Government of Tajikistan

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GWOPA
Global Water Operators' Partnerships Alliance

UN@HABITAT
FOR A BETTER URBAN FUTURE

Municipality of Dushanbe

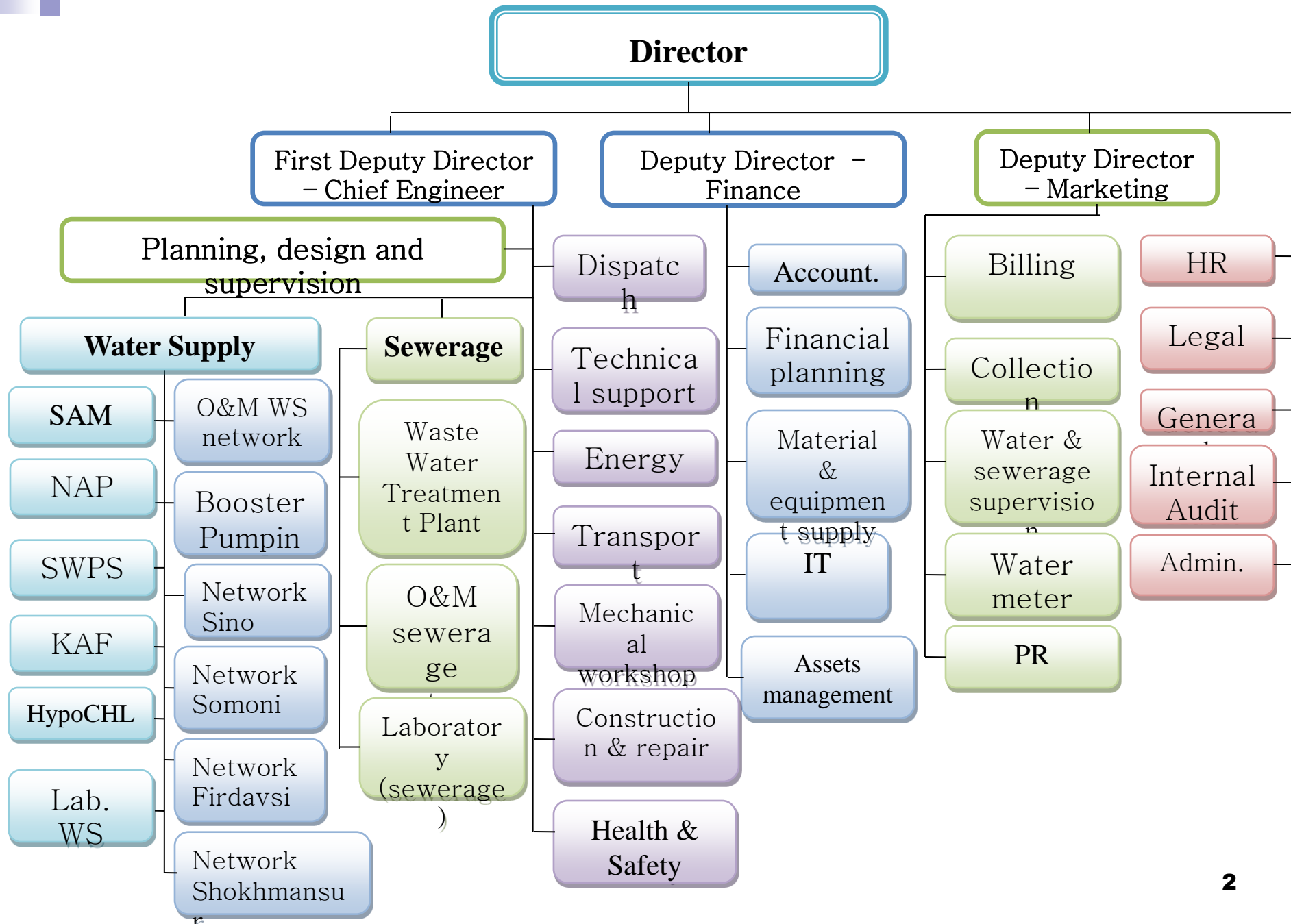КВД «ОБУ КОРЕЗИ ДУШАНБЕ»
ГУП «ДУШАНБЕВОДОКАНАЛ»

SUE "Dushanbevodokanal" (DVK)
- WSS operation and NRW reduction initiatives -

- Activities undertaken under DWSP2 -

Workshop on topic "Capacity Development, Water Operators' Partnerships and Financing for Non-revenue Water Management"
July 07-09, 2014

DVK provides water supply and sewerage services in the following districts of Dushanbe:

1. **Sino;**
2. **Firdavsi;**
3. **Shokhmansur;**
4. **Somoni;**

And in one district outside of Dushanbe:

5. Rudaki

■ The total number of inhabitants amounts to **764,300** persons. Population data were received from the State Committee of Statistics. The data allow a spatial distribution of the inhabitants in Dushanbe and allocation of the population for each supply zone.

