / $1m^3$)
Budgetary Consumers	57.36	61.80	61.80
• Water supply	35.20	35.20	35.20
• Wastewater services	22.16	26.60	26.60
Private Entities	57.36	61.80	61.80
• Water supply	35.20	35.20	35.20
• Wastewater services	22.16	26.60	26.60
Population	18.18	21.60	21.60
• Water supply	9.14	10.90	10.90
• Wastewater services	9.14	10.70	10.70
Weighted average		30.26	
• Water supply		14.09	
• Wastewater services		16.17	

Source: Falesti Municipal Services Utility

In the period of 2013 - 2015, the tariffs for WSS services did not change. This fact demonstrates that the operator's activity is not based on cost recovery principle. Also, in accordance with the operator's data were calculated the weighted average tariffs.

6.2.1.6 Detailed cost structure

The operator's detailed cost structure for water and wastewater services is shown in Table 6-18. It can be noticed that the majority of the costs are for salaries and electricity.

Table 6-18: Detailed cost structure of Falesti Municipal Services Utility, 2014

Cost category	Amount (MDL)	Percentage (%)
WATER SUPPLY	2,839,010	100.0
Electricity (for pumping)	1,385,997	48.8
Chemicals for water treatment	7,340	0.3
Fuel for transport for water supply	104,270	3.7
Salaries of employees working at water supply	736,327	25.9
• Number of employees (pers.)	29	-
• Average monthly salary per employee	2,116	-

Cost category	Amount (MDL)	Percentage (%)
Social benefits (pension fund/insurance)	198,808	7.0
Depreciation	114,670	4.0
Maintenance costs for water supply	123,640	4.4
External services for water supply	83,119	2.9
Tax for water capturing	71,039	2.5
Other costs	13,800	0.5
WASTEWATER SERVICES	1,565,077	100.0
Electricity (for wastewater treatment)	278,945	17.8
• For pumping	96,738	-
• For wastewater treatment	182,207	-
Chemicals for wastewater treatment	3,145	0.2
Fuel for transport for wastewater services	37,547	2.4
Salaries of employees working in wastewater services	773,647	49.4
• Number of employees (pers.)	25	-
• Average monthly salary per employee	2,579	-
Social benefits (pension fund/insurance)	208,885	13.3
Depreciation	191,370	12.2
Maintenance costs for wastewater services	52,741	3.4
External services for wastewater services	9,098	0.6
Other costs	9,699	0.6
OTHER SERVICES	4,402,406	100.0
ADMINISTRATION AND OVERHEAD	1,684,432	100.0
Salaries of employees working in administration	1,219,467	72.4
• Number of employees (pers.)	26	-
• Average monthly salary per employee	3,908	-
Social benefits (pension fund/insurance)	329,256	19.5
Maintenance costs for administration	41,665	2.5
Fuel for transport for administration	46,210	2.7
Insurance costs	708	-
External services	32,072	1.9
Other overhead costs	15,054	0.9

Source: Falesti Municipal Services Utility

6.2.1.7 Investments

The operator obtained co-financing for external sources for investments and capacity development as follows (see Table 6-19).

Table 6-19: Investments

Investments	Source	Period	Amount (MDL)
Total			22,008,968
Falesti town water supply from Prut river	NEF	2010	9,400,000
Falesti town water supply from Prut river	NEF	2013	12,608,968

Source: Falesti Municipal Services Utility; National Ecological Fund

6.2.2 Information on existing loans (if any)

No long-term or short-term loans are in operation for the moment.

6.2.3 Creditworthiness capacity of the Operator

Capacity to repay a loan is the most important criterion used to assess the operator's creditworthiness. The loan repayment shall be less than the net profit and depreciation if there are no investment and financial activities. Unfortunately, the operator uses cash surpluses generated from depreciation to decrease working capital. In conclusion, the operator presently has no creditworthiness capacity.

6.3 Financial analysis

6.3.1 Investment costs

The total investment outlays amount to MDL 45.79 million (EUR 2.2 million). The outlays include:

- Rehabilitation of the water distribution network in the town of Falesti – 11.56 km;
- Extension of the water distribution network in the town of Falesti – 2.42 km;
- Construction of water transmission main pipelines - 2.6 km;
- Equipment and tools;
- Detailed design and procurement;
- Technical assistance, supervision and capacity development;
- Contingencies.

The presented construction costs were prepared using conceptual design estimates. Using the information obtained, the costs were estimated based on expert experience from many years of design works, tenders and investment supervision in water management. Also, in preparation of investment plan was taking into consideration the priority objectives regarding the development of water supply system and wastewater system established by Local Public Administration and Falesti Municipal Service Utility. In the calculations, the experts took into account the different investment conditions. The costs are inclusive of VAT.

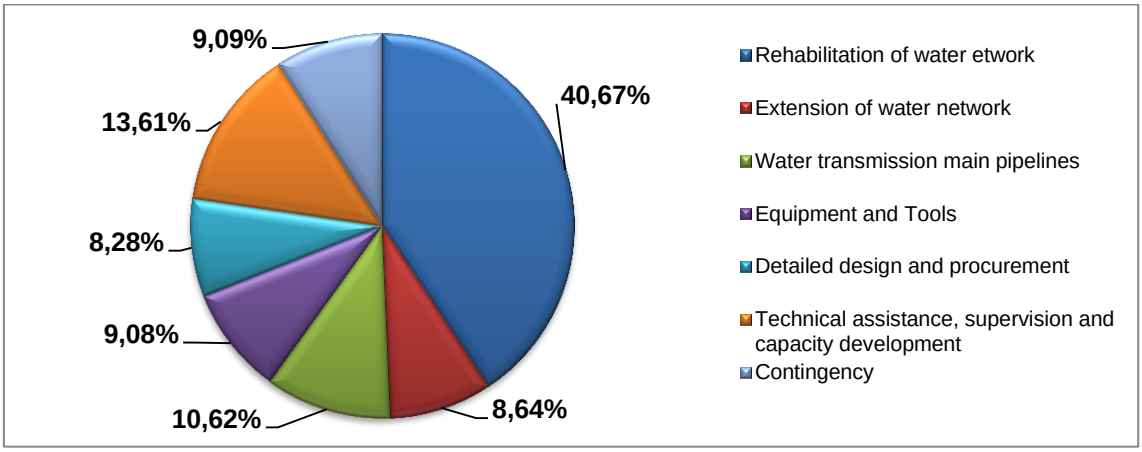
Table 6-20: Summary of the investment costs (MDL mil.)

Project investment outlays	Amount (MDL mil.)	Percentage (%)
Rehabilitation of water network	18.62	40.67
Extension of water network	3.96	8.64
Water transmission main pipelines	4.86	10.62
Equipment and Tools	4.16	9.08
Detailed design and procurement	3.79	8.28
Technical assistance, supervision and capacity development	6.23	13.61
Contingency	4.16	9.09
Total	**45.79**	**100.00**

Source: GIZ/MLPS

The main part of investment costs about 49.3% will be for the rehabilitation and extension of water distribution network of the town Falesti. Another 10.6% will be for construction of water transmission main pipelines. Capacity development and technical assistance will be around 22% of the total investment cost. Also, in the project are provided various and unforeseen expenditures in the amount of 9% of investment costs.

Figure 6-2: Structure of the project investment costs (%)



Source: GIZ/MLPS

6.3.2 Financing of the project and assessing the need for additional funding

6.3.2.1 Additional sources of income

There are two additional sources of project financing: 'local contribution' and tariffs. Local contributions – co-financing of capital investment projects by citizens – are widely used in Moldova. The possible local contributions were proposed based on the experience in Moldova in implementing other investment projects. Accordingly, the estimated contribution of citizens is MDL 1,000 MDL per household connected to the system[37].

These funds will be spent on the local wastewater network, thus households already connected to the local wastewater system will not contribute because usually they already had been contributing to the construction of the network. Thus only households not connected to sanitation system were taken into account.

It is estimated that 73 households will be connected to the water supply system in the first year of the project realization. The estimation of the citizens contribution is amounted to MDL 0.07 million.

Tariffs could be a source of financing of the WSS capital project, in particular to help repay existing and future loans. On the other hand, if the development of water and wastewater systems will be realized through loans, than the tariffs calculated, will exceed the affordable constrains. In addition, the Falesti Municipal Services Utility currently has no creditworthiness capacity.

As indicated when calculating the financial gap (see Chapter 6.3.7 'Financial performance of the project - NPV and IRR calculation'), project is not profitable (FNPV(K)~=0) when own contribution achieve MDL 6.24 million. This means that apart from citizen contributions of MDL 0.07 million, the additional MDL 6.17 million needs to be provided from other sources.

[37] This is not the total household spending capacity, as the connection to the water supply system also has to be financed.

6.3.2.2 Financial plan

The total investment outlays will be financed by:

- Domestic and international donors;
- Citizens providing local contribution;
- National sources (national development funds. local and central budgets. water operator).

The following methods for assessing the amount to be financed from each source of financing were used:

Table 6-21: Methods used for assessing the amount to be financed from each source of financing

Source of financing	Method used to estimate share in project financing
Citizens providing local contribution	The practice of 'local contribution' – co-financing of capital investment projects, including water supply, by citizens – is widely used in Moldova. The estimate was based on experience from other projects in Moldova. The estimated contribution of citizens is MDL 1,000 per household which will be connected to the wastewater system.
Domestic and international donors	The assumption is that remaining part of the investment costs will be financed by donors. Donors may not spend more than the estimated 'financing gap'[38]. The calculation of the required donor contribution takes into account that the project should not lead to financial losses for residents and communes. The social discount rate of 5% is used to determine the financial net present value (FNPV(K)) of the project. The donor contribution is then determined at the level at which FNPV(K) is equal to zero.
Water utility	The water utility may co-finance the project from tariffs. As the level of tariff is above affordability level, it means that currently the water utility will have no capacity to co-finance the project from tariffs. Also, currently Falesti Municipal Services Utility has no creditworthiness capacity.

Source: GIZ/MLPS

The following table presents the investment outlays and their financing:

Table 6-22: Summary of the financing sources (MDL mil.)

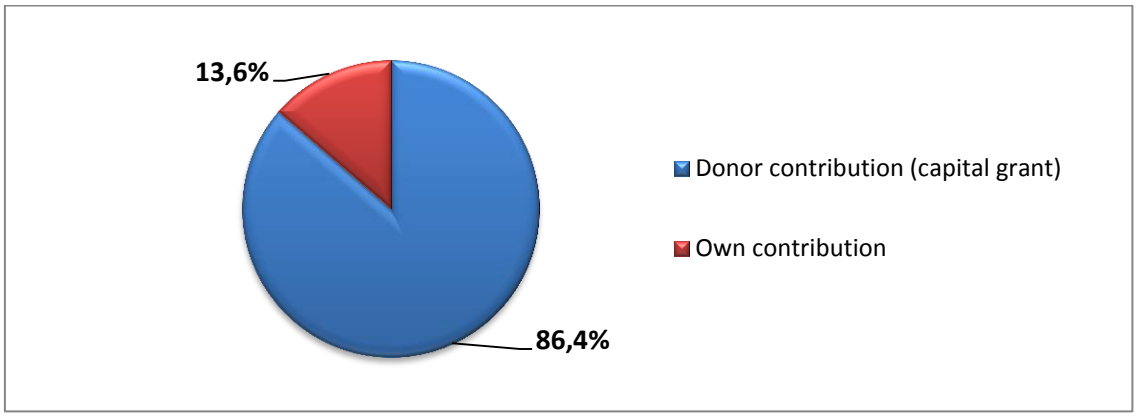
Project financing sources	Amount (MDL mil.)	Percentage (%)
Citizens providing local contribution	0.07	0.16
Domestic and International donors	39.55	86.38
Other domestic sources	6.17	13.47
Water utility	0.00	0.00
Total	**45.79**	**100.00**

Source: GIZ/MLPS

The donor contribution was estimated as 86.4% of the total investment costs, while the local sources' contribution is 13.6%.

[38] This is not an EU financing gap calculation, however, it is based on a similar assump-tions.

Figure 6-3: Structure of project financing (%)



Source: GIZ/MLPS

The project will be implemented during the period of three years and the implementation schedule is as indicated in the following table. For the first year, it is assumed that the project will be implemented in 10%, for the second year is foreseen 50% and for the third year 40%.

Table 6-23: Summary of the investment implementation schedule (MDL mil.)

Project investment outlays	2015 (MDL mil.)	2016 (MDL mil.)	2017 (MDL mil.)	Total (MDL mil.)
	10%	50%	40%	
Rehabilitation of water network	1.86	9.31	7.45	18.62
Extension of water network	0.40	1.98	1.58	3.96
Water transmission main pipelines	0.49	2.43	1.95	4.86
Equipment and Tools	0.42	2.08	1.66	4.16
Detailed design and procurement	0.38	1.90	1.52	3.79
Technical assistance, supervision and capacity development	0.62	3.12	2.49	6.23
Contingency	0.42	2.08	1.67	4.16
Total	**4.58**	**22.90**	**18.32**	**45.79**

Source: GIZ/MLPS

6.3.3 Forecast of operating costs

A detailed cost structure of Falesti Municipal Services Utility for the year 2014 was presented in section 6.**Error! Reference source not found.** (**Error! Reference source t found.**). The cost structure was used as a basis for the expenditure forecast with and without the project.

The following assumptions were used for the expenditure forecast:

- **Direct costs for labour – salaries and benefits**. In the project the labour cost is calculated based on forecasted enterprise staff number (Description of enterprise staff is provided in chapter 7.6 ‘Corporate development of the operator’). For both options (BAU and with project) it have been used an average real growth rate equal to the wages increase forecast. Three scenarios of wages increase were prepared (see chapter 6.1.2 ’Wages forecast’), but for the financial forecast the base case scenario is presented;

- **Direct costs (chemicals for treatment and water abstraction fee).** Currently, the costs are estimated to be 0.17 MDL/m^3 of water treated. No real cost increase is forecasted;
- **Direct costs (electricity).** The following assumptions were used for unit consumption:
  - **For pumping stations and water treatment plant**. The electricity consumption for the water pumping stations and water treatment plant is estimated to be 1.76 kWh/m^3;
  - **For wastewater treatment plant**. The electricity consumption for the wastewater treatment plant is estimated to be 0.44 kWh/m^3;
  - **For wastewater pumping station**. The electricity consumption for the wastewater pumping station is estimated to be 0.23 kWh/m^3.

Electricity costs are estimated taking into account the electricity prices and the electricity consumption. Price of energy[39] for the reference period is adjusted by forecast of real changes of electricity prices. Electricity consumption is calculated resulting from electricity consumption based on unit of water/wastewater (1 m^3 of water/wastewater) multiplied by total volume of water/wastewater production.

- **General administration costs**. General administration costs are currently MDL 1.68 million annually. For the expenditure forecast, due to limited expansion of the service area, it is assumed that the costs will increase with the GDP growth rate forecasted for both scenarios (BAU and with project). The GDP growth forecast is presented in the macroeconomic forecasts, where was developed three scenarios of GDP growth (base case, optimistic and pessimistic). The base case scenario was used in the financial forecast;
- **Depreciation**. Currently, depreciation is at the level of MDL 0.3 million annually. However, depreciation costs will increase to about MDL 1.11 million annually, after the investments in new assets have been implemented, beginning with the year 2018.

The depreciation costs are taken into account for project sustainability analysis, and are taken into account in the tariff policy discussion.

Details on depreciation forecast are presented in Annex 6, Tables 3-8, which also include calculation of net assets that is further used for the balance sheet forecast.

The operational costs forecasts are presented in the following table.

Table 6-24: Summary of the operational costs projections (MDL mil.)

Water supply service	Unit	2014	2015	2016	2017	2018	2019	2024	2034	2044
Variable costs water	MDL mil.	1.46	1.52	2.08	2.13	2.06	2.07	2.89	6.06	9.66
Electricity for pumping	MDL mil.	1.39	1.44	2.00	2.04	1.98	1.99	2.79	5.91	9.49
Water treatment costs	MDL mil.	0.07	0.08	0.08	0.08	0.08	0.08	0.10	0.15	0.17
Fixed costs water	MDL	2.30	2.30	2.47	3.18	5.14	5.24	6.06	7.57	9.15

[39] It has to be noted that current electricity price for all pumping station is 1.57 MDL/kWh.

Water supply service	Unit	2014	2015	2016	2017	2018	2019	2024	2034	2044
	mil.									
Salaries and related costs	MDL mil.	0.94	0.94	0.96	1.01	0.90	0.94	1.42	2.11	2.86
Maintenance - old assets	MDL mil.	0.00	0.00	0.00	0.00	2.00	2.04	2.25	2.75	3.20
Maintenance - new assets	MDL mil.	0.00	0.00	0.04	0.25	0.42	0.42	0.42	0.42	0.42
Fuel	MDL mil.	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Depreciation of fixed assets	MDL mil.	0.11	0.11	0.20	0.61	0.95	0.95	0.95	0.95	0.95
General and administrative expenditures	MDL mil.	0.93	0.93	0.94	0.98	0.55	0.57	0.69	1.03	1.40
Other costs	MDL mil.	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Total costs for water	MDL M	3.76	3.83	4.55	5.30	7.19	7.30	8.95	13.63	18.81
Wastewater service	**Unit**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2024**	**2034**	**2044**
Variable costs wastewater	MDL mil.	0.28	0.28	0.38	0.38	0.38	0.37	1.08	2.02	3.41
Electricity for pumping	MDL mil.	0.28	0.28	0.38	0.38	0.38	0.37	1.07	2.01	3.40
Wastewater treatment costs	MDL mil.	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Fixed costs water	MDL mil.	2.04	2.04	2.08	2.16	2.08	2.14	2.88	3.98	5.16
Salaries and related costs	MDL mil.	0.98	0.98	1.01	1.06	0.83	0.86	1.46	2.15	2.92
Maintenance - old assets	MDL mil.	0.00	0.00	0.00	0.00	0.50	0.51	0.56	0.69	0.80
Maintenance - new assets	MDL mil.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel	MDL mil.	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Depreciation of fixed assets	MDL mil.	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
General and administrative expenditures	MDL mil.	0.76	0.76	0.77	0.80	0.45	0.46	0.57	0.84	1.14
Other costs	MDL mil.	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Total costs for wastewater	MDL mil.	2.32	2.32	2.46	2.54	2.46	2.51	3.96	5.99	8.57
TOTAL COSTS	**MDL mil.**	**6.08**	**6.15**	**7.02**	**7.84**	**9.65**	**9.81**	**12.91**	**19.63**	**27.38**

Source: GIZ/MLPS

The summary of the variable costs forecast are provided in Annex 6, Table 9. The fixed costs are presented in Annex 6, Table 10 and total (fixed and variable) in Table 11.

6.3.4 Revenue forecast (including the calculation of tariffs)

6.3.4.1 Forecast of the tariff

To estimate revenues for the water supply service in the future, the average tariff for the service is calculated. This is done by taking into account:

- Operating and maintenance cost of the system, including: direct costs of labour, electricity costs, chemicals, fuel, maintenance costs, financial and administrative costs;
- Application of polluter-pays principle and full cost recovery tariff (including depreciation) in the long run;
- Need to generate positive cumulative cash flow of the operator to maintain sustainable operations. This requires that the tariff calculation includes reserves for irregular receivables.

The Table 12 in the Annex 6 contains a calculation of the tariff with and without depreciation. The proposed tariff takes into account the full cost recovery principle and affordability. The full cost recovery principle means that the operational costs and capital costs should be covered by the tariff. If the tariff with depreciation exceeds the assumed affordability limit, a lower tariff needs to be proposed, albeit one that fully covers operating costs.

Based on the foregoing the future tariff is proposed as illustrated in the following table.

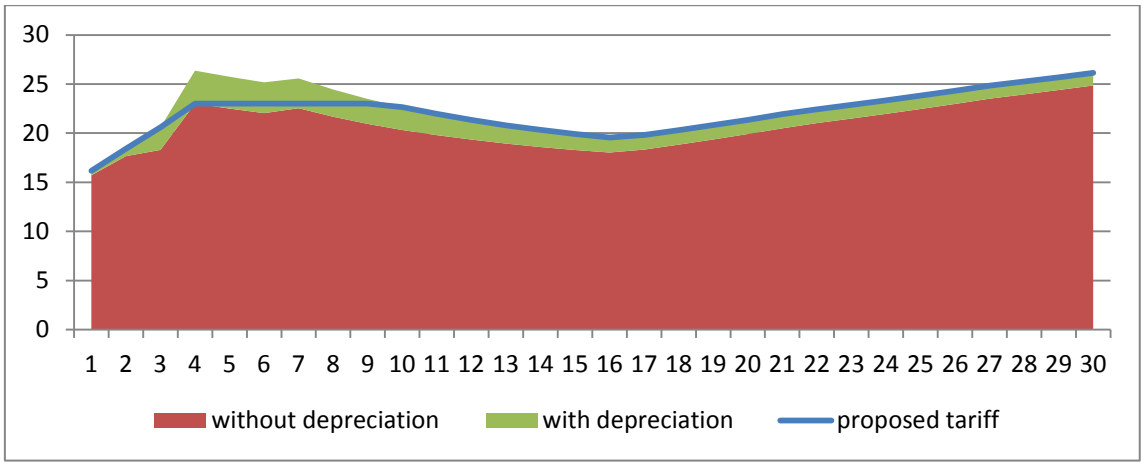
Table 6-25: Tariff calculation for the option 'with project' (MDL mil.)

Water supply service	**Unit**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2024**	**2034**	**2044**
Variable and fixed costs	MDL M	3.65	3.71	4.36	4.69	6.25	6.36	8.00	12.69	17.86
Depreciation	MDL M	0.11	0.11	0.20	0.61	0.95	0.95	0.95	0.95	0.95
Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserve for irregular receivables	MDL M	0.00	0.19	0.20	0.21	0.25	0.22	0.22	0.34	0.47
Sale of water	ths m^3	238.7	248.5	258.3	268.0	282.4	292.2	404.7	654.2	737.5
Tariff without depreciation	MDL/ m^3	15.30	15.71	17.66	18.29	23.01	22.50	20.32	19.91	24.85
Tariff with depreciation	MDL/ m^3	15.78	16.17	18.43	20.58	26.36	25.74	22.66	21.36	26.14
Proposed average tariff	MDL/ m^3	14.22	16.17	18.43	20.58	23.00	23.00	22.66	21.36	26.14
Waste-water service	**Unit**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2024**	**2034**	**2044**
Variable and fixed costs	MDL M	2.13	2.13	2.27	2.35	2.27	2.32	3.77	5.80	8.38
Depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserve for irregular receivables	MDL M	0.00	0.12	0.11	0.10	0.09	0.08	0.10	0.15	0.21
Sale of wastewater	ths m^3	160.6	162.5	164.4	166.3	168.2	170.1	492.6	675.6	796.0
Tariff without depreciation	MDL/ m^3	13.26	13.81	14.48	14.73	14.00	14.07	7.86	8.81	10.80
Tariff with depreciation	MDL/ m^3	14.45	14.99	15.64	15.88	15.13	15.20	8.25	9.09	11.04
Proposed average tariff	MDL/ m^3	15.64	14.99	15.00	15.00	15.00	15.00	8.25	9.09	11.04

Source: GIZ/MLPS

The following Figure 6-4 illustrates the evolution of the proposed tariffs. During the construction period when the capital costs will increase significantly and water sales are limited approximately to the same level, it is proposed that tariff does not contain depreciation costs. This would stimulate the water consumption and will keep the tariffs below affordability constraints. After the project is completed, the water consumption will increase because of new consumers connecting to the system; when possible, the tariff should include depreciation. The estimation shows that full cost recovery tariff can be applied starting with year 9 of the forecast for water supply service and in year 6 for sanitation system.

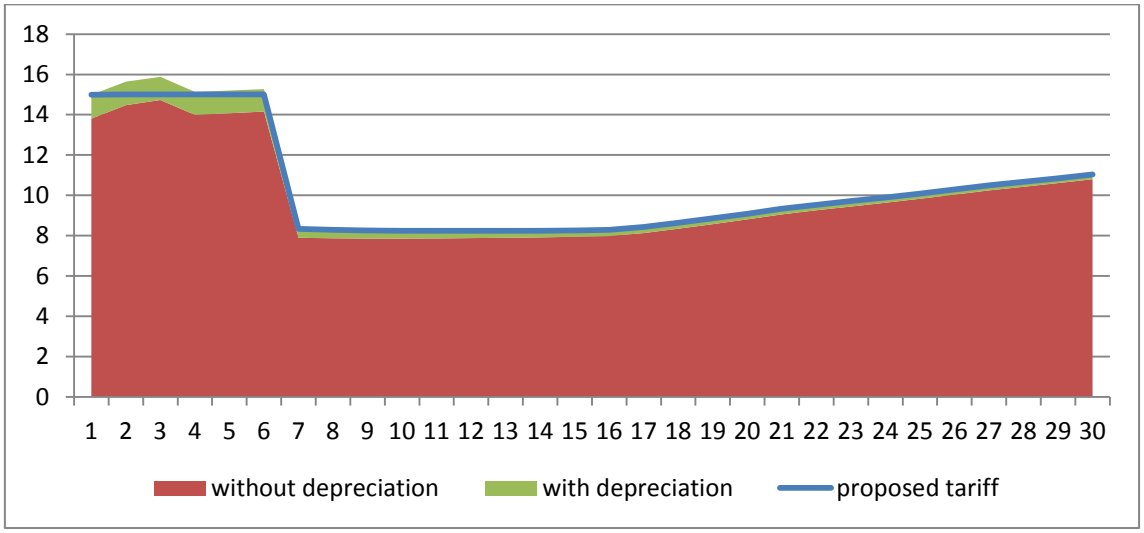
Figure 6-4: Forecast of the tariff for water (MDL/m^3)



Source: GIZ/MLPS

The tariff of water is forecasted to be about MDL 22.00 per m^3 for the whole projected period. The financial projections, however, do not take into account the effect of inflation. As a result, the real decrease or increase of tariffs will depend of the development of costs and their variation.

Figure 6-5: Forecast of the tariff for wastewater (MDL/m^3)



Source: GIZ/MLPS

The tariff for wastewater is forecasted to be about MDL 10.30 per m^3 for the whole projected period. Also, the financial projections do not consider the effect of inflation, but the real decrease or increase of tariff will depend on how costs develop and fluctuate.

6.3.4.2 Tariff affordability

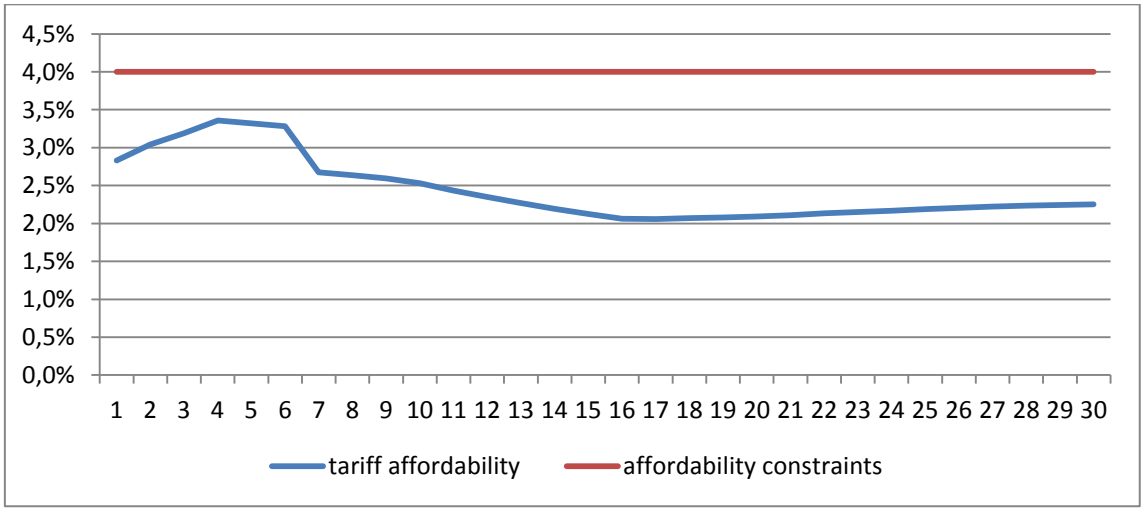
The affordability of tariffs, expressed as the ability of households to pay for services, is estimated as the household expenditures on water and wastewater services expressed as a percentage of disposable household income. For Eastern Europe countries, a common benchmark figure for the affordability threshold for water and wastewater services is 4%. As discussed, the tariff should cover at least operating and maintenance costs and should not exceed a level covering these costs together with capital costs (depreciation). In the event the calculated tariff is higher than the affordable tariff, a subsidy to the price from the LPA should be proposed. Tariff affordability, based on household bills for WSS services as a percentage of disposable household income, is presented in Table 13 in Annex 6.

During the entire period of the financial projections, the average tariff will constitute about 2.4% of average disposable household income, which means that it is within the limits of the affordability threshold of 4%.

For the first years of the project implementation, it is proposed that tariff does not contain the capital cost component (depreciation). Otherwise, the proposed tariff would be too high and the affordability constraint would lead to a further decrease of water consumption. The average bill in these years does not exceed 4% of average disposable household income.

The proposed bill for water as a percentage of disposable household income is presented by Figure 6-6.

Figure 6-6: Proposed tariff and tariff affordability (MDL/m^3)



Source: GIZ/MLPS

6.3.4.3 Revenue forecast

The calculation of revenues was based on the demand analysis taking into account water demand and the proposed tariff for water and wastewater services. The revenues forecast for each service is presented in the Table 6-26.

Table 6-26: Revenues forecast for the option 'with project' (MDL mil.)

Water supply service	Unit	2014	2015	2016	2017	2018	2019	2024	2034	2044
Sale of water	ths m^3	238.7	248.5	258.3	268.0	282.4	292.2	404.7	654.2	737.5
The weighted average tariff for water	MDL/ m^3	14.22	16.17	18.43	20.58	23.00	23.00	22.66	21.36	26.14
Revenues from water service	MDL M	3.39	4.02	4.76	5.52	6.50	6.72	9.17	13.97	19.28
Wastewater service	**Unit**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2024**	**2034**	**2044**
Sale of wastewater	ths m^3	160.6	162.5	164.4	166.3	168.2	170.1	492.6	675.6	796.0
The weighted average tariff for wastewater	MDL/ m^3	15.64	14.99	15.00	15.00	15.00	15.00	8.25	9.09	11.04
Revenues from sanitation service	MDL M	2.51	2.44	2.47	2.49	2.52	2.55	4.06	6.14	8.79
Total Revenues	**MDL M**	**5.91**	**6.45**	**7.23**	**8.01**	**9.02**	**9.27**	**13.23**	**20.12**	**28.06**

Source: GIZ/MLPS

The water demand will increase from 238.7 thousand m^3 per year to 737.5 thousand m^3 per year at the end of the period of analysis. This increase is determined by the growth of water consumption per capita from 55.0 l/c/d to 110 l/c/d in 2045 and the increase of consumers by 9,180.

The wastewater inflow is calculating proceeding from wastewater generation per capita and the number of consumers. It is assumed that the number of consumers will grow from the current number of 4,836 to 18,278 persons and the wastewater generation will increase from the current 62.7 l/c/d up to 110 l/c/d in 2045.

The tariff for water services will increase slowly from 14.20 MDL/m^3 to approximately 26.00 MDL/m^3 at the end of projection period.

The tariff for wastewater services will be about 15.00 MDL/m^3 in the period 2015-2020. After that, the tariff will increase gradually from 8.30 MDL/m^3 to 11.00 MDL/m^3 at the end of projection period.

6.3.5 Income statement and Balance sheet forecast

6.3.5.1 Income statement

The profit and loss (income) statement illustrates the financial performance of the operator in each year of the reference period. It should be noted, however, that financial statements are more relevant instruments to assess the financial situation of business entities/commercial companies. The negative values of net profit are acceptable and do not mean that the operator will face cash flow problems during the implementation phase. In the long-term, however, financial losses mean that the revenue from tariffs do not cover O&M and capital costs.

The financial results from the provision of water supply services will be positive with the exception of the period 2018-2022 in which the profit is expected to be negative. The

average annual profit is expected to be MDL 0.31 million. For the sanitation services the financial results will be positive for the entire projected period. The average annual profit for the sanitation service will be about MDL 0.12 million. The cumulated net profit for the projected period will be positive with a value of MDL 7.53 million.

The calculation of net profit for each service provided in the ‚with project' option is presented in the Table 6-27.

Table 6-27: Net profit forecast for the 'with project' scenario (MDL mil.)

Water supply service	Unit	2014	2015	2016	2017	2018	2019	2024	2034	2044
Sale of water	MDL M	3.39	4.02	4.76	5.52	6.50	6.72	9.17	13.97	19.28
Costs of water services	MDL M	3.77	3.83	4.55	5.30	7.19	7.30	8.95	13.63	18.81
Gross profit from water services	MDL M	-0.37	0.19	0.20	0.21	-0.70	-0.58	0.22	0.34	0.47
Wastewater service	**Unit**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2024**	**2034**	**2044**
Sale of wastewater	MDL M	2.51	2.44	2.47	2.49	2.52	2.55	4.06	6.14	8.79
Costs of wastewater services	MDL M	2.32	2.32	2.46	2.54	2.46	2.51	3.96	5.99	8.57
Gross profit from wastewater services	MDL M	0.19	0.12	0.01	-0.04	0.06	0.04	0.10	0.15	0.21
Total gross profit	MDL M	-0.18	0.31	0.21	0.17	-0.63	-0.54	0.32	0.49	0.68
Income tax	MDL M	0.00	0.04	0.03	0.02	0.00	0.00	0.04	0.06	0.08
Net profit	MDL M	-0.18	0.27	0.19	0.15	-0.63	-0.54	0.28	0.43	0.60
Cumulated net profit	MDL M		0.27	0.46	0.60	-0.03	-0.57	-1.35	2.28	7.53

Source: GIZ/MLPS

The forecast of income statement for 'with project' and BAU scenarios, is presented in Annex 6, Tables 14 and 15.

