22	Doza de sulfat de aluminiu/polimer	B	0	0	0	15/0.2	0	15/0.2	20/0.25	25.0.25	25/0.25				
23	Aluminiu	B	-												
		P1	0.005	0.016	0.008	0.106	0.004	0.165	0.163	0.152	0.194				
	(mg/dm^3)	P2	0.005	0.013	0.009	0.110	0.005	0.168	0.172	0.162	0.199				
24	Mangan	B	0.009	0.027	0.023	0.037	0.026	0.041	0.079	0.089	0.06				
		P1	0.005	0.018	0.013	0.013	0.015	0.017	0.018	0.011	0.006				
	(mg/dm^3)	P2	0.006	0.016	0.014	0.015	0.016	0.018	0.020	0.012	0.006				
25	Magneziu	B	4.10	4.74	4.98	4.86	5.23	4.74	4.38	4.62	4.5				
		P1	4.10	4.74	4.98	4.86	5.23	4.74	4.38	4.62	4.5				
	(mg/dm^3)	P2	4.10	4.74	4.98	4.86	5.23	4.74	4.38	4.62	4.5				
26	Sulfuri	B	0.005	0.006	0.006	0.006	0.004	0.006	0.019	0.020	0.01				
		P1	0.003	0.004	0.004	0.004	0.003	0.004	0.006	0.004	0.003				
	mg/dm3	P2	0.003	0.003	0.004	0.004	0.003	0.004	0.007	0.004	0.003				
27	Fluor	B	0.19	0.16	0.24	0.24	0.16	0.30	0.82	0.61	0.58				
		P1	0.21	0.15	0.25	0.32	0.09	0.32	0.58	0.54	0.44				
	(mg/dm^3)	P2	0.22	0.15	0.24	0.33	0.10	0.31	0.58	0.52	0.41				

Notă :
B - apa brută - intrare statie
P1 - apa potabilă -iesire rezervor 1
P2- apa potabilă - iesire rezervor 2

Şef laborator ,
ing. chim.Maria Lupeş

5 WATER SUPPLY ZONE TARGU OCNA

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BULETIN DE ANALIZA Nr. 57/ DATA 7 05.2010
BENEFICIAR : ILF Consulting Engineers
PROBA DE ANALIZAT__Apă potabilă
Prelevare: - punct de prelevare_:Intrare rezervor – Tg. Ocna
- metoda de prelevare:SR ISO 5667-5/1998

Data prelevare/receptionare probă/ : 5.05.2010 ora 18^{00}/ 6.05.2010 ora 8^{00}

Nr. crt.	PARAMETRI ANALIZATI	UM	/Metoda de analiza	Rezultate obtinute	Limite admise c Legea 458/2002,3
1.	Culoare		SR EN ISO 7887/2002	incolora Acceptabila consumatorilor nici o modificare anormala	Acceptabila consumatorilor n modificare anorm
2.	Miros		SR EN 1622/2007	Nici un miros anormal	Acceptabil consumatorilor modificare anor
3.	Gust		SR EN 1622/2007	Nici un gust anormal	Acceptabil consumatorilor modificare anor
4.	Turbiditate	N.T.U.	USEPA 180.1	5,40	≤5
5.	pH	unit. pH	SR ISO 10523/1997	7,23	≥6,5 ; ≤ 9,
7.	Conductivitate electrică	µS/cm	SR EN 27888/1997	173,8	2500
8.	Reziduu fix	mg/l	conductometric	113	
9.	Alcalinitate	mmol/l	SR EN ISO 9963-1/2002	1,25	
10.	Aciditate	mval/l	STAS 6363/1976	0,2	
11.	Duritate totală	grade germane	SR ISO 6059/2008	5,05	minim 5
12.	Calciu	mg/l	SR ISO 6058/2008	30,4	
13.	Fier total	mg/l	SR ISO 6332/1996	0,015	0,200
14.	Aluminiu	µg/l	SR ISO 10566/2001	196	200
15.	Cloruri	mg/l	SR ISO 9297/2001	5,67	250
16.	Sulfat	mg/l	STAS 3069/1987	23,9	250
17.	Indice de permanganat	mgO_2/l	SR EN ISO 8467/2001	2,08	5,0
19	Amoniu	mg/l	SR ISO 7150-1/2001	0,009	0,50
20	Nitrati	mg/l	SR ISO 7890-3/2000	4,02	50
21	Nitriti	mg/l	SR EN 26777/2002	0,003	0,50
22	Clor rezidual liber la capat de retea	mg/l	STAS 6364/1978	0,075	0,25

Aprobat,
Sef laborator , ing.chim. Lupes Maria

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Responsabil analize,
ing.chim. Leascu Elena

Buletinul se referă numai la proba specificată.
Se interzice reproducerea parțială a buletinului fără aprobarea laboratorului emitent.

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BULETIN DE ANALIZA Nr. 34/ DATA 17.03 2010
BENEFICIAR : ILF Consulting Engineers
PROBA DE ANALIZAT__Apă potabilă
Prelevare: - punct de prelevare_:Intrare rezervor – Tg. Ocna
- metoda de prelevare:SR ISO 5667-5/1998
Data prelevare/receptionare probă/_: 15.03.2010 ora 16^{00}/ 16.03.2010 ora 8^{00}

Nr. crt.	PARAMETRI ANALIZATI	UM	/Metoda de analiza	Rezultate obtinute	Limite admise con Lege 458/2002,311
1.	Culoare		SR EN ISO 7887/2002	incolora Acceptabila consumatorilor nici o modificare anormala	Acceptabila consumatorilor nici modificare anorma
2.	Miros		SR EN 1622/2007	Nici un miros anormal	Acceptabil consumatorilor şi n modificare anorma
3.	Gust		SR EN 1622/2007	Nici un gust anormal	Acceptabil consumatorilor nic modificare anorma
4.	Turbiditate	N.T.U.	USEPA 180.1	4,95	≤ 5
5.	pH	unit. pH	SR ISO 10523/1997	7,48	≥6,5 ; ≤ 9,5
7.	Conductivitate electrică	µS/cm	SR EN 27888/1997	201	2500
8.	Reziduu fix	mg/l	conductometric	130	
9.	Alcalinitate	mmol/l	SR EN ISO 9963-1/2002	1,5	
10.	Aciditate	mval/l	STAS 6363/1976	0,2	
11.	Duritate totală	grade germane	SR ISO 6059/2008	5,21	minim 5
12.	Calciu	mg/l	SR ISO 6058/2008	31,2	
13.	Fier total	mg/l	SR ISO 6332/1996	0,015	0,200
14.	Aluminiu	µg/l	SR ISO 10566/2001	210	200
15.	Clorui	mg/l	SR ISO 9297/2001	7,48	250
16.	Sulfat	mg/l	STAS 3069/1987	18,9	250
17.	Indice de permanganat	mgO_2/l	SR EN ISO 8467/2001	1,44	5,0
19	Amoniu	mg/l	SR ISO 7150-1/2001	0,017	0,50
20	Nitraţi	mg/l	SR ISO 7890-3/2000	3,21	50
21	Nitriţi	mg/l	SR EN 26777/2002	0,004	0,50
22	Clor rezidual liber la capat de reţea	mg/l	STAS 6364/1978	0,025	0,25

Aprobat,
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ing.chim. Leaşcu Elena

Buletinul se referă numai la proba specificată.
Se interzice reproducerea parţială a buletinului fără aprobarea laboratorului emitent.

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BULETIN DE ANALIZA Nr. 50/ DATA 23.04.2010
BENEFICIAR : ILF Consulting Engineers
PROBA DE ANALIZAT__Apă potabilă
Prelevare: - punct de prelevare_:Intrare rezervor – Tg. Ocna
- metoda de prelevare:SR ISO 5667-5/1998
Data prelevare/recepţionare probă/_: 21.04.2010 ora 15^{30}/ 22.04.2010 ora 8^{00}

Nr. crt.	PARAMETRI ANALIZATI	UM	/Metoda de analiza	Rezultate obtinute	Limite admise cor Lege 458/2002,311
1.	Culoare		SR EN ISO 7887/2002	incolora Acceptabila consumatorilor nici o modificare anormala	Acceptabila consumatorilor nic modificare anorma
2.	Miros		SR EN 1622/2007	Nici un miros anormal	Acceptabil consumatorilor şi r modificare anorma
3.	Gust		SR EN 1622/2007	Nici un gust anormal	Acceptabil consumatorilor nic modificare anorma
4.	Turbiditate	N.T.U.	USEPA 180.1	4,32	≤ 5
5.	pH	unit. pH	SR ISO 10523/1997	7,16	≥6,5 ; ≤ 9,5
7.	Conductivitate electrică	µS/cm	SR EN 27888/1997	175	2500
8.	Rezidnu fix	mg/l	conductometric	113	
9.	Alcalinitate	mmol/l	SR EN ISO 9963-1/2002	1,25	
10.	Aciditate	mval/l	STAS 6363/1976	0,2	
11.	Duritate totală	grade germane	SR ISO 6059/2008	5,05	minim 5
12.	Calciu	mg/l	SR ISO 6058/2008	30,4	
13.	Fier total	mg/l	SR ISO 6332/1996	0,005	0,200
14.	Aluminiu	µg/l	SR ISO 10566/2001	180	200
15.	Cloruri	mg/l	SR ISO 9297/2001	7,23	250
16.	Sulfat	mg/l	STAS 3069/1987	24,7	250
17.	Indice de permanganat	mgO_2/l	SR EN ISO 8467/2001	2,43	5,0
19	Amoniu	mg/l	SR ISO 7150-1/2001	0,012	0,50
20	Nitraţi	mg/l	SR ISO 7890-3/2000	3,61	50
21	Nitriţi	mg/l	SR EN 26777/2002	0,006	0,50
22	Clor rezidual liber la capat de reţea	mg/l	STAS 6364/1978	0,05	0,25

Aprobat,
Şef laborator,
ing.chim. Lupeş Maria

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Responsabil analize,
ing.chim. Leascu Elena

Buletinul se referă numai la proba specificată.
Se interzice reproducerea parţială a buletinului fără aprobarea laboratorului emitent.