■The specific consumption per person in Dushanbe is between **718 – 903 l/p/d.** This figure includes domestic demand, physical losses, commercial and institutional demand and demand for budget organisations and government.
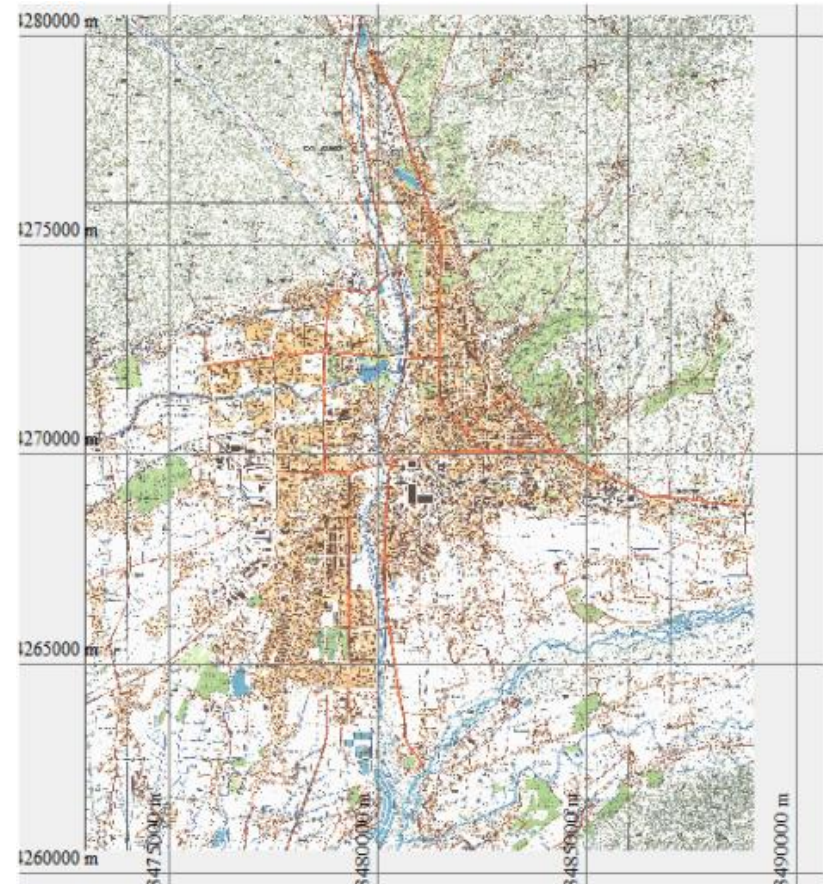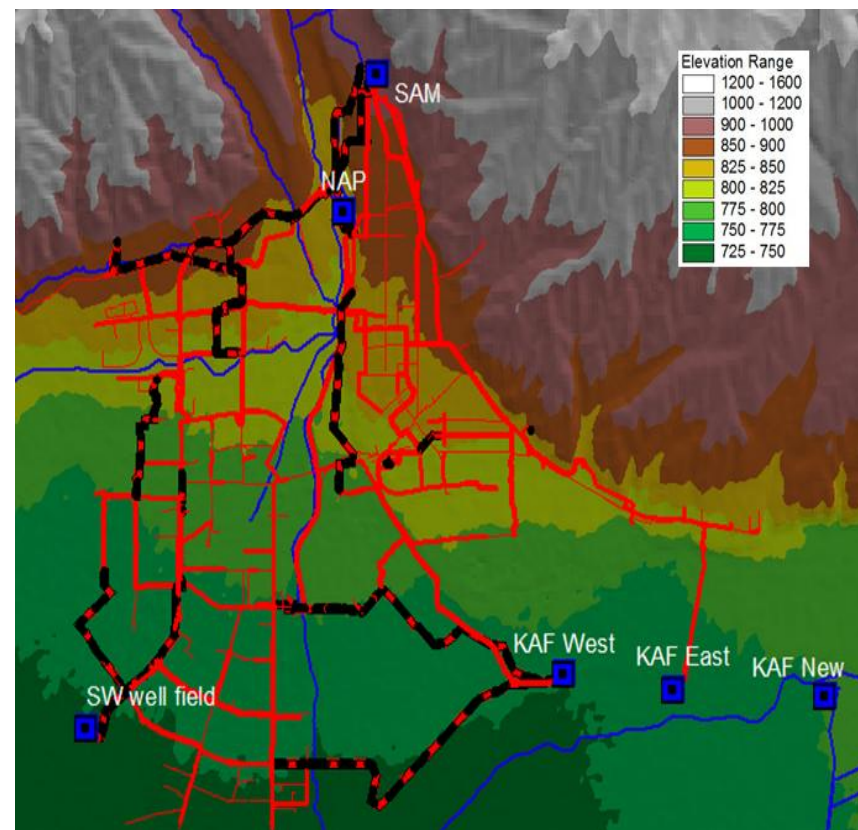
WATER PRODUCTION

4 water production facilities:

☐ **SAM Water Treatment Plant ≈ 228,9 ths. m³/day**
☐ **NAP Water Treatment Plant ≈ 55,8 ths. m³/day**
☐ **KAF Wellfield   ≈ 211,9 ths. m³/day**
☐ **SW Wellfield   ≈ 182,4   ths. m³/day**

TOTAL PRODUCTION:

≈ 680 – 750 ths. m³/day

WATER SUPPLY NETWORK

1. **Transmission mains - 173,7 km, DN = 300 – 1200 mm**

2. **Water main pipelines - 292,1 km, DN = 100 – 600 mm**

3. **Distribution network – 220 km, DN = 50 – 150 mm**

TOTAL LENGTH: 675,8 km
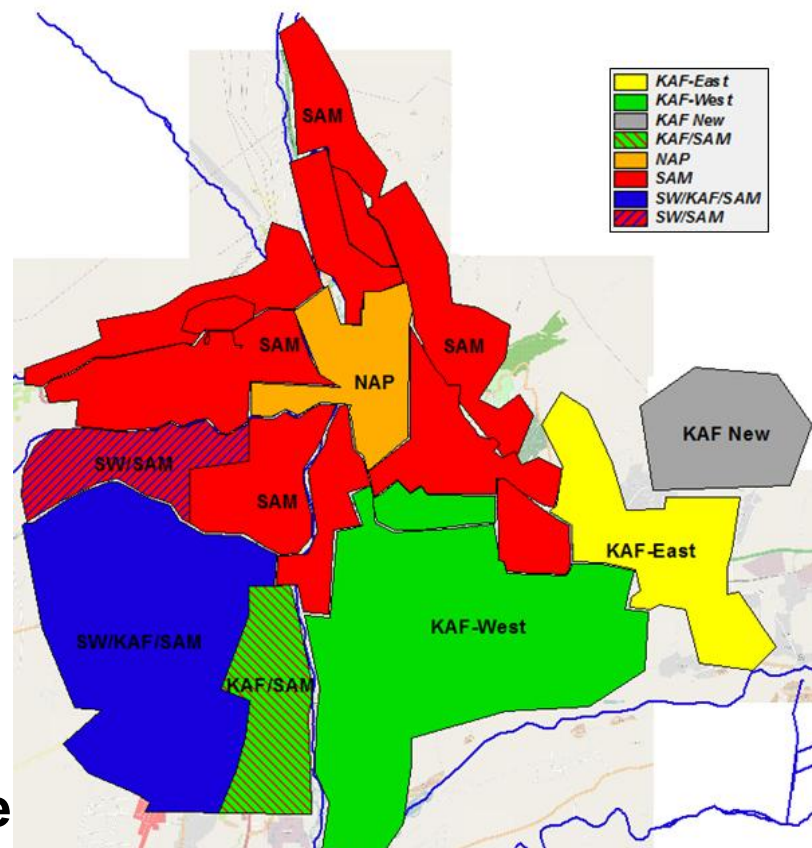
Average age – 51 years

Tech. losses – 75%

Leakages – 3 leak./km

Difference in altitude – 200 m

Network – 8 pressure zones

Average pressure – 2÷6 bars in each zone

KAF-East
KAF-West
KAF New
KAF/SAM
NAP
SAM
SW/KAF/SAM
SW/SAM

SAM
NAP
SAM
SAM
KAF New
SW/SAM
SAM
KAF-East
SW/KAF/SAM
KAF-West
KAF/SAM

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WATER SUPPLY NETWORK – RESERVOIRS

Name	Volume	Year of Commisioning	Altitude of Bottom
ON WATER SUPPLY NETWORK			
III. Zone	$2 \times 6,000m^3$	1975	876,5m
Kalinin	$10,000m^3$	1967	846,3m
V. Zone	$2 \times 10,000m^3$	1975	805,8m
Surkhob	$6,000m^3$	1980	846,3m
	$3,000m^3$	1970	846,3m
CDP	$2 \times 6,000m^3$	1977	811,7m
Bakhori	$6,000m^3$	1980	846,3m
	$1,000m^3$	1970	846,3m
ON WATER TREATMENT PLANTS			
SAM	$2 \times 2,000m^3$	1957-61	898,4m
NAP	$1,000m^3$	1962	823,5m
	$500m^3$	1932	825,1m
	$60m^3$	1980	830,0m
SW	$2 \times 3,000m^3$	1977	743,1m
	$2,000m^3$	1979	743,1m
KAF (east)	$3,000m^3$	2013	630,3m
	$2,000m^3$	1972	630,3m
	$1,000m^3$	1972	630,3m
KAF (west)	$6,000m^3$	1987	755,7m
	$2,000m^3$	1967	755,7m
	$2,000m^3$	1972	755,7m

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Water loss reduction strategy (WLRS)

- ❑ **Goals of WLRS**
- ❑ **Types of water losses:**
  - ▪ *Commercial:*
    - ❖ **Eliminate unauthorized consumers**
    - ❖ **Accurate consumption measurement**
  - ▪ *Physical:*
    - ❖ **Method for detection**
    - ❖ **Repairs**
    - ❖ **Success Control**
    - ❖ **Documentation**

Production Metering
Alarm → Pre-Detection
Leak Detection
Repair
Success Control
YES   NO
Documentation
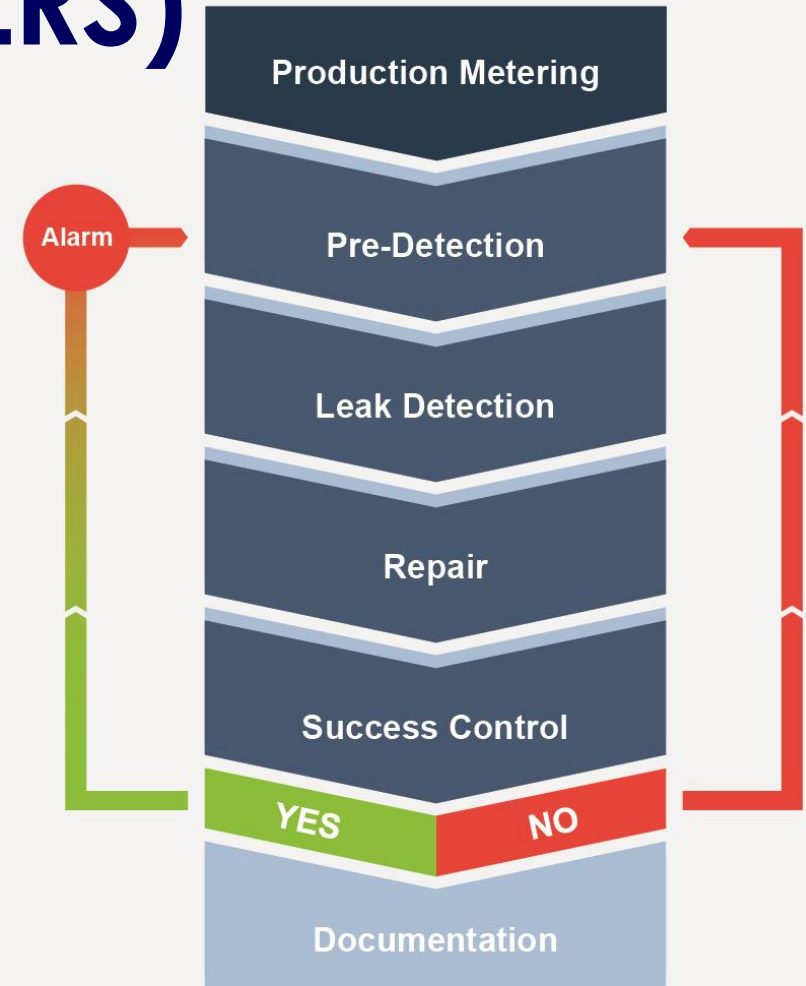
Components of RW and NRW