6.3.5.2 Balance sheet

The balance sheet illustrates the 'net worth' of the company. It reveals the company's assets, liabilities and owner's equity at certain point of time (e.g. end of the year). The balance sheet forecast is presented in Annex 6, Tables 18, 19 for with project and BAU scenario.

6.3.6 Cash flow and financial indicators forecast

6.3.6.1 Working capital

The working capital sheet illustrates the current assets and current liabilities of the company and is use to estimate balance sheet and cash flow. The following assumptions were made in the calculation of working capital (see Table 6-28):

Table 6-28: Assumption for calculation of working capital

Current assets or liabilities	Average payment period
Inventory	30 days
Short-term receivables	30 days
Accounts payable to suppliers	30 days
Accounts payable to employees	30 days

Source: GIZ/MLPS

The forecast of working capital is presented in the Annex 6, Table 16 and 17 for the 'with project' and BAU scenarios.

6.3.6.2 Cash flow and financial sustainability

A cash flow analysis was carried out for the project. The cash flow statement is a basic instrument used to assess the financial sustainability of the project of improving the operator's infrastructure. The purpose of carrying out a cash flow analysis is to verify whether the project operator faces of cash flow constraints. The projections were made for the entire reference period, i.e. 30 years. As cumulative cash flow is positive in each year of project analysis, the project is considered **financially sustainable**. The cash flow is presented in the Table 6-29:

Table 6-29: Cash flow forecast for the 'with project' scenario (MDL mil.)

Indicator	Unit	2014	2015	2016	2017	2018	2019	2024	2034	2044
Financial inflows	MDL M	0.00	10.87	30.19	26.37	9.11	9.29	13.29	20.19	28.14
Donor contribution (capital grant)	MDL M	0.00	3.96	19.78	15.82	0.00	0.00	0.00	0.00	0.00
Own contribution	MDL M	0.00	0.62	3.12	2.50	0.00	0.00	0.00	0.00	0.00
Revenues from sale	MDL M	0.00	6.45	7.23	8.01	9.02	9.27	13.23	20.12	28.06
Increase in current liabilities	MDL M	0.00	-0.16	0.07	0.04	0.09	0.02	0.06	0.08	0.08
Financial outflows	MDL M	0.00	8.03	29.61	25.46	8.74	8.70	11.88	18.62	26.40
Investment costs	MDL M	0.00	4.58	22.89	18.32	0.00	0.00	0.00	0.00	0.00
Costs of providing services	MDL M	0.00	5.84	6.63	7.04	8.52	8.67	11.77	18.49	26.24
Increase in current assets	MDL M	0.00	-2.43	0.07	0.08	0.23	0.03	0.07	0.07	0.07
Income tax	MDL M	0.00	0.04	0.03	0.02	0.00	0.00	0.04	0.06	0.08
Net cash flow (inflow - outflow)	MDL M	0.00	2.84	0.58	0.91	0.37	0.59	1.41	1.57	1.75
Cumulated cash	MDL M	0.21	3.05	3.63	4.54	4.91	5.50	10.41	25.46	42.14

Source: GIZ/MLPS

The detailed cash flow analysis is presented in Annex 6, Tables 20 and 21 for ‚with project' and BAU scenarios.

The amount of the financial surplus is not sufficient to repay a new loan to finance the investment costs of MDL 45.79 million. In the first years of the project, the net cash flow is insignificant, and is increasing in value in the latest years. During the 30-year period of analysis, the project is expected to generate MDL 42.14 million cumulative cash

flow, which can be used for capital investments to reduce water losses and expand services, as required.

It has to be emphasised that Table 20 in Annex 6 – as its major purpose is to present project sustainability – does not present incremental values but values for the 'with project' scenario.

6.3.7 Financial performance of the project - NPV and IRR calculation

The analysis of NPV was based on discounting the incremental cash flows (operating surpluses) generated by WSS operator. The nominal discount rate used for the financial analysis was 5% over the entire forecast period.

In estimating NPV, no re-investment rate was assumed and thus it was assumed that the generated funds (available funds at the end of each year) are not re-invested (e.g. paid into term deposit accounts or put into treasury bills). This assumption avoids distortions in the NPV due to differences in the price of capital because usually the present reinvestment rate differs from the price of capital (in the present case the discount rate).

A key element in determining the NPV of a project is the residual value of assets, defined at the end of the forecast period. The residual value was defined at a level equal to the net present value of the fixed assets at the end of the forecast period.

The NPV analysis was conducted using an incremental cash flow model. This means that the financial projections were constructed in such a manner so as to identify additional cash flows attributable to the project.

Table 22 in Annex 6 presents the incremental cash flows used to calculate the FNPV(C) of the project. FNPV(C) means that financial net present value of the investment is calculated. This indicator and FRR(C) - Financial Rate of Return of the Investment – illustrate the profitability of the investment project. Inflows include the increase in revenues associated with increasing the volume of water and wastewater services provided. On the expenditures side, investment outlays and changes in operating costs were taken into account.

It is important to point out that the project involves an increase in the amount of water delivered and volume of wastewater discharged. For this reason, the return on the investment should be viewed from the social rather than financial perspective.

The calculated NPV at a 5% discount rate for a 30-year operating period is negative. This attests to the fact that the project does not generate a return and is financially unprofitable.

This is a typical result for a project in which costs are incurred (capital and operating) but revenues do not significantly increase. Public sector investments often generate similar results.

Negative financial indicators (rate of return) for a project cannot serve as the sole basis for determining whether a project should be pursued. These results, however, serve as the basis for estimating the social benefits associated with the project.

FNPV (C)=	-35.37	MDL million
FRR (C)=	-1%	

Source: GIZ/MLPS

The financial analysis on profitability of the own capital contribution was also conducted. The analysis is similar to that presented above, but takes into account the capital contribution to the project only and does not count grant (donor) contribution to the project.

Table 23 in Annex 6 presents the incremental cash flows used to calculate the financial net present value of own capital of the project - FNPV(K). Financial Rate of Return of the own capital (FRR(K)) indicates the profitability of the own capital invested in the project and is equal to 5%.

The results are close to 0, what is according to the assumption that external co-financing should not lead to profitability of own funds used.

FNPV (K) =	0.0	MDL million
FRR (K) =	5%	

Source: GIZ/MLPS

6.3.8 Sensitivity analysis

A sensitivity analysis was conducted to analyse the forecast in the event of changes in the following variables:

- **Investments costs**. The sensitivity was conducted for investments costs varying from 100% to 125% of the calculated values;
- **Real wage increase**. The real wage increase indicator is used in the financial model to determine the costs of employment and also to determine the increase in disposable household income. The sensitivity analysis was done not by changing a single indicator on annual real wage increase, but rather switching the entire forecast for the entire time horizon of the project. Thus, three forecasts of real wage increase were prepared (as described in the section on macroeconomic assumptions):
  - Base case;
  - Half base case;
  - Pessimistic.
- **Real GDP growth**. Similarly to real wage increase, three forecasts of real GDP growth were prepared. The real GDP growth is used in the financial model to forecast increase in water demand from industry and institutions. The proposed forecasts are: base case, optimistic, pessimistic;
- **Costs of electricity**. The financial analysis assumed an increase in the costs of electricity. As electricity costs are a large component of total costs, the sensitivity analysis also covers these costs. Similarly to real GDP growth, three forecasts of real increase of electricity prices were prepared.

For each variable, the sensitivity analysis provides results for:

- FNPV(C);
- FRR(C);
- FNPV(K);
- FRR(K);

- Financial sustainability (TRUE/FALSE – indicating whether the cumulated cash flow is positive during the entire time horizon of the analysis).

The results of sensitivity analysis are presented in Annex 6, Table 25.

The analysis shows that project is sensitive an increase in investment costs. The influence of investment costs, however, is limited due to the fact that majority of investments costs are assumed to be co-financed by donors.

Nevertheless, in none of the cases did the project lose financial sustainability (cumulated cash flow less than zero).

6.3.9 Cost-benefit analysis / economic analysis

Preparing an economic analysis (Cost-Benefit Analysis, or CBA) is important for infrastructure projects; especially those co-financed using international donor aid.

The objective of a CBA is to analyse a measure's impact on society's well-being in the region (or country) in which the project is implemented. This approach is what makes a CBA different from a financial analysis, which only takes into account the costs and benefits that accrue to the investor as a result of the measure. A CBA should include the total costs and benefits from the perspective of the public that benefits from the project. The fundamental rule in selecting projects holds that benefits from the measure should exceed its costs. In essence, for a CBA this means that the measure should generate a positive economic net present value (ENPV).

In describing the economic effectiveness of the project, the CBA includes the following indicators:

- ENPV;
- ERR.

The starting point for calculation of these indicators is the financial cash flows from the financial analysis.

Many methods exist to estimate the social costs and benefits for CBA purposes. The general rule holds that outlays on the project should be described in terms of their opportunity cost, while the benefits (effects) of the measure should be measured by the society's willingness to pay to obtain a given effect. Often the benefits transfer technique is used, which involves extrapolating results from studies from sectors and projects similar to the analysed project.

6.3.9.1 Analysis of socio-economic costs

Price distortions on means of production

Shadow prices arise when distortions occur in a given market, which lead to the costs of a factor of production to differ from the cost that society incurs. Market distortions may be caused by the existence of a monopoly, quotas and price regulation.

Due to the competitive market for factors of production, no price distortions on factors of production were considered. Only electricity prices – which are regulated – differ from market values and appropriate corrections have been made.

Wage distortions

The scale of the project is low and given the unemployment rate in Moldova, it is not expected to distort wages.

Tax aspects

The project does not involve negative tax aspects.

External costs

Investments in water and wastewater networks involve external costs generated due to the temporary exclusion of land and streets from use; yet, these costs are taken into account in investment outlays (possible damages/compensation, repairs of the road). Moreover, the project has a positive impact on the natural environment and no other external costs are expected.

A CBA should take into account social costs that are not compensated and that have a significant impact for the wider public apart from those that refer directly to the project.

The decline in the value of land in the vicinity of the wastewater treatment plant, water storage tank, water towers and pumping stations – these types of objects do not motivate buyers, which means that land in the vicinity will have a lower value – could be an external cost. Yet, the facilities' location was selected outside built-up areas, close to the existing water production facilities and will not be significant or will have minimal impact.

Non-financial costs

It is not expected that the project will involve non-financial costs.

Social costs resulting from additional employment

Additional employment is not required for the project operation. It is required for the project implementation but will not distort the labour market and thus social costs do not arise due to the investment.

6.3.9.2 Analysis of socio-economic benefits

Price distortions on the means of production

The effect of engaging unemployed persons during construction was taken into account. This aspect is described in the section on social benefits from additional employment.

Tax aspects

Transfers include all taxes, fees, financial costs and subsidies. These should be excluded from a CBA because they do not constitute a cost to society but rather a transfer of income (a tool for the redistribution of income). They do not contribute to an increase or decline in social welfare.

Value Added Tax

The VAT contained in investment outlays is a transfer and the cash flows used to calculate ENPV have been corrected by the amount of this tax.

External benefits

The concept of external effect is associated with the imperfections of the functioning of the market. An external effect occurs when the actions of one economic actor cause a change in the welfare of another economic actor and this change is not compensated. In other words the external effect occurs if the utility function or production function of entity 'A' contain real (that is. monetary) variables, the value of which were determined

by other entities (person, company, government) without their taking into account the impact on the level of welfare of actor 'A'.

In the present project, a number of external benefits arise due to implementation. Among the main external effects the following should be mentioned:

- Health effects due to reduction of pollution in the water;
- Social effects due to uninterrupted water supply;
- Economic development effects.

Health benefits

The approach to estimating benefits from water quality improvement programmes involves determining the positive health effects that will result from the programme and assigning a monetary value to them. This approach, however, requires precise study of the relationships between pollution in the source and a response (e.g., improvement of health. reduction in morbidity). This relationship is described in a dose-response function. While these studies have been conducted in EU countries for various pollutants, their application in water quality improvement programmes have many limitations.

The economic valuation of the benefits from implementing a water quality improvement programme is difficult due to the low number of studies conducted on this issue as well as the need to determine precisely the physical effects of these programmes (knowledge of the dose-response relationship is essential).

Evaluating the benefits based on data from studies conducted in other countries does not yield authoritative results due to the differences in the conditions that prevail in project impact area. Further limitations in evaluating programme benefits are due to the inability of estimating some benefits in monetary terms. The literature indicates that these results should be viewed in the context of many assumptions, limitations and uncertainties in evaluating benefits. Limitations include, inter alia, lack of available data on illnesses caused by water pollution; underestimation of economic costs of water pollution, etc., P. Faircloth[40] describes four types of benefits of implementing water quality improvement programmes:

- Health benefits;
- Amenity benefits;
- Non-use benefits;
- Benefits for water users – agriculture, households.

Another problem is that, although, it is obvious that the amount of pollution in water will be reduced quantitative data on nitrates and other pollutions differs from commune to commune and are not available. The situation in communes where there is no water supply is even more difficult to estimate. However, there are studies that estimate, especially health benefits. ECOTEC report[41] provides estimation of benefits of avoided water-related diseases. Per capita value for Romania (good proxy for Moldova) is EUR 27 per capita and this value was used for the estimation.

[40] Peter Faircloth (Cranford Economics) and others "Approximation of Environmental legislation A Study of the Benefits of Compliance with the EU Environmental Acquis"

[41] The benefits of compliance with the environmental Aquis for the candidate countries

New business enterprises

The demand analysis uses the annual increase in businesses proportional to the GDP increase. Currently, the water supply system is not able to provide water for new businesses. This situation is due to high level of leakages in the water distribution network in Falesti, and lack of the network in other localities. The situation reduces the possibilities of business development or the business will have to find other sources of water - this may cause very high social costs if the project is not implemented (or high social benefits for the project implementation). Having in mind, limitations in valuation of the social benefits from establishing new businesses, shadow prices for delivery of water to new business were used. The shadow price was estimated at 30 MDL/m3, as equal to the production price and distribution costs (including distribution by cisterns). The shadow price was applied to the water demand from business.

Non-financial benefits

Apart from those described elsewhere in this chapter no non-financial benefits in this project were identified.

Social benefits resulting from additional employment

In a CBA, additional employment is a cost because the project is using labour resources that become unavailable for alternative social purposes.

Two separate methods exist of estimating the social benefits of additional employment:

- Using accounting wages below the current wages in the project;
- Estimating the income multiplier of investment revenues on the social income resulting from the project that will be higher than the income for private investors.

Both methods have disadvantages and limitations. In this CBA results are corrected so that the cost of employing persons from the ranks of unemployed is equal to zero.

The following social effects from additional employment were taken into account in the analysis:

- Increase in the number of jobs during investment implementation (temporary effect);
- New jobs resulting from the economic development made possible due to investment implementation.

The first effect was estimated and described in detail below, while the second effect is not quantified.

Increase in jobs during investment implementation

Project implementation results in additional employment. This will be a temporary effect from the infrastructure investments, in which a significant portion of the investment outlays is associated with labour. Full automation is not possible during construction of the water and sewer networks, especially in excavation works, and thus the required labour includes a significant portion of low qualified workers from the ranks of the unemployed. Due to the lack of detailed data on outlays, typical cost estimates of similar project scopes were analysed in order to determine the share of wages for low qualified labour in total outlays. Based on this analysis, a share of 30% of such labour in outlays was assumed and in the CBA this result was adjusted so that the cost of employing these persons was equal to zero.

Reducing developmental disparities among regions

The project's impact on reducing developmental disparities among regions results foremost from the expansion of access to technical infrastructure. Tasks completed under the project have a positive impact on increasing investment also in the entire region.

Two aspects are of key importance for reducing the level of development between regions:

- Expansion of infrastructure is the basic element of development in the region and is viewed by residents as a requirement. A lack of infrastructure leads to a degradation in the region and an outflow of persons toward areas that are better developed;
- The second element in reducing developmental disparities between regions is linked to the strict relationship between the expansion of communal infrastructure – including water– and economic development. The project provides not only for constructing water pipes but also gives the possibility for business development in commercial and service (agriculture) areas. The lack of a water capacity is a large barrier to development of these areas because transporting water by cisterns is much more expensive. This discourages potential investors from developing activities in the area that is lacking basic infrastructure.

6.3.9.3 Economic rate of return (ERR) and economic net present value (ENPV)

Table 24 in Annex 6 contains a calculation of the economic rate of return (ERR) and the economic net present value (ENPV).

This table includes the results of the financial analysis that were corrected for transfers, external effects and price distortions on factors of production.

The net cash flow balance was corrected for the social costs and benefits described earlier:

- Fiscal corrections:
  - VAT.
- Price distortions:
  - Engaging unemployed persons during construction;
  - Price distortions for electricity prices.
- External effects:
  - Shadow prices related to business development;
  - Benefits of avoided water-related diseases.

The calculation does not take into account the grant because it is a transfer.

After making the above corrections, the surplus after corrections was calculated; this in turn was the basis for calculating the economic rate of return (ERR) and the economic net present value (ENPV).The calculated ERR is 8% while the ENPV is MDL 12.34 million at a discount rate of 5%. The CBA lists many factors that were not expressed in monetary terms. If it were possible to estimate them, the value of ERR would be considerably higher. The positive result of the economic analysis (ENPV greater than zero) indicates that from a public perspective, the project should be implemented.

7 Institutional development

7.1 Potential for WSS services area extension

With respect to the regionalisation of water supply and wastewater services in administrative-territorial units included in this feasibility study, by operating jointly the services and developing the projects related to these services infrastructure, the parties have expressed a consensus of opinion.

The existing operator in the town of Falesti, Falesti Municipal Services Utility has stated that extension of water supply and wastewater services area to other administrative units is one of the company's strategic development activities.

Representatives of local public administrations of the town of Falesti, communes of Falestii Noi and Calugar have agreed to appoint Falesti Municipal Services Utility as regional operator, to whom they intend to delegate the management of water supply and wastewater services.

Opinions of the local authorities/operator on the regionalisation of Water Supply and Sanitation (WWS) services in the Falesti Rayon were received following discussions at meetings of the project working groups and from questionnaires completed by each administrative-territorial unit.

7.2 Competence of local public administration and inter-municipal cooperation

The Constitution of the Republic of Moldova (RM) states in Article 109 that the public administration in administrative-territorial units is based on the principles of local autonomy, decentralization of public services, eligibility of authorities of local public administration and consultations with citizens on local problems of major interest. Thus, Moldova returned to the principle of autonomy through decentralization and transfer of major responsibilities to local authorities.

The deliberative authorities of administrative-territorial units have the exclusive competence on the set-up, organization, coordination, monitoring and control of water supply and wastewater services. They have also the competence of management and operation of the public goods which make up the administrative-territorial units' public infrastructure associated with those services.

According to the Law no. 303 on water supply and sanitation public service dated December 13, 2013, the local councils have the competence to:

- Draw up and implement own business operations and development plan on water supply and wastewater public services for short/mid/long term;
- Approve tariffs of water supply and wastewater public services;
- Manage water supply and sewerage public systems as the integrated components of the administrative-territorial units' infrastructure;
- Approve the regulations and specifications of the service;
- Select the method of management and approve the documentation on organization and conducting of procedures regarding management delegation;
- Approve the performance indicators of the services.

The management of services concerns the organization, operation and control of water supply and wastewater services under the conditions laid down by local public administrations.

Management of water supply and wastewater services can be organised in two ways, the choice being left to the discretion of local public administrations:

- Direct management through specialized structures (divisions, departments) organised within the local public administrations;
- Delegated management, defined as a type of management through which the local authorities assign one or more operators to manage directly this service, namely the management and operation of water supply and wastewater systems, under a contract of management delegation. Delegated management is performed via a management delegation contract between one or more administrative-territorial units, as granting authority, and an operator as a delegate. The basis for awarding such a contract of management delegation is the public tendering in compliance with the applicable procedures.

The form of management is determined by the decisions of the deliberative authorities of the administrative-territorial units, depending on the nature and status of the service, the need to ensure the best price / quality ratio, present and future interests of administrative-territorial units, and size and complexity of public utility systems.

The legal basis for local public authority cooperation on water supply and wastewater services development is mentioned in law no. 303[42], local public administration level 1 (LPA 1):

- Decide on administrative-territorial units association for the purpose of setting up, organizing and encouraging investments in the relevant systems of water supply and wastewater services;
- Use own financial resources/or goods to increase the operator's assets to provide water supply and wastewater services.

The development of water supply and wastewater services requires a level of investment in infrastructure that far exceeds the financial capacities of most local authorities. In addition, localities lack staff specialized in service provision as well as experience in the preparation and implementation of projects.

Thus, the recommended solution to address the lack of sufficient financial and human resources capacity is to organise and operate the services at the regional level, in order to ensure sustainable development and efficiency of activities through achieving economies of scale.

7.3 Institutional model for regionalisation

From the institutional point of view, regionalisation is achieved by reorganization of existing public services owned by local authorities. For the current project, regionalisation is achieved through two institutional elements:

[42]Art. 8 of Law no. 303 on water supply and wastewater public service dated December 12, 2013

- Regional operator, a public equity company founded by one or more administrative-territorial units, to which water supply and wastewater services are delegated through delegated management contract;
- Contract on delegated management services. The administrative-territorial units through local authorities delegate the management of water supply and wastewater services to the regional operator through a single delegated management contract.

The relationship between these institutions will be regulated by constitutive act of the regional operator and by delegated management contract.

7.3.1 Regional operator

A regional operator can be considered the operator organised as a business enterprise with public equity owned by one or more administrative-territorial units. It provides water supply and wastewater public services within the area of several administrative-territorial units, ensuring management and operation of the systems related to these public services.

The main activities of the regional operator will be abstraction/intake, treatment and distribution of drinking water; wastewater collection and treatment; performing other activities as well in accordance with the legislation in force, necessary to achieve the goal of activity established by constituent act.

The regional operator is responsible for the provision of water supply and wastewater public services within the area of administrative-territorial units that have delegated the management of the service. The operator also bears responsibility for the management, operation, maintenance, renewal and extension, where appropriate, of all fixed assets (systems) subject to the contract.

All administrative-territorial units take charge of the activities carried out by regional operator activities under the provisions specified in the constitutive act.

The regional operator can be set up on the basis of the existing operator following one of two ways:

- Reorganisation of the Falesti Municipal Services Utility.
  Reorganization through transformation of the legal person, applicable in this case, means the continuity of legal person's activity, having the same rights of property and corresponding liabilities, ensuring uninterrupted operation of the assets and continuous production of benefits.
  The process of transformation does not imply the transfer of rights and obligations from one legal person to the other because it does not disappear, but continues its existence in a different legal form;
- Setting up of a new business enterprise with wholly public equity, whose founders are administrative-territorial units only in the area where regional operator will provide the service.
  In this case the Falesti Municipal Services Utility will not stop the work and will provide other municipal public services.

Another important point is to identify the organizational-legal form of a new regional operator, in accordance with legislation in force and specificity of the public service.

Given the subject of activity, namely the provision of the water supply and wastewater services and legal provisions in force as well, the following are the organisational-legal forms that can be taken in the future: the municipal enterprise with more founders, limited liability company, and joint stock company.

Table 7-1: Comparative analysis of the organizational-legal forms

	Municipal enterprise (inter-municipal)	Limited liability company	Joint-stock company
Regulatory framework	• Government Decision no. 387 of 06.06.1994 regarding the approval of regulations' model of Municipal Enterprise; • Civil Code (Law no. 1107-XV of June 6, 2002); • Law on entrepreneurship and enterprises no. 845-XII from 01.03.1992; • Law on State Registration of Legal Entities and Individual Entrepreneurs No. 220-XVI from 10.19.2007.	• Law on Limited Liability Companies no. 135-XVI of 06.14.2007; • Civil Code (Law no. 1107-XV of June 6, 2002); • Law on entrepreneurship and enterprises no. 845-XII from 01.03.1992; • Law on State Registration of Legal Entities and Individual Entrepreneurs No. 220-XVI from 10.19.2007.	• Law on Joint Stock Companies no.1134-XIII of 04.02.1997; • Civil Code (Law no. 1107-XV of June 6, 2002); • Law on entrepreneurship and enterprises no. 845-XII from 01.03.1992; • Law on State Registration of Legal Entities and Individual Entrepreneurs No. 220-XVI from 10.19.2007.
Governing bodies	• The head (director); • Boards of directors (if needed).	• General meeting of shareholders; • The council of enterprise; • Enterprise's manager; • Auditor.	• General meeting of shareholders; • The council of enterprise; • Executive body; • Auditing committee.
Responsibilities of governing bodies	The director manages the daily operations of enterprise; its responsibilities are set out in the employment contract concluded between the founder and head of the company.	• General meeting of shareholders is the supreme body of the enterprise (art. 48-61 of Law no. 135-XVI dated 06.14.2007)); if enterprise has only one shareholder, the rights and liabilities of general meeting are taken over by the latter (art. 62 of Law no. 135-XVI dated 06.14.2007); • Council of the enterprise (at least 3 people) is its executive body (art. 64-68 of Law no. 135-XVI dated 06.14.2007 and constituent act); • The company may have one or more managers (art. 69-76 of Law no. 135-XVI dated 06.14.2007); • Auditor is enterprise's supervisory body; the general meeting may appoint one or more	• Shareholders general meeting is the supreme leading body (art. 50-64 of Law no. 1134-XIII dated 04.02.1997); • Council of the enterprise performs general management and control over enterprise's activities (art. 65-68 of Law no. 1134-XIII dated 04.02.1997); • The executive body carries out the management of enterprise's current activities (art. 69-70 of Law no. 1134-XIII dated 04.02.1997); • Auditing Committee exercises control over financial and economic activity of enterprise (art. 71-72 of Law no. 1134-XIII dated 04.02.1997).

	Municipal enterprise (inter-municipal)	Limited liability company	Joint-stock company
		auditors; the enterprise may instead appoint an independent audit censor (art. 77-79 of Law no. 135-XVI dated 05.14.2007).	
Legal liability	• The enterprise is liable for the obligations assumed by entire property it owns under ownership right; • The administrative-territorial units are not responsible for the obligations of municipal enterprises; • Municipal enterprises are not responsible for the obligations of administrative-territorial units.	• The company is liable for its obligations with all its assets; • Shareholders are not liable for enterprise's obligations; they bear the risk of losses resulting from the enterprise's activity within their participation in the share capital.	• The enterprise is liable for its obligations by entire property it owns under ownership right; • The enterprise is not liable for obligations of its shareholders; • Shareholders are not liable for enterprise's obligations and bear the risk of losses within the value of shares belonging to them.
Setting up conditions	• Setting up decision and enterprise charter is adopted by founder (local council); • Incorporation from the moment of registration by State Registration Chamber.	• Enterprise can be set up by one or more natural and/or juridical persons; • Number of associates shall not be more than 50; • Founding agreement is signed by all founders and notarized; charter is approved by single founder; • It is registered by State Registration Chamber.	• Enterprise can be set up by one or more persons; • Both natural and juridical persons can be founders of enterprise; • Shareholders can be natural and juridical persons from Republic of Moldova, other countries, stateless citizens, foreign countries and international organizations; • Contract conclusion (decision taken on enterprise setting up); founders subscription to shares and constituent assembly holding; enterprise contract (statement on enterprise setting up) loses its force since enterprise is registered; charter approval by founding members; • Incorporation from the moment of registration by State Registration Chamber.
Constituent acts	Local council decision on enterprise setting up and its charter	Founding agreement or enterprise charter (art.12 of Law no.135-XVI of 06.14.2007)	Founding agreement (or founding statement) and enterprise charter (art.32 of Law no.1134-XIII of 04.02.1997)
Initial equity	Not regulated	Equity capital shall not be less than 5,400 MDL (art. 21 para 2 of Law no. 135-XVI of 06.14.2007)	Equity capital shall not be less than 20,000 MDL (art. 40 of Law no. 1134-XIII of 04.02.1997)
New members ac-	No members	Allowed in accordance with charter provisions	Allowed in accordance with charter provisions

	Municipal enterprise (inter-municipal)	Limited liability company	Joint-stock company
ceptance			
Strengths	• The best known organizational-legal form for public services provision; • A separate legal entity having own property and budget; • The loans taken are guaranteed by the Local Public Administration; • Subsidies from Local Public Administrations.	• The most applicable organizational-legal form for delegated public services in the rural area; • More mobility and capacity to respond to the economic and financial changes; • Possibility to access loans for investments; • Independence from Local Public Administrations; • More simple procedure on setting up and registration.	• Possibility to attract investments for development; • More mobility and capacity to respond to the economic and financial changes; • More profitable services when provided on larger area (regional or rayon level) • Higher transparency of activity and management of public goods.
Weaknesses	• Outdated legal regulations in this sector; • Limited possibility for investments; • Dependence on founding Local Public Administrations; • High probability on budgeting dependence and political influence on tariffs level.	• It is subject to all risks of market economy; • I is seen through concern for personal benefits to the detriment of the public interest.	• It is subject to all risks of market economy; • More complex registration procedures; • More complex structure and operating mode; • Not practical for rural areas.

Source: GIZ/MLPS

Taking into account all mentioned above and considering the regionalisation policy for water supply and wastewater sector by creating stronger operators, it is proposed that the optimal legal form for conversion of the existing operator is joint-stock company.

Setting up of the regional operator will be made in compliance with Civil Code, Law on entrepreneurship and enterprises no. 845-XII of 01.03.1992, Law on Joint Stock Companies no. 1134-XIII of 04.02.1997, Law on State Registration of Legal Entities and Individual Entrepreneurs no. 220-XVI of 10.19.2007.

7.3.2 Delegated management contract

Under a delegated management contract, an LPA as delegator assigns to a licensed operator as a delegatee, acting on own risk and responsibility, the rights and obligations to provide full water supply and wastewater services for a specified period of time. Alternatively, only some specific activities may be delegated to the operator, including the rights and obligations to manage and operate the technical infrastructure associated with services provided, in return for a management fee.

The delegated management contract establishes specific rights and obligations of each party on the provision of water supply and wastewater services, development of in-

vestment programs, and achievement of the certain performance levels. The provisions of the delegated management contract are stipulated in Law no. 303[43].

In this way, the regional operator bears responsibility for the management, operation, maintenance, renovation and expansion of fixed assets, pursuant to the contract.

In the regionalisation process, a delegated management contract for water supply and wastewater services is an agreement between regional operator (delegatee), on the one hand, and the local authority (delegator) on the other.

One approach would be to draw up a single contract for the entire project area (town of Falesti, communes of Falestii Noi and Calugar), signed by each administrative-territorial unit separately, corresponding to the jurisdiction of all administrative-territorial units that delegate water supply and wastewater services to the operator.

The following addendums are mandatory to be attached to the delegated management contract:

- Technical specifications regarding provision of service;
- Regulations on provision of service;
- Inventory of movable and immovable assets, which are associated with the service provided, including public or private property;
- Protocols on the take-over assets listed in 3rd subparagraph.

Regardless of the stipulations in the contract, the ownership of public assets and the responsibility for providing water supply and wastewater services at affordable prices remains with the local public administrations. Since the assets remain under public ownership, they need to be reclaimed by their owner (administrative-territorial units) upon termination of the contract.

The delegated management contract is typically concluded for a long period of time. The tariff policy aims at full cost recovery and is applied by the regional operator in accordance with the applicable regulations issued by ANRE, under the control and with the approval of the administrative-territorial unit. The financing and commercial risk is assumed by reorganised operator.

Delegating management is made by direct award, as stipulated in Law no. 303[44].

7.4 Steps to implement institutional framework

7.4.1 Selecting the management model of water supply and wastewater public services

At this stage, local public administrations (town of Falesti, communes of Falestii Noi and Calugar) should decide on the management model for water supply and wastewater services, specifically direct management or delegated management.

Under Law no. 303[45], this phase begins with the preparation by local authorities of a study to substantiate and identify optimal solutions for water supply and wastewater services delegation.

[43] Art. 13, par. 8 of Law no. 303

[44] Art.13, par. 12 of Law no. 303

[45] Art. 13, par. 14 of Law no. 303

After that, the Local Councils from each administrative-territorial unit have to approve this study as part of the regionalisation process.

Based on the study findings and proposed solutions, local councils then adopt decisions on the management model. A decision on delegation of service management to a single / regional operator provides the grounds for taking the next step.

7.4.2 Regional operator

The starting point is the local council decisions approving studies, which substantiate this regionalisation and identification of the optimal institutional model regarding regionalisation in Falesti Rayon.

Establishment of a working group to identify the fastest and most viable solution for the setting up regional operator. This activity has the character of a recommendation, but creates prerequisites for a detailed analysis of the future operator.

Adoption of the decision on reorganization through transformation of the Falesti Municipal Services Utility or decision on new business enterprise setting up.

Establishing new operator will be subject to the provisions of the Civil Code, Law on entrepreneurship and enterprises no. 845-XII from 01.03.1992, the Law on joint stock companies no. 1134-XIII of 04.02.1997, the Law on state registration of legal entities and individual entrepreneurs no. 220-XVI from 10.19.2007, and it is recommended to be organised as a joint stock company.

This stage ends with acquiring legal personality of the new operator by registering at the State Registration Chamber.