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BULETIN DE ANALIZA Nr. 44/ DATA 9. 04.2010
BENEFICIAR : ILF Consulting Engineers
PROBA DE ANALIZAT__Apă potabilă
Prelevare: - punct de prelevare_:Intrare rezervor – Tg. Ocna
- metoda de prelevare:SR ISO 5667-5/1998
Data prelevare/recepţionare probă/_: 7.04.2010 ora 18^{30}/ 8.04.2010 ora 8^{00}

Nr. crt.	PARAMETRI ANALIZATI	UM	/Metoda de analiza	Rezultate obtinute	Limite admise con Lege 458/2002,311
1.	Culoare		SR EN ISO 7887/2002	incolora Acceptabila consumatorilor nici o modificare anormala	Acceptabila consumatorilor nici modificare anorma
2.	Miros		SR EN 1622/2007	Nici un miros anormal	Acceptabil consumatorilor şi n modificare anorma
3.	Gust		SR EN 1622/2007	Nici un gust anormal	Acceptabil consumatorilor nic modificare anorma
4.	Turbiditate	N.T.U.	USEPA 180.1	3,97	≤ 5
5.	pH	unit. pH	SR ISO 10523/1997	7,23	≥6,5 ; ≤ 9,5
7.	Conductivitate electrică	µS/cm	SR EN 27888/1997	177,3	2500
8.	Reziduu fix	mg/l	conductometric	115	
9.	Alcalinitate	mmol/l	SR EN ISO 9963-1/2002	1,15	
10.	Aciditate	mval/l	STAS 6363/1976	0,2	
11.	Duritate totală	grade germane	SR ISO 6059/2008	5,04	minim 5
12.	Calciu	mg/l	SR ISO 6058/2008	31,2	
13.	Fier total	mg/l	SR ISO 6332/1996	0,021	0,200
14.	Aluminiu	µg/l	SR ISO 10566/2001	159	200
15.	Cloruri	mg/l	SR ISO 9297/2001	7,23	250
16.	Sulfat	mg/l	STAŞ 3069/1987	17,8	250
17.	Indice de permanganat	mgO_2/l	SR EN ISO 8467/2001	1,44	5,0
19	Amoniu	mg/l	SR ISO 7150-1/2001	0,04	0,50
20	Nitraţi	mg/l	SR ISO 7890-3/2000	3,45	50
21	Nitriţi	mg/l	SR EN 26777/2002	0,006	0,50
22	Clor rezidual liber la capat de reţea	mg/l	STAS 6364/1978	0,25	0,25

Aprobat,
Sef laborator
ing.chim. Lupeş Maria

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Responsabil analize,
ing.chim. Leasca Elena

Buletinul se referă numai la proba specificată.
Se interzice reproducerea parţială a buletinului fără aprobarea laboratorului emitent.

Fax 397/10.05.2010

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BULETIN DE ANALIZA Nr. 42/ DATA 26.03 2010
BENEFICIAR : ILF Consulting Engineers
PROBA DE ANALIZAT__Apă potabilă
Prelevare: - punct de prelevare_:Intrare rezervor – Tg. Ocna
- metoda de prelevare:SR ISO 5667-5/1998
Data prelevare/recepţionare probă/_: 26.03.2010 ora 13^{00}/ 26.03.2010 ora 13^{30}

Nr. crt.	PARAMETRI ANALIZATI	UM	/Metoda de analiza	Rezultate obtinute	Limite admise con Lege 458/2002,311
1.	Culoare		SR EN ISO 7887/2002	incolora Acceptabila consumatorilor nici o modificare anormala	Acceptabila consumatorilor nici modificare anormal
2.	Miros		SR EN 1622/2007	Nici un miros anormal	Acceptabil consumatorilor şi n modificare anorma
3.	Gust		SR EN 1622/2007	Nici un gust anormal	Acceptabil consumatorilor nici modificare anorma
4.	Turbiditate	N.T.U.	USEPA 180.1	5,51	≤ 5
5.	pH	unit. pH	SR ISO 10523/1997	7,42	≥6,5 ; ≤ 9,5
7.	Conductivitate electrică	µS/cm	SR EN 27888/1997	208	2500
8.	Reziduu fix	mg/l	conductometric	135	
9.	Alcalinitate	mmol/l	SR EN ISO 9963-1/2002	1,45	
10.	Aciditate	mval/l	STAS 6363/1976	0,2	
11.	Duritate totală	grade germane	SR ISO 6059/2008	5,27	minim 5
12.	Calciu	mg/l	SR ISO 6058/2008	32,8	
13.	Fier total	mg/l	SR ISO 6332/1996	0,06	0,200
14.	Aluminiu	µg/l	SR ISO 10566/2001	205	200
15.	Cloruri	mg/l	SR ISO 9297/2001	7,44	250
16.	Sulfat	mg/l	STAS 3069/1987	33	250
17.	Indice de permanganat	mgO_2/l	SR EN ISO 8467/2001	1,66	5,0
19	Amoniu	mg/l	SR ISO 7150-1/2001	0,04	0,50
20	Nitraţi	mg/l	SR ISO 7890-3/2000	3,20	50
21	Nitriţi	mg/l	SR EN 26777/2002	0,005	0,50
22	Clor rezidual liber la capat de reţea	mg/l	STAS 6364/1978	0,10	0,25

Aprobat,
Sef laborator ,
ing.chim. Leaşcu Elena

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Responsabil analize,
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Annex 3.3 Field Measurements

3.3.1 Flow Measurements in Bacau City

Assumptions of specific consumption have been confirmed by over handed measurements from the Operator during this FS in 2009.

District Serbanesti

District Serbanesti is located in the West of Bacau City and is supplied by a single pipe (material: steel) laying in the street " B-Dul Unirii "(bridge crossing tributary to "Lacul de Acumulare U.H.E. Bacau II"). This steel pipe is connected to another steel pipe DN 700 from PS Gheraiesti. At the pipe to District Serbanesti a flow meter is installed. Just refer to the figures below.

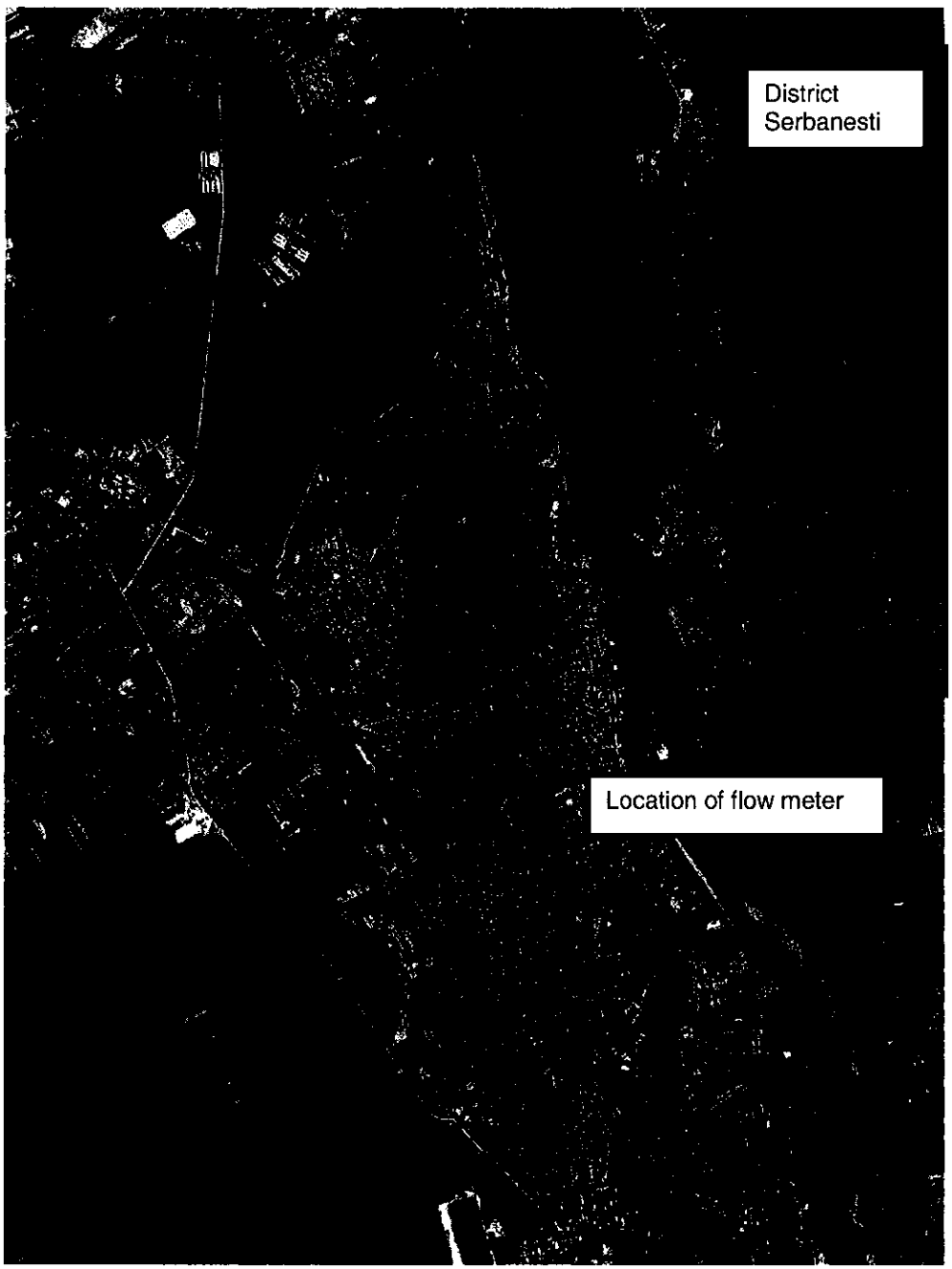


Figure 1 : Location of Flow meter for District Serbanesti

Figure 2 : Bridge to District Serbanesti

Figure 3 : Flow meter chamber for District Serbanesti

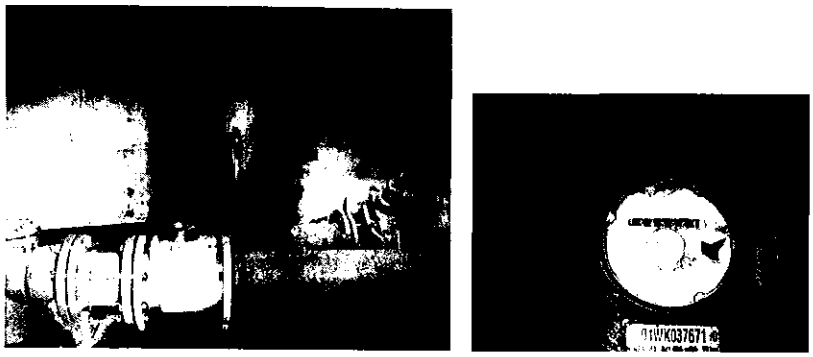


Figure 4 : Flow meter for District Serbanesti

In district of Serbanesti 3,410 persons are connected. There are 1,364 houses out of which 1,284 are paying the metered and recorded quantities, the remaining are paying by lump sum. Furthermore there are 66 nondomestic consumers out of which 63 are paying the metered and recorded quantities, the remaining are paying by lump sum.