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Rev. Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Rev. Water
			Unbilled Unmetered Consumption	
	Water Losses	Commercial Losses	Unauthorized Consumption	
			Customer Meter Inaccuracy and Data Handling Errors	
		Physical Losses	Leakages on Main and Distribution Lines	
			Leakages and Overflows from Storage Tanks	
			Leakages on Service Connections up to the Consumer	

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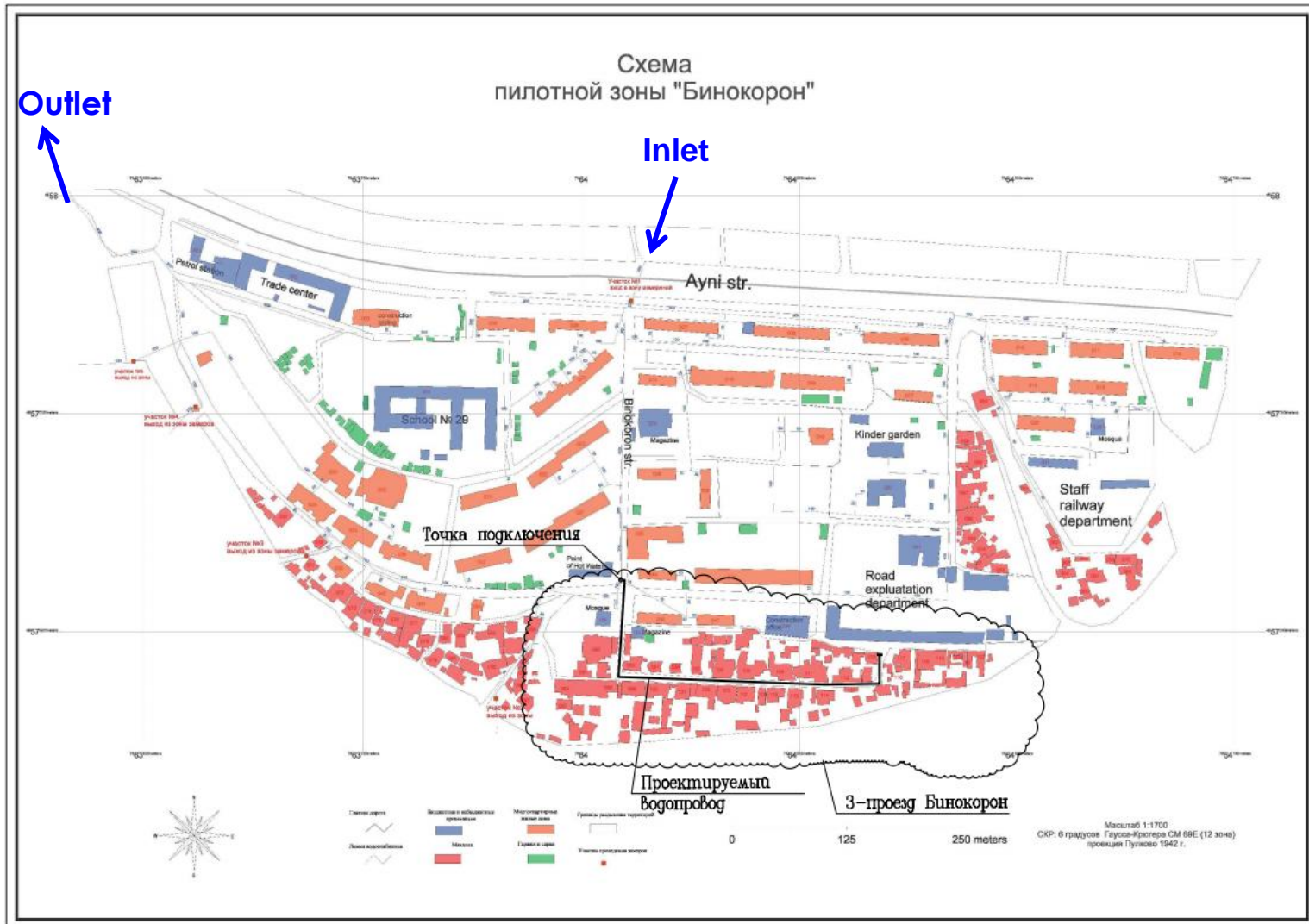
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BASIC DATA

Network length: **5,0 km**

Material: **carbon steel**

Network topology: **52.4% DN 100/150**

             23.8% <DN 80

             23.8% others

Age: **>50 years**

No. of customers: **1,227[*)]**

No. of inhabitants: **3,611[*)]**

*)   DVK database   23/08/2013

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OBJECTIVES

- **Determination of the share of the different kind of losses (administrative/technical)**