7.4.3 Delegation of water supply and wastewater services

The activities necessary for water supply and wastewater public services delegation to regional operator are under competence of deliberative authorities from administrative-territorial units in the project area. Thus, local councils in the town of Falesti and communes of Falestii Noi and Calugar are responsible for:

- Drawing up and approving the delegated management contract and awarding this contract directly to the regional operator;
- Defining and elaborating performance indicators for water supply and wastewater services provided to consumers;
- Elaborating and approving the regulations and specifications of water supply and wastewater services;
- Ensuring the signature of the contract by executive authorities, for and on behalf of administrative-territorial units.

In this process it is recommended that negotiations should be carried out at the same time with all interested parts involved and a single delegated management contract have to be signed by all administrative-territorial units, including clauses and annexes specific to each administrative-territorial unit.

7.5 Timeframe for regionalisation process of water supply and wastewater services

The regionalisation of the water supply and wastewater services needs time because the legislation is quite rigid regarding deadlines that must be followed and the required activities are complex and time-consuming.

In addition, local authorities in Moldova point to the lack of legal and regulatory framework that would guide the entire regionalisation process.

Given the steps needed to introduce regionalisation of services, as well as time limits imposed by legislation, an outline time schedule with approximate limits is as follows:

Table 7-2: Outline of time schedule with approximate limits

No.	Method chosen for setting up the regional operator	Steps	Time
a)	Reorganization of Falesti Municipal Services Utility	Reorganization of the Falesti Municipal Services Utility into Joint Stock Company with Falesti Town Council as a sole shareholder. Increase of the authorized capital stock through acceptance of the new shareholders, in person of administrative-territorial units Falestii Noi and Calugar. Delegation of the management of the water supply and wastewater services to the new set up operator.	5-7 months 5-7 months 3 months
b)	Setting up of a new business enterprise	Setting up of the Joint Stock Company, whose founders (shareholders) are Falesti Town Council; Falestii Noi Local Council; Calugar Local Council. Delegation of the management of the water supply and wastewater services to the new set up operator.	6-9 months 3 months

Source: GIZ/MLPS

Given the fact that at the present time there is water supply and wastewater services operator in the town of Falesti, the reorganisation of the Falesti Municipal Services Utility into Joint Stock Company (regional operator) is recommended as an optimal solution.

Following the deadlines foreseen by legislation in force and taking into account the practical aspects of regionalisation of water supply and wastewater services, it can be stated that the whole process will coincide with Phase 1 of the feasibility study implementation (the Project). Once Phase 2 starts, the full regionalisation of water supply and wastewater services within the localities of the Falesti Rayon will be completed.

7.6 Corporate and human resources development of the operator

The existing institutional setup of the Falesti Municipal Services Utility will require considerable changes, in order to meet the increasing demands of the expanding service area.

In general, Falesti Municipal Services Utility is currently overstaffed, as the staff efficiency indicator is 10.65 W&WW staff per 1,000 W&WW connections, while an average value for Moldova is 5.51.

At this point, it is rather difficult to propose an efficient institutional model, as the beneficiary localities have to decide first on the legal form of the company (e.g. joint-stock company, municipal company etc.) and ways of service management (e.g. delegated to the Company, certain activities outsourced to third-parties etc.). This may have an impact over the number of staff and internal procedures.

The following factors are expected to improve the institutional and operational capacity of the company:

- Increased level of automation. Introduction of automated systems for the existing water production, pumping and distribution facilities, as well as wastewater pumping will have a positive impact on the reduction of the number of technicians and operating staff. Introduction of a SCADA system will improve data management and will require less administrative effort;
- Introduction of Management Information System. This is expected to reduce the burden over the accounting, economic, human resources and customer service departments and may contribute to the optimisation of administration;
- Implementation of a dispatch centre. Regular monitoring and control of all service localities will help determine if customer service targets are being met. A mobile emergency team may replace local operating staff;
- Outsourcing of activities. Outsourcing may be suggested for billing system or specialised services (e.g. heavy equipment works).

Most of the mentioned activities shall be further developed under the corporate development programme proposed as part of the technical assistance in the first phase of implementation of the priority investment programme (i.e., the Project). This corporate development programme should also provide a general direction for institutional development, in close relation to the phasing of infrastructure investments.

For the Project (first phase of investments until 2018), no extension of water services over the rural localities is planned, while most of investments will be spent on rehabilitation and extension of the existing water supply network in the town of Falesti. However, an slight increase of 1% in total number of water consumers is foreseen by 2018 on account of the urban population from the town of Falesti who are going to be connected to the local water supply network. No extension of wastewater services within the town of Falesti is foreseen for this period of time.

This means that the proposed investments for Phase 1 do not require increase of the Operator staffing. Therefore, the company needs to improve its staff efficiency to be able to operate WSS in a sustainable manner.

It is noteworthy that currently the Operator provides different municipal services, including water supply, wastewater collection and treatment, heating, town cleaning and development etc. All these services have common accounting system and no separate budgets. This situation does not allow an efficient monitoring and control of costs per different types of activities and therefore a separation of costs and accounting for water and wastewater services from other types of activities is recommended to be implemented by the Operator in first place.

Also, reduction of administrative and support staff is advised. Currently, only 52 out of 129 staff members are dedicated to water and wastewater operations, while 59 persons deal with the other services and 18 persons provide support and admin services to all activities of the Operator.

A proportional split of support teams per different types of activities gives an estimative figure of 13 persons dedicated to water and wastewater services.

It is projected that the utility will tend to reach an average staff efficiency indicator for Moldovan utilities of 5.5 water and wastewater staff per 1000 total connections, with the first benchmark of 8.0 staff persons per 1,000 water and wastewater connections in 2018. Basing on the projected number of future water and wastewater consumers, this would result in total need of 49 staff persons in 2018. In absolute values this means a

decrease by 16 persons, as compared to the current situation. This could be done on account of the staff which approaches retirement age.

As for the second phase (2018-2021), an extension of both water and wastewater service areas is foreseen in urban and rural communities. This will require increase in water and wastewater staff. It is estimated that the Operator shall tend to keep the same staff optimization pace, as in the first phase (2015-2018), and will achieve the staff efficiency indicator of 5.5 W&WW staff per 1000 W&WW connections by 2021. It is expected that that number of water staff will be increased for the new rural members, having representatives in each rural locality. The reduced staff from the first phase can be hired for the new positions in the second phase. In order to avoid interruptions in the staff activities, a smooth HR strategy shall be foreseen, which will link improvement of operational efficiency and reallocation/optimisation of staffing.

In the meantime, continuous slow reduction of administration and support staff is foreseen. The staff projections are provided in the Table below:

Table 7-3: Staff projections

Indicator	Unit	Current Situation, as of 2015	Projected Situation for 2018	Projected Situation for 2021
Number of water staff	people	28	24	30
Number of wastewater staff	people	24	18	25
Number of administrative and other W&WW staff	people	13	7	7
Total Number of staff	people	65	49	62
Number of water connections	conn.	3,877	3,904	5,081
Number of wastewater connections	conn.	2,229	2,206	6,105
Water & related admin staff per 1000 W connections	pers./1,000 con	9.03	7.17	6.69
WW & related admin staff per 1000 WW connections	pers./1,000 conn.	13.46	9.52	4.59
Total staff per 1000 W&WW connections	pers./1,000 conn.	10.65	8.00	5.50

Source: GIZ/MLPS

In order to facilitate further institutional development of the Operator, the Phase 1 investments foresee a Technical Assistance for Corporate Development (see Chapter 5).

7.7 FOPIP

Because the process of regionalisation of water supply and wastewater services requires a relatively long period of time comprising several stages that have to be completed in order to implement the institutional framework, active support of the national / local authorities is absolutely necessary to complete this process successfully.

Also, given the need for sequencing in the process of establishment of the regional operator, based on the existing services operator Falesti Municipal Services Utility, it is the priority and extremely important to develop its capacity to take over some administrative units, whose operational and financial results are reduced or even non-performing.

Based on mentioned above, a Financial and Operational Performance Improvement Program (FOPIP) for the regional operator is necessary to elaborate for the benefit of all administrative-territorial units involved in the project.

The program of improving financial and operational performances should have the objective to provide assistance in/for:

- Compliance with legal provisions in the water and wastewater sector;
- The process of regionalisation;
- Regional operator to become sustainable and able to implement investment projects etc.

In this regard, the main activities will comprise support for institutional reorganization; improving staff performance and efficiency; support for improving operational and technical performance; and financial and business performance improvement, among others.

8 Environmental and social assessment

8.1 Executive summary and conclusions

It is proposed to rehabilitate and extend the water supply and wastewater system (WSS) in Falesti town and the localities of Falestii Noi and Calugar.

The feasibility study for Falesti town and Falestii Noi and Calugar localities has been developed for the WSS sector by the Project “Modernisation of Local Public Services” (MLPS Project, intervention area 2) and it refers the following components:

Water Supply System:

- Rehabilitation of the water distribution network in the town of Falesti – 21,515 m;
- Extension of the water distribution network in the town of Falesti - 8,115 m;
- Construction of water transmission main WTP - railway station Falesti – 2,600 m;
- Construction of water transmission main, railway station Falesti – district of Sugar Factory – 1,960 m;
- Construction of water transmission main to Falestii Noi locality – 2,585 m;
- Construction of the water distribution network in the Falestii Noi locality – of 11,645 m;
- Construction of water tower in the Falestii Noi locality – 2 units;
- Construction of water transmission main to Calugar locality – 4,850 m;
- Extension of the water distribution network in the Calugar locality – 16,540 m;
- Construction of underground reservoirs of drinking water in the Calugar locality – 2 units.

Wastewater system:

- Rehabilitation of the sewerage network in the town of Falesti – 10,147 m;
- Extension of the sewer network in the town of Falesti – 43,290 m;
- Construction of wastewater pumping station in the town of Falesti – 1 unit;
- Rehabilitation/Construction of WWTP (of Falesti town) – 1 unit;
- Rehabilitation/Construction of Wastewater Treatment Plant in Falesti – 1 unit;
- Construction of the sewer network in the Falestii Noi locality - 13,200 m;
- Construction of Wastewater pumping station in the Falestii Noi locality – 1 unit;
- Construction of the sewer network in the Calugar locality – 15,800 m;
- Construction of wastewater pumping station in the Calugar locality – 1 unit.

The investment programme includes short, medium and long term measures designed for a planning horizon until the year 2045. The priority short-term measures are divided into two phases as follows:

- Phase 1 – priority measures to be implemented until 2018, which in the context of this FS is considered the “The Project”;

- Phase 2 – priority measures to be implemented between 2018 and 2021 (the period might be extended depending on the availability of funds and the capacity of the operator or implementing agency).

Priority Investment Plan (PIP) includes investment cost estimates for Phase 1 and Phase 2 measures. Schemes of existing and proposed water supply system and wastewater systems in the town of Falesti and Falestii Noi and Calugar localities are presented in the Figures 8-1 and 8-2.

Figure 8-1: Scheme of existing and proposed water supply system in the town of Falesti and Falestii Noi and Calugar localities

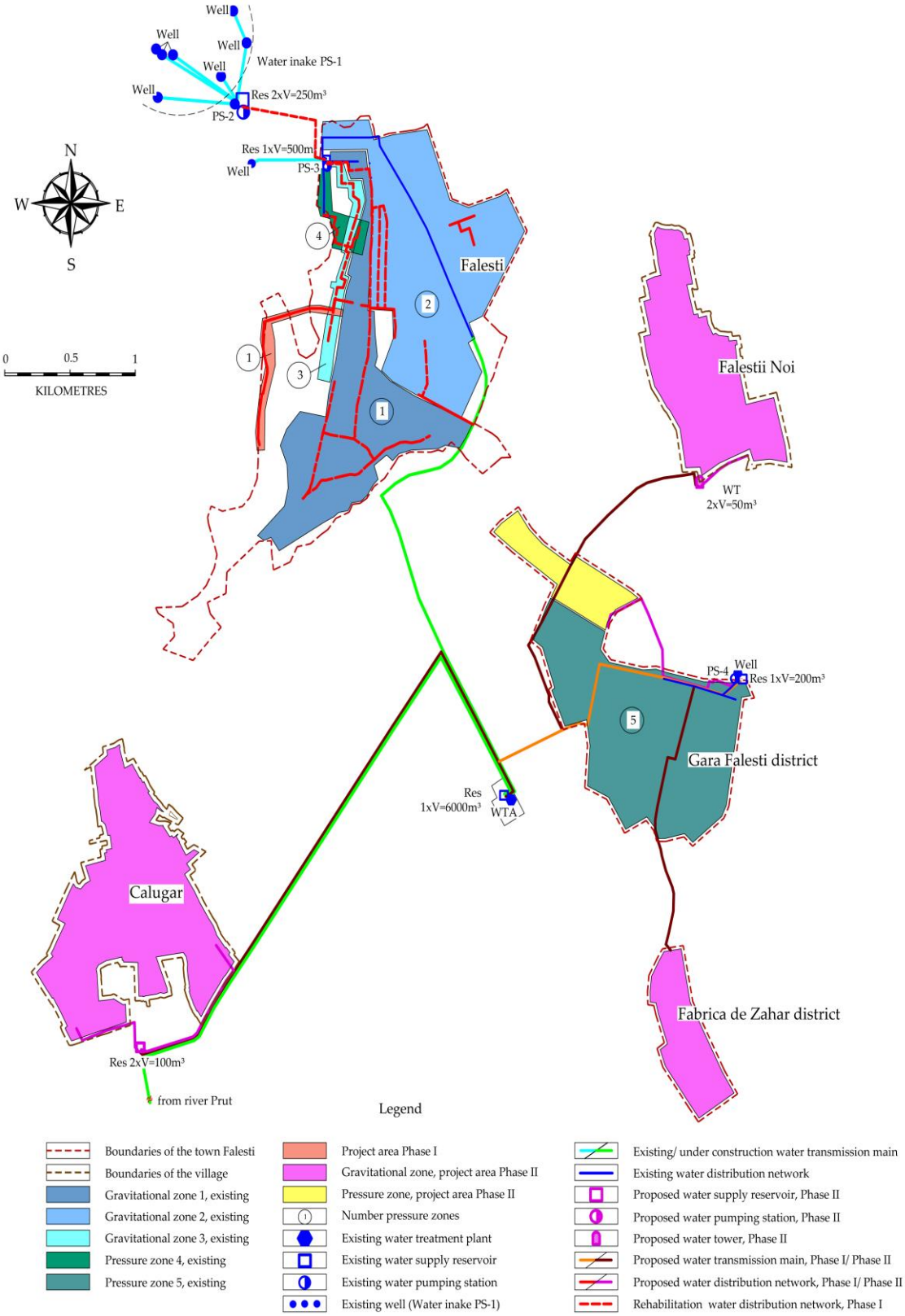
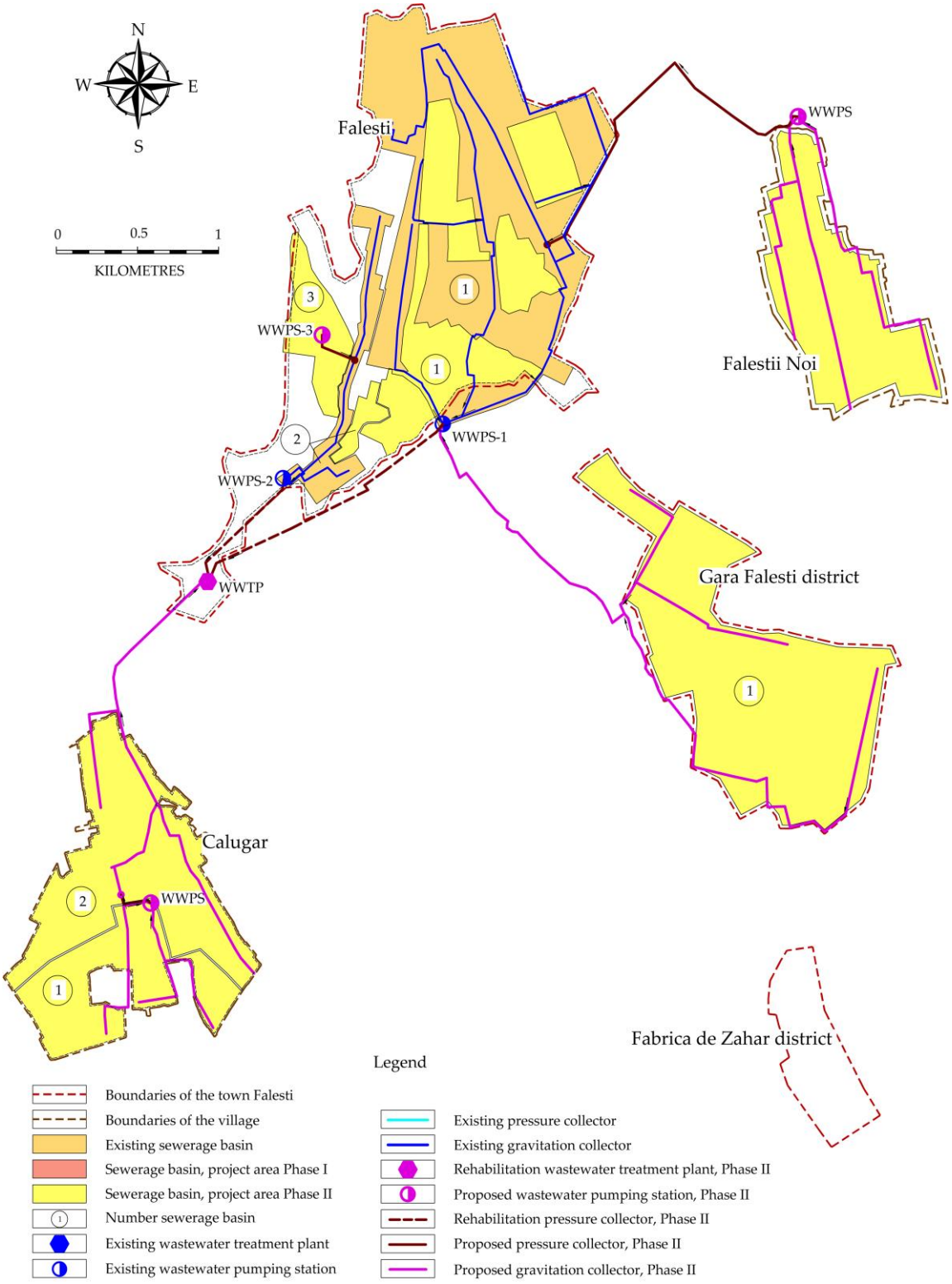


Figure 8-2: Scheme of existing and proposed wastewater system in the town of Falesti and Falestii Noi and Calugar localities



An Environmental and Social Assessment (ESA) was prepared in order to facilitate the implementation of the Project and to ensure that the envisaged Project objectives will comply with Moldova's environmental and social legislation, as well as procedures and

policies and international and EU conventions. In addition, this ESA addresses the environmental and social impacts, mitigation measures and management issues associated with the proposed objectives of the project.

According to the new law on environmental assessment (Law No. 86/29.05.2014 on Environmental Impact Assessment which is in force from beginning January 4, 2015) none of the WSS objectives of the Project is subject to full scale EIA on the national level.

For acquiring the environmental and construction permission it is required to prepare the documents for the State Ecological Expertise (SEE). This needs to be done in the detailed design stage of the Project.

The environmental impacts of the measures proposed in this FS have been assessed in this Environmental and Social Assessment. The results of analysing the environmental impacts and mitigation measures are presented below “Environmental Impacts and Mitigation measures”. Potential environmental impacts arising from the designed project along with a set of the mitigation measures to reduce the impacts to acceptable levels is provided.

The analysis reveals that the environmental impacts associated with the implementation of the Project are site specific, small scale and mostly limited to the construction stage. Therefore, the overall conclusion of the assessment is that provided the mitigation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the various objectives of the Project. There should in fact be positive benefits through major improvements in quality of life and individual and public health once the scheme is in operation. The implementation of the Project will stimulate economic growth and generate new job opportunities.

Individual and public health standards will improve as a result of the project.

8.2 Introduction

This document presents the Environmental and Social Assessment (ESA) for the Phase 1 of feasibility study (the Project). The Environmental and Social Assessment is part of the feasibility study.

8.2.1 Objective of the environmental and social assessment

The objective of the ESA is to facilitate the implementation and to ensure that the envisaged Project objectives will comply with Moldova’s environmental and social legislation, procedures and policies and international and EU conventions. In addition, the ESA Report addresses the environmental and social impacts, mitigation measures and management issues associated with the proposed objectives of the Project.

8.2.2 Methodology

The methodology used for the preparation of this Environmental and Social Assessment was based upon the review of the documents that were so far prepared in the lead up to this FS, particularly the Regional Sector Programme in the WSS sector for the North Development Region (NDR) and the documents prepared in the PPC (Possible Project Concept) stage of the Project Development Pathway.

In addition the existing Moldovan environmental and social legislation and the pertinent safeguard requirements of International Financing Agencies (IFA) were respected.

8.2.3 Study area

The Project Area of Influence (PAI) comprises the territory of the town of Falesti. The area that is foreseen for water supply rehabilitation and extension is shown in the figures in Chapter 8.4 Project Description and Location.

8.3 Legislation and legal approval procedure

According to the new law on environmental assessment (Law No. 86/29.05.2014 on Environmental Impact Assessment which is in force from beginning January 4, 2015) none of the WSS components of the FS is subject to EIA on large scale at national level.

For acquiring the environmental and construction permission it is required to prepare the documents for the SEE. This needs to be done in the detailed design stage of the Project.

A separate annex has been prepared on the legal approval procedure. The Annex 8 describes in detail the legal framework conditions and the SEE approval process.

8.4 Project description and location

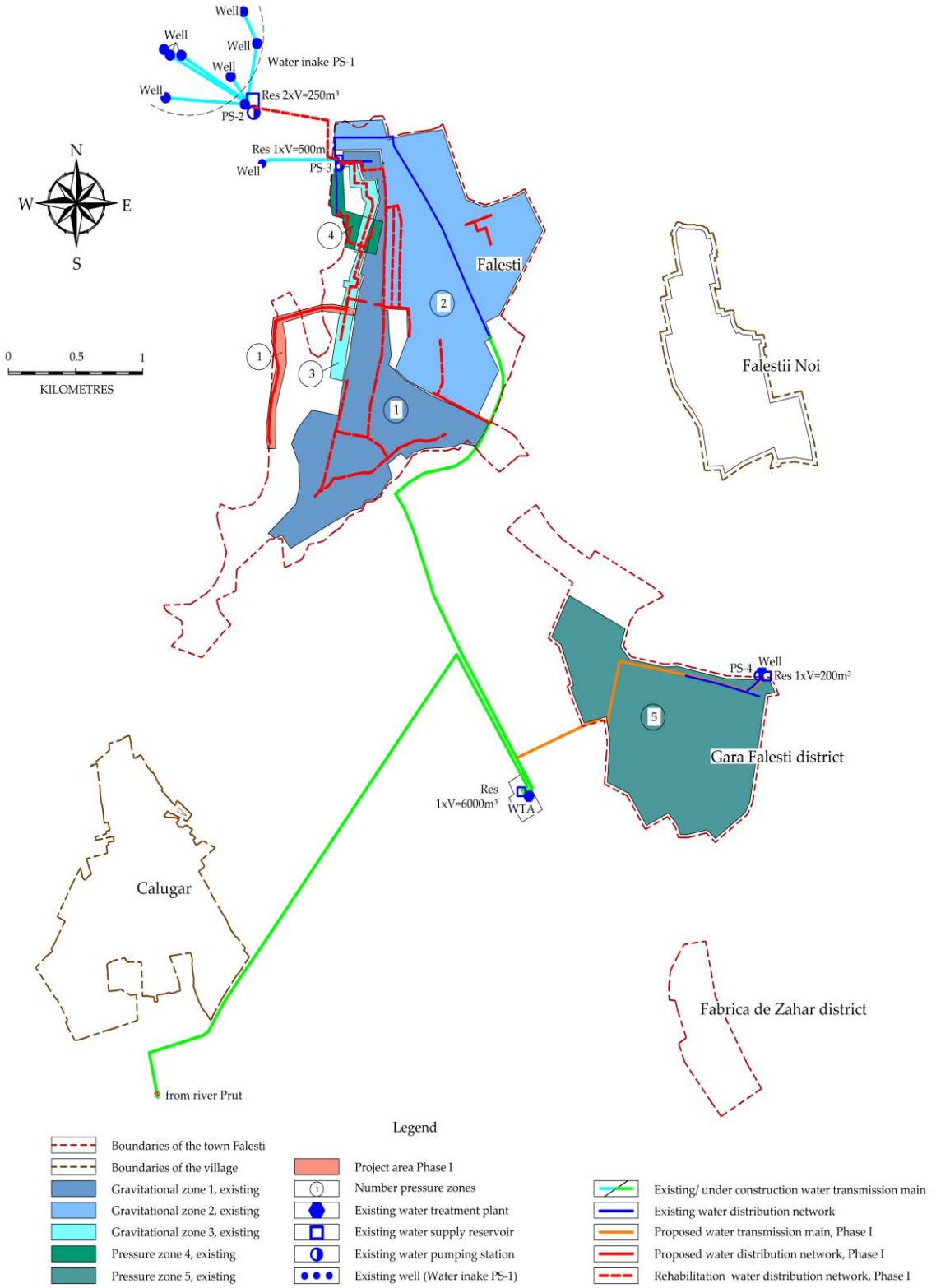
The FS involves the new construction and rehabilitation of various components in the WSS systems. It is designed to improve the service standards of the WSS system in the Falesti town.

Water supply system:

- Rehabilitation of the water distribution network in the town of Falesti – 11,555 m;
- Extension of the water distribution network in the town of Falesti – 2,420 m;
- Construction of water transmission main WTP – railway station Falesti – 2,600 m.

Scheme of existing and proposed water supply system in the town of Falesti (Phase 1) is presented in the Figure 8-3.

Figure 8-3: Scheme of existing and proposed water supply system in the town of Falesti[46]



Source: GIZ/MLPS

[46] Phase 1

8.5 Project implementation stages

With regard to potential environmental impacts it needs to be distinguished between the construction stage and the operational stage of the new WSS system. In the following the required activities for these stages are described under Environmental considerations.

8.5.1 Construction stage

In the Water Supply System the following main elements are planned.

Water Supply Sector:

- Rehabilitation of the water distribution network in the town of Falesti – 11,555 m;
- Extension of the water distribution network in the town of Falesti – 2,420 m;
- Construction of water transmission main WTP – railway station Falesti – 2,600 m.

The new pipes for installing will be polyethylene. Pipes of smaller diameter will be laid for rehabilitation and extension of the distribution network in Falesti town.

The typically depth of trench will be 1.5–2.5m depending on topographical conditions. The width of the trench in average will vary depending on the pipe's outside diameter, type of soil and groundwater level. After construction part of trench will be occupied by pipe and sand layer, and trench is refilled with the excavated material.

In the wastewater system no elements are planned in the first phase.

Water needed for civil works comprises of potable water and construction (technical) water: potable water shall comply with the national quality standards and shall not compete with the needs of the local population. Construction water and water to be used for dust suppression measures may be taken from the French lake or other surface waters in the vicinity of construction site.

Transportation routes: construction site is accessible via the Republican Roads R16, R17 and R57 and local roads.

For mitigation measures please refer to subsequent chapters.

8.5.2 Operation stage

Water supply infrastructure will require repair and maintenance activities like detection and repair of leaks. Since good quality pipes are being used breaks are very rare, and leaks will be mainly limited to joints between pipes. Repair work will be conducted in the same way the pipe was laid, after locating the leaking section.

The sewerage infrastructure will require repair and maintenance activities including cleaning and regular inspection. Since good quality pipes are being used sedimentation on the pipes will be very rare, the repair work will be conducted in the same way the pipe was laid. The extension of the wastewater system will improve the environmental situation in the respective area allowing to increase in the collected wastewater flow.

No significant environmental impacts are associated with the operation of the new water supply system.

8.6 Environmental and social baseline conditions

8.6.1 Physical environment

Falesti town is located in the north-east part of the Republic of Moldova. Most of the study area is built up area. The adjoining area is mainly under agricultural use.

According to the geologic map of Moldova the wider study area is mainly characterized by Quaternary deposits. Fertile chernozems (black earth) as are typical for wide parts of the country prevail in the area. Soils and ground water are reported to have suffered significantly from intensive use of chemical fertilizers, pesticides and herbicides during the Soviet Union.

The regional climate is temperate continental and usually characterized by a lengthy frost period, comparatively mild and dry winters and warm summers with relatively high rainfall levels, erratic rainfall and extended droughts. Rainfall is about 550 mm annually in Falesti Rayon. Average temperatures are - 3.5°C in January and 21.4°C in July. Winds tend to mainly come from northwest (24%) or southeast (21%).

8.6.2 Biological environment

Falesti is located within Moldova's steppe zone. Due to naturally favourable conditions the region became a traditional agricultural area since the 19th century. Typical crops of the region are corn, sunflower, wheat, and sugar beet. Locally there are also orchards with apple and plum.

Due to the intensive agricultural land use the natural steppe vegetation has almost entirely disappeared in the environs of the Project area. However on some pastures and alongside edges of agricultural fields typical steppe species like Volga fescue (*Festuca valesiaca*) and various species of feathergrass such as *Stipa capillata*, *S. lessingiana*, and *S. Pulcherima* may still be found.

Due to intensive agricultural use the Project area's vicinity does not provide important reproduction habitats and migration routes of wild animals, including rare species.

Typical faunal elements of the forest-steppe zone of northern Moldova white egret (*Egretta alba*), black stork (*Ciconia nigra*), lesser spotted eagle (*Aquila pomarina*) and harrier (*Circus cyaneus*). Typical mammal species of the region are hare (*Lepus europaeus*), fox (*Vulpes vulpes*), forest polecat (*Mustela putorius*), hedgehogs (*Erinaceus europaeus*) and beech marten (*Martes foina*) may occur.

8.7 Environmental impacts and mitigation measures

In the below table the environmental impacts that are associated with the Project implementation are de-scribed together with the identified mitigation measures that need to be implemented for reducing the impacts to acceptable levels. The environmental impacts and mitigation measures are described for the 3 different phases of Project implementation, the pre-construction, construction phase and the operation phase.

Ultimately, all proposed measures for impact avoidance or mitigation that relate to construction need to be incorporated into the bidding or contract documents thereby becoming binding elements of the construction and construction supervision contracts.