Recordings of the installed flow meter for the year 2009 are presented in the next tables.

	billed			
SIV Serb	nondomestic	domestic	total billed	Losses
[m³]	[m³]	[m³]	[m³]	[%]
71,898	3,060	5,947	9,007	87%
54,975	3,760	6,578	10,338	81%
71,919	2,295	7,211	9,506	87%
72,815	3,182	7,593	10,775	85%
121,007	2,515	9,101	11,616	90%
83,706	2,030	12,454	14,484	83%
86,269	3,143	9,146	12,289	86%
88,611	1,906	11,139	13,045	85%
89,632	2,522	10,287	12,809	86%
76,664	2,270	9,475	11,745	85%
73,134	1,973	7,996	9,969	86%
79,103	1,991	6,932	8,923	89%

969,733	30,647	103,859	134,506

fraction	fraction
23%	77%

Table 1: Bacau – recordings of flow meter to District Serbanesti in the year 2009 and calculation of losses

Month	Serbanesti	billed	
		nondomestic	domestic
	[m³]		
Jan	71,898	3,060	5,947
Feb	54,975	3,760	6,578
Mar	71,919	2,295	7,211
Apr	72,815	3,182	7,593
May	121,007	2,515	9,101
Jun	83,706	2,030	12,454
Jul	86,269	3,143	9,146
Aug	88,611	1,906	11,139
Sep	89,632	2,522	10,287
Oct	76,664	2,270	9,475
Nov	73,134	1,973	7,996
Dec	79,103	1,991	6,932
TOTAL	**969,733**	**30,647**	**103,859**
Average	**Average**		
[m³/month]	**[l/day]**		
969,733	**284,545**		

connected inhabitants
3,410

specific domestic consumption [l/cd)]
83

specific total consumption [l/cd)]
108

domestic		
consumption	8,655	[m³/month]
	284,545	[l/day]

total		
consumption	1,614,072	[m³/month]
	368,510	[l/day]

Table 2: Bacau – recordings in District Serbanesti in the year 2009 and calculation of specific water consumption

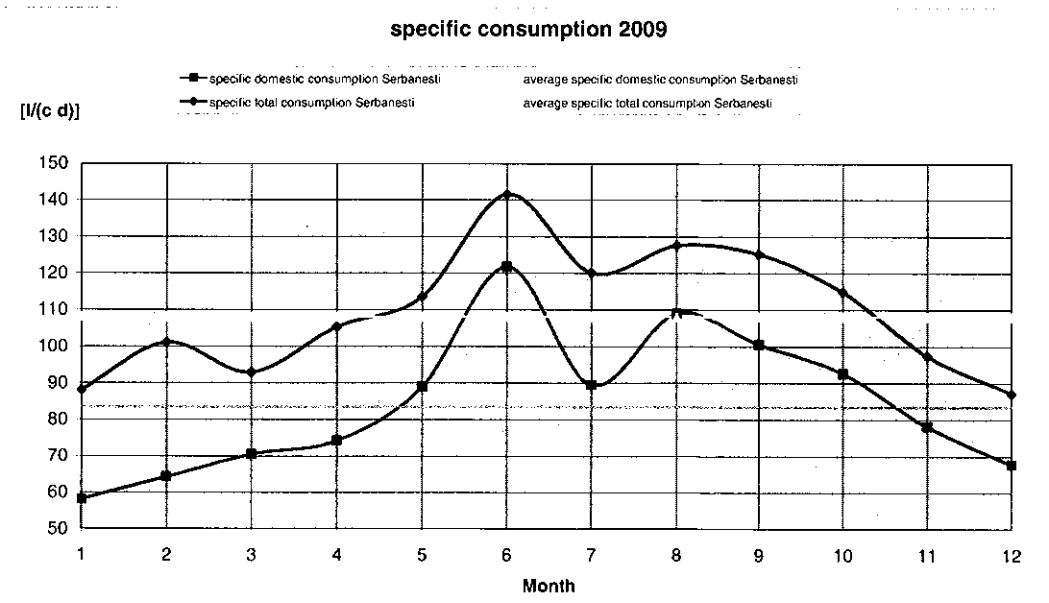


Figure 5 : Bacau – specific consumption for District Serbanesti in the year 2009

The specific domestic consumption sums up to 83 l/(cd). The specific total consumption (including nondomestic) in this district comes up to 108 l/(cd) without losses. The main pipes in that district are made up of Asbestos Cement. The level of losses is calculated to higher than 80%. The Asbestos Cement parts have been in the years of 1960.

3.3.2 Flow Measurements in Moinesti City

During this FS in WSZ Moinesti flow measurements have been executed to confirm the specific consumption.

To measure the flow an ultrasonic flow meter (clamp-on) device was used (see also the figure below).

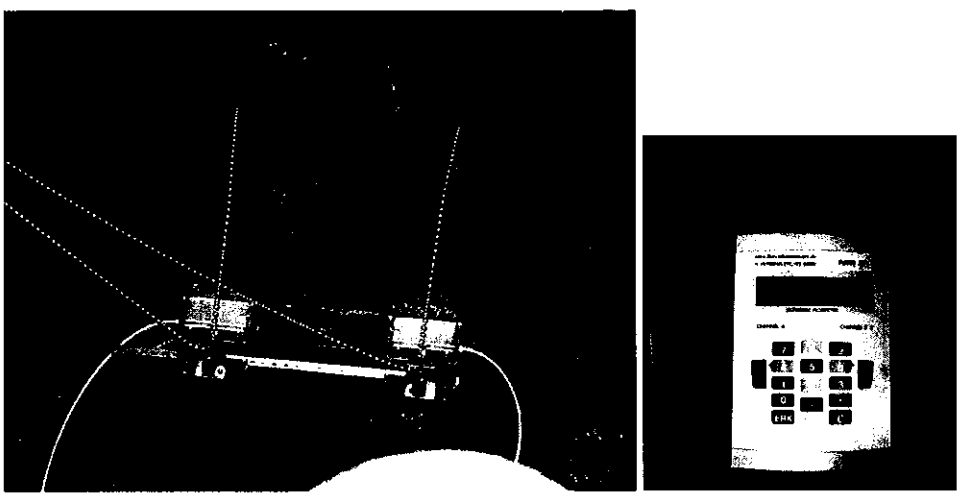


Figure 6 : Installed clamp-on ultrasonic flow meter device at RSV Christea in WSZ Moinesti

The Measurement in Moinesti was executed during 24 hours at RSV Christea which supplies District Lucasesti.

In "Zona Lucasesti" there are officially 726 single houses connected (consumption of 528 connected houses is metered and the other 198 houses have lump sum contracts) and further 1,044 apartments are also connected to RSV Christea. Furthermore there are 87 industrial consumers.

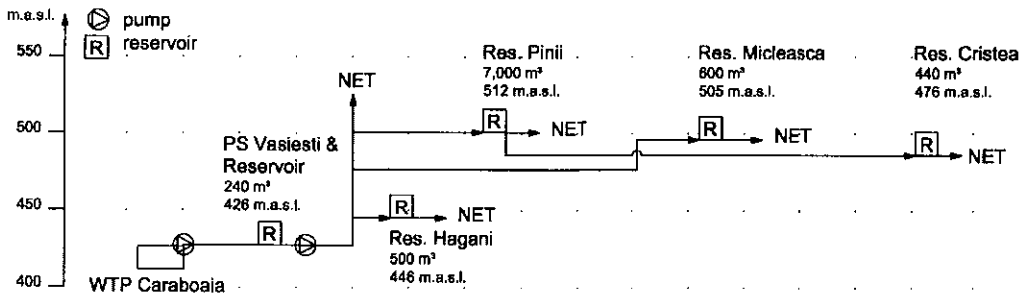


Figure 7 : General supply situation WSZ Moinesti

In WSZ Moinesti measurements have been executed from 31/03/2010 till 01/04/2010. The result is shown in the figure below.