- **Examination of the impact of different NRW reduction measures**

- **Derivation of a NRW reduction strategy for the whole network**

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METHODOLOGY

- **Measurement of the daily consumption pattern**

- **Installation of new customer meters**
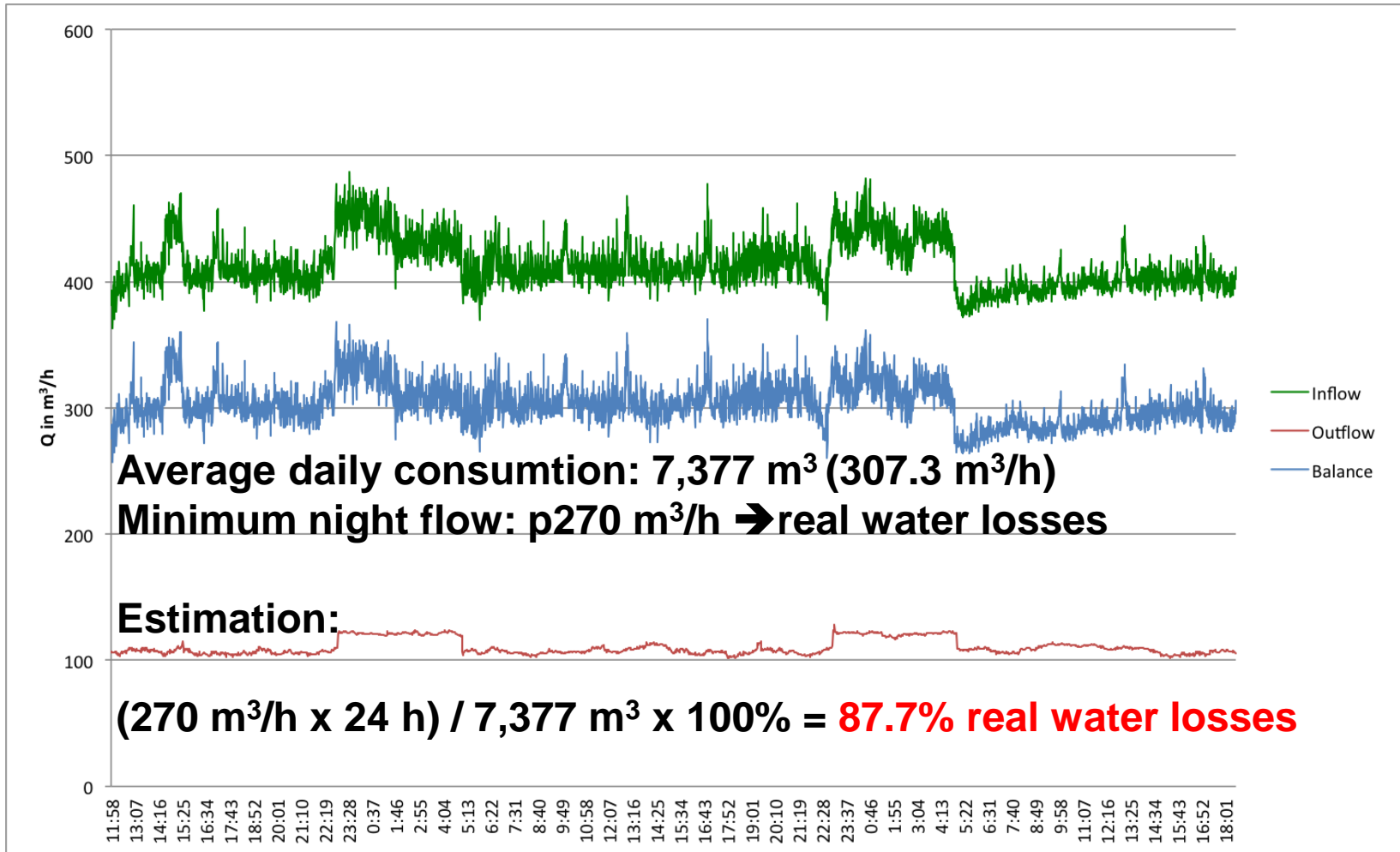
- **Leak detection and repair**

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MEASUREMENT OF THE DAILY CONSUMPTION

PATTERN

- **Metering of the total consumption of the pilot area**

➔ **Basic data for the NRW calculation**

- **Evaluation of the minimum night flow**

➔**Indicator of real water losses**

- **Reference value for future measurements**

➔ **Success control**

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FIRST MEASUREMENT ON 25/09/2013

Average daily consumtion: 7,377 m³ (307.3 m³/h)
Minimum night flow: p270 m³/h ➜real water losses

Estimation:

(270 m³/h x 24 h) / 7,377 m³ x 100% = 87.7% real water losses

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INSTALLATION OF NEW CONSUMER METERS

- **Field Investigation – cleaning up the customer data base, determination of the number of not yet registered consumers**

➔ **Administrative losses by not registered consumption**

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INSTALLATION OF NEW CONSUMER METERS

- Comparison of previous and actual monthly consumptions

➔ Administrative losses by wrong estimation and inaccurate consumer meters

➔ Effect of water saving by billing based on really consumption, increase of the daily per–capita consumption

Status quo: Shortly before completion

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LEAK DETECTION

- **Detection and repair of all visible and hidden pipe and valve damages**

➔ **Determination and reduction of technical losses**

- **Investigation of the causes**

➔ **Elaboration of a sustainable rehabilitation strategy**

Status quo: Equipment is procured/repaired

Stuff was trained in a training camp

Field training starts now

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LEAK DETECTION

Attention!

An unique leak detection and repair campaign doesn◇t reduce the technical water losses durably.

➔ **New damages because of the increasing**

pressure and the continuing aging

Therefore a permanent flow monitoring is required (District Metering).