Table 8-1: Environmental Impacts and Mitigation Measures

Activity / Impacts	Mitigation measures	Responsibility	Location	Cost
Pre-Construction				
Possible removal of terrestrial habitat. Loss of vegetation and top soil	Construction site rehabilitation by contractor after finalization of construction activities. Vegetation planting and stabilization of site, including replacement of any native plant species that were removed during construction activities.	Construction Contractor	Construction and labour camp, storage area. Trenches for pipes	Part of construction cost
Construction				
Ambient Air and Local Dust	• Cover or damp down by water spray on the excavated mounds of soil to control dust generation; • Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process; • Bring the material (aggregate and sand) as and when required; • Ensure speedy completion of work and proper site clearance after completion; • Damp down unsatisfied /bad condition roads to avoid dust generation while using for transport of waste/material; • Use tarpaulins to cover loose material that is transported to and from the site by truck; • Control dust generation while unloading the loose material (particularly aggregate and sand) at the site by sprinkling water/unloading inside barricaded area; • Clean wheels and undercarriage of haul trucks prior to leaving construction site; • Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing.	Construction Company	Excavation areas for trenches in Falesti town	Part of construction cost
	The Contractor shall coordinate with local Traffic Police Department to minimize construction traffic impact in the following topics: • Temporary parking restrictions; • Pedestrian and cyclist diversion routes where construction prevents access; • Temporary traffic signals; • One way scheme; • Maintaining local residential access at all times; • General traffic diversion routes where roads are closed; • Sound barriers should be erected at schools and hospitals if the	Contractor	Transportation routes of construction material	Part of construction cost

Activity / Impacts	Mitigation measures	Responsibility	Location	Cost
	distance to the construction site is less than 50 m.			
Noise Pollution	• Maintain machinery and vehicle silencer units to minimize noise; • Keep noise generating activities associated with construction activities to a minimum and within working hours; • Notify the residents close to the Project area prior to commencement of the construction phase; • Vehicles and machinery that are used intermittently should not be left in idling condition for long period of time; • Equipment used on site will be quietest reasonably available; • Haul routes for construction traffic entering and leaving the site will be selected to ensure noise levels at noise sensitive receptors are kept at a minimum.	Construction Contractor	Excavation areas for trenches in Falesti town	Part of construction cost
Impact on surface water bodies due to construction	• In case of heavy rain, protect open trenches from entry of rain water by raising earthen bunds with excavated soil; • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site; • Ensure that drains are not blocked with excavated soil.	Construction Contractor	Project area	Part of construction cost
Soil Contamination	• The contractors will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination; • Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites; • Construction chemicals will be managed property; • Clearly labelling all dangerous products; • Fuel tanks (diesel or oil) should be placed in a concrete pool with perimeter walls that are at least 1.0 m high; • A proper floor drain should be installed on the slab of the concrete pool for safely discharging the leakages.	Construction Contractor	Construction site, Camp	Part of construction cost
Impact on Flora and Fauna	• Avoid tree cutting; • In unavoidable cases, plant two trees of same species for each tree that is cut for construction; • The trench shall not be kept open in the night/after working hours. This will avoid any safety risk to people, domesticated, stray or wild animals; • The Contractor shall ensure that the work site be kept clean, tidy and free of rubbish that would attract animals.	Construction Contractor	Construction site	Part of construction cost

Activity / Impacts	Mitigation measures	Responsibility	Location	Cost
Impact on Traffic	• Inform all residents and businesses about the nature and duration of any work well in advance so that they can make necessary preparations if necessary; • Provide wooden walkways/planks across trenches for pedestrians and metal sheets where vehicle access is required; • Increasing workforce to complete the work in minimum time in these stretches; • Initial situation of private properties has to be re-established after construction.	Construction Contractor	Construction site, Access Roads	Part of construction cost
Hazardous Materials	• Comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemical, harmful and hazardous substances and materials; • Establish an emergency procedure for dealing with spills or releases of petroleum; • Storage of all hazardous material to be safe, tamper proof and under strict control; • Petroleum, chemical, harmful and hazardous waste throughout the site must be stored in appropriate, well maintained containers; • Any accidental chemical / fuel spills need to be corrected immediately.	Construction Contractor	Construction site Storage Area	Part of construction cost
Solid Waste	Place for disposal of waste must be demarcated. The waste may not be stored nearby drainage structures. Waste has to be immediately removed from the working sites. Waste has to be placed in secondary protective basins. Waste may only be transferred to a certified contractor. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in: • Waste handling; • Waste treatment; • Waste storage.	Construction Contractor	Construction site, waste storage area, camp site	Part of construction cost
Loss of top soil	Top soil of about 0.3 m depth shall be removed and stored separately during excavation work, and after pipeline construction the same soil shall be replaced on the top.	Construction Contractor	Construction site	Part of construction cost
Erosion due to excavation/refilling	Ensure proper compaction of refilled soil. There shall not be any loose soil particles on the top; the material shall be refilled in layers and compacted properly layer by layer.	Construction Contractor	Construction site	Part of construction cost

Activity / Impacts	Mitigation measures	Responsibility	Location	Cost
Impact on air quality due to emissions from construction equipment/vehicles	Ensure that all equipment & vehicles used for construction activity are in good condition and are well maintained. Ensure that all equipment & vehicles confirm to emission and noise norms.	Construction Contractor	Construction sites and access roads	Part of construction cost
Socio-economic benefits from employing local people in construction work	To the extent possible labour force should be drawn from the local community	Construction Contractor	All construction sites	Part of construction cost
Safety risk – public and worker	• Follow standard and safe procedures for all activities – such as provision of shoring up deep trenches (>2 m); • Exclude public from the site – enclose construction area, provide warning and sign boards, security personnel; • Provide adequate lighting to avoid accidents; • Ensure that all workers are provided with and use appropriate Personal Protective Equipment - helmets, hand gloves, boots, masks, safety belts (while working at heights etc.); • Maintain accidents records and report regularly; • Trench construction shall be taken up in small segments, so that work (excavation, pipe laying and refilling) in each segment is completed in a day. No trenches shall be kept open in the night/after work hours.	Construction Contractor	All construction sites	Part of construction cost
Historical, archaeological chance finds during excavation	Contractor shall put in place a protocol for conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: • Having excavation observed by a person with archaeological field training; • Stopping work immediately to allow further investigation if any finds are suspected; • Calling in the state archaeological authority if a find is suspected, and taking any action they require ensuring its removal or protection in situ.	Construction Contractor	All construction sites	Part of construction cost
Operation Phase				
Disturbance/ nuisance/ noise due to operation activity including haulage of waste, dewatered sludge	• Plan transportation routes in consultation with Municipality and Police; • Schedule transportation activities by avoiding peak traffic periods; • Use tarpaulins to cover loose material that is transported to and	Contractor, Police Department	Construction site, access road	Part of operation costs

Activity / Impacts	Mitigation measures	Responsibility	Location	Cost
	from the site by truck; • Educate drivers: limit speed between 20-25 Km/h and avoid use of horn in the town; • Provide prior information to local people about work.			
Potential waste water discharges	Regular monitoring and control of pipe system regarding leakages	State Environmental Inspection of the Minis-try of Environment		
Risk of delivery of unsafe water to consumers	• Conduct regular water quality monitoring; • Develop & implement water quality monitoring program for distribution system; • Establish a water quality laboratory as part of the project, with adequate building, equipment and trained personnel.	State Environmental Inspection of the Ministry of Environment and Centre of Public Health of the Ministry of Health	Water intake, transmission main, distribution network	Part of operation cost
Influx of insects and rodents	Regular waste and sludge disposal on landfill	State Environmental Inspection of the Ministry of Environment and Centre of Public Health of the Ministry of Health	WTP	Part of operation costs

Source: GIZ/MLPS

8.8 Social and gender assessment of WSS project in Falesti

8.8.1 Social and gender issues in Moldova and in WSS project area

The main gender characteristics for the Republic of Moldova, including for the Project area, are as follow:

- **The population of the Republic of Moldova has decreased in recent years, with Falesti rayon exhibiting the same trend**. As of 1 January 2015, the official population of the Republic of Moldova was 3,555,159 persons, with 4,382 persons less than 2012. The population decrease is determined by the negative natural growth rate and the on-going out-migration processes. The same situation is observed in Falesti rayon where the population decreased by 452 persons: from 92,389 in 2012 to 91,937 persons in 2014.[47] The population of Falesti town was 16,900 in 2014, which represented 18.3% of the total population of Falesti rayon and 0.47% of the total population of the Republic of Moldova;
- **Women are predominant in both the general population and the population of the Project area**. The gender distribution of the population in the country has been practically the same for a long period of time, with small deviations: around 52% of women and 48% of men. In 2014 in the Republic of Moldova the breakdown of the population by gender was: 51.9% women and 48.1% men. In Falesti rayon, the gender distribution was the following: women – 51.4% and men – 48.6%.[48] In Falesti town the gender distribution was the same as at the national level;
- **On average, at the national level women have higher life expectancy at birth than men by 7.9 years in 2014**.[49] In 2014 the average life expectancy at birth was 67.5 years for men and 75.4 years for women. Because of the differentiated level of mortality, the average duration of life of inhabitants at birth in the urban areas is higher than in rural areas, respectively by 4.6 years for men and 3.5 years for women. In Falesti rayon, the average duration of life is almost identical to the average per country (men – 67.5 years, women – 75.3 years);[50]
- **In 2015, the average age of women (39.1 years) was higher than the average age of men (35.8 years).** The average age at the national level increased from 36.7 years in 2012 to 37.5 years in 2015. In Falesti rayon the average age increased from 37.1 years in 2012 to 37.5 years in 2014 while for the town the figures are 37.5 in 2012 and 38.2 in 2014. The average age by gender for the Project area is higher than the one at national level: women – 39.7 years, men – 36.7 years;[51]
- **The employment rate among women was lower** (37.4%) **compared to that for men** (42.1%) in 2014. For the North Statistical Region the employment rate for men was 41.6% while for women – 38.3%. Women with higher levels of education are more likely to participate in the labour market. Therefore, the employment rate is greater among women with higher education (54.2%), followed by those with specialised secondary education (48%) and secondary professional

[47] Statistica teritoriala, 2014; Statistical databank, NBS website.

[48] Statistica teritoriala, 2014.

[49] ttp://www.statistica.md/newsview.php?l=ro&id=3814&idc=168

[50] Statistica teritoriala, 2014.

[51] Ibid.

education (44.5%), secondary school (39%) and those with gymnasium (31.5%).[52] The analysis of statistical data also shows that the female employment rate depends on various factors, including whether they have children under 16. The employment rate of women with children gradually decreases depending on the number of children: from 52.2% for women with one child up to 43.9% for women with three or more children. This rate of employed women also depends on the children' age, the biggest differences being registered to persons with children up to two years old, the employment rate being 15.3% for women compared to 53% for men;[53]

- **There are significant discrepancies in the employment of women and men in different spheres**.
  There is a larger share of women employed in the service sector (60% compared to 40% of men) but they are less in the agricultural (44%), industry (44%) and constructions (9%) sectors. Women are predominant in economic activities like hotels and restaurants (73.7%), education (81.5%), health protection (81.3%) and trade (56.6%);[54]
- **Women are mostly employed in low-paying jobs and occupy lower positions in the job hierarchy where they are employed**.[55] The statistical data shows that women are dominant in the group of specialists with higher levels of qualification (65% women and 35% men), in administrative officials (83% women and 17% men) and in workers in services and trade (77% women and 23% men). However, men constitute 56% of the total managers of all levels. The gender differences for the top leaders of economic and social units are even more pronounced. The gender ratio among employers is one woman to four men regardless of ownership of the unit they lead;[56]
- **Unemployment affects men more than women**. The unemployment rate at the country level was 3.9% in 2014, compared to 5.6% in 2012[57], the rate among unemployed men being higher (4.6%) compared to women (3.1%). In 2013, in Falesti town the unemployment rate was 4.7% compared to 3.9% at the national level;
- **At the national level, the average salary for women is 11.6% less than the average salary for men**. Discrepancies between the salaries of women and men decreased in the period 2003-2013; however, this trend has slightly reversed since then. Thus, the monthly average earnings for women amount to 88.4% of the average salary for men in 2013; in monetary terms, the discrepancy constituted 454 MDL on average (according to NBS). This gap persists because women, most often, either work in lower-paid sectors – education, healthcare or services – or occupy lower-paid positions. The situation was different in Falesti rayon, where the gender pay gap was 101.5%, women getting 41 MDL more than men;[58]

[52] Statistical databank, NBS website.

[53] Statistica Moldovei, 2014. Portretul statistic al barbatilor si femeilor in Republica Moldova.

[54] Ibid.

[55] http://www.undp.md/mdg/MDG3/gender.shtml

[56] Statistica Moldovei, 2014. Portretul statistic al barbatilor si femeilor in Republica Moldova.

[57] Statistical databank, NBS website.

[58] Promote gender equality and empower women, UNDP Moldova; Statistica teritoriala 2014.

- **Women spend more time on unremunerated household work than men**. According to statistical data, unremunerated work in Moldova constitutes on average 3.9 hours per day per person (in urban areas – 3.8 hours, in rural areas – 4.9 hours). Women spend on average 4.9 hours per day (in rural areas – 5.9 hours and in urban areas – 4.4 hours) and men – 2.8 hours per day (in rural areas – 3.9 hours and in urban areas – 2.7 hours);[59]
- **The average size of female pensions is less than the average size for men**. The discrepancies in the remuneration of men and women influence also the size of pensions for statutory retirement. In 2013, the average woman's pension was 16% lower than the average man's pension. Furthermore, the average pension for employees in the non-agricultural sector is higher compared to agricultural sector: in the case of women, the difference is 20.7% while for men the gap is higher – 45.7%;[60]
- **The average nominal monthly earning per employee** in Falesti in 2013 was 2770 MDL (compared to 3765.1 MDL in the country overall), with 487 MDL more than in 2011; this constitutes 75.4% of the average salary in the country overall. According to the deprivation index of the small areas calculated in 2012, out of 35 LPAs of 2nd level, Falesti rayon is ranked eleventh for the index of multiple deprivation and 19th in income deprivation specifically;[61]
- **More women than men are enrolled in the higher education system**. In 2014, from the total number of graduates from higher education institutions, women represented about 60.5% compared to 39.5% of men (statistical databank). There are gender discrepancies at the level of specialities with a significant share of women in the teaching staff (over 80%). The almost exclusive domination of primary education by women confirms that there are stereotypes according to which women are those who must educate and take care of children. The poor remuneration in education and the exodus of teachers abroad are also worth mentioning;[62]
- **Domestic violence and human trafficking have gender dimensions and remain among the largest problems for women in Moldova**. According to data from the Ministry of Internal Affairs on combating human trafficking, during 2012 the following was recorded: 151 criminal cases for human trafficking offences, with 266 identified victims out of which about 65% are women and 35% are men. The purpose of trafficking varied as following: a) 126 victims were sexually exploited (100% women); b) 126 victims were exploited in labour (37 women, 89 men); and, c) 13 victims were exploited in begging (6 women, 7 men);[63]
- **Women in Moldova are less represented in politics than men**, constituting 19.8% of the members of Parliament, 18.6% of councillors in rayonal councils, 29.9% in local councils, and 20.5% of the mayors. After the local elections in June 2015, the Falesti Rayon Council comprises 33 councillors, of whom six

[59] Biroul National de Statistica, Chisinau 2013. Utilizarea timpului in Republica Moldova. Sinteza.

[60] Statistica Moldovei, 2014. Portretul statistic al barbatilor si femeilor in Republica Moldova.

[61] In order to establish the deprivation level of the locality in a certain field, the city halls were arranged in the order of rank obtained: first rank indicates the most deprived community (the poorest, lacking certain services), rank 35 – the lowest deprivation (the wealthiest), Ministry of Economy, National Bureau of Statistics.

[62] Government decision no.933 from 31.12.2009 on approval of the National Programme on ensuring gender equality in the Republic of Moldova during the period 2009-2015.

[63] CEDAW. Replies of Moldova to the list of issues.

(18%) are women.[64] Regarding the Local Council of Falesti town, of 23 councillors 8 (35%) are women;

- **Poverty in Moldova continues to affect vulnerable population categories: traditional families who depend on farming, older people, people without education and professional skills, and households consisting of several children**. Although the poverty rate in Moldova decreased from 26.4% in 2008 to 12.7% in 2013, it continued to be high in rural areas (18.8%), in households with three and more children (34.6%), in households with the head aged over 65 (18%), in households where the head has low level of education (no education – 40.8%; primary/gymnasium education - 24.1%), among agricultural workers (31.3%), self-employed (21.7%) and retired persons (14.7%). The proportion of the poor population that lives in rural areas increased from 75.6% in 2006 to 84% in 2013.[65] In Falesti town, the vulnerable families constituted 13% (1018) of the total families in 2012 and included 886 families with persons with disabilities, 92 families – with one parent, 23 families – with three and more children, 17 families – that have children under the tutorship (IDAM, 2012);[66]
- **The high poverty level limits the access of vulnerable groups to goods and services for a decent standard of living**. Expenditure for the purchase of food and communal services' payments absorb approximately 73% of the budget of poor families, a fact which limits their access to other goods and services necessary for a decent living. According to the Household Budget Survey (2013), in the 1st quintile, only 35.5% of population have access to water supply services, only 7.33% of the population have access to a centralised sewage system, and only 7.4% of the population have access to the toilet inside their houses. The poor, in comparison with the wealthy group of population spend 20 times less for education, 11 times less for leisure activities, six times less for clothes and shoes and five times less for health services.[67]

Based on the analysis of social and gender dimensions in the Republic of Moldova and in the Project area, the conclusion is that, despite the adoption of the legal and regulatory framework on ensuring gender equality, and the relatively high ranking of Moldova in the Global Gender GAP Index 2015 (26)[68] there are still many problems faced within its practical implementation in the country, including in the Project area, including among others:

- Employment inequalities;
- Under-representation of women in decision-making positions;
- Salary and pension disparity between women and men;
- Engagement of women in unremunerated household work etc.

[64] Webpage of the Rayonal Council Falesti: http://www.cr-falesti.md/index.php/consiliul-rayonal/consilieri-rayonali

[65] Raport privind saracia in Republica Moldova, 2014.

[66] Ministry of Economy, Deprivation Index for Small Areas, 2012 http://www.mec.gov.md/ro/content/indicatori-social-economici-pe-localitati; National Bureau of Statistics.

[67] Raport privind saracia in Republica Moldova, 2014.

[68] World Economic Forum. The Gender Global GAP report, 2015 http://reports.weforum.org/global-gender-gap-report-2015/economies/#economy=MDA

Poverty in Moldova still affects the most vulnerable groups of population (families who depend on farming, older people, people without education and professional skills, households consisting of three and more children) and limits their access to goods and services, like water supply and wastewater, centralised heating systems, education and health. Given this situation, social and gender mainstreaming is an essential component of the implementation of WSS project in Falesti town. The methodological approach and the description of the pilot gender study (performed for the town of Straseni and considered to apply also for the FS of Falesti) are presented in Annex 8.2.

9 Procurement strategy and implementation plan

9.1 General

The following chapter describes all actions for the procurement of services and works for a successful and efficient project implementation including an envisaged time schedule. The project measures for Falesti in Phase 1 comprise capital investments and technical assistance that need to be procured and implemented.

The works and services to be procured for the implementation of Phase 1 measures are as follows:

Technical assistance components:

- Design and Engineering for Phase 1 investments;
- Corporate Development Program;
- Stakeholder Participation Program;
- Water Supply Network Analysis and Water Loss Reduction Programme;
- Medium to Long-term Sanitation Study.

Capital investments and goods

- Rehabilitation of the existing water distribution network in the town of Falesti (11,555 m);
- Extension of the water distribution network in the town of Falesti (2,420 m);
- Construction of water transmission main (2,600 m);
- Equipment for operational performance improvement (water supply and wastewater).

9.2 Procurement plan

In line with Moldova's policies and rules, the required public sector services and works contracts shall be awarded on the basis of open competitive tendering, which should assure a maximum of competition and transparency.

The fundamental requirements of open competitive tendering are:

- Be open to all qualified and interested bidders;
- Be advertised locally (and internationally, when required);
- Have objective qualification criteria;
- Have neutral and clear technical specifications;
- Have clear and objective evaluation criteria;
- Be awarded to the least-cost provider, without contract negotiations.

9.2.1 Procurement strategy

It is proposed to arrange procurement into four different contracts:

- Design & engineering contract;

- Works contract;
- Supply contract;
- Technical assistance.

9.2.1.1 Design & engineering contract / technical assistance

Design and engineering is proposed to be procured separately from the remaining technical assistance tasks (Corporate Development Programme, Stakeholder Participation Programme, Water Supply Network Analysis and Water Loss Reduction Programme, Medium to Long-term Sanitation Study) as the requirements for the consulting company are different.

9.2.1.2 Capital investment and goods

The strategy is to keep contract values at a size to attract international contractors as well as local contractors. Due to the similarity of the works (mainly network rehabilitation and extension; investment amount of chlorination equipment will be too small to be procured in a separate contract) and the relatively small total investment value it is proposed to combine all capital investment measures in one contract. The Conditions of Contracts for the works contracts should be based on “FIDIC Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer (FIDIC Red Book)”.

Although the contract value will be relatively small, the equipment for operation and maintenance improvement is proposed to be procured under a supply contract (shopping).

The summary of cost breakdown per contract and the procurement plan below, lists the different contracts to be procured during the entire project including, project component, costs and financing, type of contract and the procurement method.

Table 9-1: Summary cost breakdown per contract

N°	Component	Total project costs	Design & engineering	Construction works	Supply of equipment	Technical assistance
1	Water supply					
1.1	Rehabilitation of the water distribution network in the town of Falesti	896,240		896,240		
1.2	Extension of the water distribution network in the town of Falesti	190,476		190,476		
1.3	Construction of water transmission main, HDPE pipe OD 200	234,000		234,000		
2	Equipment and tools for operational performance improvement (water supply and wastewater)	200,000			200,000	
3	Technical assistance					
3.1	Design, engineering, supervision for Phase 1 investments (12% of investment costs)	182,486	182,486			
3.2	Technical assistance (Corporate Development Stakeholder Participation Programme, Water Supply Network analysis and Water Loss Reduction programme, Medium to Long-term Sanitation	300,000				300,000

N°	Component	Total project costs	Design & engineering	Construction works	Supply of equipment	Technical assistance
	Study)					
4	Contingencies (10% of 1+2+3)	200,320	18,249	132,072	20,000	30,000
GT	**Total Costs per contract**	**2,203,522**	**200,735**	**1,452,788**	**220,000**	**330,000**

Source: GIZ/MLPS

Table 9-2: Procurement plan

N°	Description	Estimated contract value[69], EUR	Contract type	Procurement method
1	Design and engineering for Phase 1 investments	200.735	Consulting services	Competitive
2	Construction Works: Rehabilitation and extension of the water supply system in the town of Falesti and construction of a transmission main.	1.452.788	Works	Open
3	Supply of Equipment for operational performance improvement	220.000	Supply of goods	shopping
4	Technical assistance for: Corporate Development Programme, Stakeholder Participation Programme Water Supply Network analysis and Water Loss Reduction Programme, Medium to Long-term Sanitation Study	330.000	Consulting services	Competitive
GT	**Total Amount**	**2.203.522**		

Source: GIZ/MLPS

9.3 Project implementation plan

9.3.1 Key steps of project implementation

Key steps in project implementation will be the following:

9.3.1.1 Concluding of funding arrangements

In order to conclude on the funding arrangements the following will be necessary:

- Agreement of all relevant stakeholders (i.e. local authorities, ministries, relevant funding institutions) on project volume, funding sources, financing plan;
- Conclusion of funding agreements as basis for project start.

9.3.1.2 Setting-up of project implementation structures

In order to establish a sound and efficient project steering and project management a proper project implementation structure shall be established by the client of the project (the Employer). The client will either70 be the LPA Falesti, which is the owner of the

[69] Including Contingencies

[70] Depending on the funding arrangement (donor and type of contract)

assets or the Municipal Services Utility of Falesti, which manages and operates these assets. Further, relevant stakeholders shall be involved in the project implementation structure in order to have coordinated decisions and processes.

The project implementation shall be managed by a Project Manager (PM), appointed by the Employer.

The main tasks of a project implementation structure are:

- Establish adequate conditions for operation, location, and endowment;
- Selection of a qualified staff;
- Develop implementation plan for the project;
- Tendering process for services and works contracts;
- Monitor the implementation of the service and works contracts;
- Organise in due time all required licenses, permits and conclusions;
- Financial management and reporting;
- Maintain records for all the documents and communications;
- Monitor of disbursements and reporting to the funding institution.

9.3.1.3 Procurement and implementation of consulting services

The first key activity directly related with project implementation will be the timely and successful procurement of the required consulting services for detailed design and construction supervision of the identified rehabilitation works, supplies and their installation.

The steps about procurement and implementation of the Consulting Services (the Engineer) will be:

- Issuing the Request for Proposal;
- Technical and financial evaluation of the received proposals;
- Recommendation for consultant selection;
- Contract award for consulting services;
- Implementation of consulting Services.

9.3.1.4 Procurement and implementation of works and supplies contracts

In cooperation with the Engineer the Employer (project implementation structure) will hold responsible for the procurement process for the works contracts comprising following steps:

- Invitation for tendering and issuing of tender documents;
- Tender period;
- Receiving of bids;
- Bid evaluation and preparation of evaluation report;
- Contract award for work contracts;
- Implementation of works contract;
- Defects liability period.

9.3.1.5 Project monitoring and evaluation

Project monitoring during implementation of the project and internal as well as external evaluation at the end of the project implementation period shall be carried out.

- Monitoring is an instrument for systematic collection of data on specific indicators to provide the management and the main stakeholder relevant information on the project progress and the achievement of objectives;
- Evaluation is the systematic and objective assessment of the on-going or completed project, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability.

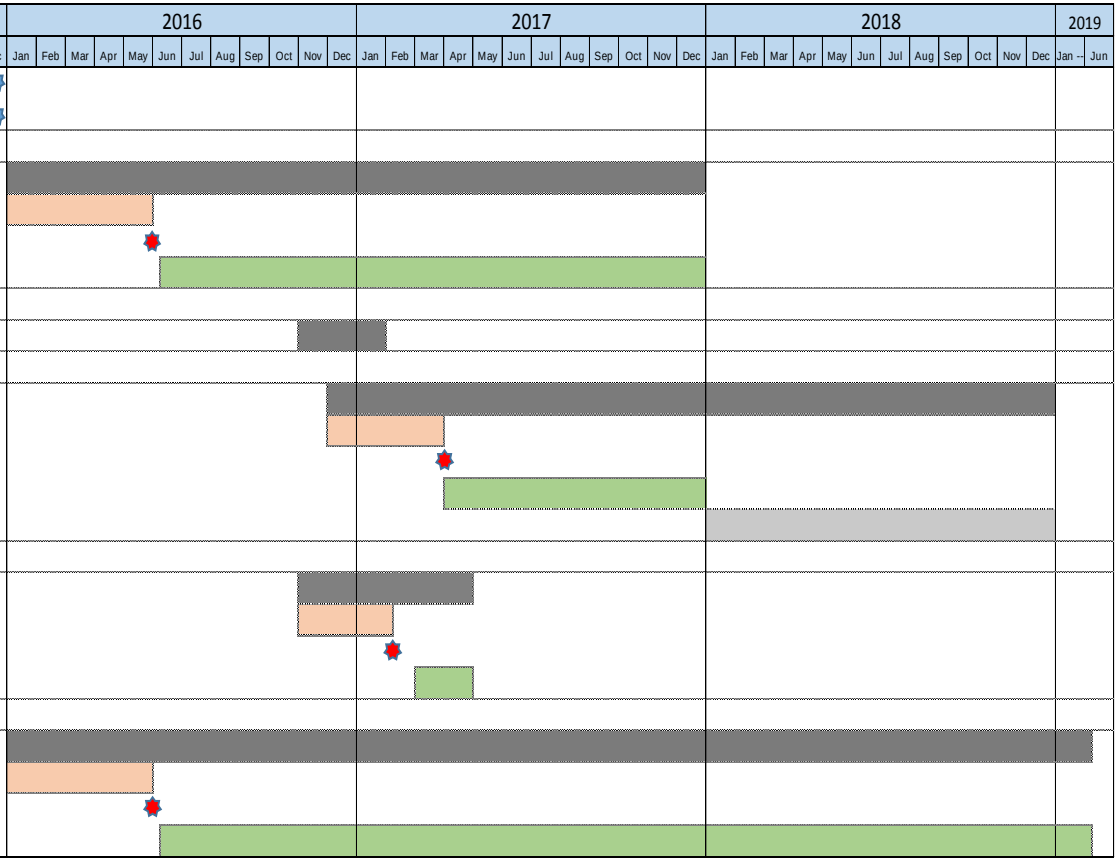
For both instruments the setting of targets and indicators as well as the methodology and administration of data collection need to be organised.

9.3.2 Project implementation plan

All key data for the above mentioned implementation steps are based on having the funding arrangement concluded by end of 2015. The table below gives the project implementation plan for the proposed measures.

Table 9-3: Project implementation plan

No	Item	start date	end date
1	Concluding of funding arrangements*	31.12.2015	
2	Setting-up of project implementation structures	31.12.2015	
3	Design and engineering	01.01.2016	01.12.2017
3.1	Procurement of consulting services	01.01.2016	30.05.2016
3.2	Contract award for consulting services	30.05.2016	
3.3	Implementation of consulting services	09.06.2016	01.12.2017
4	Obtaining required conclusions and permits	01.11.2016	30.01.2017
5	Works contracts	01.12.2016	31.12.2018
5.1	Procurement of works	01.12.2016	31.03.2017
5.2	Contract award for works contracts	31.03.2017	
5.3	Implementation of works contract	31.03.2017	31.12.2017
5.4	Defects liability period	01.01.2018	31.12.2018
6	Supply contracts	01.11.2016	30.04.2017
6.1	Procurement of equipment and tools	01.11.2016	31.01.2017
6.2	Contract award for supply contracts	31.01.2017	
6.3	Delivery of goods	01.03.2017	30.04.2017
7	Other technical assistance components	01.01.2016	09.06.2019
7.1	Procurement of consulting services	01.01.2016	30.05.2016
7.2	Contract award for consulting services	30.05.2016	
7.3	Implementation of consulting services	09.06.2016	09.06.2019



* In case the conclusion of funding arrangements and/or the setting up of the project implementation structures are delayed all following activities will be postponed accordingly

Source: GIZ/MLPS

10 Risk analysis

10.1 General

The following chapter applies and adapts the methodology for qualitative risk analysis in the new guide to cost-benefit analysis published by the European Commission[71].

According to the Guide, a qualitative risk analysis includes the following elements:

- "A list of adverse events to which the project is exposed;
- A risk matrix for each adverse event indicating:
  - The possible causes of occurrence;
  - The link with the sensitivity analysis, where applicable;
  - The negative effects generated on the project;
  - The (ranked) levels of probability of occurrence and of the severity of impact;
  - The risk level.
- An interpretation of the risk matrix including the assessment of acceptable levels of risk;
- A description of mitigation and/or prevention measures for the main risks, indicating who is responsible for the applicable measures to reduce risk exposure, when they are considered necessary[72]."

Further, the Guide continues that "according to the CBA methodology, as described in Annex III to the Implementing Regulation on application form and CBA methodology, the probabilistic risk analysis is required where the residual risk exposure is still significant. In other cases it may be carried out where appropriate, depending on project size and data availability[73]". Given that the project at hand entails "no regrets" measures in the first phase of a short-term priority investment programme (PIP), which in turn is part of a long-term investment plan, the residual risk exposure is not expected to be significant. Further, the project size, while above the threshold of a typical water and wastewater sector project in the Republic of Moldova, is below any objective measure of a major project. Therefore, a qualitative risk analysis is deemed sufficient for the present study.

10.2 Assumptions

A number of assumptions related to the project are important to its success. These assumptions serve to acknowledge the dependencies, potential points of weakness, and risks associated with the project:

- The per capita water consumption will increase, as provided in Chapter 5-4 Water demand and wastewater flow projection;
- The connection rate to the water systems will increase as a result of the investments and technical assistance;

[71] European Commission, Guide to Cost-Benefit Analysis of Investment Projects, Economic appraisal tool for Cohesion Policy 2014-2020, December 2014.

[72] Ibid, p 69

[73] Ibid, p. 71

- The operators will implement unified tariffs for the entire area of their operations;
- As a target for the tariff strategy, we have considered that the affordability ratio should be somewhere between 3% and 3.5% of average household income.

It is also assumed that the local authorities, as owners of the assets operated by the target water utility will commit themselves to support the implementation of the Project and the Priority Investment Programme.

It is finally assumed that the sensitivity analysis covers overall changes in investment costs, operating costs and revenues, and the overall impacts of these changes on project effectiveness. Specific aspects of risk are covered in the following risk matrix.

10.3 Identification of adverse events and risks

As an input to the risk matrix, a list of adverse events to which the project is exposed needs to be developed. The following list is offered, together with a brief description of each risk:

- Political and policy risks, including:
  - Political risk from national and local elections – possibly delaying key decisions and policy changes;
  - Political risk from interference in day-to-day operations – causing both instability and delay in implementing day to day operational decisions;
  - Financial crisis at national level – limiting domestic financing sources;
  - Legal and regulatory framework – sectoral policy: delays in establishment of new tariff policy for the regional and local water companies by the National Agency for Energy Regulation (ANRE);
  - Legal and regulatory framework – sectoral policy: Lack of regulation regarding the elaboration of PAAS (Water Supply and Sanitation plans);
  - Legal and regulatory framework – sectoral policy: Lack of legal framework on ownership of land and public infrastructure at the regional level.
- Institutional risks, including:
  - Limited understanding of functioning of commercial companies – raising risk that the operator will not make necessary improvements to improve and expand its services;
  - Operator size – operators are rather small in Moldova, making regionalisation of services difficult;
  - Institutional capacity – weak institutional capacity on the operational level in Water Supply and Sanitation (WSS), including financial weaknesses of the institutions to attract investments, manage investments, as well as provide quality services to the population;
  - Institutional capacity – ongoing and delayed decentralization process which leads to uncertainty in the WSS sector and artificial fragmentation of the areas managed by the specialized institutions;
  - Institutional capacity – financial weakness of the institutions which increases the perceived risks of making investments in WSS.
- Operational risks, including:
  - Insufficient number of customers when networks extended – raising the risks that forecasted revenues will not be realised;

  - Lack of reliable data collection and recording on the part of the operator – increasing the number of assumptions required in any study, thus raising the uncertainty, as well as reducing the likelihood that project impacts will be properly tracked in the future;
  - Delay in obtaining the construction permits due to delay in submission or approval by the local authorities.
- Financial risks, including:
  - Low financial absorption capacity at national and local level;
  - Lack of expressed co-financing commitment from donors for priority projects;
  - Lower number of actual consumers than estimated after the investment implementation;
  - Political interference in tariff adjustments.
- Project implementation and management risks, including:
  - Insufficient technical expertise at local level that creates serious difficulties in supplementing project teams with qualified staff;
  - Insufficient project management and implementation experience at local level;
  - Construction delays;
  - Cost overruns;
  - Outdated construction standards of materials and technologies applied for design and project implementation.

10.3.1 Risk matrix

The risk matrix is presented in the following tables.

Key:

Probability of occurrence: A. Very unlikely (0–10% probability); B. Unlikely (10–33% probability); C. About as likely as not (33–66% probability); D. Likely (66–90% probability); E. Very likely (90–100% probability).

Severity of impact: I – No relevant effect on social welfare, even without remedial actions.; II – Minor loss of the social welfare generated by the project, minimally affecting the project long run effects- However, remedial or corrective actions are needed.; III – Moderate: social welfare loss generated by the project, mostly financial damage, even in the medium-long run. Remedial actions may correct the problem.; IV – Critical: High social welfare loss generated by the project; the occurrence of the risk causes a loss of the primary function(s) of the project. Remedial actions, even large in scope, are not enough to avoid serious damage; V Catastrophic: Project failure that may result in serious or even total loss of the project functions.