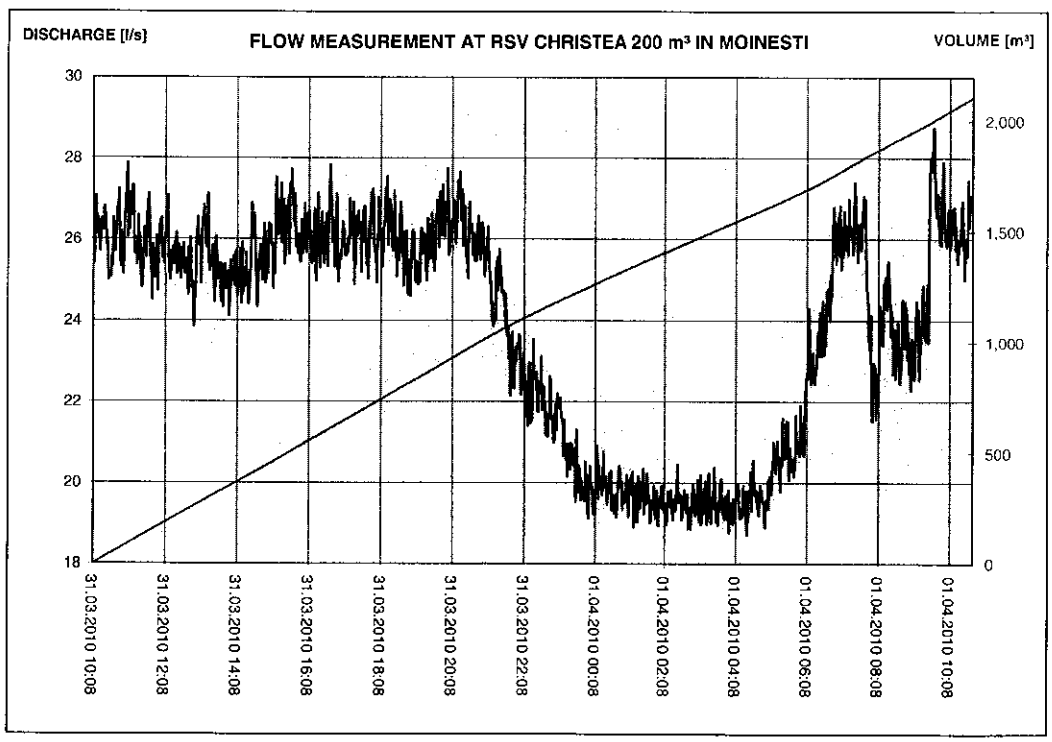


Figure 8 : Flow measurement at RSV Christea 200 m³ in Moinesti from 31/03/2010 - 01/04/2010

During these 24 hours (from 31/03/2010; 10:08 a.m. to 01/04/2010; 10:08 a.m.) a total Volume of 2,047 m³ was distributed to the network.

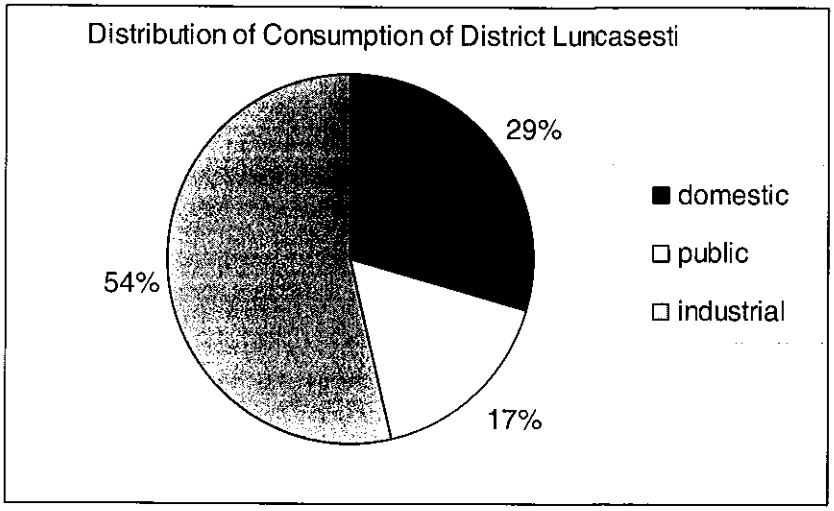


Figure 9 : Distribution of water consumption in District Luncasesti in February 2010

This comes up to a specific consumption of 274 l/(cd) (including losses) during the measurement.

Assuming a level of losses of approx. 50 % (refer also to chapter 8 and to the water balance of Moinesti in chapter 5) a domestic specific consumption of 183 l/(cd) is resulting. By the way, there is a big part (approx. 54 %) of industry in District Luncasesti refer to the Figure above. So a specific domestic consumption of approx. 90 l/(cd) is resulting.

Flow Measurements in Buhusi

During this FS in WSZ Buhusi flow measurements have been executed to confirm the specific consumption.

To measure the flow an ultrasonic flow meter (clamp-on) device was used (see also the figure below).

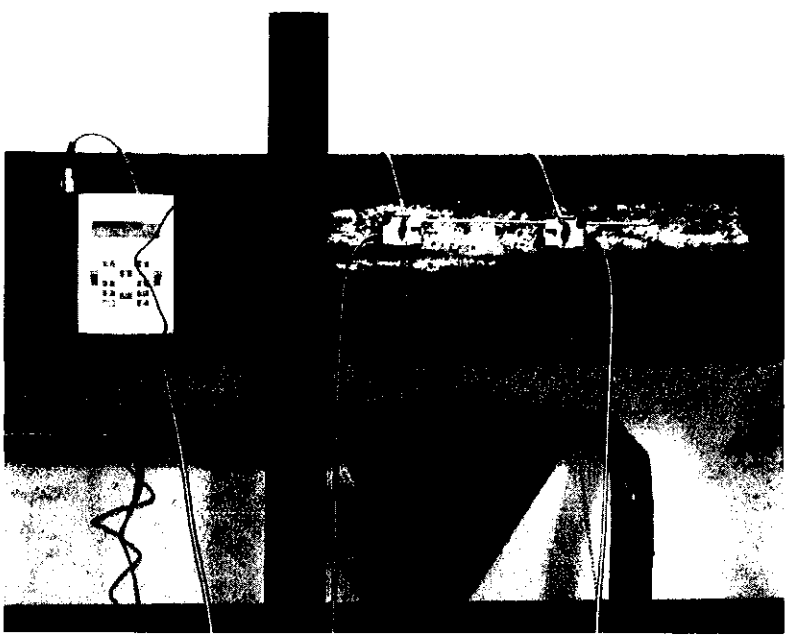


Figure 10 : Installed clamp-on ultrasonic flow meter device in Buhusi

The city of Buhusi is supplied by pumps (4 x Grundfos tip CR 4 x CR 90-3) which are pumping directly into the network.

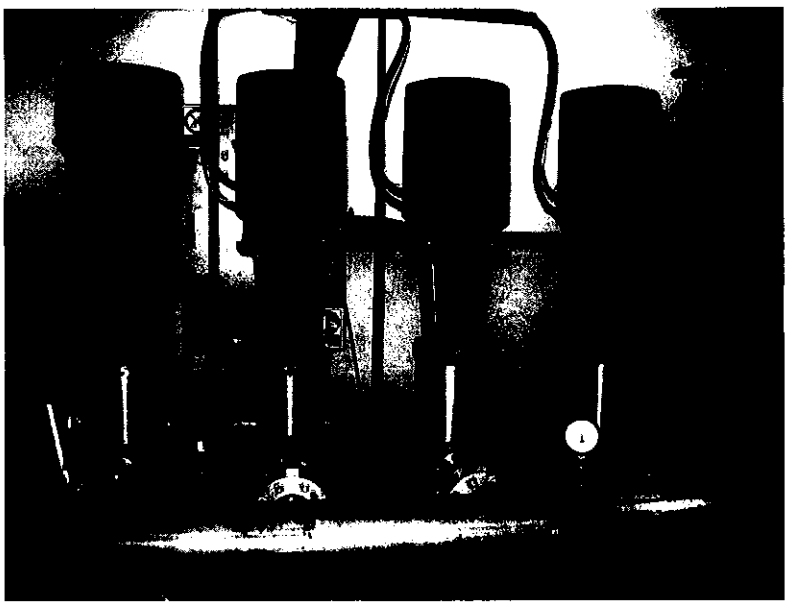


Figure 11 : Installed pumps which are supplying Buhusi

In WSZ Buhusi measurements have been executed from 24/02/2010 till 26/02/2010. The result is shown in the figure below.

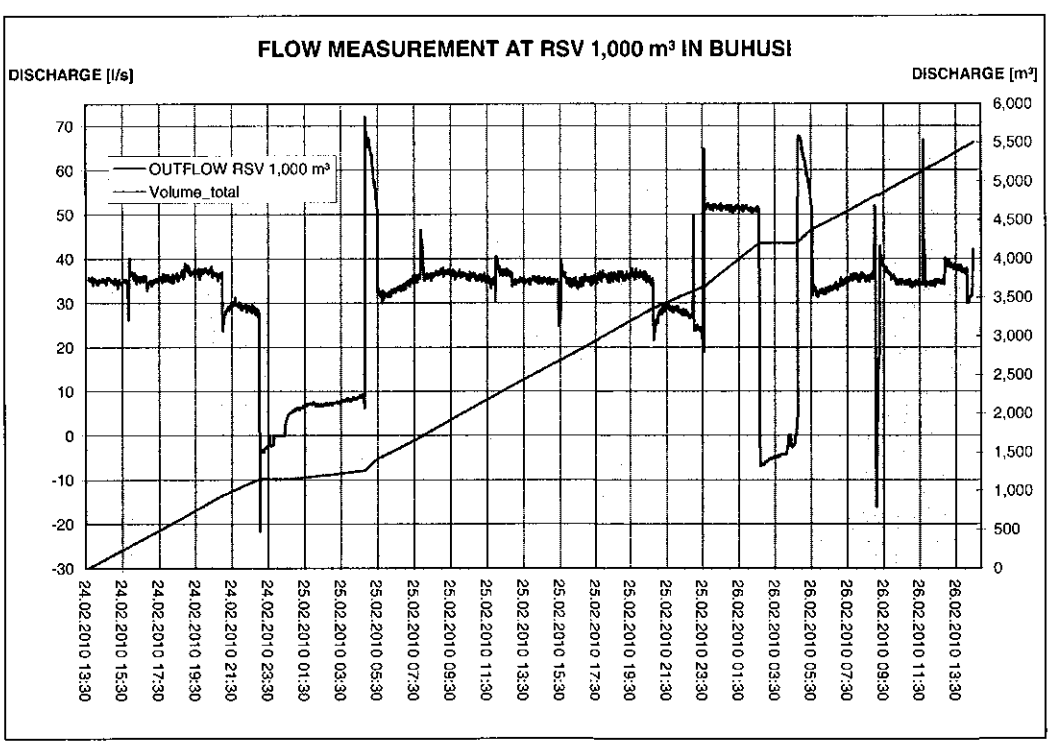


Figure 12 : Flow measurement at RSV 1,000 m³ in Buhusi from 24/02/2010 -26/02/2010

During these 48 hours (from 24/02/2010 ; 13:40 to 26/02/2010 ; 13:40) a Volume of 5,396 m³ was distributed to the network. This comes up to a specific consumption of 171 l/(cd) (including losses) during the measurement.