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EMBEDDING INTO OVERALL STRATEGY

- **Step by step implementation in all isolable network districts (DMA´s)**

➔ **Continuously reduction of technical losses**
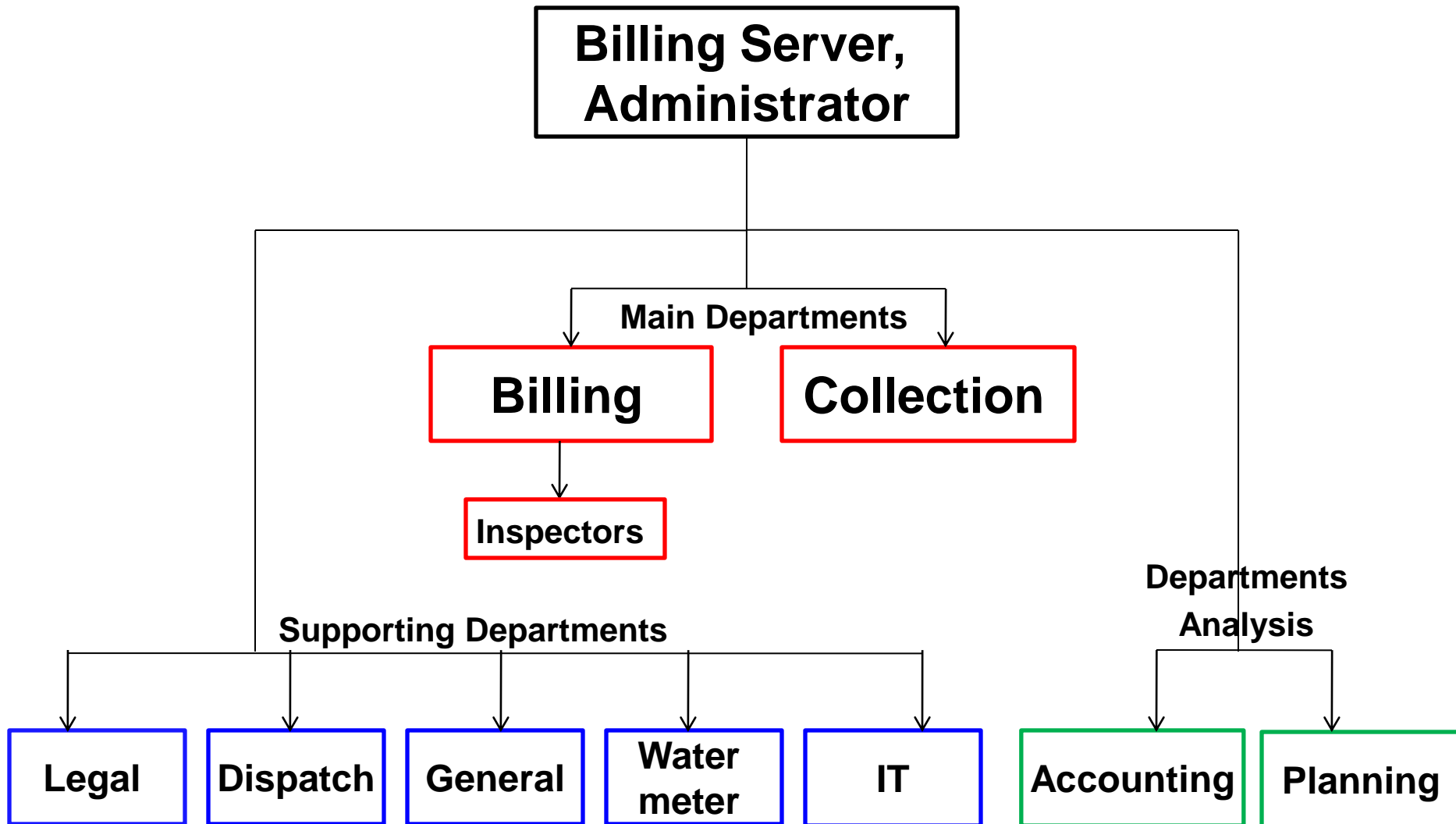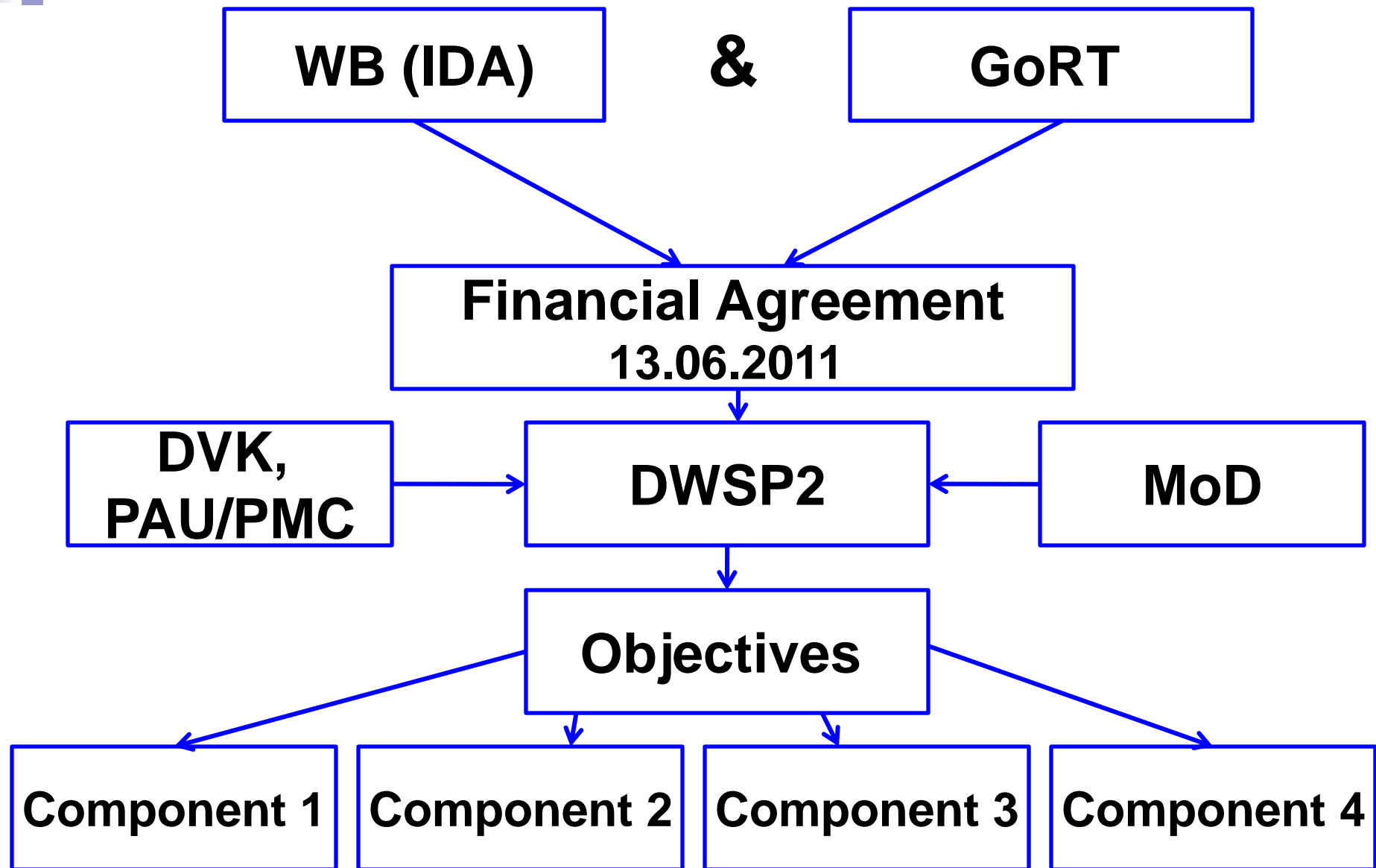
➔ **Improvement of the rehabilitation strategy**