Table 10-1: Risk matrix, political and policy risks

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
Delay in key decisions and policy changes	n/a	National and/or local elections	Reduced project efficiency	Medium	Delay in establishing positive cash flow	D	III	High	Intensify work within partner systems to ensure policy decisions are taken in a timely manner and followed by subsequent regimes	High, but cannot be modelled
Instability and delay in implementing day to day operational decisions	Operating costs	Political interference in day-to-day operations	Reduced project efficiency	Medium	Negative	C	III	Moderate	Corporate development programme as part of technical assistance	Low to moderate
Limited availability of domestic financing sources	n/a	Financial crisis at national level	Delay in project start	Short	Delay in establishing positive cash flow and benefits to public	E	IV	Very high	Policy recommendations at national level to consolidate funding sources. Supporting unified policy to external donors	Moderate
Unclear tariff regime	Operating revenues	Delays in establishment of new tariff policy for the regional and local water companies	Reduced project efficiency and financial stability of operator	Medium	Negative	C	III	Moderate	Policy recommendations at national level; Corporate development programme as part of technical assistance	Low to moderate
Planning uncertainty	n/a	Lack of regulation regarding the elaboration of PAAS (Water Supply and Sanitation	Reduced project efficiency; project not meeting local	Medium to long-term	Negative	C	III	Moderate	Regional sector programmes; intensive cooperation with local partners to identify needs; Corporate development programme	Low

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
		plans)	needs						as part of technical assistance	
Uncertainty in ownership of assets at regional operator	n/a	Lack of legal framework on ownership of land and public infrastructure at the regional level	Reduced project efficiency and financial stability of operator	Medium to long-term	Negative	B	III	Moderate	Corporate development programme as part of technical assistance; Road map for establishment of regional operator	Low

Table 10-2: Risk matrix, institutional risks

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
AC will not make necessary improvements to improve and expand its services	Operating revenues	Limited understanding of functioning of commercial companies	Reduced operator efficiency; delays in provision of improved services	Medium to long-term	Negative	C	III	Moderate	Corporate development programme as part of technical assistance; Road map for establishment of regional operator	Low to moderate
Regionalisation of services will not be achieved	Operating revenues	Small existing operators; lack of national level policy guidance	Reduced operator efficiency; delays in provision of improved services	Medium to long-term	Negative	C	III	Moderate	Corporate development programme as part of technical assistance; Road map for es-	Low to moderate

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
									tablishment of regional operator; National level policy advise	
Expansion of higher quality services is delayed	n/a	Weak institutional capacity on the operational level in WSS, including financial weaknesses of the institutions to attract investments, manage investments, as well as provide quality services to the population	Delay in project start	Short	Delay in establishing positive cash flow and benefits to public	E	IV	Very high	Policy recommendations at national level to consolidate funding sources. Supporting unified policy to external donors	Moderate
Unclear tariff regime ongoing and delayed decentralization process which leads to uncertainty in WSS sector and artificial fragmentation of the areas managed by the specialized institutions	Operating revenues	Delays in establishment of new tariff policy for the regional and local water companies ongoing and delayed decentralization process which leads to uncertainty in WSS sector and artificial frag-	Reduced project efficiency and financial stability of operator	Medium	Negative	C	III	Moderate	Policy recommendations at national level; Corporate development programme as part of technical assistance	Low to moderate

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
		mentation of the areas managed by the specialized institutions								
Planning uncertainty financial weakness of the institutions which increases the perceived risks of making investments in WSS	n/a	financial weakness of the institutions which increases the perceived risks of making investments in WSS	Reduced project efficiency; project not meeting needs	Medium and long-term	Negative	C	III	Moderate	Regional sector programmes; intensive cooperation with local partners to identify needs; Corporate development programme as part of technical assistance	Low
Uncertainty in ownership of assets at regional operator	n/a	Lack of legal framework on ownership of land and public infrastructure at the regional level	Delays in implementation; depreciation not calculated in tariff	Short to medium-term	Negative	B	III	Moderate	Corporate development programme as part of technical assistance	Low

Table 10-3: Risk matrix, financial risks

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
Delay in project implementation	n/a	Low financial absorption capacity at national and local level	Delay in project start	Short to medium	Delay in establishing positive cash flow	D	II	Moderate	Capacity development within partner systems	Moderate
Delay in project approval and implementation	n/a	Lack of expressed co-financing commitment from donors for priority projects	Delay in project start	Short to medium	Delay in establishing positive cash flow	C	III	Moderate	Corporate development programme as part of technical assistance	Low to moderate
Project indicators and cash flow forecast not met	Operating revenues	Lower number of actual consumers than estimated after the investment implementation	Reduced project efficiency and financial stability of operator	Medium	Negative	D	III	High	Corporate development programme – revenue enhancement activities, as part of technical assistance; public information campaign	Moderate
Unclear tariff regime	Operating revenues	Political interference in tariff adjustments	Reduced project efficiency and financial stability of operator	Short to medium	Negative	C	III	Moderate	Policy recommendations at national level; Corporate development programme as part of technical assistance	Low to moderate

Table 10-4: Risk matrix, project implementation and management risks

Adverse event	Variable	Causes	Effect	Timing (short, medium, long-term)	Effect on cash flows	Probability	Severity	Risk level	Prevention and/or mitigation measures	Residual risk
Difficulties in supplementing project teams with qualified staff	n/a	Insufficient technical expertise at local level	Reduced project efficiency	Medium	Delay in establishing positive cash flow	C	III	High	Corporate development programme as part of technical assistance; establishment of Project Implementation Unit (PIU)	Moderate
Difficulties in supplementing project teams with qualified staff	n/a	Insufficient project management and implementation experience at local level	Reduced project efficiency	Medium	Delay in establishing positive cash flow	C	III	High	Corporate development programme as part of technical assistance; establishment of PIU	Moderate
Construction delays	n/a	Insufficient project management and implementation experience at local level	Reduced project efficiency	Short to medium	Delay in benefits to public	C	II	Moderate	Corporate development programme and technical supervision as part of technical assistance; assistance to PIU	Moderate
Cost overruns in excess of contingencies	n/a	Insufficient project management and implementation experience at local level	Reduced project efficiency	Short to medium	Negative	C	III	Moderate	Corporate development programme and technical supervision as part of technical assistance; assistance to PIU	Low to moderate
Project targets not met	n/a	Outdated construction standards of materials and technologies applied for design and project implementation	Project not meeting local needs	Medium to long-term	Delay in benefits to public	C	III	Moderate	Lobbying within partner systems; Technical supervision as part of technical assistance; assistance to PIU	Moderate

Table 10-5: Risk level

Severity/Probability	I - none	II – minor	III – moderate	IV - critical	V - catastrophic
A. Very unlikely (0-10% probability)	Low	Low	Low	Low	Moderate
B. Unlikely (10–33% probability)	Low	Low	Moderate	Moderate	High
C. About as likely as not (33–66% probability)	Low	Low	Moderate	High	High
D. Likely (66–90% probability)	Low	Moderate	High	Very high	Very high
E. Very likely (90–100% probability)	Moderate	High	Very high	Very high	Very high

10.3.2 Interpretation of risk matrix

Adverse events for which the residual risk is higher than “moderate” should be modelled in a probabilistic risk analysis. It is assumed that all risk resulting from the adverse events will be mitigated down to at least “moderate” level through the measures indicated, with the exception of the political risk from elections and the winding up of various governments. This risk, in turn, cannot be adequately modelled in a probabilistic risk analysis.

The main mitigation measures are related to lobbying within partner systems (work with line ministries), establishment and assistance to a Project Implementation Unit, and technical assistance to the WSS operator through a corporate development programme. The corporate development programme is described in Chapter 5.7.6 – Technical Assistance.

Annexes

Annex 3	Legal and regulatory framework
Annex 4	General information on consumers
Annex 5	Investment Programme
Annex 6	Financial and economic analysis
Annex 8	Environmental impact assessment and gender aspects
Annex 11	Conceptual drawings

Annex 3

Legal and regulatory framework

Annex 3: Legal and regulatory framework

International regulations:

- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991), ratified by Parliament Decision No. 1546-XII dated 23 June, 1993. It was applied in construction impact assessment of a larger number of facilities, including Giurgiulesti terminal on Prut - Danube Rivers;
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992), ratified by Republic of Moldova Parliament Decision no. 1546 -XII dated 23 June 1993. Institutional cooperation entities in transboundary watercourses management were established based on bilateral cooperation agreements with Ukraine (11.23.1994) and Romania (08.28.2010);
- Convention on the Transboundary Effects of Industrial Accidents (Helsinki, 1992), ratified by Parliament Decision no. 1546-XII dated 23 June, 1993;
- Convention on cooperation and protection and sustainable use of the Danube River (Sofia, 1994) created the general legal instrument for cooperation in transboundary watercourse management in Danube River basin. The Convention was ratified by Republic of Moldova Parliament Decision no. 323-XIV of 17 March 1999, respectively that is a part of the management committee of Danube river basin;
- Convention on Access to Environmental Information, Public Participation in Environmental Decision-making and Access to Justice in environmental matters (The Aarhus Convention) was signed on 25 June 1998 and entered into force on 30 October 2001. The Aarhus Convention was ratified by Republic of Moldova Parliament Decision o. n46-XIV dated 07 April 1999 and the National Action Plan for implementing the Aarhus Convention in Moldova was approved by Government Decision no. 471 dated 28 June 2011;
- The Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes EEC UNO / WHO-EURO, adopted in London on 17 June 1999 entered into force on 4 August 2005. Republic of Moldova ratified the Protocol on Water and Health based on Law No. 207 dated 29 July 2005.

National Regulations:

- Law on local public administration no. 436 dated 12.28.2006, published in Monitorul Oficial, Republic of Moldova no. 32-35 dated 03.09.2007;
- Law on administrative decentralisation no. 435-XVI dated 12.28.2006, published in Monitorul Oficial, Republic of Moldova no. 29-31/91 dated 03.02.2007;
- Law on Local Public Finances No. 397-XV of 10.16.2003, published in Monitorul Oficial of Republic of Moldova no. 248/253 dated 10.16.2003;
- Law on public utility services no. 1402-XV of 10.24.2002, published in Monitorul Oficial, Republic of Moldova no.14-17/49 dated 02.07.2003;
- Law on Water Supply and Sanitation Public Services no. 303 dated 13 December 2013, published in Monitorul Oficial, Republic of Moldova no. 60-65 dated 03.14.2014;

- Water Law no. 272 of 23 December 2011, published in Monitorul Oficial al Republicii Moldova no. 81 dated 04.26.2012;
- Law on drinking water no. 272-XIVof 02.10.1999, published in Monitorul Oficial, Republic of Moldova no. 39-41 dated 22 April 1999;
- Law on state supervision of public health no. 10-XVI dated 02.03.2009, published in Monitorul Oficial, Republic of Moldova No. 67/183 dated 04.03.2009;
- Law on Public - Private Partnership no. 179-XVI of 07.10.2008, published in Monitorul Oficial, Republic of Moldova no. 165-166/605 dated 09.02.2008;
- Law on Concessions no. 534-XIII of 07.13.95, published in Monitorul Oficial, Republis of Moldova no. 67/752 dated 11.30.1995;
- Law on protection areas and protection strips of river waters and water basins no. 440-XIII of 27 Aprilie 1995, published in Monitorul Oficial, Republic of Moldova no. 43/482 dated 08.03.1995;
- Law on irrigation water users associations no. 171 of 07.09.2010, published in Monitorul Oficial, Republic of Moldova no. 160-162 dated 09.07.2010;
- Civil Code of Republic of Moldova no. 1107-XV of 6 June 2002, published in Monitorul Oficial, Republic of Moldova no. 82-86 dated 06.22.2002;
- Law on entrepreneurship and enterprises no. 845-XII of 01.03.1992, published in Monitorul Oficial, Republic of Moldova no. 2 dated 02.28.1994;
- Law on Joint Stock Companies no.1134-XIII of 04.02.1997, published in Monitorul Oficial, Republic of Moldova no. 38-39 dated 06.12.1997;
- Law on Limited Liability Companies no. 135 of 06.14.2007, published in Monitorul Oficial, Republic of Moldova no. 127-130 dated 08.17.2007;
- The law on state registration of legal entities and individual entrepreneurs no. 220-XVI of 10.19.2007, published in Monitorul Oficial, Republic of Moldova no. 184-187 dated 11.30.2007;
- Government Decision of Republic of Moldova no. 685 dated September 4 2013 on the National Strategy for Regional Development for the period 2013-2015, published in Monitorul Oficial, Republic of Moldova no. 198-204 dated 09.13.2013;
- Government Decision of Republic of Moldova on approval of Water Supply and Sanitation Strategy (2014-2028) no. 199 dated 20 March 2014, published in Monitorul Oficial, Republicof Moldova no. 72-77 dated 03.28.2014;
- Government Decision of Republic of Moldova no. 802 dated 10.09.2013 for approving the Regulation on conditions for waste water discharge into water bodies, published in Monitorul Oficial, Republic of Moldova no. 243-247 dated 11.01.2013;
- Government Decision of Republic of Moldova no. 950 of 25 November 2013 approving the Regulation on requirements for collection, treatment and discharge of wastewater into the sewerage system and / or water bodies for urban and rural areas, published in Monitorul Oficial, Republic of Moldova no. 284-289 dated 12.06.2013;

- Government Decision of Republic of Moldova no. 387 of 06.06.1994 on the approval of the Model Regulation for Municipal enterprises, published in Monitorul Oficial, Republic of Moldova no. 2 dated 09.02.1994;
- Government Decision of Republic of Moldova no. 1006 of 09.13.2004 on the approval of the Regulation on public utility service concession, published in Monitorul Oficial, Republic of Moldova no. 171 dated 09.17.2004;
- Government Decision of Republic of Moldova no. 656 of 05.27.2002 on the approval of the Regulation Framework on the use of municipal water supply and sewerage system, published in Monitorul Oficial, Republic of Moldova no. 71-73 dated 06.06.2002;
- Government Decision of Republic of Moldova no. 1228 dated 11.13.2007 approving the Regulation on the acquisition, designing, installation, reception and operation of the equipment for recording water consumption, published in Monitorul Oficial, Republic of Moldova no. 180-183 dated 11.23.2007;
- Government Decision of Republic of Moldova no. 1188 dated in 11.02.2004 on the Action Plan related to the operation of the 'Soroca - Balti' water main and the water supply of some areas of the country, published in Monitorul Oficial, Republic of Moldova no. 199-204 of 11.05.2004;
- Government Decision of Republic of Moldova no. 619 dated 08.16.1994 on the regulation of links in the field of water management and rational use of water resources in Republic of Moldova, published in Monitorul Oficial, Republic of Moldova no. 3 dated 09.08.1994;
- Decision of the National Agency for Energy Regulation no. 741 of 12.18.2014 on approving the Methodology for determination, approval and application of tariffs for public water supply, sanitation and wastewater treatment services, published in Monitorul Oficial, Republic of Moldova no. 33-38 dated 02.13.2015;
- Decision of the Ministry of Regional Development, Construction, Housing and Communal Services on the approval of the Strategy for modernization and development of municipal water supply and sewerage systems no. 7/1 dated 05.14.99, published in Monitorul Oficial, Republic of Moldova no. 130-133/238 of 11.25.1999;
- Order of the Ministry of Environment and Ministry of Health on approving the list of target indicators for implementation of the Protocol on Water and Health no. 91 / 704 of 20 October 2010.

Standards for the design and construction of infrastructure in the field of water supply and sanitation are:

- Construction Standard of Moldova / CSM L.01.07: 2005 The structure of the bill of quantity in construction;
- CSM A.07.03: 2014 Procedure on development, notification and approval of special technical conditions regarding project documentation of building projects (this one is valid);
- CSM G.03.01: 2012 Small capacity wastewater treatment plants;
- Practice Code / PC G.03.02-2006 Design and installation of water supply and sewerage systems made of polymer materials;

- PC G.03.06-2011 Design and installation of sewage underground pipes made of glass fiber reinforced plastics;
- SNiP 2.04.01-85 Internal water supply and sewerage systems;
- SNiP 2.04.02-84 Water supply. External networks and installations;
- SNiP 2.04.03-85 Sewerage. External networks and installations;
- SNiP 3.05.04-85 Water supply and sewerage external networks and installations;
- GOST 12.3.006-75* Safety standards system. Operation of the water supply and sewage facilities and networks. General safety requirements;
- Guideline to SNiP 2.04.02 Design of installations for surface water catchment;
- Guideline to SNiP 2.04.02-84 Design of installations for water treatment;
- Guideline to SNiP 2.04.03-85 Design of installations for wastewater treatment;
- Guideline to SNiP 2.04.02-84 Guideline on the volume and content of the project documentation for external water supply and sewerage systems;
- Guideline to SNiP 3.05.04-85 Guideline on laying and installation of cast iron, concrete and asbestos-cement pipelines of water supply and sewerage systems.

Annex 4

General information on consumers

Annex 4: General information on consumers

Table 4-1: General information about public institutions in the town of Falesti

No.	Public institution name	No. of pupils/children/ places/beds	No. of employers	Connected to water supply system	Connected to centralised sewerage system
1.	Boarding school	n/f	-	yes	yes
2.	Technical college No. 9	52	28	yes	yes
3.	Lyceum “Alexandru Puskin”	436	68	yes	yes
4.	Lyceum “Mihai Eminescu’’	1,111	103	yes	yes
5.	Lyceum “Ion Creanga”	347	47	yes	yes
6.	Gymnasium Gheorghe Caruntu	140	29	yes	
7.	Lyceum Fabrica de Zahar	61	24	yes	yes
8.	Creation House	41	17	yes	yes
9.	Sport school	59	12	yes	yes
10.	Music school - Culture	39	6	yes	yes
11.	Painting and Culture Department	11	3	yes	yes
12.	Kindergarten no.5	171	27	yes	yes
13.	Kindergarten no.6	137	24	yes	
14.	Kindergarten no.8	92	19	yes	
15.	Kindergarten no.10	159	25	yes	yes
16.	Kindergarten no.12	224	36	yes	yes
17.	Public Healthcare Centre		49	yes	yes
18.	Rayon Hospital	280	381	yes	yes

Source: LPA Florești, Falesti Municipal Services Utility

Table 4-2: General information about public institutions in Falestii Noi and Calugar villages

No.	Type of public institution	Locality name			
		Falestii Noi		Calugar	
		No. of pupils/children/ /places/beds	No. of employers	No. of pupils/children/ /places/beds	No. of employers
1.	School	234	29	276	28
2.	Kindergarten	159	28	122	14
3.	Centre of Family Physicians		5		4

Source: LPA Falestii Noi Commune, LPA Calugar Commune

Table 4-3: General information about business entities in the town of Falesti

No.	Business entity	No. of employers	Field	Type of property	Connected to water supply system	Connected to centralised sewerage system
1	C. B. “Banca Sociala” Falesti subsidiary	18	banking services	joint stock company	yes	yes
2	C.B. “Moldovagroindbank” Falesti subsidiary	15	banking services	joint stock company	yes	yes
3	C.B. “Banca de	14	banking	joint stock	yes	yes

No.	Business entity	No. of employers	Field	Type of property	Connected to water supply system	Connected to centralised sewerage system
	Economii" Falesti subsidiary		services	company		
4	C.B. "Victoriabanc" Falesti subsidiary	21	banking services	joint stock company	yes	yes
5	"Moldelectrica" J.S.C.	8	commerce	joint stock company	yes	
6	S.A. "Dina" J.S.C.	11	commerce	private	yes	
7	Department of Maintaining Balti Railway	16	services	private	yes	
8	FFE "Martatex"Ltd.	325	commerce	private	yes	yes
9	Teba Industrias Subsidiary	124	commerce	private	yes	yes
10	Bakery	35	commerce	private	yes	yes
11	Elita-5	12	commerce	private	yes	yes
12	T.C. "Netcomax-Nord" Ltd.	11	commerce	private	yes	yes
13	"Benasem" Ltd.	5	commerce	private	yes	yes
14	FFE,"Romina Cablagi" Ltd.	106	commerce	private	yes	yes
15	Moldtelecom Falesti JSC	26	services	joint stock company	yes	yes
16	Falesti Post Office	19	services	state enterprise	yes	yes
17	Consum COOP JSC	36	commerce	joint stock company	yes	yes
18	"Red-Nord" JSC	135	services	joint stock company	yes	yes
19	"Primafarm" Ltd.	12	commerce	private	yes	
20	"Babii Nord"Ltd.	16	commerce	private	yes	
21	Specialised company in technique repair Falesti JSC	17	commerce	private	yes	
22	Raion Dental Centre	14	services	joint venture	yes	yes
23	"Balti-Gaz" Ltd. Falesti subsidiary	27	services	joint stock company	yes	yes
24	JSC "Prut-80"	29	commerce	private	yes	yes
25	JSC Unitex – Servicii	12	services	joint stock company	yes	yes
26	FFE UniMarket Discount Ltd.	24	commerce	private	yes	yes
27	I.E Fabrica de vin"	18	commerce	private	yes	yes
28	I.E. "Cecan Ion"	18	commerce	private	nu	
29	Healthcare institution Statia zonala AMI Nord	12	services	state enterprise	yes	yes
30	C.B. "Mobiasbanca"	6	banking services	joint stock company	yes	yes

Source: LPA Falești, Falesti Municipal Services Utility

Table 4-4: General information about business entities in Falestii Noi village

No.	Business entity	Total no. of business entities	Connected to water supply system
1.	JSC „Prut 80”	37	individual deep well
2.	JSC „UMS”	23	no
3.	JSC „Uzina de tevi PROTOS”	10	no
4.	Ltd. „Polimergazconducte”	35	individual deep well
5.	42 business entities	155	no

Source: LPA Falestii Noi Commune

Table 4-5: General information about business entities in Calugar village

No.	Business entity	Total no. of business entities	Connected to water supply system
1.	Ltd. „Abilitate Agro”	50	no
2.	Ltd. „Agro Petruc Plus”	3	no
3.	Ltd. „Marcons Drum”	9	no
4.	23 business entities	89	no

Source: LPA Calugar Commune

Annex 5

Investment Programme

Annex 5: Investment Programme

Annex 5.1: Water Demand Projection

N°	Parameter	Unit	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	**Population in the project area served with water**																																	
1.1	Total population serviced	N°	10,258	10,232	10,206	10,180	10,329	10,303	10,277	13,058	13,757	14,455	15,152	15,849	16,545	17,239	17,933	18,626	19,318	19,326	19,334	19,342	19,350	19,358	19,366	19,374	19,382	19,390	19,398	19,406	19,414	19,422	19,430	19,438
1.2	In urban settlements	N°	10,258	10,232	10,206	10,180	10,329	10,303	10,277	10,499	11,141	11,782	12,422	13,060	13,698	14,335	14,970	15,604	16,237	16,200	16,164	16,127	16,090	16,054	16,017	15,980	15,944	15,907	15,870	15,834	15,797	15,760	15,724	15,687
1.3	In rural settlements	N°	0	0	0	0	0	0	0	2,559	2,616	2,673	2,731	2,789	2,847	2,905	2,963	3,022	3,081	3,126	3,170	3,215	3,260	3,304	3,349	3,394	3,438	3,483	3,527	3,572	3,617	3,661	3,706	3,751
2	**Volume of water sold in total and disaggr. for different consumers**																																	
2.1	Total volume sold	m^3/y	238,700	248,519	258,287	268,003	282,443	292,224	301,955	351,857	385,977	421,482	458,369	496,635	536,278	577,295	619,683	663,439	708,560	720,925	733,309	745,715	758,140	770,587	783,054	795,541	808,049	820,578	833,128	845,698	858,288	870,900	883,532	896,185
2.2	Domestic customers	m^3/y	206,100	212,199	218,265	224,298	234,261	240,334	246,377	286,507	312,140	338,664	366,078	394,380	423,568	453,641	484,597	516,434	549,151	561,688	574,244	586,821	599,419	612,037	624,676	637,335	650,015	662,715	675,437	688,178	700,941	713,724	726,527	739,352
2.3	Industrial customers	m^3/y	24,100	26,038	27,966	29,883	32,338	34,269	36,190	39,021	43,585	48,394	53,449	58,749	64,293	70,081	76,111	82,383	88,897	88,697	88,496	88,295	88,094	87,893	87,693	87,492	87,291	87,090	86,889	86,689	86,488	86,287	86,086	85,886
2.4	Institutional customers	m^3/y	8,500	10,283	12,056	13,821	15,844	17,621	19,389	26,329	30,252	34,424	38,842	43,506	48,417	53,573	58,975	64,621	70,512	70,541	70,569	70,598	70,627	70,656	70,685	70,714	70,743	70,773	70,802	70,831	70,860	70,889	70,918	70,948
3	**Total water sold disaggr. for urban and rural areas**																																	
3.1	Urban Settlements	m^3/y	238,700	248,519	258,287	268,003	282,443	292,224	301,955	319,164	350,037	382,181	415,593	450,269	486,205	523,398	561,845	601,542	642,486	651,517	660,500	669,437	678,326	687,167	695,961	704,707	713,406	722,058	730,662	739,218	747,728	756,189	764,603	772,970
3.2	Rural settlements	m^3/y	0	0	0	0	0	0	0	32,693	35,940	39,301	42,776	46,367	50,073	53,896	57,837	61,896	66,075	69,408	72,809	76,278	79,815	83,420	87,093	90,834	94,643	98,521	102,466	106,479	110,561	114,711	118,929	123,215
4	**Non-Revenue Water (NRW) volume dissagregated for total NRW, apparent losses, and real losses**																																	
4.1	Total NRW	m^3/y	222,700	231,861	215,727	200,168	188,295	176,585	164,986	173,303	185,488	197,586	209,564	221,392	233,039	244,477	255,678	266,616	277,263	279,202	281,067	282,857	284,574	286,218	287,789	289,288	290,715	292,070	293,355	294,569	295,713	296,787	297,792	298,728
4.2	Apparent losses	m^3/y	55,675	57,965	53,932	50,042	47,074	43,756	40,468	42,013	43,812	45,398	46,755	47,868	48,723	49,306	49,604	49,603	49,291	50,006	50,719	51,429	52,136	52,840	53,542	54,241	54,938	55,632	56,324	57,013	57,700	58,384	59,066	59,746
4.3	Real losses (physical losses)	m^3/y	167,025	173,896	161,795	150,126	141,222	132,829	124,518	131,290	141,676	152,188	162,809	173,523	184,316	195,171	206,075	217,013	227,972	229,196	230,348	231,429	232,438	233,378	234,247	235,046	235,776	236,438	237,031	237,556	238,013	238,403	238,726	238,983
5	**The water demand figures considering the demand variation factors**																																	
5.1	Yearly water demand/production	m^3/y	461,400	480,380	474,014	468,171	470,738	468,809	466,941	525,160	571,465	619,068	667,933	718,027	769,317	821,772	875,361	930,054	985,823	1,000,127	1,014,376	1,028,572	1,042,715	1,056,805	1,070,843	1,084,829	1,098,764	1,112,648	1,126,482	1,140,267	1,154,001	1,167,687	1,181,324	1,194,913
5.2	Average daily water demand	m^3/d	1,264	1,316	1,299	1,283	1,290	1,284	1,279	1,439	1,566	1,696	1,830	1,967	2,108	2,251	2,398	2,548	2,701	2,740	2,779	2,818	2,857	2,895	2,934	2,972	3,010	3,048	3,086	3,124	3,162	3,199	3,237	3,274
5.3	Maximum daily water demand	m^3/d	1,330	1,384	1,369	1,356	1,367	1,364	1,362	1,535	1,671	1,812	1,956	2,103	2,255	2,410	2,568	2,730	2,895	2,938	2,980	3,022	3,064	3,106	3,148	3,190	3,232	3,273	3,315	3,356	3,397	3,438	3,479	3,519
5.4	Average hourly water demand	m^3/h	53	55	54	53	54	54	53	60	65	71	76	82	88	94	100	106	113	114	116	117	119	121	122	124	125	127	129	130	132	133	135	136
5.5	Max. hourly water demand	m^3/h	69	71	71	71	73	73	73	83	91	99	107	115	124	132	141	150	160	162	165	167	170	172	174	177	179	182	184	187	189	191	194	196

*existing situation

**1st year of operation phase 1 investments

*** 1st year of operation phase 2 investments

Annex 5.2: Wastewater Flow and Load Projection

N°	Parameter	Unit	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	**Population in the project area served with sewerage**																																	
1.1	Total population serviced	N°	4,836	4,824	4,812	4,799	4,787	4,775	4,763	13,132	13,588	14,046	14,506	14,967	15,430	15,894	16,360	16,828	17,297	17,367	17,436	17,505	17,573	17,640	17,707	17,773	17,838	17,903	17,967	18,031	18,094	18,156	18,217	18,278
1.2	In urban settlements	N°	4,836	4,824	4,812	4,799	4,787	4,775	4,763	10,976	11,373	11,772	12,172	12,575	12,979	13,385	13,793	14,202	14,613	14,634	14,655	14,676	14,696	14,716	14,736	14,755	14,774	14,793	14,812	14,831	14,849	14,867	14,885	14,903
1.3	In rural settlements	N°	0	0	0	0	0	0	0	2,156	2,215	2,275	2,333	2,392	2,451	2,509	2,568	2,626	2,684	2,733	2,781	2,829	2,877	2,924	2,971	3,018	3,064	3,110	3,155	3,200	3,244	3,289	3,332	3,376
2	**Volume of wastewater charged in total and disaggr. for different customers**																																	
2.1	Total volume of wastewater gen,	m^3/y	160,600	162,519	164,427	166,324	168,211	170,088	171,955	429,081	451,983	475,447	499,474	524,066	549,226	574,956	601,258	628,134	655,586	667,719	679,930	692,218	704,582	717,021	729,532	742,116	754,770	767,493	780,284	793,142	806,066	819,053	832,103	845,215
2.2	by domestic customers	m^3/y	110,700	113,105	115,497	117,877	120,243	122,597	124,940	317,625	336,928	356,811	377,276	398,326	419,964	442,192	465,013	488,429	512,443	524,206	536,051	547,977	559,982	572,065	584,225	596,460	608,770	621,153	633,607	646,132	658,726	671,387	684,115	696,908
2.3	by industrial customers	m^3/y	42,958	41,822	40,691	39,566	38,446	37,331	36,222	81,131	81,645	82,001	82,199	82,238	82,117	81,835	81,390	80,781	80,008	80,123	80,236	80,348	80,459	80,569	80,677	80,784	80,890	80,994	81,097	81,198	81,299	81,398	81,495	81,591
2.4	by Institutional customers	m^3/y	6,942	7,592	8,239	8,882	9,522	10,159	10,793	30,324	33,410	36,635	39,998	43,502	47,145	50,930	54,856	58,924	63,135	63,390	63,643	63,893	64,141	64,387	64,630	64,871	65,110	65,346	65,580	65,812	66,041	66,268	66,493	66,716
3	**Total wastewater charged disaggr, for urban and rural areas**																																	
3.1	in urban Settlements	m^3/y	160,600	162,519	164,427	166,324	168,211	170,088	171,955	401,535	421,547	442,008	462,921	484,288	506,113	528,396	551,142	574,352	598,030	607,037	616,057	625,089	634,134	643,191	652,259	661,338	670,428	679,528	688,638	697,758	706,886	716,023	725,169	734,322
3.2	in rural settlements	m^3/y	0	0	0	0	0	0	0	27,546	30,436	33,439	36,553	39,778	43,114	46,560	50,116	53,782	57,556	60,682	63,873	67,129	70,448	73,830	77,273	80,777	84,341	87,965	91,646	95,385	99,179	103,030	106,935	110,893
4	**The sewer infiltration water based on the determined infiltration rate**																																	
4.1	**Sewer Infiltration water**	m^3/y	80,300	77,197	73,992	70,688	67,284	56,696	45,855	85,816	89,455	93,108	96,773	100,446	104,124	107,804	111,483	115,158	118,825	119,633	120,404	121,138	121,834	122,491	123,109	123,686	124,223	124,718	125,171	125,581	125,948	126,271	126,549	126,782
5	**The wastewater generation figures considering the variation factors**																																	
5.1	Avg, wastewater flow (dry weather)	m^3/y	240,900	239,716	238,419	237,012	235,495	226,784	217,809	514,897	541,438	568,555	596,247	624,512	653,351	682,761	712,741	743,292	774,411	787,352	800,334	813,356	826,416	839,512	852,641	865,802	878,992	892,211	905,455	918,723	932,014	945,324	958,652	971,997
5.2	Max, daily dry weather flow (Qdmax)	m^3/d	704	701	698	695	691	668	644	1,528	1,607	1,688	1,770	1,855	1,940	2,028	2,117	2,209	2,301	2,340	2,379	2,418	2,457	2,496	2,536	2,575	2,615	2,655	2,694	2,734	2,774	2,814	2,854	2,895
5.3	Max, hourly dry weather flow (QDWF)	m^3/h	47	48	48	48	48	47	46	112	118	124	130	137	143	149	156	163	170	173	176	179	182	185	188	191	194	197	200	204	207	210	213	216
5.4	Max, hourly Storm Water Flow (QSWF)	m^3/h	62	62	62	62	62	61	60	146	153	161	169	177	186	194	203	212	221	225	229	233	237	241	245	249	253	257	261	265	269	273	277	281
6	**Population equivalents in total and disaggr, for different customers**																																	
6.1	Total population equivalent	PE_{60}	5,349	5,331	5,314	5,297	5,280	5,263	5,246	14,277	14,770	15,265	15,761	16,259	16,758	17,258	17,760	18,263	18,768	18,842	18,915	18,987	19,059	19,129	19,200	19,269	19,338	19,407	19,474	19,541	19,607	19,673	19,738	19,802
6.2	by domestic customers	PE_{60}	4,836	4,824	4,812	4,799	4,787	4,775	4,763	13,132	13,588	14,046	14,506	14,967	15,430	15,894	16,360	16,828	17,297	17,367	17,436	17,505	17,573	17,640	17,707	17,773	17,838	17,903	17,967	18,031	18,094	18,156	18,217	18,278
6.3	by Industrial and instit, customers	PE_{60}	513	508	503	498	493	488	483	1,145	1,182	1,219	1,255	1,292	1,328	1,364	1,400	1,435	1,471	1,474	1,478	1,482	1,486	1,489	1,493	1,496	1,500	1,503	1,507	1,510	1,514	1,517	1,520	1,524
7	**Pollution load – BOD in total and disaggr, for different customers**																																	
7.1	The total BOD_5 load	kg/d	321	320	319	318	317	316	315	857	886	916	946	976	1,005	1,035	1,066	1,096	1,126	1,130	1,135	1,139	1,144	1,148	1,152	1,156	1,160	1,164	1,168	1,172	1,176	1,180	1,184	1,188
7.2	by domestic customers	kg/d	290	289	289	288	287	287	286	788	815	843	870	898	926	954	982	1,010	1,038	1,042	1,046	1,050	1,054	1,058	1,062	1,066	1,070	1,074	1,078	1,082	1,086	1,089	1,093	1,097
7.3	by industrial and instit, customers	kg/d	31	30	30	30	30	29	29	69	71	73	75	78	80	82	84	86	88	88	89	89	89	89	90	90	90	90	90	91	91	91	91	91