The high negative peaks in Figure 12 result from an apparent backflow in the pipe due to pressure condition by switching of the pumps (during the night). On the other hand there are also high positive peaks by switching on the pumps in the morning.

Assuming a level of losses of approx. 50 % (refer also to chapter 8 and to the water balance of Buhusi in chapter 5) a specific consumption of 114 l/(cd) is resulting including nondomestic.

9.1.2.1.1 Flow Measurements in Darmanesti

For Darmanesti the specific consumption is only available by the over handed water balance:

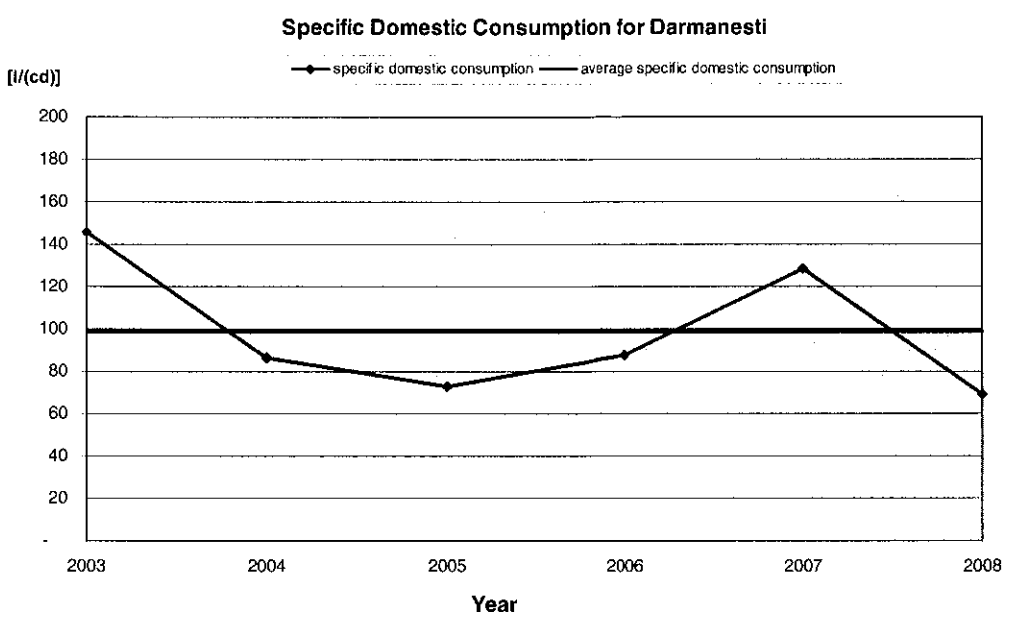


Figure 13 : Darmanesti – specific consumption from waterbalance

The specific consumption sums up from 146 l/(cd) to 73 l/(cd) during the last few years. Assuming a level of losses of 30 % (refer also to chapter 8 and the water balance in chapter 5) the specific domestic consumption in this district comes up to 80 l/(cd) (base is an average specific consumption of 104 l/(cd)).

By the way, there are no big industries in the water supply system of Darmanesti. So the specific consumption is a little bit lower than the assumed domestic consumption of 110 l/ (cd) for urban areas (without industry).

3.3.3 Flow Measurements in Targu Ocna

Assumptions of specific consumption have been confirmed by over handed measurements from the Operator during this FS in 2009.

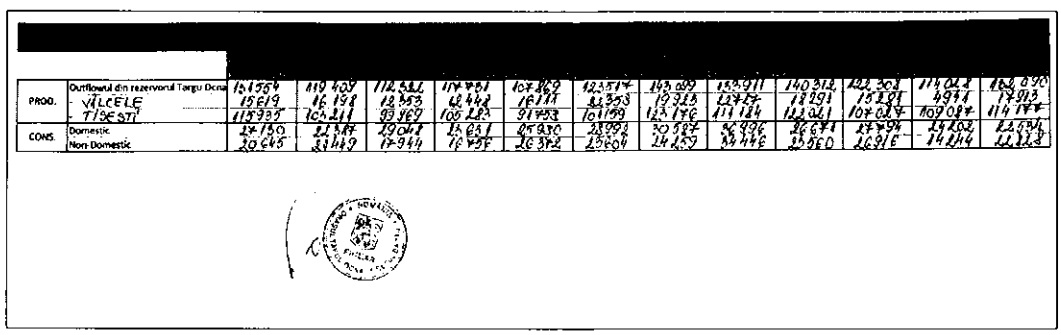


Table 3: Targu Ocna – provided recordings of water volumes in the year 2008

Month	Domestic	Non-domestic	TOTAL
	[m³]	[m³]	[m³]
Jan	27,130	20,645	47,775
Feb	22,387	21,449	43,836
Mar	29,048	17,944	46,992
Apr	23,631	16,756	40,387
May	25,980	26,372	52,352
Jun	28,992	23,604	52,596
Jul	30,587	24,259	54,846
Aug	36,996	34,446	71,442
Sep	26,671	23,560	50,231
Oct	27,794	26,916	54,710
Nov	24,202	14,244	38,446
Dec	22,534	22,828	45,362
TOTAL			
Average	**Average**		
[m³/month]	**[l/day]**	**connected inhabitants (97%)**	
49,915	**1,782,664**	**11,754**	

specific consumption [l/cd])
140

Table 4: Targu Ocna – recordings of water volumes in the year 2008

The tables above include the entire WSZ Targu Ocna with a Connection Rate of 97% for water supply system. The WSZ Targu Ocna contains 12,118 inhabitants.

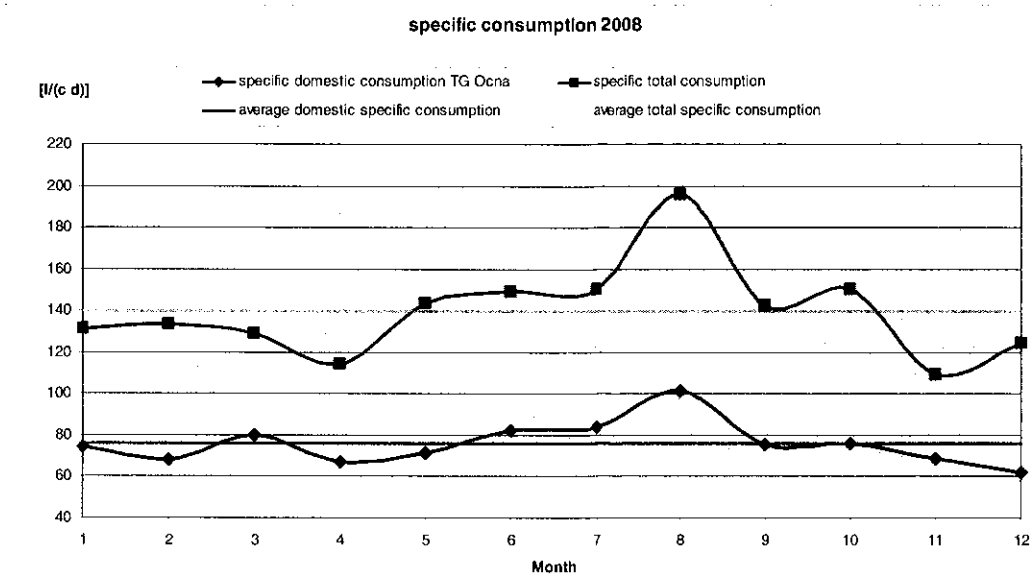


Figure 14 : Targu Ocna – specific consumption in the year 2008

The total specific consumption sums up to 140 l/(cd). Assuming a level of losses of 60 % (refer also to chapter 8 and the water balance in chapter 5) the total specific consumption in this district comes up to 88 l/(cd).

The domestic specific consumption sums up to 76 l/(cd). Assuming a level of losses of 60 % (refer also to chapter 8 and the water balance in chapter 5) the specific consumption in this district comes up to 48 l/(cd).

Comparing to the municipality Bacau City (approx. 200,000 inhabitants) this specific consumption seems very low.

But it is also to remark that only approx. half of the population is connected to the sewage system (connection rate water supply system: 97%). So, half of the population must manage discharging of sewage water by themselves.