New Billing System

(for reducing NRW)

- *Automated billing system will reduce the amount of unbilled consumption*

- *Regular updating of Database will reduce unauthorized consumption*

- *New methods of meter reading will reduce inaccuracies*

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Project Development Objective (PDO):

To improve water utility performance and water supply services in selected areas of Dushanbe.

Performance indicators:

- *Quality of water*

- *Customer satisfaction with water supply service*

- *Improvement of financial performance of DVK*

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PROJECT COMPONENTS:

- Component 1: Metering and Demand Management

- Component 2: Water Quality Improvement

- Component 3: Institutional Strengthening and Capacity Building

- Component 4: Implementation Support

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METERING AND DEMAND MANAGEMENT:

- *Procurement of 76,500 residential water meters*

- *Installation of 76,500 residential water meters*

- *Proc. & installation of flow meters at 4 WTP*

- *Procurement of software for the NIS system (Establishing of NIS)*

- *Procurement and installation of SCADA (Installation of SCADA)*

- *Public communication and awareness program*

- *Customer Satisfaction Surveys*

WATER QUALITY IMPROVEMENT:

- *Cleaning network sections and reservoirs*

- *Design and Build of Rapid Sand Filters at SAM*

- *Design and Build of PS and two reservoirs at NAP*

- *Procurement of hydraulic excavator*

- *Procurement of laboratory equipment*

- *Procurement and installation of re-chlorination units at 5 reservoirs*

- *Procurement of Measuring Equipment for Leakage Detection*

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INSTITUTIONAL STRENGTHENING AND CAPACITY BUILDING:

- *Institutional Assessment*

- *Revaluation of FA and Inventory*

- *Procurement of new accounting software*

- *Procurement of Customer Management System*

- *Technical Assistance for corporate development and financial performance*

- *Technical Assistance for operational improvements*

- *Training programs*

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Programme	**Training Programmes in Tajikistan**	Training providing company	Status	Coordinated with the WB	Period of conducting
DWSP2- TP0	Procurement of Equipment for Training program		ongoing	Not	июн.04
DWSP2-TP1	Courses of English for Businessmen	Mr. Nizomiddin Shobiddinov	ongoing	yes	Jan- Dec 2014
DWSP2-TP2	Comprehensive phased financial, accounting and HR course	Public Institute of professional Accountants, Tajikistan	ongoing	yes	May 2014- April 2015
DWSP2-TP3	Complex of technical trainings for electricians; plumbers; mechanics; welders				During 2015
DWSP2-TP4	Training course on AutoCAD software				During 2015
DWSP2-TP5	Training program on working with customers				During 2015

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	Training Programmes abroad				
DWSP2-TP6	Study tour on operation & maintenance of Rapid Sand Filters	Veolia Water Solutions…. Romania	Offer received	yes	07.08-14.08.2014 or later
DWSP2-TP7, DWSP2-TP14	1. Study tour on Water Utility Management: finance & accounting & customer management 2. Study tour on HR issues (motivation of employees, attraction of qualified personnel, etc.	**Utility** Company Sachsen Wasser, Leipzig, Germany	Offer received	yes	09.10 - 15.10.2014
DWSP2-TP8, DWSP2-TP10	1. Study tour on network operation, maintenance & rehabilitation and meter management. 2. Modern methods for cleaning of the network sections and reservoirs; teleinspection and diagnostics of pipes	**Utility** Company Sachsen Wasser, Leipzig, Germany	Offer received	yes	14.09 - 19.09.2014
DWSP2-TP9, DWSP2-TP12	1. Study tour on specifics of SCADA in water supply utilities (network structuring, work flow optimization, etc.)Study tour on 2. Electromechanical Equipment: pumping machinery and automatization (2nd and 3rd level of pumps)	**Utility** Company Sachsen Wasser, Leipzig, Germany	Offer received	yes	26.10 - 31.10.2014
DWSP2-TP11	Study tour on leak detection; pipe detection; pressure and flow measurements	F.A.S.T. GmbH, Germany	Completed	yes	23.03-28.03.2014
DWSP2-TP13	Study tour on using of laboratory equipment	**Utility** Company Sachsen Wasser, Leipzig, Germany	Offer received	yes	12.10 - 17.10.2014
DWSP2-TP15	Study tour on operation of tariff and billing system		Offer not yet received		

PROJECT IMPLEMENTATION SUPPORT:

- *Design and supervision of works*

- *Consultancy, Audit*

Project Development Objective (PDO): *Improve water utility performance and water supply services in selected areas of Dushanbe.*