*existing situation

**1st year of operation phase 1 investments)

*** 1st year of operation phase 2 investments)

Annex 5.3: Development of connection rates water supply

N°	Settlement	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Falesti	61%	61%	61%	61%	62%	62%	62%	63%	67%	71%	75%	79%	84%	88%	92%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	Falestii Noi	0%	0%	0%	0%	0%	0%	0%	62%	63%	65%	66%	68%	69%	71%	73%	74%	76%	78%	79%	81%	82%	84%	85%	87%	88%	90%	91%	93%	95%	96%	98%	100%
3	Calugar	0%	0%	0%	0%	0%	0%	0%	60%	61%	63%	64%	66%	68%	69%	71%	73%	75%	76%	78%	79%	81%	83%	84%	86%	87%	89%	91%	93%	94%	96%	98%	100%
TOT	**Total**	**49%**	**49%**	**49%**	**48%**	**49%**	**49%**	**49%**	**63%**	**66%**	**70%**	**73%**	**77%**	**81%**	**84%**	**88%**	**91%**	**95%**	**95%**	**96%**	**96%**	**96%**	**97%**	**97%**	**97%**	**98%**	**98%**	**98%**	**99%**	**99%**	**99%**	**100%**	**100%**

Annex 5.4: Development of connected population water supply

N°	Settlement	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Falesti	10,258	10,232	10,206	10,180	10,329	10,303	10,277	10,499	11,141	11,782	12,422	13,060	13,698	14,335	14,970	15,604	16,237	16,200	16,164	16,127	16,090	16,054	16,017	15,980	15,944	15,907	15,870	15,834	15,797	15,760	15,724	15,687
2	Falestii Noi	0	0	0	0	0	0	0	1,283	1,310	1,337	1,365	1,392	1,420	1,448	1,475	1,503	1,531	1,552	1,574	1,595	1,616	1,637	1,658	1,679	1,700	1,721	1,742	1,763	1,784	1,805	1,826	1,847
3	Calugar	0	0	0	0	0	0	0	1,276	1,306	1,336	1,366	1,396	1,427	1,457	1,488	1,519	1,550	1,574	1,597	1,620	1,644	1,667	1,691	1,714	1,738	1,761	1,785	1,809	1,833	1,856	1,880	1,904
TOT	**Total**	**10,258**	**10,232**	**10,206**	**10,180**	**10,329**	**10,303**	**10,277**	**13,058**	**13,757**	**14,455**	**15,152**	**15,849**	**16,545**	**17,239**	**17,933**	**18,626**	**19,318**	**19,326**	**19,334**	**19,342**	**19,350**	**19,358**	**19,366**	**19,374**	**19,382**	**19,390**	**19,398**	**19,406**	**19,414**	**19,422**	**19,430**	**19,438**

Annex 5.5: Development of connection rates wastewater

N°	Settlement	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Falesti	29	29	29	29	29	29	29	66	69	71	74	77	79	82	85	87	90	90	91	91	91	92	92	92	93	93	93	94	94	94	95	95
2	Falestii Noi	0	0	0	0	0	0	0	53	54	56	57	59	60	62	63	65	67	68	70	71	73	74	76	77	79	80	82	83	85	87	88	90
3	Calugar	0	0	0	0	0	0	0	50	51	53	55	56	58	60	61	63	65	66	68	70	71	73	74	76	78	79	81	83	85	86	88	90
TOT	**Total**	**23**	**23**	**23**	**23**	**23**	**23**	**23**	**63**	**65**	**68**	**70**	**73**	**75**	**78**	**80**	**83**	**85**	**86**	**86**	**87**	**87**	**88**	**89**	**89**	**90**	**90**	**91**	**92**	**92**	**93**	**93**	**94**

Annex 5.6: Development of connected population wastewater

N°	Settlement	2014*	2015	2016	2017	2018**	2019	2020	2021***	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Falesti	4,836	4,824	4,812	4,799	4,787	4,775	4,763	10,976	11,373	11,772	12,172	12,575	12,979	13,385	13,793	14,202	14,613	14,634	14,655	14,676	14,696	14,716	14,736	14,755	14,774	14,793	14,812	14,831	14,849	14,867	14,885	14,903
2	Falestii Noi	0	0	0	0	0	0	0	1,092	1,121	1,149	1,176	1,204	1,232	1,259	1,286	1,313	1,340	1,364	1,387	1,409	1,432	1,454	1,476	1,498	1,519	1,541	1,562	1,582	1,603	1,623	1,643	1,662
3	Calugar	0	0	0	0	0	0	0	1,064	1,095	1,126	1,157	1,188	1,219	1,250	1,282	1,313	1,344	1,369	1,395	1,420	1,445	1,470	1,495	1,520	1,545	1,569	1,593	1,618	1,642	1,666	1,690	1,713
TOT	**Total**	**4,836**	**4,824**	**4,812**	**4,799**	**4,787**	**4,775**	**4,763**	**13,132**	**13,588**	**14,046**	**14,506**	**14,967**	**15,430**	**15,894**	**16,360**	**16,828**	**17,297**	**17,367**	**17,436**	**17,505**	**17,573**	**17,640**	**17,707**	**17,773**	**17,838**	**17,903**	**17,967**	**18,031**	**18,094**	**18,156**	**18,217**	**18,278**

Annex 6

Financial and economic analysis

Annex 6: Financial and economic analysis

Table 6-1: Macroeconomic forecast

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Real Wage Increase	1.50%	3.00%	4.60%	4.30%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Base Case	1.50%	3.00%	4.60%	4.30%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Pessimistic	0.75%	1.50%	2.30%	2.15%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Optimistic	3.50%	5.00%	6.60%	6.30%	5.00%	5.00%	5.00%	6.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%	5.00%
Real GDP growth	-2.00%	1.50%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Base Case	-2.00%	1.50%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Pessimistic	-2.00%	0.75%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Optimistic	-2.00%	3.00%	4.50%	5.00%	5.00%	5.00%	5.00%	6.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%	5.00%
Costs of electricity	0.0%	37.0%	1.0%	1.0%	1.0%	1.0%	1.0%	3.0%	3.0%	3.0%	3.0%	3.0%	2.5%	2.5%	2.5%
Base Case	0.0%	37.0%	1.0%	1.0%	1.0%	1.0%	1.0%	3.0%	3.0%	3.0%	3.0%	3.0%	2.5%	2.5%	2.5%
Pessimistic	0.0%	37.0%	2.3%	2.4%	2.3%	2.4%	2.4%	6.0%	6.0%	6.0%	6.0%	6.0%	5.0%	5.0%	5.0%
Optimistic	0.0%	37.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

Indicator	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Real Wage Increase	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Base Case	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Pessimistic	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Optimistic	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Real GDP growth	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Base Case	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Pessimistic	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Optimistic	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Costs of electricity	2.5%	2.5%	5.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	4.0%	4.0%	3.0%	3.0%	3.0%
Base Case	2.5%	2.5%	5.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	4.0%	4.0%	3.0%	3.0%	3.0%
Pessimistic	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	4.0%	4.0%	3.0%	3.0%	3.0%
Optimistic	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

Table 6-2: Investment costs for water supply

Category of Costs		TOTAL	1	2	3	4	5
Equipment and tools	MDL M	4.16	0.42	2.08	1.66	0.00	0.00
Pipelines	MDL M	27.44	2.74	13.72	10.98	0.00	0.00
Water towers	MDL M						
Reservoirs	MDL M						
Pumping stations	MDL M						
Water treatment plant	MDL M						
TOTAL Construction and installation costs	**MDL M**	**31.60**	**3.16**	**15.80**	**12.64**	**0.00**	**0.00**
Design and engineering	MDL M	3.79	0.38	1.90	1.52	0.00	0.00
Technical assistance	MDL M	6.23	0.62	3.12	2.49	0.00	0.00
Contingencies	MDL M	4.16	0.42	2.08	1.67	0.00	0.00
TOTAL Investment Costs for Water Supply	**MDL M**	**45.79**	**4.58**	**22.89**	**18.32**	**0.00**	**0.00**

Table 6-3: Depreciation rates for water supply

		years	%
1	Pipelines	50	2.0%
2	Water towers	16	6.3%
3	Reservoirs	20	5.0%
4	Pumping stations	20	5.0%
5	Equipment and tools	10	10.0%
6	Water treatment plant	35	2.9%
7	Land acquisition	99999999	0.0%
8	Technical assistance	50	2.0%
9	Contingency	50	2.0%

Table 6-4: Summary of investment costs for water supply

			TOTAL	1	2	3	4	5	6
1	Pipelines	MDL M	27.4	2.7	13.7	11.0	0.0	0.0	0.0
2	Water towers	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Reservoirs	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Pumping stations	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Equipment and tools	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Water treatment plant	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Land acquisition	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Technical assistance	MDL M	10.0	1.0	5.0	4.0	0.0	0.0	0.0
9	Contingency	MDL M	4.2	0.4	2.1	1.7	0.0	0.0	0.0
	TOTAL	**MDL M**	**41.6**	**4.2**	**20.8**	**16.7**	**0.0**	**0.0**	**0.0**

Table 6-5: Depreciation for water supply

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Pipelines	MDL M		0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
8	Technical assistance	MDL M		0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9	Contingency	MDL M		0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	TOTAL	MDL M	**0.0**	**0.1**	**0.5**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Pipelines	MDL M	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
8	Technical assistance	MDL M	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9	Contingency	MDL M	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	TOTAL	MDL M	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**

Table 6-6: Gross value of new assets for water supply

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Pipelines	MDL M	2.7	16.5	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4
8	Technical assistance	MDL M	1.0	6.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
9	Contingency	MDL M	0.4	2.5	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
	TOTAL	**MDL M**	**4.2**	**25.0**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Pipelines	MDL M	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4
8	Technical assistance	MDL M	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
9	Contingency	MDL M	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
	TOTAL	**MDL M**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**	**41.6**

Table 6-7: Net assets for water supply

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Pipelines	MDL M	2.7	16.4	27.1	26.5	26.0	25.4	24.9	24.3	23.8	23.2	22.7	22.1	21.6	21.0	20.5
8	Technical assistance	MDL M	1.0	6.0	9.9	9.7	9.5	9.3	9.1	8.9	8.7	8.5	8.3	8.1	7.9	7.7	7.5
9	Contingency	MDL M	0.4	2.5	4.1	4.0	3.9	3.9	3.8	3.7	3.6	3.5	3.4	3.4	3.3	3.2	3.1
	TOTAL	MDL M	**4.2**	**24.9**	**41.1**	**40.2**	**39.4**	**38.6**	**37.7**	**36.9**	**36.1**	**35.2**	**34.4**	**33.6**	**32.7**	**31.9**	**31.1**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Pipelines	MDL M	19.9	19.4	18.8	18.3	17.7	17.2	16.6	16.1	15.5	15.0	14.4	13.9	13.3	12.8	12.2
8	Technical assistance	MDL M	7.3	7.1	6.9	6.7	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5
9	Contingency	MDL M	3.0	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0	1.9	1.9
	TOTAL	MDL M	**30.2**	**29.4**	**28.6**	**27.7**	**26.9**	**26.1**	**25.2**	**24.4**	**23.6**	**22.7**	**21.9**	**21.1**	**20.2**	**19.4**	**18.6**

Table 6-8: Depreciation costs for water supply

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Pipelines	MDL M		0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
8	Technical assistance	MDL M		0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9	Contingency	MDL M		0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	TOTAL	**MDL M**		**0.1**	**0.5**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Pipelines	MDL M	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
8	Technical assistance	MDL M	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9	Contingency	MDL M	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	TOTAL	**MDL M**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**

Table 6-9: Variable costs – summary

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Water supply																
1	Electricity for pumping	MDL M	1.44	2.00	2.04	1.97	1.98	1.99	2.00	2.24	2.50	2.77	3.06	3.38	3.69	4.03	4.38
2	Water treatment costs	MDL M	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.13	0.14
	TOTAL variable costs for water	MDL M	1.525	2.084	2.128	2.045	2.056	2.068	2.083	2.328	2.591	2.872	3.172	3.491	3.814	4.155	4.515
	Wastewater																
1	Electricity for pumping	MDL M	0.278	0.378	0.380	0.381	0.371	0.360	0.717	0.771	0.827	0.887	0.949	1.016	1.080	1.148	1.219
2	Wastewater treatment costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	TOTAL variable costs for water	MDL M	0.281	0.381	0.383	0.384	0.374	0.362	0.723	0.776	0.833	0.893	0.956	1.023	1.088	1.156	1.227

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Water supply																
1	Electricity for pumping	MDL M	4.75	4.92	5.22	5.54	5.88	6.24	6.61	6.95	7.29	7.65	8.03	8.43	8.75	9.09	9.44
2	Water treatment costs	MDL M	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17
	TOTAL variable costs for water	MDL M	4.894	5.069	5.372	5.693	6.033	6.391	6.769	7.102	7.449	7.813	8.193	8.589	8.919	9.259	9.612
	Wastewater																
1	Electricity for pumping	MDL M	1.294	1.349	1.441	1.539	1.644	1.754	1.872	1.979	2.091	2.208	2.332	2.463	2.575	2.691	2.813
2	Wastewater treatment costs	MDL M	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	TOTAL variable costs for water	MDL M	1.302	1.357	1.450	1.548	1.652	1.763	1.881	1.988	2.100	2.218	2.342	2.472	2.584	2.701	2.823

Table 6-10: Fixed costs

	Water		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Maintenance - old assets	MDL M	0.00	0.00	0.00	2.00	2.04	2.08	2.12	2.16	2.21	2.25	2.30	2.34	2.39	2.44	2.49
2	Maintenance - new assets	MDL M	0.00	0.04	0.25	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
3	Salaries and related costs	MDL M	0.94	0.96	1.01	0.90	0.94	0.97	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73
4	Fuel	MDL M	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
5	General and administrative expenditures	MDL M	0.93	0.94	0.98	0.55	0.57	0.59	0.62	0.64	0.67	0.69	0.72	0.75	0.78	0.81	0.85
6	Other costs	MDL M	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
	TOTAL fixed costs for water	MDL M	2.189	2.272	2.562	4.191	4.289	4.390	4.748	4.865	4.987	5.113	5.243	5.377	5.515	5.658	5.806
	Wastewater																
1	Maintenance - old assets	MDL M	0.00	0.00	0.00	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.59	0.60	0.61	0.62
2	Maintenance - new assets	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Salaries and related costs	MDL M	0.98	1.01	1.06	0.83	0.86	0.90	1.29	1.35	1.40	1.46	1.51	1.57	1.64	1.70	1.77
4	Fuel	MDL M	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5	General and administrative expenditures	MDL M	0.76	0.77	0.80	0.45	0.46	0.48	0.50	0.52	0.54	0.57	0.59	0.61	0.64	0.66	0.69
6	Other costs	MDL M	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	TOTAL fixed costs for wastewater	MDL M	1.847	1.888	1.965	1.884	1.945	2.008	2.436	2.518	2.604	2.693	2.785	2.880	2.979	3.082	3.189

	Water		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Maintenance - old assets	MDL M	2.54	2.59	2.64	2.69	2.75	2.80	2.84	2.89	2.93	2.97	3.02	3.06	3.11	3.15	3.20
2	Maintenance - new assets	MDL M	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
3	Salaries and related costs	MDL M	1.80	1.87	1.95	2.03	2.11	2.19	2.26	2.33	2.40	2.47	2.54	2.62	2.70	2.78	2.86
4	Fuel	MDL M	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
5	General and administrative expenditures	MDL M	0.88	0.91	0.95	0.99	1.03	1.07	1.10	1.13	1.17	1.20	1.24	1.28	1.32	1.35	1.40
6	Other costs	MDL M	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
	TOTAL fixed costs for water	MDL M	5.959	6.117	6.280	6.449	6.624	6.804	6.944	7.087	7.235	7.385	7.540	7.699	7.862	8.029	8.200
	Wastewater																
1	Maintenance - old assets	MDL M	0.63	0.65	0.66	0.67	0.69	0.70	0.71	0.72	0.73	0.74	0.75	0.77	0.78	0.79	0.80
2	Maintenance - new assets	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Salaries and related costs	MDL M	1.84	1.91	1.99	2.07	2.15	2.24	2.31	2.38	2.45	2.52	2.60	2.67	2.76	2.84	2.92
4	Fuel	MDL M	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5	General and administrative expenditures	MDL M	0.72	0.74	0.77	0.80	0.84	0.87	0.90	0.92	0.95	0.98	1.01	1.04	1.07	1.10	1.14
6	Other costs	MDL M	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	TOTAL fixed costs for wastewater	MDL M	3.300	3.415	3.534	3.658	3.786	3.920	4.023	4.130	4.240	4.353	4.469	4.589	4.712	4.838	4.968

Table 6-11: Total costs

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Variable costs	MDL M	1.81	2.47	2.51	2.43	2.43	2.43	2.81	3.10	3.42	3.76	4.13	4.51	4.90	5.31	5.74
2	Fixed costs	MDL M	4.04	4.16	4.53	6.07	6.23	6.40	7.18	7.38	7.59	7.81	8.03	8.26	8.49	8.74	9.00
3	Depreciation	MDL M	0.31	0.39	0.81	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
	TOTAL costs	MDL M	6.147	7.015	7.844	9.643	9.802	9.967	11.128	11.627	12.153	12.709	13.294	13.910	14.535	15.190	15.876

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Variable costs	MDL M	6.20	6.43	6.82	7.24	7.68	8.15	8.65	9.09	9.55	10.03	10.53	11.06	11.50	11.96	12.43
2	Fixed costs	MDL M	9.26	9.53	9.81	10.11	10.41	10.72	10.97	11.22	11.47	11.74	12.01	12.29	12.57	12.87	13.17
3	Depreciation	MDL M	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
	TOTAL costs	MDL M	16.593	17.097	17.775	18.487	19.233	20.016	20.756	21.446	22.163	22.908	23.682	24.488	25.215	25.966	26.741

Table 6-12: Calculation of the water and wastewater tariff

	Water Supply		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Variable and fixed costs	MDL M	3.65	3.71	4.36	4.69	6.24	6.35	6.46	6.83	7.19	7.58	7.98	8.41	8.87	9.33	9.81	10.32
2	Depreciation	MDL M	0.11	0.11	0.20	0.61	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
3	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Reserve for irregular receivables	MDL M	0.00	0.19	0.20	0.21	0.25	0.22	0.19	0.19	0.20	0.21	0.22	0.23	0.25	0.26	0.27	0.28
5	Sale of water	m3	238,700	248,519	258,287	268,003	280,931	290,660	300,339	310,404	339,956	370,649	402,473	435,419	469,477	504,638	540,892	578,230
6	Tariff without depreciation	MDL M/m3	15.30	15.71	17.66	18.29	23.09	22.58	22.12	22.63	21.76	21.02	20.39	19.86	19.41	19.00	18.64	18.34
7	Tariff with depreciation	MDL M/m3	15.78	16.17	18.43	20.58	26.46	25.84	25.27	25.68	24.54	23.58	22.75	22.04	21.43	20.87	20.39	19.97
8	**Proposed avarage tariff**	**MDL/m3**	**14.22**	**16.17**	**18.43**	**20.58**	**23.00**	**23.00**	**23.00**	**23.00**	**23.00**	**23.00**	**22.75**	**22.04**	**21.43**	**20.87**	**20.39**	**19.97**
	Wastewater																	
1	Variable and fixed costs	MDL M	2.13	2.13	2.27	2.35	2.27	2.32	2.37	3.16	3.29	3.44	3.59	3.74	3.90	4.07	4.24	4.42
2	Depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
3	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Reserve for irregular receivables	MDL M	0.00	0.12	0.11	0.10	0.09	0.08	0.06	0.08	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.12
5	Sale of wastewater	m3	160,600	162,519	164,427	166,324	168,211	170,088	171,955	358,467	374,574	390,963	407,630	424,573	441,788	459,273	477,024	495,038
6	Tariff without depreciation	MDL M/m3	13.26	13.81	14.48	14.73	14.00	14.07	14.16	9.05	9.03	9.02	9.03	9.04	9.07	9.09	9.12	9.15
7	Tariff with depreciation	MDL M/m3	14.45	14.99	15.64	15.88	15.13	15.20	15.27	9.58	9.54	9.51	9.50	9.49	9.50	9.50	9.52	9.54
8	**Proposed avarage tariff**	**MDL/m3**	**15.64**	**14.99**	**15.00**	**15.00**	**15.00**	**15.00**	**15.00**	**9.58**	**9.54**	**9.51**	**9.50**	**9.49**	**9.50**	**9.50**	**9.52**	**9.54**
	Dynamic prime costs for water	**MDL/m3**		**25.79**														
	Dynamic prime costs for wastewater	**MDL/m3**		**10.23**														

	Water Supply		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Variable and fixed costs	MDL M	10.85	11.19	11.65	12.14	12.66	13.19	13.71	14.19	14.68	15.20	15.73	16.29	16.78	17.29	17.81
2	Depreciation	MDL M	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
3	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Reserve for irregular receivables	MDL M	0.30	0.30	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.46	0.47
5	Sale of water	m3	616,642	625,310	633,932	642,509	651,040	659,526	667,966	676,360	684,710	693,013	701,271	709,483	717,650	725,772	733,847
6	Tariff without depreciation	MDL M/m3	18.08	18.37	18.88	19.41	19.96	20.54	21.08	21.54	22.02	22.51	23.03	23.57	24.00	24.45	24.91
7	Tariff with depreciation	MDL M/m3	19.62	19.89	20.37	20.88	21.42	21.98	22.50	22.94	23.40	23.88	24.38	24.90	25.32	25.75	26.20
8	**Proposed avarage tariff**	**MDL/m3**	**19.62**	**19.89**	**20.37**	**20.88**	**21.42**	**21.98**	**22.50**	**22.94**	**23.40**	**23.88**	**24.38**	**24.90**	**25.32**	**25.75**	**26.20**
	Wastewater																
1	Variable and fixed costs	MDL M	4.60	4.77	4.98	5.21	5.44	5.68	5.90	6.12	6.34	6.57	6.81	7.06	7.30	7.54	7.79
2	Depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
3	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Reserve for irregular receivables	MDL M	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.19	0.20
5	Sale of wastewater	m3	513,312	523,271	533,295	543,381	553,529	563,736	574,001	584,321	594,696	605,122	615,599	626,124	636,696	647,313	657,972
6	Tariff without depreciation	MDL M/m3	9.20	9.36	9.59	9.83	10.08	10.34	10.55	10.74	10.94	11.14	11.35	11.57	11.75	11.95	12.14
7	Tariff with depreciation	MDL M/m3	9.57	9.72	9.95	10.18	10.42	10.68	10.89	11.07	11.26	11.45	11.66	11.87	12.05	12.24	12.43
8	**Proposed avarage tariff**	**MDL/m3**	**9.57**	**9.72**	**9.95**	**10.18**	**10.42**	**10.68**	**10.89**	**11.07**	**11.26**	**11.45**	**11.66**	**11.87**	**12.05**	**12.24**	**12.43**

Table 6-13: Tariff affordability

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Avarage bill for water (per person)	MDL/month	27.57	32.39	37.28	42.87	44.10	45.32	46.54	47.77	48.99	49.66	49.28	49.06	48.90	48.86	48.92
2	Avarage bill for wastewater (per person)	MDL/month	25.54	26.37	27.16	27.96	28.76	29.56	19.38	19.81	20.26	20.73	21.23	21.75	22.26	22.80	23.36
3	Avarage bill for water and wastewater (per person)	MDL/month	53.11	58.75	64.44	70.84	72.86	74.88	65.93	67.58	69.25	70.39	70.51	70.81	71.17	71.66	72.28
4	Disposable households income	MDL/month	1876.51	1932.81	2021.72	2108.65	2193.00	2280.72	2371.95	2466.82	2565.50	2668.12	2774.84	2885.84	3001.27	3121.32	3246.17
5	Tariff affordability	%	2.8%	3.0%	3.2%	3.4%	3.3%	3.3%	2.8%	2.7%	2.7%	2.6%	2.5%	2.5%	2.4%	2.3%	2.2%
6	Affordability constrains	%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Avarage bill for water (per person)	MDL/month	49.08	50.82	53.15	55.59	58.15	60.84	63.47	65.94	68.51	71.18	73.97	76.87	79.52	82.25	85.07
2	Avarage bill for wastewater (per person)	MDL/month	23.95	24.85	25.95	27.10	28.30	29.57	30.71	31.81	32.96	34.14	35.37	36.65	37.85	39.09	40.37
3	Avarage bill for water and wastewater (per person)	MDL/month	73.03	75.67	79.09	82.68	86.45	90.41	94.18	97.75	101.47	105.33	109.35	113.53	117.37	121.34	125.44
4	Disposable households income	MDL/month	3376.02	3511.06	3651.50	3797.56	3949.46	4107.44	4230.67	4357.59	4488.31	4622.96	4761.65	4904.50	5051.64	5203.19	5359.28
5	Tariff affordability	%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
6	Affordability constrains	%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%

Table 6-14: Profits and losses - with project

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Sale of water	MDL M	4.02	4.76	5.52	6.46	6.69	6.91	7.14	7.82	8.52	9.15	9.60	10.06	10.53	11.03	11.55
2	Sale of wastewater	MDL M	2.44	2.47	2.49	2.52	2.55	2.58	3.43	3.57	3.72	3.87	4.03	4.20	4.36	4.54	4.72
3	Other revenues	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	**Total revenues**	**MDL M**	**6.45**	**7.23**	**8.01**	**8.98**	**9.24**	**9.49**	**10.57**	**11.39**	**12.24**	**13.03**	**13.63**	**14.26**	**14.90**	**15.57**	**16.27**
5	Costs of water services	MDL M	3.83	4.55	5.30	7.18	7.29	7.41	7.78	8.14	8.52	8.93	9.36	9.82	10.28	10.76	11.27
	variable costs	MDL M	1.52	2.08	2.13	2.05	2.06	2.07	2.08	2.33	2.59	2.87	3.17	3.49	3.81	4.15	4.51
	fixed costs	MDL M	2.19	2.27	2.56	4.19	4.29	4.39	4.75	4.87	4.99	5.11	5.24	5.38	5.52	5.66	5.81
	depreciation	MDL M	0.11	0.20	0.61	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
6	Costs of wastewater services	MDL M	2.32	2.46	2.54	2.46	2.51	2.56	3.35	3.49	3.63	3.78	3.93	4.09	4.26	4.43	4.61
	variable costs	MDL M	0.28	0.38	0.38	0.38	0.37	0.36	0.72	0.78	0.83	0.89	0.96	1.02	1.09	1.16	1.23
	fixed costs	MDL M	1.85	1.89	1.97	1.88	1.94	2.01	2.44	2.52	2.60	2.69	2.78	2.88	2.98	3.08	3.19
	depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
7	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Costs of other services and general costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	**Total costs**	**MDL M**	**6.15**	**7.02**	**7.84**	**9.64**	**9.80**	**9.97**	**11.13**	**11.63**	**12.15**	**12.71**	**13.29**	**13.91**	**14.53**	**15.19**	**15.88**
10	**Gross profit**	**MDL M**	0.31	0.21	0.17	-0.66	-0.57	-0.48	-0.55	-0.23	0.09	0.32	0.33	0.35	0.36	0.38	0.40
11	**Income tax**	MDL M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	**Net profit**	**MDL M**	**0.27**	**0.19**	**0.15**	**-0.66**	**-0.57**	**-0.48**	**-0.55**	**-0.23**	**0.08**	**0.28**	**0.29**	**0.31**	**0.32**	**0.33**	**0.35**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Sale of water	MDL M	12.10	12.44	12.92	13.42	13.94	14.50	15.03	15.51	16.02	16.55	17.10	17.67	18.17	18.69	19.23
2	Sale of wastewater	MDL M	4.91	5.09	5.30	5.53	5.77	6.02	6.25	6.47	6.69	6.93	7.18	7.43	7.67	7.92	8.18
3	Other revenues	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	**Total revenues**	**MDL M**	**17.01**	**17.52**	**18.22**	**18.95**	**19.71**	**20.52**	**21.28**	**21.98**	**22.72**	**23.48**	**24.27**	**25.10**	**25.85**	**26.62**	**27.41**
5	Costs of water services	MDL M	11.80	12.13	12.60	13.09	13.60	14.14	14.66	15.14	15.63	16.15	16.68	17.24	17.73	18.24	18.76
	variable costs	MDL M	4.89	5.07	5.37	5.69	6.03	6.39	6.77	7.10	7.45	7.81	8.19	8.59	8.92	9.26	9.61
	fixed costs	MDL M	5.96	6.12	6.28	6.45	6.62	6.80	6.94	7.09	7.23	7.39	7.54	7.70	7.86	8.03	8.20
	depreciation	MDL M	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
6	Costs of wastewater services	MDL M	4.79	4.96	5.17	5.40	5.63	5.87	6.10	6.31	6.53	6.76	7.00	7.25	7.49	7.73	7.98
	variable costs	MDL M	1.30	1.36	1.45	1.55	1.65	1.76	1.88	1.99	2.10	2.22	2.34	2.47	2.58	2.70	2.82
	fixed costs	MDL M	3.30	3.41	3.53	3.66	3.79	3.92	4.02	4.13	4.24	4.35	4.47	4.59	4.71	4.84	4.97
	depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
7	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Costs of other services and general costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	**Total costs**	**MDL M**	**16.59**	**17.10**	**17.78**	**18.49**	**19.23**	**20.02**	**20.76**	**21.45**	**22.16**	**22.91**	**23.68**	**24.49**	**25.22**	**25.97**	**26.74**
10	**Gross profit**	**MDL M**	0.41	0.43	0.44	0.46	0.48	0.50	0.52	0.54	0.55	0.57	0.59	0.61	0.63	0.65	0.67
11	**Income tax**	MDL M	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12	**Net profit**	**MDL M**	**0.37**	**0.38**	**0.39**	**0.41**	**0.42**	**0.44**	**0.46**	**0.47**	**0.49**	**0.50**	**0.52**	**0.54**	**0.55**	**0.57**	**0.59**