Annex 3-4-1

Modelling Results
WS Models

LEGEND AND NOTES

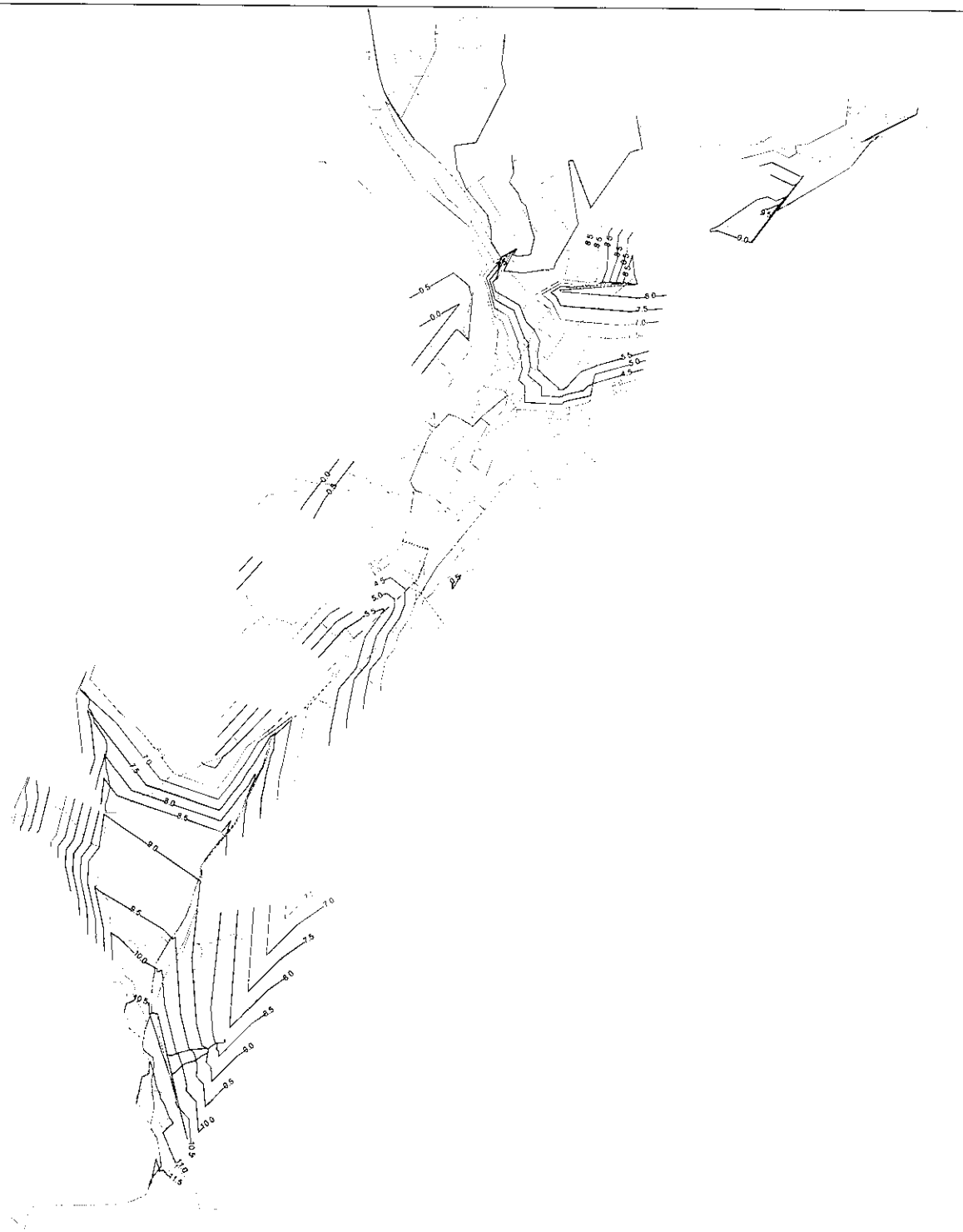
FLOW VELOCITY

- VELOCITY from 0,0 to 0,5 m/s
- VELOCITY from 0,5 to 1,5 m/s
- VELOCITY from 1,5 to 2,0 m/s
- VELOCITY above 2,0 m/s

PART 1

WATER SUPPLY ZONE MOINESTI

SCENARIO PEAK DAY - PEAK HOUR
FLOW VELOCITIES



LEGEND AND NOTES

PIPES:

- EXISTING
- EXTENSION

PRESSURE CONTOUR LINES:

- PRESSURE from 0.0 to 1.0 bar
- PRESSURE from 1.0 to 1.5 bar
- PRESSURE from 1.5 to 2.0 bar
- PRESSURE from 2.0 to 2.5 bar
- PRESSURE from 2.5 to 3.0 bar
- PRESSURE from 3.0 to 3.5 bar
- PRESSURE from 3.5 to 4.0 bar
- PRESSURE from 4.0 to 4.5 bar
- PRESSURE from 4.5 to 5.0 bar
- PRESSURE from 5.0 to 5.5 bar
- PRESSURE from 5.5 to 6.0 bar
- PRESSURE from 6.0 to 6.5 bar
- PRESSURE from 6.5 to 7.0 bar
- PRESSURE from 7.0 to 7.5 bar
- PRESSURE from 7.5 to 8.0 bar
- PRESSURE above 8 bar

PART 2

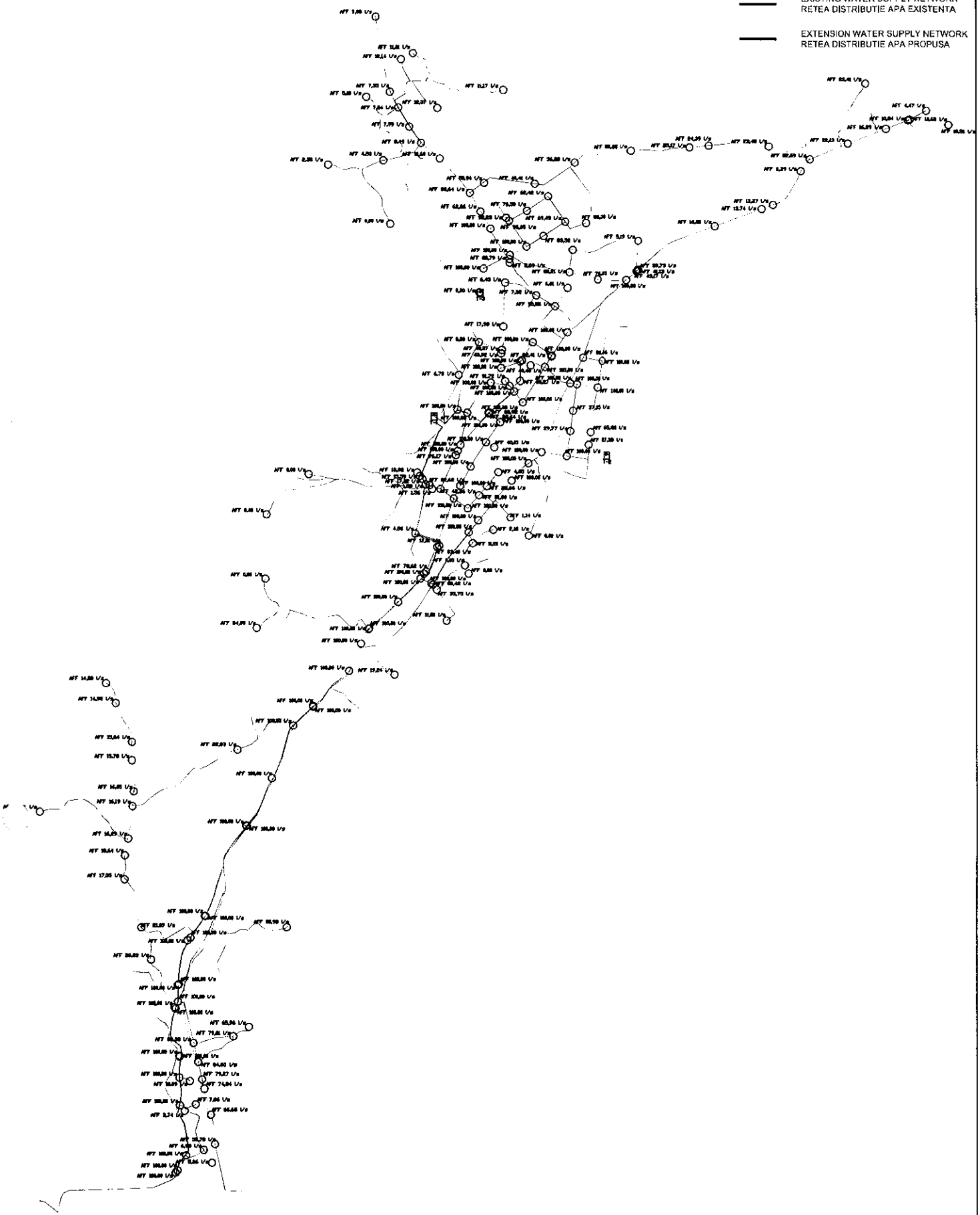
WATER SUPPLY ZONE MOINESTI

SCENARIO PEAK DAY - PEAK HOUR
PRESSURE CONTOUR LINES

LEGEND AND NOTES:
LEGENDA SI NOTE:

EXISTING WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA EXISTENTA

EXTENSION WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA PROPUSA



PART 3

WATER SUPPLY ZONE MOINESTI

SCENARIO AVERAGE DAY - PEAK HOUR
AVAILABLE FIRE FLOW

LEGEND AND NOTES

FLOW VELOCITY

- VELOCITY from 0,0 to 0,5 m/s
- VELOCITY from 0,5 to 1,5 m/s
- VELOCITY from 1,5 to 2 m/s
- VELOCITY above 2 m/s

PART 1

WATER SUPPLY ZONE BUHUSI

SCENARIO PEAK DAY - PEAK HOUR
FLOW VELOCITIES

LEGEND AND NOTES

PIPES:

- EXISTING
- EXTENSION

PRESSURE CONTOUR LINES:

- PRESSURE from 0.0 to 1.0 bar
- PRESSURE from 1.0 to 1.5 bar
- PRESSURE from 1.5 to 2.0 bar
- PRESSURE from 2.0 to 2.5 bar
- PRESSURE from 2.5 to 3.0 bar
- PRESSURE from 3.0 to 3.5 bar
- PRESSURE from 3.5 to 4.0 bar
- PRESSURE from 4.0 to 4.5 bar
- PRESSURE from 4.5 to 5.0 bar
- PRESSURE from 5.0 to 5.5 bar
- PRESSURE from 5.5 to 6.0 bar
- PRESSURE from 6.0 to 6.5 bar
- PRESSURE from 6.5 to 7.0 bar
- PRESSURE from 7.0 to 7.5 bar
- PRESSURE from 7.5 to 8.0 bar
- PRESSURE above 8 bar

N

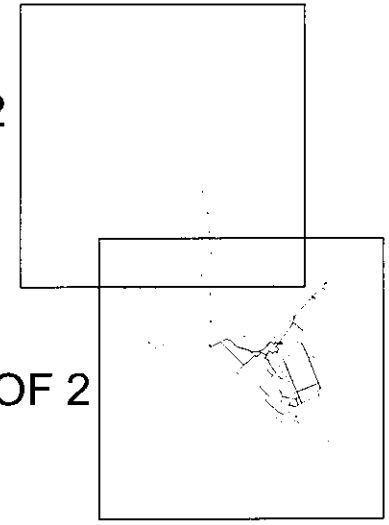
PART 2
WATER SUPPLY ZONE BUHUSI
SCENARIO PEAK DAY - PEAK HOUR PRESSURE CONTOUR LINES