PDO Level Results Indicators*	Baseline	Cumulative Target Values**					Responsibility for Data Collection	Description (indicator definition, etc.)
		YR 1 (2011)	YR 2 (2012)	YR3 (2013)	YR 4 (2014)	YR5(2015)		
Indicator One: Water quality in the network:								
Parameter 1: Turbidity in the network. TARGETS	2009: 40% of samples comply with the standard (MAC* is 2mg/l)	To start the design of the SAM filters	**To start construction of SAM filters**	To start operation of the SAM filters; 99% of samples comply with the standard	40 % of samples comply with the standard To start design and construction of SAM filters	86 % of samples comply with the standard To start operation of the SAM filters;	DVK/PMC	Improvement of indicators is subject to successful operation of NAP filters, construction and operation of SAM filters, and partial washing of the network.
RESULTS		47% Preparatory stage of the Project	**49% Selection of Project Management Consultant**	36.7% of the samples correspond. Bidding documents for construction of new filters were prepared and no objection of theWB was received.				

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Parameter 2: Residual chlorine in the network. TARGETS	2009: 98% of samples show residual Cl	Design and installation of rechlorination equipment in the network	Completion and start up of the re chlorination equipment in the network	99% of samples show residual Cl	99% of samples show residual Cl Design and installation of rechlorination equipment in the network	99% of samples show residual Cl Completion and start up of the re chlorination equipment in the network	DVK/PMC	Note: sensitivity of the test is 0,02 mg/l of Cl concentration- this is a traceable border.The indicator is subject to installation of rechlorinationsystems and general reduction of turbidity in the network.
RESULTS		98% Preparatory stage of the Project	99% Selection of Project Management Consultant	In 100% of samples residual chlorine is present. The bidding was conducted. The winner has not been determined. All proposals were rejected.				
Parameter 3: Bacteriological water quality: TARGETS	2009: 96% of samples comply with the standard (MAC* is 3 coli forms/l)	Subject to improvement of water treatment at SAM and NAP and re chlorination in the network	Subject to improvement of water treatment at SAM and NAP and re chlorination in the network	99% of samples comply with the standard	99% of samples comply with the standard	99% of samples comply with the standard	DVK/PMC	The indicators are subject to reduction of turbidity in the network and presence of residual Cl in the network.
RESULTS		98% Preparatory stage of the Project	99% Selection of Project Management Consultant	99% of samples comply with the standard. The bidding for coagulation was conducted. Thisassignmentwas included to PMC contract. Thebidding on re-chlorination was conducted. The winner has not been determined.All proposals were rejected				

Indicator Two: Customer satisfaction with water supply services								
Parameter 1: Improved water quality (in general) - Percentage of customers, satisfied with water quality. **TARGETS**	2010 TBD by the Customer Satisfaction Survey, conducted under the DWSSP 1	No changes are excepted	**No changes are expected**	Improved	Improved to 89 %	Improved to 90 %	DVK/ PMC	Note: the target value will be set after the baseline will be determined under the DWSSP 1.
RESULTS	76% based on the 2011 Customer Satisfaction Survey	No changes are excepted	**No changes are expected**	**86,4%based on Customer Satisfaction Survey for 2013 (fromReport onDWSP2-20.2)**				
Parameter 2: Availability of ws services- Percentage of customers with more thn 12 h of ws service per day. **TARGETS**	70% of population are satisfied with ws services; to be revised based on the results of 2011 Customer Satisfaction Survey (DWSP) 2	No changes are excepted	**No changes are expected**	Improvements due to installed meters	Improvements due to installed meters 80 %	90% of customers receive more than 12 h in a day services; the final target will be revised after hydraulic model is in place	DVK/PMC	Hydraulic model will be developed by the project.
RESULTS	57% have more than 12 h of services per day , in 2011	No changes are excepted	**No changes are expected**	**72.1% of customers have more than 12 hours of service per day (fromReport on DWSP2-20.2)**				

Indicator Three: Improvement of financial performance of DVK									
Parameter 1: Cash operating ratio has improved	29:01,1	Setting of project accounts, no target is imposed	**To reach 1**	Not higher than 0,9	Not higher than 0,9	Not higher than 0,9	DVK/PMC	**Financial working ratio of total cash operating expenses (excluding interest and other charges on debt) to total cash operating revenues; ideally should be less then 1; improvement of ratio means increase of revenues (if revenues grow faster then expenses).**
RESULTS		1.22	**1.07**	**1.09 (according to preliminary data from DVK)**				
Parameter 2: Number of residential customer registered and billed.	2009: 154,000 residential customers or 340 495 people	**Intensive inventorying of customers should take place**	**By the end of 2011 the baseline number should be increased to cover reflect the actual I population of Dushanbe (plus the service area in Rudaki rayon)**	**To reach actual population of the DVK service area**	**To reach actual population of the DVK service area**	**To reach actual population of the DVK service area**	DVK/PMC	**Officially, population in Dushanbe is 720,000 people, plus the population in the service area in Rudaki rayon should be reflected. The baseline data are taken from the feasibility study report.**
TARGETS								

RESULTS		176 443 residential customers or 410 000 people (Inventory of residential customers was not completed)	**167 340 registered residential customers or 647 122 people (out the these 13 478 are in Rudaki district or 71 591 people)**	167 001 registeredreside ntialcustomerso r539 876 people(includin g 13 494 customers/or 75 938 people located in Rudakidistrict)				
Parameter 3: Accounts receivable as % of revenue.　　　　　　TARGETS	25%	Gradual decrease towards 15%	**Gradual decrease towards 15%**	15%	15%	15%	DVK/PMC	Reaching the target by the end of the year 3 is subject to overall improvement of water quality in the system.
RESULTS		**82%**	**48%**	**44.7%**　**(according to preliminary data from DVK)**				

THANK YOU!