Table 6-15: Profits and losses - without project

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Sale of water	MDL M	4.02	4.69	4.86	6.39	6.61	6.83	7.05	7.72	8.42	6.48	7.01	7.57	8.14	8.76	9.41
2	Sale of wastewater	MDL M	2.44	2.47	2.49	2.52	2.55	2.58	2.60	2.70	2.79	2.90	3.00	3.11	3.22	3.34	3.46
3	Other revenues	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	**Total revenues**	**MDL M**	**6.46**	**7.15**	**7.35**	**8.91**	**9.16**	**9.41**	**9.65**	**10.42**	**11.22**	**9.38**	**10.01**	**10.68**	**11.37**	**12.09**	**12.87**
5	Costs of water services	MDL M	3.83	4.48	4.67	4.23	4.40	4.56	4.99	5.40	5.84	6.32	6.83	7.38	7.94	8.54	9.18
	variable costs	MDL M	1.52	2.14	2.24	2.34	2.45	2.55	2.66	3.00	3.37	3.76	4.19	4.65	5.12	5.62	6.16
	fixed costs	MDL M	2.19	2.23	2.31	1.77	1.83	1.89	2.21	2.28	2.36	2.44	2.53	2.62	2.71	2.80	2.90
	depreciation	MDL M	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
6	Costs of wastewater services	MDL M	2.32	2.47	2.56	1.99	2.05	2.11	2.54	2.63	2.73	2.83	2.93	3.04	3.15	3.26	3.38
	variable costs	MDL M	0.29	0.39	0.40	0.41	0.42	0.43	0.44	0.46	0.48	0.51	0.53	0.55	0.57	0.59	0.62
	fixed costs	MDL M	1.85	1.89	1.97	1.38	1.43	1.49	1.91	1.98	2.05	2.13	2.21	2.29	2.38	2.47	2.57
	depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
7	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Costs of other services and general costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	**Total costs**	**MDL M**	**6.15**	**6.96**	**7.23**	**6.22**	**6.44**	**6.67**	**7.53**	**8.03**	**8.57**	**9.15**	**9.76**	**10.42**	**11.09**	**11.80**	**12.55**
10	**Gross profit**	**MDL M**	0.31	0.19	0.12	2.69	2.72	2.74	2.12	2.39	2.64	0.23	0.24	0.26	0.28	0.29	0.31
11	**Income tax**	MDL M	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
12	**Net profit**	**MDL M**	**0.27**	**0.17**	**0.11**	**2.37**	**2.39**	**2.41**	**1.87**	**2.10**	**2.33**	**0.20**	**0.21**	**0.23**	**0.24**	**0.26**	**0.28**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Sale of water	MDL M	10.09	10.47	11.04	11.63	12.26	12.93	13.60	14.21	14.84	15.51	16.20	16.93	17.57	18.22	18.91
2	Sale of wastewater	MDL M	3.58	3.72	3.87	4.03	4.20	4.37	4.53	4.68	4.83	4.99	5.16	5.33	5.50	5.67	5.85
3	Other revenues	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	**Total revenues**	**MDL M**	**13.68**	**14.19**	**14.91**	**15.66**	**16.46**	**17.30**	**18.12**	**18.88**	**19.67**	**20.50**	**21.36**	**22.26**	**23.06**	**23.89**	**24.75**
5	Costs of water services	MDL M	9.85	10.22	10.77	11.35	11.96	12.61	13.27	13.86	14.48	15.13	15.81	16.52	17.14	17.78	18.44
	variable costs	MDL M	6.73	6.99	7.43	7.89	8.39	8.91	9.47	9.96	10.48	11.02	11.59	12.18	12.69	13.21	13.75
	fixed costs	MDL M	3.01	3.11	3.23	3.34	3.46	3.59	3.69	3.79	3.89	4.00	4.11	4.22	4.34	4.46	4.58
	depreciation	MDL M	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
6	Costs of wastewater services	MDL M	3.50	3.63	3.78	3.93	4.10	4.27	4.42	4.56	4.71	4.87	5.03	5.20	5.36	5.53	5.71
	variable costs	MDL M	0.64	0.67	0.71	0.76	0.80	0.86	0.91	0.96	1.01	1.07	1.13	1.19	1.24	1.29	1.35
	fixed costs	MDL M	2.67	2.77	2.87	2.98	3.10	3.22	3.31	3.41	3.51	3.61	3.71	3.82	3.93	4.05	4.17
	depreciation	MDL M	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
7	Interest and financial costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Costs of other services and general costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	**Total costs**	**MDL M**	**13.35**	**13.84**	**14.54**	**15.28**	**16.06**	**16.88**	**17.68**	**18.42**	**19.19**	**20.00**	**20.84**	**21.72**	**22.50**	**23.31**	**24.15**
10	**Gross profit**	**MDL M**	0.33	0.35	0.36	0.38	0.40	0.42	0.44	0.46	0.48	0.50	0.52	0.54	0.56	0.58	0.60
11	**Income tax**	MDL M	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12	**Net profit**	**MDL M**	**0.29**	**0.30**	**0.32**	**0.34**	**0.35**	**0.37**	**0.39**	**0.41**	**0.42**	**0.44**	**0.46**	**0.48**	**0.50**	**0.51**	**0.53**

Table 6-16: Working Capital - with project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Current assets**	**MDL M**	**3.06**	**0.62**	**0.69**	**0.78**	**1.00**	**1.03**	**1.05**	**1.15**	**1.22**	**1.30**	**1.37**	**1.42**	**1.48**	**1.54**	**1.60**	**1.66**
1	Inventories	MDL M	1.50	0.09	0.10	0.12	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33
2	Accounts receivable	MDL M	1.55	0.53	0.59	0.66	0.74	0.76	0.78	0.87	0.94	1.01	1.07	1.12	1.17	1.22	1.28	1.34
	Increase in current assets	MDL M		-2.43	0.07	0.08	0.22	0.03	0.03	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06
B	**Current liabilities**	**MDL M**	**0.80**	**0.64**	**0.71**	**0.75**	**0.84**	**0.86**	**0.88**	**1.03**	**1.08**	**1.13**	**1.19**	**1.25**	**1.31**	**1.37**	**1.43**	**1.50**
1	Liabilities to suppliers	MDL M	0.30	0.48	0.54	0.58	0.70	0.71	0.73	0.82	0.86	0.91	0.95	1.00	1.05	1.10	1.15	1.21
2	Liabilities to employees	MDL M	0.51	0.16	0.16	0.17	0.14	0.15	0.15	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29
3	Increase in current liabilities	MDL M		-0.16	0.07	0.04	0.09	0.02	0.02	0.15	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Current assets**	**MDL M**	**1.73**	**1.78**	**1.84**	**1.91**	**1.98**	**2.06**	**2.13**	**2.19**	**2.26**	**2.33**	**2.40**	**2.47**	**2.54**	**2.61**	**2.68**
1	Inventories	MDL M	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.38	0.39	0.40	0.40	0.41	0.42	0.42	0.43
2	Accounts receivable	MDL M	1.40	1.44	1.50	1.56	1.62	1.69	1.75	1.81	1.87	1.93	2.00	2.06	2.12	2.19	2.25
	Increase in current assets	MDL M	0.07	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
B	**Current liabilities**	**MDL M**	**1.57**	**1.62**	**1.69**	**1.76**	**1.84**	**1.92**	**1.99**	**2.06**	**2.13**	**2.20**	**2.28**	**2.35**	**2.43**	**2.50**	**2.58**
1	Liabilities to suppliers	MDL M	1.27	1.31	1.37	1.43	1.49	1.55	1.61	1.67	1.73	1.79	1.85	1.92	1.98	2.04	2.10
2	Liabilities to employees	MDL M	0.30	0.31	0.32	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.48
3	Increase in current liabilities	MDL M	0.07	0.05	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.08	0.08

Table 6-17: Working Capital - without project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Current assets**	**MDL M**	**3.06**	**0.63**	**0.68**	**0.70**	**0.80**	**0.82**	**0.84**	**0.86**	**0.93**	**0.99**	**0.85**	**0.90**	**0.96**	**1.02**	**1.08**	**1.14**
1	Inventories	MDL M	1.50	0.09	0.10	0.10	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.09
2	Accounts receivable	MDL M	1.55	0.53	0.59	0.60	0.73	0.75	0.77	0.79	0.86	0.92	0.77	0.82	0.88	0.93	0.99	1.06
	Increase in current assets	MDL M		-2.43	0.06	0.02	0.09	0.02	0.02	0.02	0.07	0.07	-0.15	0.05	0.06	0.06	0.06	0.07
B	**Current liabilities**	**MDL M**	**0.80**	**0.64**	**0.71**	**0.74**	**0.63**	**0.65**	**0.68**	**0.80**	**0.85**	**0.91**	**0.96**	**1.02**	**1.09**	**1.15**	**1.22**	**1.29**
1	Liabilities to suppliers	MDL M	0.30	0.48	0.55	0.57	0.49	0.50	0.52	0.59	0.63	0.68	0.73	0.78	0.83	0.89	0.94	1.01
2	Liabilities to employees	MDL M	0.51	0.16	0.16	0.17	0.14	0.15	0.15	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29
3	Increase in current liabilities	MDL M		-0.16	0.07	0.03	-0.11	0.02	0.02	0.13	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Current assets**	**MDL M**	**1.21**	**1.26**	**1.32**	**1.39**	**1.46**	**1.53**	**1.60**	**1.66**	**1.73**	**1.80**	**1.88**	**1.95**	**2.02**	**2.09**	**2.17**
1	Inventories	MDL M	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13
2	Accounts receivable	MDL M	1.12	1.17	1.23	1.29	1.35	1.42	1.49	1.55	1.62	1.68	1.76	1.83	1.90	1.96	2.03
	Increase in current assets	MDL M	0.07	0.04	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07
B	**Current liabilities**	**MDL M**	**1.37**	**1.42**	**1.49**	**1.57**	**1.65**	**1.73**	**1.80**	**1.88**	**1.95**	**2.03**	**2.11**	**2.20**	**2.27**	**2.35**	**2.44**
1	Liabilities to suppliers	MDL M	1.07	1.11	1.17	1.23	1.29	1.36	1.43	1.49	1.55	1.62	1.69	1.76	1.82	1.89	1.96
2	Liabilities to employees	MDL M	0.30	0.31	0.32	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.48
3	Increase in current liabilities	MDL M	0.08	0.05	0.07	0.07	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Table 6-18: Balance sheet - with project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Assets**	**MDL M**	**46.40**	**51.09**	**74.24**	**92.74**	**92.17**	**91.63**	**91.17**	**90.76**	**90.58**	**90.71**	**91.05**	**91.40**	**91.76**	**92.14**	**92.54**	**92.96**
1	Fixed assets	MDL M	43.00	47.27	69.78	87.29	86.15	85.01	83.87	82.73	81.59	80.45	79.32	78.18	77.04	75.90	74.76	73.62
2	Current assets	MDL M	3.40	3.82	4.46	5.45	6.03	6.62	7.30	8.03	8.99	10.26	11.73	13.22	14.72	16.24	17.78	19.34
3	Inventories	MDL M	1.50	0.09	0.10	0.12	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33
4	Short-term receivables	MDL M	1.55	0.53	0.59	0.66	0.74	0.76	0.78	0.87	0.94	1.01	1.07	1.12	1.17	1.22	1.28	1.34
5	Cash and other financial assets	MDL M	0.21	3.05	3.63	4.54	4.89	5.45	6.11	6.75	7.63	8.82	10.23	11.66	13.11	14.57	16.04	17.53
6	Other current assets	MDL M	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
B	**Liabilities**	**MDL M**	**46.40**	**51.08**	**74.23**	**92.74**	**92.17**	**91.63**	**91.16**	**90.76**	**90.58**	**90.71**	**91.04**	**91.39**	**91.76**	**92.14**	**92.54**	**92.96**
1	Equity capital	MDL M	27.79	28.06	28.25	28.39	27.74	27.17	26.69	26.14	25.90	25.98	26.26	26.55	26.86	27.18	27.51	27.86
2	Long-term liabilities	MDL M	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
3	Long-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Short-term liabilities	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Short-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Current liabilities to suppliers	MDL M	0.30	0.48	0.54	0.58	0.70	0.71	0.73	0.82	0.86	0.91	0.95	1.00	1.05	1.10	1.15	1.21
7	Current liabilities	MDL M	16.89	16.54	16.55	16.56	16.53	16.53	16.54	16.60	16.60	16.61	16.62	16.63	16.64	16.65	16.66	16.67
8	Accruals	MDL M	0.00	4.58	27.47	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Assets**	**MDL M**	**93.39**	**93.82**	**94.28**	**94.76**	**95.26**	**95.78**	**96.31**	**96.85**	**97.40**	**97.98**	**98.58**	**99.20**	**99.82**	**100.47**	**101.14**
1	Fixed assets	MDL M	72.48	71.34	70.21	69.07	67.93	66.79	65.65	64.51	63.37	62.24	61.10	59.96	58.82	57.68	56.54
2	Current assets	MDL M	20.91	22.48	24.08	25.69	27.33	28.99	30.66	32.33	34.03	35.75	37.48	39.24	41.00	42.79	44.59
3	Inventories	MDL M	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.38	0.39	0.40	0.40	0.41	0.42	0.42	0.43
4	Short-term receivables	MDL M	1.40	1.44	1.50	1.56	1.62	1.69	1.75	1.81	1.87	1.93	2.00	2.06	2.12	2.19	2.25
5	Cash and other financial assets	MDL M	19.04	20.56	22.09	23.64	25.21	26.79	28.39	30.01	31.64	33.28	34.95	36.63	38.33	40.04	41.77
6	Other current assets	MDL M	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
B	**Liabilities**	**MDL M**	**93.39**	**93.82**	**94.28**	**94.76**	**95.26**	**95.78**	**96.30**	**96.84**	**97.40**	**97.98**	**98.58**	**99.19**	**99.82**	**100.47**	**101.13**
1	Equity capital	MDL M	28.23	28.60	29.00	29.40	29.83	30.27	30.72	31.19	31.68	32.19	32.71	33.25	33.80	34.37	34.96
2	Long-term liabilities	MDL M	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
3	Long-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Short-term liabilities	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Short-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Current liabilities to suppliers	MDL M	1.27	1.31	1.37	1.43	1.49	1.55	1.61	1.67	1.73	1.79	1.85	1.92	1.98	2.04	2.10
7	Current liabilities	MDL M	16.68	16.70	16.71	16.72	16.74	16.75	16.76	16.77	16.78	16.80	16.81	16.82	16.83	16.85	16.86
8	Accruals	MDL M	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79	45.79

Table 6-19: Balance sheet - without project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Assets**	**MDL M**	**46.40**	**46.51**	**46.75**	**46.89**	**49.14**	**51.56**	**53.99**	**55.99**	**58.14**	**60.52**	**60.77**	**61.05**	**61.34**	**61.65**	**61.98**	**62.33**
1	Fixed assets	MDL M	43.00	42.69	42.39	42.08	41.77	41.47	41.16	40.86	40.55	40.24	39.94	39.63	39.33	39.02	38.71	38.41
2	Current assets	MDL M	3.40	3.82	4.36	4.81	7.37	10.09	12.83	15.13	17.59	20.27	20.84	21.42	22.02	22.63	23.27	23.92
3	Inventories	MDL M	1.50	0.09	0.10	0.10	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.09
4	Short-term receivables	MDL M	1.55	0.53	0.59	0.60	0.73	0.75	0.77	0.79	0.86	0.92	0.77	0.82	0.88	0.93	0.99	1.06
5	Cash and other financial assets	MDL M	0.21	3.05	3.54	3.97	6.43	9.13	11.85	14.13	16.52	19.14	19.85	20.38	20.92	21.48	22.05	22.64
6	Other current assets	MDL M	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
B	**Liabilities**	**MDL M**	**46.40**	**46.51**	**46.75**	**46.88**	**49.14**	**51.55**	**53.99**	**55.98**	**58.13**	**60.51**	**60.77**	**61.05**	**61.34**	**61.65**	**61.98**	**62.33**
1	Equity capital	MDL M	27.79	28.06	28.23	28.34	30.71	33.10	35.51	37.37	39.47	41.80	42.00	42.22	42.45	42.69	42.95	43.23
2	Long-term liabilities	MDL M	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
3	Long-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Short-term liabilities	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Short-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Current liabilities to suppliers	MDL M	0.30	0.48	0.55	0.57	0.49	0.50	0.52	0.59	0.63	0.68	0.73	0.78	0.83	0.89	0.94	1.01
7	Current liabilities	MDL M	16.89	16.54	16.55	16.56	16.53	16.53	16.54	16.60	16.60	16.61	16.62	16.63	16.64	16.65	16.66	16.67
8	Accruals	MDL M	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Assets**	**MDL M**	**62.70**	**63.06**	**63.45**	**63.86**	**64.29**	**64.74**	**65.21**	**65.68**	**66.18**	**66.70**	**67.24**	**67.80**	**68.37**	**68.97**	**69.58**
1	Fixed assets	MDL M	38.10	37.80	37.49	37.18	36.88	36.57	36.27	35.96	35.65	35.35	35.04	34.74	34.43	34.12	33.82
2	Current assets	MDL M	24.60	25.26	25.96	26.67	27.41	28.17	28.94	29.72	30.53	31.35	32.20	33.07	33.94	34.84	35.76
3	Inventories	MDL M	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13
4	Short-term receivables	MDL M	1.12	1.17	1.23	1.29	1.35	1.42	1.49	1.55	1.62	1.68	1.76	1.83	1.90	1.96	2.03
5	Cash and other financial assets	MDL M	23.24	23.86	24.50	25.15	25.81	26.50	27.20	27.92	28.66	29.41	30.18	30.97	31.78	32.61	33.46
6	Other current assets	MDL M	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
B	**Liabilities**	**MDL M**	**62.70**	**63.05**	**63.44**	**63.85**	**64.28**	**64.74**	**65.20**	**65.68**	**66.18**	**66.70**	**67.24**	**67.80**	**68.37**	**68.96**	**69.58**
1	Equity capital	MDL M	43.52	43.82	44.14	44.48	44.83	45.21	45.59	46.00	46.42	46.86	47.32	47.80	48.29	48.81	49.34
2	Long-term liabilities	MDL M	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
3	Long-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Short-term liabilities	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Short-term loan	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Current liabilities to suppliers	MDL M	1.07	1.11	1.17	1.23	1.29	1.36	1.43	1.49	1.55	1.62	1.69	1.76	1.82	1.89	1.96
7	Current liabilities	MDL M	16.68	16.70	16.71	16.72	16.74	16.75	16.76	16.77	16.78	16.80	16.81	16.82	16.83	16.85	16.86
8	Accruals	MDL M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6-20: Cash flow - with project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Financial inflows**	**MDL M**		**10.87**	**30.19**	**26.37**	**9.08**	**9.26**	**9.51**	**10.73**	**11.44**	**12.30**	**13.08**	**13.68**	**14.32**	**14.96**	**15.63**	**16.34**
1	Loan disbursement	MDL M		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Donor contribution (capital grant)	MDL M		3.98	19.89	15.91	0.00	0.00										
3	Own contribution	MDL M		0.60	3.00	2.40	0.00	0.00										
4	Revenues from sale	MDL M		6.45	7.23	8.01	8.98	9.24	9.49	10.57	11.39	12.24	13.03	13.63	14.26	14.90	15.57	16.27
5	Increase in current liabilities	MDL M		-0.16	0.07	0.04	0.09	0.02	0.02	0.15	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07
B	**Financial outflows**	**MDL M**		**8.03**	**29.61**	**25.46**	**8.73**	**8.69**	**8.85**	**10.08**	**10.56**	**11.10**	**11.68**	**12.25**	**12.87**	**13.50**	**14.16**	**14.85**
1	Investment costs	MDL M		4.58	22.89	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Costs of providing services	MDL M		5.84	6.63	7.04	8.50	8.66	8.83	9.99	10.49	11.01	11.57	12.15	12.77	13.40	14.05	14.74
3	Long term loan repayment	MDL M		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Increase in current assets	MDL M		-2.43	0.07	0.08	0.22	0.03	0.03	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06
5	Income tax	MDL M		0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.04	0.04	0.04	0.05	0.05
C	Net cash flow (inflow - outflow)	**MDL M**		2.84	0.58	0.91	0.35	0.57	0.65	0.64	0.88	1.19	1.40	1.43	1.45	1.46	1.48	1.49
D	**Cumulated cash**	**MDL M**	**0.21**	**3.05**	**3.63**	**4.54**	**4.89**	**5.45**	**6.11**	**6.75**	**7.63**	**8.82**	**10.23**	**11.66**	**13.11**	**14.57**	**16.04**	**17.53**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Financial inflows**	**MDL M**	**17.08**	**17.58**	**18.29**	**19.02**	**19.79**	**20.60**	**21.35**	**22.05**	**22.79**	**23.55**	**24.35**	**25.18**	**25.92**	**26.69**	**27.49**
1	Loan disbursement	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Donor contribution (capital grant)	MDL M															
3	Own contribution	MDL M															
4	Revenues from sale	MDL M	17.01	17.52	18.22	18.95	19.71	20.52	21.28	21.98	22.72	23.48	24.27	25.10	25.85	26.62	27.41
5	Increase in current liabilities	MDL M	0.07	0.05	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.08	0.08
B	**Financial outflows**	**MDL M**	**15.57**	**16.06**	**16.75**	**17.47**	**18.22**	**19.01**	**19.75**	**20.44**	**21.16**	**21.91**	**22.69**	**23.50**	**24.22**	**24.98**	**25.75**
1	Investment costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Costs of providing services	MDL M	15.45	15.96	16.64	17.35	18.09	18.88	19.62	20.31	21.02	21.77	22.54	23.35	24.08	24.83	25.60
3	Long term loan repayment	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Increase in current assets	MDL M	0.07	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
5	Income tax	MDL M	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08
C	Net cash flow (inflow - outflow)	**MDL M**	1.51	1.52	1.53	1.55	1.57	1.58	1.60	1.61	1.63	1.65	1.66	1.68	1.70	1.71	1.73
D	**Cumulated cash**	**MDL M**	**19.04**	**20.56**	**22.09**	**23.64**	**25.21**	**26.79**	**28.39**	**30.01**	**31.64**	**33.28**	**34.95**	**36.63**	**38.33**	**40.04**	**41.77**

Table 6-21: Cash flow - without project

			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Financial inflows**	**MDL M**		**6.30**	**7.22**	**7.38**	**8.80**	**9.18**	**9.43**	**9.78**	**10.47**	**11.27**	**9.43**	**10.07**	**10.74**	**11.43**	**12.16**	**12.94**
1	Loan disbursement	MDL M		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Donor contribution (capital grant)	MDL M		0.00	0.00	0.00	0.00	0.00										
3	Own contribution	MDL M		0.00	0.00	0.00	0.00	0.00										
4	Revenues from sale	MDL M		6.46	7.15	7.35	8.91	9.16	9.41	9.65	10.42	11.22	9.38	10.01	10.68	11.37	12.09	12.87
5	Increase in current liabilities	MDL M		-0.16	0.07	0.03	-0.11	0.02	0.02	0.13	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07
B	**Financial outflows**	**MDL M**		**3.45**	**6.73**	**6.96**	**6.33**	**6.48**	**6.72**	**7.50**	**8.08**	**8.65**	**8.72**	**9.54**	**10.20**	**10.88**	**11.59**	**12.35**
1	Investment costs	MDL M		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Costs of providing services	MDL M		5.85	6.65	6.92	5.91	6.14	6.36	7.22	7.73	8.27	8.84	9.46	10.11	10.78	11.49	12.25
3	Long term loan repayment	MDL M		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Increase in current assets	MDL M		-2.43	0.06	0.02	0.09	0.02	0.02	0.02	0.07	0.07	-0.15	0.05	0.06	0.06	0.06	0.07
				0.04	0.02	0.01	0.32	0.33	0.33	0.25	0.29	0.32	0.03	0.03	0.03	0.03	0.04	0.04
C	**Net cash flow (inflow - outflow)**	**MDL M**		2.84	0.49	0.42	2.47	2.70	2.72	2.28	2.39	2.62	0.71	0.53	0.54	0.56	0.57	0.59
D	**Cumulated cash**	**MDL M**	**0.21**	**3.05**	**3.54**	**3.97**	**6.43**	**9.13**	**11.85**	**14.13**	**16.52**	**19.14**	**19.85**	**20.38**	**20.92**	**21.48**	**22.05**	**22.64**

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Financial inflows**	**MDL M**	**13.76**	**14.24**	**14.98**	**15.74**	**16.54**	**17.39**	**18.20**	**18.96**	**19.75**	**20.58**	**21.44**	**22.35**	**23.14**	**23.97**	**24.84**
1	Loan disbursement	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Donor contribution (capital grant)	MDL M															
3	Own contribution	MDL M															
4	Revenues from sale	MDL M	13.68	14.19	14.91	15.66	16.46	17.30	18.12	18.88	19.67	20.50	21.36	22.26	23.06	23.89	24.75
5	Increase in current liabilities	MDL M	0.08	0.05	0.07	0.07	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08
B	**Financial outflows**	**MDL M**	**13.15**	**13.62**	**14.34**	**15.09**	**15.87**	**16.70**	**17.50**	**18.24**	**19.01**	**19.83**	**20.67**	**21.56**	**22.33**	**23.15**	**23.99**
1	Investment costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Costs of providing services	MDL M	13.04	13.54	14.24	14.98	15.75	16.58	17.38	18.12	18.89	19.69	20.54	21.41	22.20	23.01	23.84
3	Long term loan repayment	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Increase in current assets	MDL M	0.07	0.04	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07
			0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07
C	**Net cash flow (inflow - outflow)**	**MDL M**	0.61	0.62	0.63	0.65	0.67	0.69	0.70	0.72	0.74	0.75	0.77	0.79	0.81	0.83	0.85
D	**Cumulated cash**	**MDL M**	**23.24**	**23.86**	**24.50**	**25.15**	**25.81**	**26.50**	**27.20**	**27.92**	**28.66**	**29.41**	**30.18**	**30.97**	**31.78**	**32.61**	**33.46**

Table 6-22: Financial analysis on profitability of the investment

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Financial inflows**	**MDL M**	**-0.01**	**0.07**	**0.67**	**0.28**	**0.07**	**0.08**	**0.95**	**0.97**	**1.03**	**3.65**	**3.62**	**3.58**	**3.53**	**3.47**	**3.40**
1	Incremental revenues from sales	MDL M	0.00	0.07	0.66	0.08	0.08	0.08	0.92	0.97	1.03	3.65	3.62	3.58	3.53	3.47	3.41
2	Incremental increase in current liabilities	MDL M	0.00	0.00	0.01	0.20	-0.01	-0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
3	Residual value	MDL M															
B	**Financial outflows**	**MDL M**	**2.14**	**22.94**	**18.52**	**2.81**	**2.55**	**2.49**	**2.86**	**2.84**	**2.82**	**2.80**	**2.75**	**2.72**	**2.67**	**2.62**	**2.56**
1	Investment costs	MDL M	4.58	22.89	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Incremental operational costs of providing services	MDL M	0.00	-0.03	0.12	2.59	2.53	2.46	2.77	2.76	2.75	2.73	2.70	2.66	2.61	2.56	2.49
3	Incremental increase in current assets	MDL M	-2.43	0.07	0.08	0.22	0.03	0.03	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06
C	Net cash flow (inflow - outflow)	**MDL M**	-2.15	-22.86	-17.84	-2.53	-2.48	-2.41	-1.92	-1.86	-1.80	0.85	0.86	0.86	0.86	0.85	0.85
D	FNPV(C)	**MDL M**	**-35.58**														
E	FRR(C) - Financial Rate of Return of the Investment	%	**-1%**														

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Financial inflows**	**MDL M**	**3.32**	**3.34**	**3.31**	**3.28**	**3.25**	**3.21**	**3.15**	**3.09**	**3.04**	**2.97**	**2.91**	**2.83**	**2.78**	**2.72**	**25.37**
1	Incremental revenues from sales	MDL M	3.33	3.34	3.31	3.28	3.25	3.21	3.15	3.10	3.04	2.98	2.91	2.84	2.78	2.72	2.66
2	Incremental increase in current liabilities	MDL M	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01
3	Residual value	MDL M															22.72
B	**Financial outflows**	**MDL M**	**2.48**	**2.47**	**2.46**	**2.44**	**2.41**	**2.38**	**2.31**	**2.25**	**2.20**	**2.14**	**2.08**	**2.01**	**1.95**	**1.89**	**1.83**
1	Investment costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Incremental operational costs of providing services	MDL M	2.41	2.42	2.40	2.37	2.34	2.30	2.24	2.19	2.13	2.07	2.01	1.94	1.88	1.82	1.76
3	Incremental increase in current assets	MDL M	0.07	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
C	Net cash flow (inflow - outflow)	**MDL M**	0.84	0.87	0.85	0.84	0.84	0.83	0.84	0.84	0.84	0.83	0.83	0.82	0.83	0.82	23.54

Table 6-23: Calculation of NPV on own capital

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Financial inflows**	**MDL M**	**3.97**	**19.96**	**16.59**	**0.28**	**0.07**	**0.08**	**0.95**	**0.97**	**1.03**	**3.65**	**3.62**	**3.58**	**3.53**	**3.47**	**3.40**
1	Incremental revenues from sales	MDL M	0.00	0.07	0.66	0.08	0.08	0.08	0.92	0.97	1.03	3.65	3.62	3.58	3.53	3.47	3.41
2	Incremental increase in current liabilities	MDL M	0.00	0.00	0.01	0.20	-0.01	-0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
3	Donor contribution (capital grant)	MDL M	3.98	19.89	15.91	0.00	0.00										
4	Residual value	MDL M															
B	**Financial outflows**	**MDL M**	**2.14**	**22.94**	**18.52**	**2.81**	**2.55**	**2.49**	**2.86**	**2.84**	**2.82**	**2.80**	**2.75**	**2.72**	**2.67**	**2.62**	**2.56**
1	Investment costs	MDL M	4.58	22.89	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Incremental operational costs of providing services	MDL M	0.00	-0.03	0.12	2.59	2.53	2.46	2.77	2.76	2.75	2.73	2.70	2.66	2.61	2.56	2.49
3	Incremental increase in current assets	MDL M	-2.43	0.07	0.08	0.22	0.03	0.03	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06
C	**Net cash flow (inflow - outflow)**	**MDL M**	1.83	-2.97	-1.93	-2.53	-2.48	-2.41	-1.92	-1.86	-1.80	0.85	0.86	0.86	0.86	0.85	0.85
D	**FNPV(K) - Financial Net Present value of the Capital**	**MDL M**	**0.00**														
E	**FRR(K)- Financial Rate of Return of Capital**	%	**5%**														

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Financial inflows**	**MDL M**	**3.32**	**3.34**	**3.31**	**3.28**	**3.25**	**3.21**	**3.15**	**3.09**	**3.04**	**2.97**	**2.91**	**2.83**	**2.78**	**2.72**	**25.37**
1	Incremental revenues from sales	MDL M	3.33	3.34	3.31	3.28	3.25	3.21	3.15	3.10	3.04	2.98	2.91	2.84	2.78	2.72	2.66
2	Incremental increase in current liabilities	MDL M	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01
3	Donor contribution (capital grant)	MDL M															
4	Residual value	MDL M															22.72
B	**Financial outflows**	**MDL M**	**2.48**	**2.47**	**2.46**	**2.44**	**2.41**	**2.38**	**2.31**	**2.25**	**2.20**	**2.14**	**2.08**	**2.01**	**1.95**	**1.89**	**1.83**
1	Investment costs	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Incremental operational costs of providing services	MDL M	2.41	2.42	2.40	2.37	2.34	2.30	2.24	2.19	2.13	2.07	2.01	1.94	1.88	1.82	1.76
3	Incremental increase in current assets	MDL M	0.07	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
C	**Net cash flow (inflow - outflow)**	**MDL M**	0.84	0.87	0.85	0.84	0.84	0.83	0.84	0.84	0.84	0.83	0.83	0.82	0.83	0.82	23.54

Table 6-24: Economic analysis

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	**Net cash flow (inflow - outflow)**	**MDL M**	**-2.15**	**-22.86**	**-17.84**	**-2.53**	**-2.48**	**-2.41**	**-1.92**	**-1.86**	**-1.80**	**0.85**	**0.86**	**0.86**	**0.86**	**0.85**	**0.85**
1	Social costs	MDL M	0.00	0.00	-0.01	-0.02	-0.03	-0.04	-0.05	-0.05	-0.06	-0.07	-0.08	-0.09	-0.10	-0.12	-0.13
2	Shadow prices - electricity	MDL M	0.00	0.00	-0.01	-0.02	-0.03	-0.04	-0.05	-0.05	-0.06	-0.07	-0.08	-0.09	-0.10	-0.12	-0.13
B	**Social benefits**	**MDL M**	**2.06**	**10.30**	**8.24**	**0.66**	**0.66**	**0.66**	**1.60**	**1.62**	**1.64**	**1.66**	**1.67**	**1.69**	**1.70**	**1.70**	**1.70**
1	Tax correction - VAT	MDL M	0.92	4.58	3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Social benefits resulting from additional employment	MDL M	1.14	5.72	4.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Shadow price - business	MDL M	0.00	0.00	0.00	0.01	0.01	0.01	0.95	0.97	0.99	1.01	1.02	1.04	1.04	1.05	1.05
4	Benefits of avoiding water related disease	MDL M	0.00	0.00	0.00	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
C	**Net cash flow (inflow - outflow)**	**MDL M**	-0.09	-12.56	-9.59	-1.85	-1.79	-1.71	-0.27	-0.19	-0.09	2.58	2.62	2.64	2.66	2.67	2.68
D	**ENPV**	**MDL M**	**3.37**														
E	**ERR**	%	**6%**														

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	**Net cash flow (inflow - outflow)**	**MDL M**	**0.84**	**0.87**	**0.85**	**0.84**	**0.84**	**0.83**	**0.84**	**0.84**	**0.84**	**0.83**	**0.83**	**0.82**	**0.83**	**0.82**	**23.54**
1	Social costs	MDL M	-0.15	-0.15	-0.16	-0.18	-0.19	-0.20	-0.22	-0.23	-0.24	-0.26	-0.27	-0.29	-0.30	-0.32	-0.33
2	Shadow prices - electricity	MDL M	-0.15	-0.15	-0.16	-0.18	-0.19	-0.20	-0.22	-0.23	-0.24	-0.26	-0.27	-0.29	-0.30	-0.32	-0.33
B	**Social benefits**	**MDL M**	**1.70**	**1.70**	**1.71**	**1.71**	**1.71**	**1.71**	**1.71**	**1.71**	**1.71**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**
1	Tax correction - VAT	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Social benefits resulting from additional employment	MDL M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Shadow price - business	MDL M	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.07	1.07	1.07	1.07
4	Benefits of avoiding water related disease	MDL M	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
C	**Net cash flow (inflow - outflow)**	**MDL M**	2.69	2.72	2.72	2.73	2.74	2.75	2.76	2.78	2.79	2.80	2.81	2.83	2.85	2.86	25.60

Table 6-25: Sensitivity analysis

A	**Investment Costs**	**%**	100%	105%	110.00%	115.00%	120.00%	125.00%
1	FNPV(C)	MDL M	-35.58	-36.57	-37.82	-39.08	-40.33	-41.59
2	FRR(C)	%	-1.4%	-1.6%	-1.5%	-1.5%	-1.5%	-1.4%
3	FNPV(K)	MDL M	0.00	0.25	0.49	0.74	0.98	1.23
4	FRR(K)	%	5.0%	5.1%	5.2%	5.3%	5.4%	5.5%
5	Financially sustainable		True	True	True	True	True	True

B	**Real Wage Increase**		Base Case	Base Case	Pessimistic	Optimistic
			1	1	2	3
1	FNPV(C)	MDL M	-35.58	-35.31	-35.31	-35.31
2	FRR(C)	%	-1.4%	-1.59%	-1.59%	-1.59%
3	FNPV(K)	MDL M	0.00	0.00	0.00	0.00
4	FRR(K)	%	5.0%	5.0%	5.0%	5.0%
5	Financially sustainable		True	True	True	True

C	**Real GDP growth**		Base Case	Base Case	Pessimistic	Optimistic
			1	1	2	3
1	FNPV(C)	MDL M	-35.58	-35.31	-34.88	-35.57
2	FRR(C)	%	-1.4%	-1.59%	-1.57%	-1.59%
3	FNPV(K)	MDL M	0.00	0.00	0.44	-0.26
4	FRR(K)	%	5.0%	5.0%	5.2%	4.9%
5	Financially sustainable		True	True	True	True

D	**Costs of electricity**		Base Case	Base Case	Pessimistic	Optimistic
			1	1	2	3
1	FNPV(C)	MDL M	-35.58	-35.31	-35.49	-35.60
2	FRR(C)	%	-1.4%	-1.59%	-1.51%	-1.71%
3	FNPV(K)	MDL M	0.00	0.00	-0.17	-0.29
4	FRR(K)	%	5.0%	5.0%	4.9%	4.8%
5	Financially sustainable		True	True	True	True

Annex 8

Environmental impact assessment and gender aspects

Annex 8: Environmental impact assessment and gender aspects

8.1 Summary for legal framework on SEE and EIA in WSS sector

The Moldovan legal basis for environmental assessment is covered by three main laws. During the process of approximation of Moldovan legislation to the EU acquis, these laws are to be amended and/or adjusted in the near future as follow:

- Law on Environmental Protection with subsequent amendments;
- Law on Ecological Expertise with subsequent amendments;
- Law on Environmental Impact Assessment.