LEGEND AND NOTES:
LEGENDA SI NOTE:

EXISTING WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA EXISTENTA

EXTENSION WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA PROPUSA

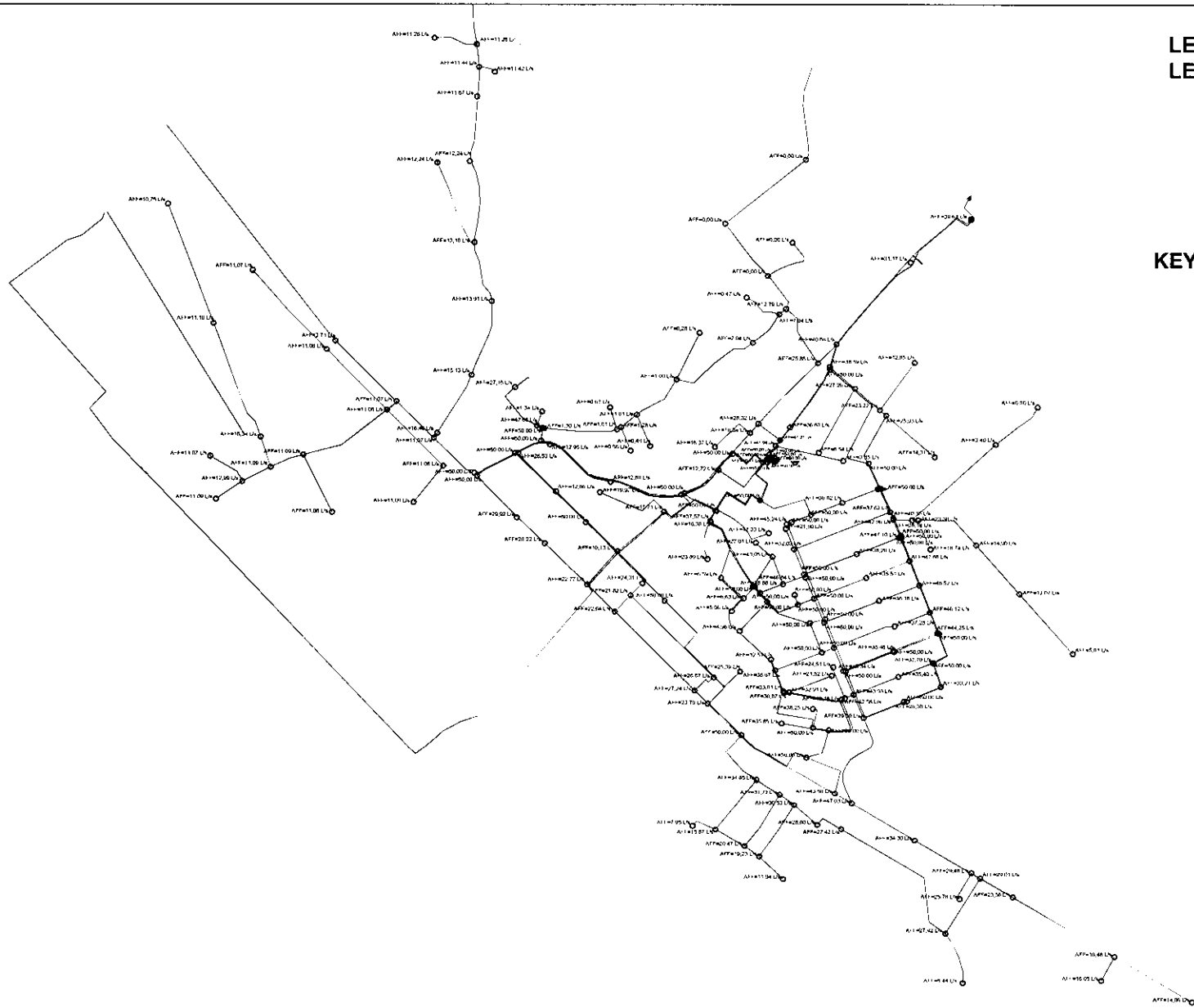
KEYPLAN:



PART 3-1

WATER SUPPLY ZONE BUHUSI

SCENARIO AVERAGE DAY - PEAK HOUR
AVAILABLE FIRE FLOW



LEGEND AND NOTES:
LEGENDA SI NOTE:

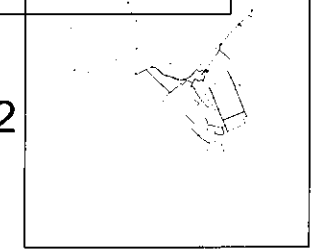
EXISTING WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA EXISTENTA

EXTENSION WATER SUPPLY NETWORK
RETEA DISTRIBUTIE APA PROPUSA

KEYPLAN:

1 OF 2

2 OF 2



PART 3-2

WATER SUPPLY ZONE BUHUSI

SCENARIO AVERAGE DAY - PEAK HOUR
AVAILABLE FIRE FLOW

Annex 3-5

Results of JAR-Tests at WTP Caraboaia

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LABORATORY TESTS

The selection of the coagulant type and the necessary dose is made taking into consideration the water to be treated. It's established through laboratory tests.
The coagulant – ferric chloride- has been tested in the laboratory for physical, chemical and bacterial analyses in order to evaluate the product for an eventual test on the technological flow.
On 4th of May 2010, at 7.40 AM, the raw water characteristics at the inlet of the WTP Darmanesti are as it follows:

1. Temperature .....
2. Colour
3. Turbidity
4. Conductivity
5. PH
6. Alkalinity
7. Index for permanganate
8. Chlorides
9. Total iron
10. Aluminium

The tests development

For establishing the necessary coagulant dose (ferric chloride), it has been used the multiple agitator JAR TEST JLT 6 with 6 agitators.
The water to be treated (raw water), having the above mentioned features, was introduced in each of the 6 Berzelius glasses. The coagulant dose was chosen as 5 mg/l at the beginning, increasing progressively with 5 mg/l.
In each Berzelius glass, a progressive dose of coagulant (ferric chloride) was introduced, followed by the adjuvant (solution 1% anionic polyelectrolyte).
The next doses have been tried: 5 mg/l, 10 mg/l, 15 mg/l, 20 mg/l, 25 mg/l, 30 mg/l and the same adjuvant dose of 0, 20 mg/l. After putting the reagents in each glass, based on JAR test, it has been proceeded a quick mixture with 160 rotations/minute, followed by a slow mixture with 60 rotations/ minute.
After 15 minutes period of sedimentation, the samples have been extracted from each glass and the next parameters were established, according to the next table:

PAGES 2- see the numbers in the original tables

Glass number	Ferric chloride dose&/adjuvant dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Index for permanganate	Chlorides	Total iron

Glass number	Aluminium sulphate dose&/adjuvant dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Index for permanganate	Chlorides	Aluminium

PAGE 3- see the original table

Metal results- raw water- WTP Caraboaia (at the inlet)
- From 30.03.2008-

ătre d-l MARCOVICI Mihai
d-l IORDACHE B. - completare la scrisoarea nr. 472/29.04.2010

1OK 389/11.05.2010

S.C. APA SERV S.A. BACĂU
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TESTE DE LABORATOR

Alegerea tipului de coagulant și a dozelor necesare se face în funcție de apa de tratat și se stabilește prin încercări de laborator.
S-a testat coagulantul clorura ferica în laboratorul de analize fizico-chimice în scopul evaluării produsului pentru o eventuală probă pe fluxul tehnologic.
Caracteristicile apei brute la intrarea în STAȚIA DE TRATARE A APEI Dărmănești în data de 4.05.2010 ,ora 7^{40} sunt :

1. Temperatura - 8,1 ^{0}C
2. Culoare - 12 mg Pt/l
3. Turbiditate - 7,01 UNT
4. Conductivitate - 170 µS/cm
5. pH - 7,59 unit.pH
6. Alcalinitate - 1,4 mmol/l
7. Indice de permanganat - 3,52 mg O_2/l
8. Cloruri - 5,2 mg/l
9. Fier total - 53 µg/l
10. Aluminiu - 17 µg/l

Desfășurarea testelor

Pentru stabilirea dozei necesare de coagulant – clorură ferică s- a folosit agitatorul multiplu JAR TEST JLT 6 cu 6 agitatoare .
În fiecare din cele 6 pahare Berzelius s-a introdus apa de tratat (apa brută) cu caracteristicile de mai sus .
Dozele de coagulant s-au ales din 5 în 5 mg/l .
S-a introdus în fiecare pahar Berzelius o doză progresivă de coagulant – clorura ferică , după care adjuvant (sol.1% polielectrolit anionic).
S-au încercat următoarele doze: 5mg/l ; 10 mg/l ; 15 mg/l ; 20 mg/l ; 25 mg/l și 30 mg/l și aceeași doză de adjuvant și anume 0,20 mg/l .
După introducerea reactivilor în fiecare pahar , cu ajutorul jar testului s-a realizat un amestec rapid cu 160 rot/min timp de 3 minute , apoi un amestec lent cu 60 rot/min timp de 5 minute .
După o perioadă de sedimentare de 15 minute s-au prelevat probe de supernatant din fiecare pahar și s-au determinat următorii parametri conform tabelului de mai jos:

Nr. pahar	Doza de clorură ferică /doza de adjuvant mg/l	Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit.pH	Conductivitate µS/cm	Indice de permanganat mg O_2/l	Cloruri mg/l	Fier total µg/l
1	5 / 0,2	8,69	16	7,22	170	3,20	10,6	536
2	10 / 0,2	6,65	11	7,04	175	2,72	14,1	655
3	15 / 0,2	6,11	8	6,96	178	2,40	19,3	762
4	20 / 0,2	5,61	7	6,83	181	2,24	23,2	802
5	25 / 0,2	2,35	3	6,48	195	2,08	31,7	852
6	30 / 0,2	2,88	2	6,46	199	1,44	35,2	924