The Law on Environment Protection[1] represents the main legal framework for development of special normative acts and instructions in the field of environment protection in order to ensure a healthy living environment, conservation of the natural environment, ecosystem restoration etc.

The Law on Ecological Expertise[2] describes the concept of the State Ecological Expertise (SEE) which precedes decision-making on activities that may have an adverse impact on the environment. It is compulsory for all economic activities that might have negative impact on environment regardless of their destination, ownership, investments, location, source of financing, etc.

The Law on Environmental Impact Assessment[3] describes procedures and requirements for Environmental Impact Assessment (EIA) on the national level.

As result of feasibility studies, technical designs will be developed, which in the regional and local planning process in the WSS (Water Supply and Sanitation) sector will be subject to SEE and the corresponding documents shall be prepared and submitted to the responsible authorities together with the technical project documentation.

The national authority responsible for SEE in Republic of Moldova is the State Ecological Inspectorate (SIE), which is a subdivision of the Ministry of the Environment (MoE). All legal procedures on State Ecological Expertise System are described in the Chapter II of the Law on Ecological Expertise, while the organization of the SEE is detailed in the Chapter V.

In relation to the national environmental permitting procedure of various project-types and activities, there are the SEE and the EIA. The procedures, requirements and entire EIA process are detailed in the new Law on Environmental Impact Assessment.

In addition, the procedures for conducting SEE are included in the Guidelines on Performing SEE (2002). They define in detail the goals, objectives and principles of the SEE and specify the procedures for submitting project documentation, as well as reviewing procedures.

[1] Law No. 1515 of 16.06.1993 on Environment Protection, published in ”Monitorul Parlamentului” No. 10 of 01.10.1993, Art. 283, last amended by the Parliament Law No. 153 of 30.07.2015.

[2] Law No. 851 of 29.05.1996 on Ecologic Expertise and Environment Impact Assessment, published in ”Monitorul Oficial” No. 52-53 of 08.08.1996, Art. 494, last amended by the Parliament Law No. 153 of 30.07.2015.

[3] Law No. 86 of 29.05.2014 on Environment Impact Assessment, published in ”Monitorul Oficial” No. 174-177 of 04.07.2014, Art. 393. Date of entry into force: 04.01.2015.

Therefore, two project categories can be distinguished on the national level:

- Projects requiring SEE only;
- Projects requiring SEE and EIA.

In conclusion, for all selected CPV (Viable Project Concept) set-up projects as a part of the RSP (Regional Sector Program) in WSS sector, the SEE shall be conducted.

In relation to the national environmental permitting procedure of various project-types and activities, there are the SEE and the EIA. The procedures, requirements and entire EIA process for WSS project activities are detailed in the new Law on Environmental Impact Assessment.

Further, the following categories of planned activities are to be subjected of full scale EIA and for which is needed the environmental impact assessment in WSS sector.

According to the new Law No. 86 on EIA the following water supply facilities are subject to full scale EIA:

- Groundwater abstraction activities or artificial groundwater recharge schemes where the annual volume of water to be abstracted or recharged amounts to 10 million cubic metres or more;
- Deep drilling for water supply drilling (5,000 cubic metres per day and more).

And included in Annex 2:

- Installations of long-distance aqueducts (thoroughfares 5 km long and more);
- Groundwater abstraction and artificial groundwater recharge schemes (not included in Appendix no 1, with an abstraction or recharge capacity of 1 million cubic metres per year and more).

In addition waste-water treatment plants with a capacity exceeding the 150,000 population equivalent are subject to full scale EIA (Annex 1 of the New EIA Law No. 86).

Waste-water treatment plants (not included in Annex no. 1, with a capacity ranging from 50,000 to 150,000 population equivalent) are listed in Annex 2 of the new Law No. 86 and require the identification of the need for the conduct of the environmental impact assessment.

All selected VPCs in the WSS sector need only improvements of existing facilities like network repair and rehabilitation. These types of Projects do not fall into the categories that require the conduct of a full scale EIA according to national Moldovan Legislation. Consequently, this project is not subject to the new Law No. 86 and not requires an EIA evaluation.

In conclusion, the financing of programs and projects is allowed only after a positive SEE decision has been issued and following the IFI / international donor’s requirements.

8.2 Social and gender assessment in Straseni

8.2.1 Methodological approach

The main scope of the study was to assess the social and gender dimensions of the WSS project from the Centre Development Region. The objectives of the study were to

analyse the social and gender situation in Moldova and in the project zone and to develop recommendations for the action plan related to these aspects.

The **main tools** used for the assessment were both qualitative and quantitative data. A desk-based review was used to collect secondary data on various aspects on men and women features at the country as well as at the project area level. Most of the collected data[4] was based on the National Bureau of Statistics and Ministry of Economy documents; administrative data from local public administration from the first and second level, as well as studies and reports written by international organisations.

The approach applied for the current project was developed and tested in a pilot study in the town of Straseni in May 2015 where an assessment of the social and gender aspects was undertaken. Its findings were integrated in the feasibility study of the respective project. Given the scope of the proposed project ("no regrets" measures to improve service provision as part of a medium-term programme) and taking into account that social and gender needs and characteristics do not differ much from a town/project to another, the conclusions reached during the field visit in Straseni are also applied to projects of other rayons/towns of Moldova. The tools applied in the field visit to Straseni were interviews with key stakeholders and focus groups disaggregated by gender with potential beneficiaries. Based on its findings a social and gender action plan was developed.

Focus group participants were selected using the following criteria: gender dimension (men/women), education status (high/low), welfare status (low, medium to high), type of dwelling (individual/apartment), and connection to the water supply system. In the end, four focus groups discussions were conducted: 1) a focus group with women with low welfare status (women with disabilities, unemployed, retired); 2) a focus group with men with low welfare status (men with disabilities, unemployed, retired); 3) a focus group with women with medium to high welfare status; 4) a focus group with men with medium to high welfare status. In total, 28 persons (18 women and 10 men) participated in the focus group discussions.

The key stakeholders who were interviewed were selected based on groups interested in the implementation of the project. In total, seven key stakeholders were interviewed, including: the vice-mayor of Straseni, the town architect of Straseni, the person in charge of attracting investments in Straseni, the director of the district hospital, one businesswoman, the director of the district environmental inspection, and the director of the municipal enterprise, Apa-Canal Straseni.

8.2.2 Beneficiaries, needs and priorities by gender

During the focus group meetings and discussions held in Straseni, it was shown that women and men use water in different ways and for different needs. The use of water depends on the distribution of roles of men and women within households. From the table below, it can be seen that the distribution of household activities (where the water is used) between men and women in the Project area is unequal, as extrapolated from the findings from the focus group meetings.

Table 8-1: Water use by men and women

Household activities where the water is used	Men	Women	Children
Cooking		X	
Washing clothes		X	

[4] All presented data at the national level do not include the rayons from the left side of Dniester River and Bender municipality.

Household activities where the water is used	Men	Women	Children
Washing dishes		X	X
Washing children		X	
Watering crops	X	X	
Cleaning the house		X	X
Watering flowers		X	
Bathing (shower or bath)	X	X	X
Cleaning garden	X	X	
Planting garden	X	X	
Washing car	X		
Washing carpets		X	
Cleaning cesspit	X		
Cleaning animal cages	X	X	
Watering domestic animals		X	X

Thus, from the list of activities shared with the participants in focus group discussions, only a few activities are done mostly by men – washing car and, cleaning the cesspit. More than half of activities are done mostly by women, sometimes with small support from children. Those activities are the following: preparation of meals, washing clothes, washing dishes, washing children, watering flowers, cleaning the house, washing carpets, watering domestic animals. Some of the activities, like watering the crops, cleaning the garden, cleaning the animal cages, planting the garden are shared among men and women. In the households connected to the centralised water system, women are mainly those who clean the water and sanitation facilities. In the households with the outdoor sanitation facilities, roles between men and women are shared. Women usually do the daily cleaning and maintenance of the facilities and the men are responsible for the evacuation of the contents of the septic tank/collectors or of the traditional toilet.

The assessment of beneficiaries' needs and priorities by gender shows that the men and women have different needs and patterns in using the water and sanitation facilities. Therefore, these discrepancies and gaps need to be taken into consideration in the development and implementation of the Project.

The perceptions of men and women regarding the impact of the future project. Both men and women consider that as a result of Project implementation the whole population of the town will benefit. At the local level, the view is that the positive impact of the Project will result in the following:

- More business enterprises will be developed and subsequently more jobs will be created;
- The quality of water and afterwards, people's health will improve;
- The ecological situation will be improved;
- There will be more transparency in the use of water;
- The water and sanitation management will improve;
- The women will have more time to spend with their children and for their personal needs;
- Men will have more time to support their wives in household activities;
- Children will have more time for homework, reading, watching TV, playing games etc.;

- More women will use automatic washing machines and will save their time for other activities.

However, men and women consider that the implementation of the project might cause social problems and social conflicts in communities, like the following:

- Vulnerable groups of the population (pensioners, single women, households with many children, households with persons with disabilities) will still have limited access to water and sanitation system because of lack of money for an individual connection and for paying for services;
- The beneficiaries will not be willing to pay an increased tariff for WSS as they do not understand well the content of the tariff, or the factors that influence the tariff calculations;
- Many households will refuse to be connected to the sanitation system because of the need to pay more for the WSS and of lack of information regarding the positive impact of this project on their health;
- Some of the households will use in parallel the wells and will pay less for sanitation;
- The connection of some enterprises to the sanitation system will raise the cost of final products;
- The treatment plants can be located close to households and the population can suffer from bad smells;
- The streets where mostly the vulnerable groups of population live can be excluded from the project;
- Conflict of interests can arise between the city hall and the construction company, which will cause a substantial increase of the cost of the project;
- The companies will have limited interest in employing local persons during the implementation of the project;
- The staff selection for new WSS management unit could be done in a non-competitive way and qualified persons will have limited opportunities to be employed.

That is why in the elaboration and implementation project process is necessary to take into account the issues mentioned by participants and avoid or prevent the emergence of social disputes.

8.2.3 Social and Gender Action Plan

The Social and Gender Action Plan (SGAP) is based on the summary of findings during the social and gender assessment of the WSS project and provides measures that aim to increase equality in the participation of men and women during all project phases. The following activities are required for the plan:

- Information of RDA staff on findings of social and gender assessment and their incorporation in the RDA plan of activities;
- Appointment of a gender focal point at the respective RDA;

- Strengthening the capacities of the RDA staff on integration of social and gender dimensions into the WSS project;
- Incorporation of the findings and recommendations of the social and gender assessment in the ToR of the company performing the detailed designs;
- Consultation of the WSS project technical design separately with women and men, according to their income, disability and age. Women will constitute at least 40% of participants at consultations. Strengthening the capacities of LPAs (rayon councils and local city halls) on the following issues: gender equity, integration of gender dimensions into the project cycle, building an accountable, affordable and qualitative WSS system and communication/information;
- Establishing monitoring committees at the local level and strengthening their capacities in social and gender issues and communication/information. At least 40% of committee members shall be women;
- Provision of information campaigns at the communities' level regarding the WSS project, including the information on SGAP that will be targeted to men/women/persons with disabilities/poor persons. 40% of participants in different communication campaigns will be women;
- Increase the access of vulnerable groups of population to WSS through their involvement at different levels of project preparation and implementation, mobilisation of community support and direct financial support;
- Change the attitudes and behaviours of population regarding the following issues: use of drinkable water for irrigation, using of permeable collectors for wastewater, sustainability of WSS services, etc. At least 40% of participants at those activities must be women.

Annex 11

Conceptual drawings

Existing water supply system in the town of Falesti

Well
Well
Well
Well
Well
Water inake PS-1
Res 2xV=250m³
PS-2
Res 1xV=500m³
PS-3
Falesti
Falestii Noi
Gara Falesti
Well
PS-4
Res 1xV=200m³
Res 1xV=6000m³
WTA
from river Prut
Fabrica de Zahar

N
W
E
S

0 0.5 1
KILOMETRES

Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Well, Water inake PS-1	
Existing water treatment plant	WTP
Existing water pumping station	PS
Existing water supply reservoir	Res
Existing water transmission main	
Existing water distribution network	
Under construction water transmission main	

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Existing water supply system in the town of Falesti

Scale:	Drawing No:	Date:	Annex:
1:10 000	1/8	2015.11.25	No.11

Format A1

Existing sewerage system in the town of Falesti

Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Existing wastewater treatment plant	WWTP
Existing wastewater pumping station	WWPS
Existing sewerage network	
Existing pressure sewerage network	

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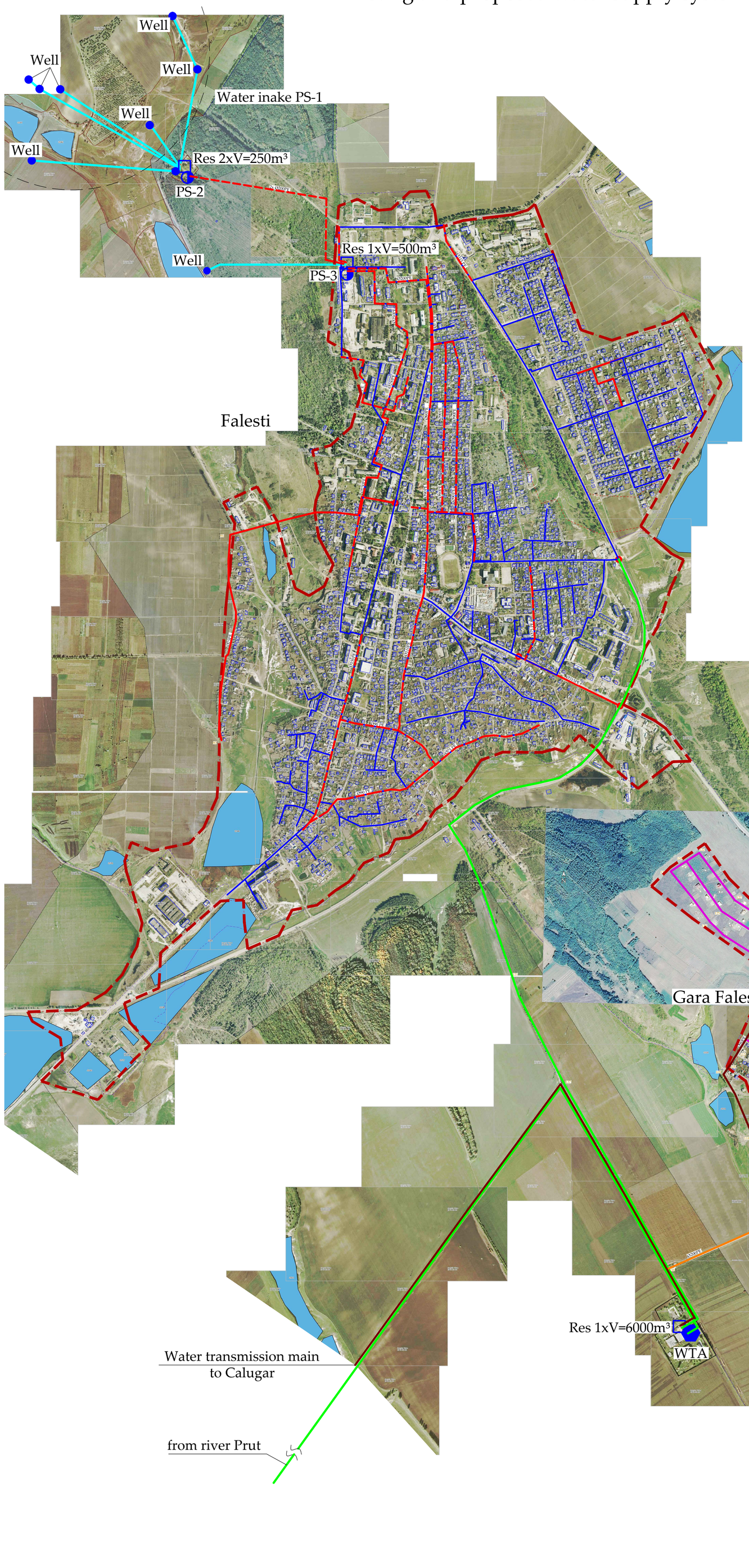
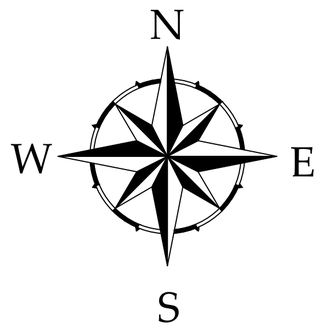
Existing sewerage system in the town of Falesti

Scale:	Drawing No:	Date:	Annex:
1:10 000	2/8	2015.11.25	No.11

Format A1

Existing and proposed water supply system in the town of Falesti





0 0.5 1

KILOMETRES

Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Well, Water inake PS-1	
Existing water treatment plant	WTP
Existing water pumping station	PS
Existing water supply reservoir	Res
Existing water transmission main	
Existing water distribution network	
Under construction water transmission main	
Rehabilitation of water distribution network, Phase I	
Extension of water distribution network, Phase I	
Proposed water transmission main, Phase I	
Rehabilitation of water distribution network, Phase II	
Proposed water transmission main, Phase II	
Extension of water distribution network, Phase II	

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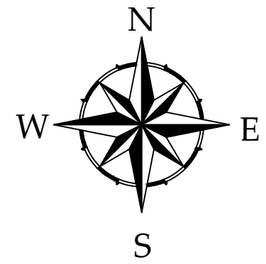
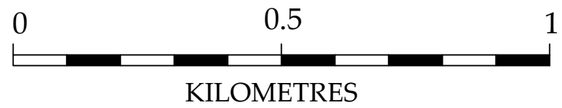
Existing and proposed water supply system in the town of Falesti

Scale:	Drawing No:	Date:	Annex:
1:10 000	3/8	2015.11.25	No.11

Format A1

Proposed water supply system in the Falestii Noi village





Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Proposed water tower, Phase II	
Proposed water transmission main, Phase II	
Extension of water distribution network, Phase II	

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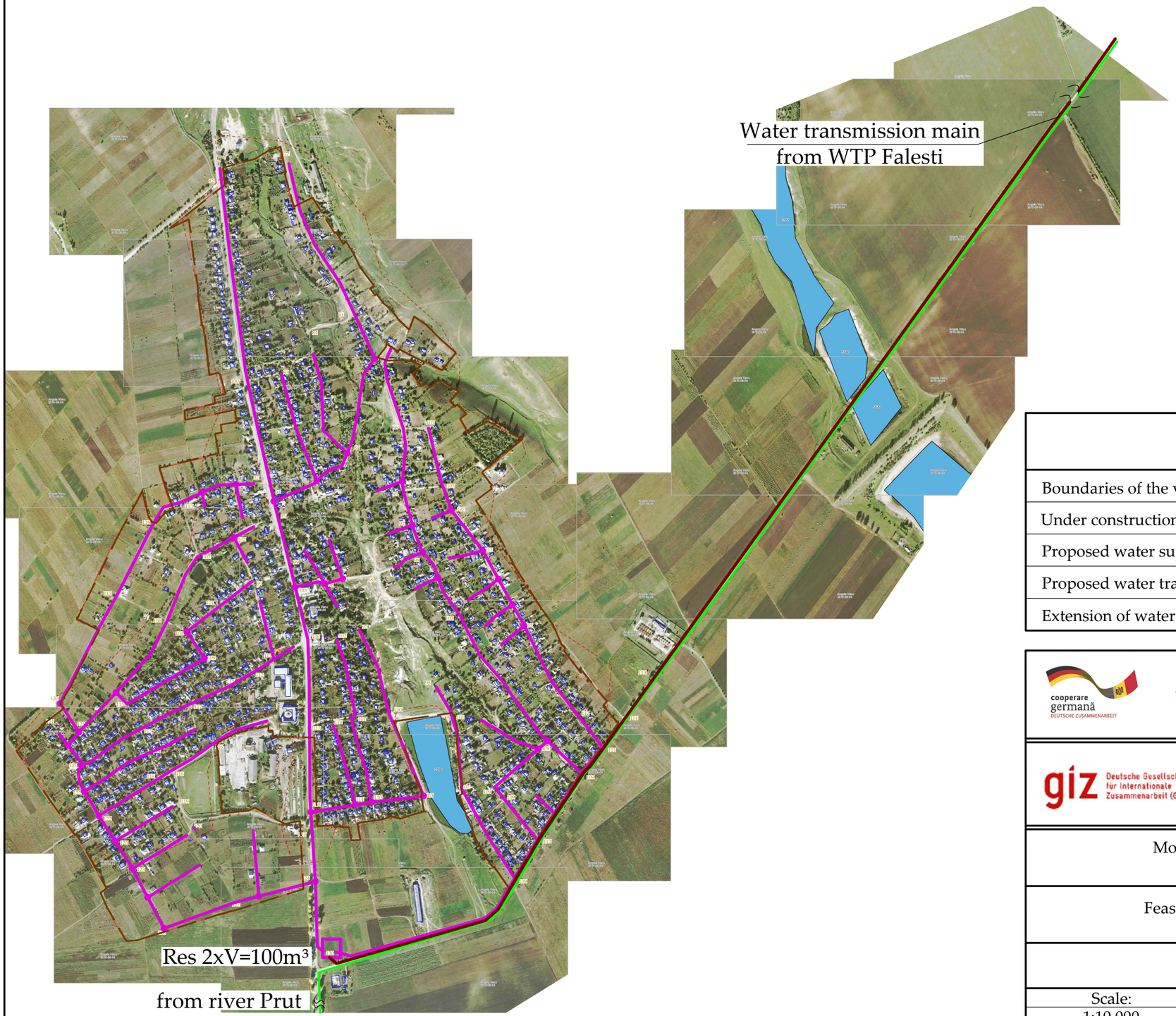
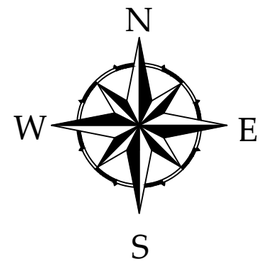
Proposed water supply system in the Falestii Noi village

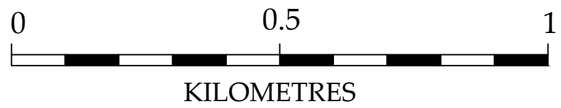
Scale:	Drawing No:	Date:	Annex:
1:10 000	4/8	2015.11.25	No.11

Format 2970x4800

Proposed water supply system in the Calugar village







Legend

Name	Symbol
Boundaries of the village	
Under construction water transmission main Prut-Falesti	
Proposed water supply reservoir, Phase II	Rez
Proposed water transmission main, Phase II	
Extension of water distribution network, Phase II	

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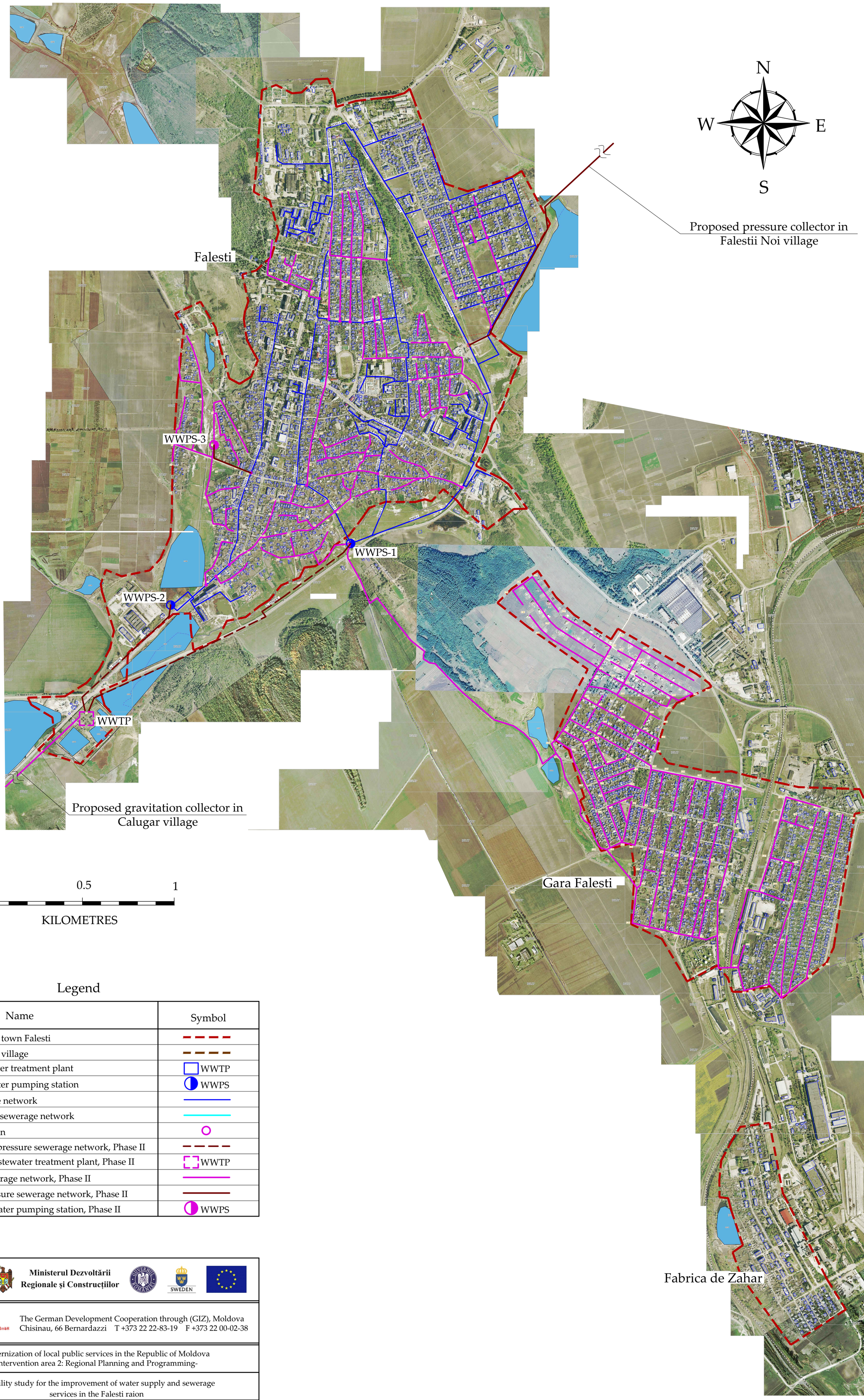
Proposed water supply system in the Calugar village

Scale:	Drawing No:	Date:	Annex:
1:10 000	5/8	2015.11.25	No.11

Format 2970x4800

Existing and proposed sewerage system in the town of Falesti



Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Existing wastewater treatment plant	WWTP
Existing wastewater pumping station	WWPS
Existing sewerage network	
Existing pressure sewerage network	
Point of connection	
Rehabilitation of pressure sewerage network, Phase II	
Rehabilitation wastewater treatment plant, Phase II	WWTP
Extension of sewerage network, Phase II	
Extension of pressure sewerage network, Phase II	
Proposed wastewater pumping station, Phase II	WWPS

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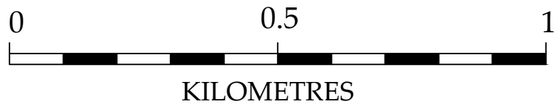
Existing and proposed sewerage system in the town of Falesti

Scale:	Drawing No:	Date:	Annex:
1:10 000	6/8	2015.11.25	No.11

Format A1

Proposed sewerage system in the Falestii Noi village



Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Existing sewerage network	
Point of connection	
Extension of sewerage network, Phase II	
Extension of pressure sewerage network, Phase II	
Proposed wastewater pumping station, Phase II	WWPS

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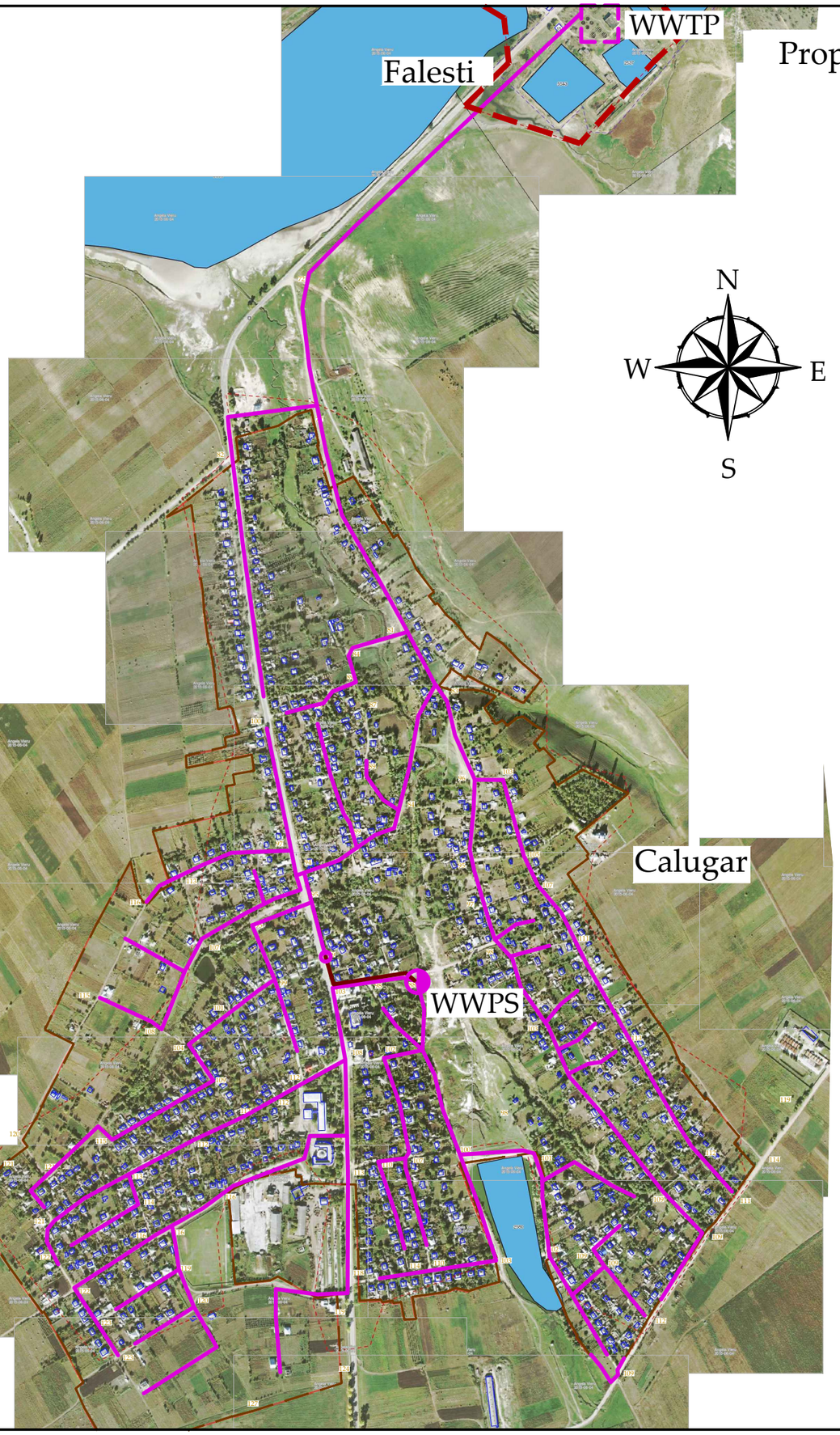
Proposed sewerage system in the Falestii Noi village

Scale:	Drawing No:	Date:	Annex:
1:10 000	7/8	2015.11.25	No.11

Format 2970x4800

Proposed sewerage system in the Calugar village



0 0.5 1

KILOMETRES

Legend

Name	Symbol
Boundaries of the town Falesti	
Boundaries of the village	
Rehabilitation wastewater treatment plant, Phase II	WWTP
Point of connection	
Extension of sewerage network, Phase II	
Extension of pressure sewerage network, Phase II	
Proposed wastewater pumping station, Phase II	WWPS

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Proposed sewerage system in the Calugar village

Scale:	Drawing No:	Date:	Annex:
1:10 000	8/8	2015.11.25	No.11

Format A3