Nr. pahar	Doza de sulfat de aluminiu /doza de adjuvant mg/l	Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit.pH	Conductivitate µS/cm	Indice de permanganat mg O_2/l	Cloruri mg/l	Aluminiu µg/l
1	5 / 0,2	9,62	15	7,39	170	3,52	5,2	511
2	10 / 0,2	9,03	13	7,37	173	3,36	5,2	750
3	15 / 0.2	9,01	12	7,29	175	2,88	5,2	687
4	20 / 0,2	6,65	7	7,13	177	2,56	5,2	708
5	25 / 0,2	4,79	7	7,10	180	2,24	5,2	664
6	30 / 0,2	6,03	8	6,97	183	2,08	5,2	723

Şef laborator
ing. chim. Maria Lupeş

Responsabil analize,
ing. chim. Elena Leaşcu

REZULTATE METALE PENTRU SECTIUNEA PRIZA CARABOAIA
din data de 30.01.2008

METALE ANALIZATE -µg/l -	Be	B	Al	Ti	V	Cr	Mn	Co
LQ	0,466	0,106	0,273	0,366	0,013	0,099	0,086	0,009
Total	< LQ	4,98	996	24,6	1,3	2,1	64,9	0,9
Dizolvat	< LQ	< LQ	6,25	0,275	0,088	0,218	11,4	0,075

METALE ANALIZATE -µg/l -	Ni	Cu	Zn	As	Se	Mo	Ag	Cd
LQ	0,003	0,025	0,07	0,113	1,598	0,024	0,007	0,043
Total	1,53	8,13	15,3	0,63	< LQ	1,66	0,33	0,1
Dizolvat	0,725	1,025	2,25	0,175	< LQ	0,183	0,05	0,078

METALE ANALIZATE -µg/l -	Sn	Sb	Te	Ba	Hg	Tl	Pb	U
LQ	0,025	0,024	0,5	0,05	0,033	0,004	0,006	0,003
Total	0,03	0,098	< LQ	53,28	< LQ	0,009	3,5	0,143
Dizolvat	< LQ	0,058	< LQ	35,78	< LQ	< LQ	1,75	0,078

NOTĂ - LQ - limita de cuantificare a metodei

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LABORATORY TESTS

The coagulant ferric chloride DONAUCHEM Romania type was tested on the 25th of June 2010 in the laboratory for physical-chemical analyses in order to evaluate the product comparative with aluminium sulphate.

On 25th of June 2010, at 12.00 AM, the raw water characteristics at the inlet of the WTP Darmanesti were as it follows:

1. Temperature .....see the original document
2. Colour
3. Turbidity
4. Conductivity
5. PH
6. Alkalinity
7. Index for permanganate
8. Chlorides
9. Ammonium
10. Nitrites
11. Nitrates
12. Total iron

The tests development

For establishing the necessary coagulant dose (ferric chloride-Donau Klar), it has been used the multiple agitator JAR TEST JLT 6 with 6 agitators.
The water to be treated (raw water), having the above mentioned features, was introduced in each of the 6 Berzelius glasses.
The coagulant dose was chosen as 5 mg/l at the beginning, increasing progressively with 5 mg/l.

A progressive dose of coagulant (ferric chloride Donau Klar) was introduced in each Berzelius glass.

The next doses of ferric chloride were tested: 15 mg/l, 20 mg/l, 25 mg/l and the next doses of aluminium sulphate: 15 mg/l, 20 mg/l, 25 mg/l.
After putting the reagents in each glass, based on JAR test, it has been proceeded a quick mixture with 160 rotations/minute, for 3 minutes, followed by a slow mixture with 60 rotations/ minute for 5 minutes.
After 30 minutes period of sedimentation, the samples have been extracted from each glass and the next parameters were established, according to the next table:

Ferric chloride(Donau Klar) dose/polyelectrolyte dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Chlorides	Total iron	Alkalinity
See the original document							

It has been also tested the aluminium sulphate on the same raw water. The next results have been established.

Aluminium sulphate dose/polyelectrolyte dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Alakalinity
See the original document					

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TESTE DE LABORATOR

În data de 25.06.2010 s-a testat coagulantul clorura ferica tip -Donau Klar de la firma DONAUCHEM Romania în laboratorul de analize fizico-chimice în scopul evaluării produsului în comparaţie cu sulfatul de aluminiu .
Caracteristicile apei brute la intrarea în STAŢIA DE TRATARE A APEI Dărmăneşti în data de 25.06.2010 ,ora 12 sunt :

1. Temperatura - 9, 8 °C
2. Culoare - 9 mg Pt/l
3. Turbiditate - 7,25 UNT
4. Conductivitate - 171,3 µS/cm
5. pH - 7,61 unit.pH
6. Alcalinitate - 1,35 mmol/l
7. Indice de permanganat - 3,68 mg O_2/l
8. Cloruri - 6,87 mg/l
9. Amoniu - 0,018 mg/l
10. Nitraţi - 2,90 mg/l
11. Nitriţi - 0,012 mg/l
12. Fier total - 39 µg/l

Desfăşurarea testelor

Pentru stabilirea dozei necesare de coagulant – clorură ferică -Donau Klar s- a folosit agitatorul multiplu JAR TEST JLT 6 cu 6 agitatoare .
În fiecare din cele 6 pahare Berzelius s-a introdus apa de tratat (apa brută) cu caracteristicile de mai sus .
Dozele de coagulant s-au ales din 5 în 5 mg/l .
S-a introdus în fiecare pahar Berzelius o doză progresivă de coagulant – clorura ferică -Donau Klar
S-au încercat următoarele doze de clorură ferică: 15 mg/l 20 mg/l ; 25 mg/l şi următoarele doze de sulfat de aluminiu 15 mg/l 20 mg/l ; 25 mg/l
După introducerea reactivilor în fiecare pahar , cu ajutorul jar testului s-a realizat un amestec rapid cu 160 rot/min timp de 3 minute , apoi un amestec lent cu 60 rot/min timp de 5 minute .
După o perioadă de sedimentare de 30 minute s-au prelevat probe de supernatant din fiecare pahar şi s-au determinat următorii parametri conform tabelului de mai jos:

Doza de clorură ferică (Donau Klar)/polielectrolit mg/l		Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit .pH	Alcalinitate mmol/l	Conductivitate µS/cm	Cloruri mg/l	Fier total µg/l
1	15 /0,2	5,02	5	7,21	1,30	172,7	10,6	50
2	20 /0,2	3,39	4	7,23	1,25	174,5	10,8	28
3	25 /0,2	1,22	3	7,19	1,20	175	11	22

Deasemeni s-a testat şi sulfatul de aluminiu pe aceeaşi apă brută şi s-au obţinut următoarele rezultate .

Doza de sulfat de aluminiu)/ polielectrolit mg/l		Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit.pH	Alcalinitate mmol/l	Conductivitate µS/cm
1	15 /0,2	10,9	6	7,39	1,30	173
2	20/0,2	9,7	4	7,34	1,24	174
3	25 /0,2	8,5	3	7,23	1,15	175

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ing. Grigoraş Valeriu

Şef laborator
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LABORATORY TESTS

The coagulants- aluminium polychlorides and ferric chloride from the company DONAUCHEM Romania- were tested on the 13th of July 2010 in the laboratory for physical-chemical analyses in order to evaluate the products.

On 13th of July 2010, at 8.00 AM, the raw water characteristics at the inlet of the WTP Darmanesti were as it follows:

1. Temperature .....see the original document
2. Colour
3. Turbidity
4. Conductivity
5. PH
6. Alkalinity
7. Index for permanganate
8. Chlorides
9. Total iron

The tests development

For establishing the necessary coagulant dose (ferric chloride-Donau Klar), it has been used the multiple agitator JAR TEST JLT 6 with 6 agitators.
The water to be treated (raw water), having the above mentioned features, was introduced in each of the 2 Berzelius glasses.
The coagulant dose was chosen as 5 mg/l at the beginning, increasing progressively with 5 mg/l.

A progressive dose of coagulant (ferric chloride) was introduced in each Berzelius glass, followed by the adjuvant (solution 1% anionic polyelectrolyte).

Having a high level of the raw water turbidity, the next doses were tested: 20 mg/l, 25 mg/l, 30 mg/l, 35 mg/l and the same adjuvant dose of 0, 20 mg/l.
After putting the reagents in each glass, based on JAR test, it has been proceeded a quick mixture with 160 rotations/minute, for 3 minutes, followed by a slow mixture with 60 rotations/ minute for 5 minutes.
After 15 minutes period of sedimentation, the samples have been extracted from each glass and the next parameters were established, according to the next table:

PAGES 2- see the numbers in the original tables

Ferric chloride(Donau Klar) dose/polyelectrolyte dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Index for permanganate	Chlorides	Total iron	Alkalinity
See the original document								

It has been also tested the aluminium sulphate on the same raw water. The next results have been established.

Aluminium sulphate dose/polyelectrolyte dose Mg/l	Turbidity	Colour after the filtration	PH	Conductivity	Index for permanganate	Chlorides	Alakalinity
See the original document							

Fax 660/23.07.2010

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TESTE DE LABORATOR

În data de 13.07.2010 s-au testat coagulanţii – policloruri de aluminiu şi clorura ferica de la firma DONAUCHEM Romania în laboratorul de analize fizico-chimice în scopul evaluării produselor .
Caracteristicile apei brute la intratrea în STAŢIA DE TRATARE A APEI Dărmăneşti în data de 13.07.2010 ,ora 8^{00} sunt :

1. Temperatura 14,7 ^{o}C
2. Culoare 26 mg Pt/l
3. Turbiditate 84,1 UNT
4. Conductivitate 134,8 µS/cm
5. pH 7,50unit.pH
6. Alcalinitate 1,05 mmol/l
7. Indice de permanganat 5,92 mg O_2/l
8. Cloruri 5,67mg/l
9. Fier total 393 µg/l

Desfăşurarea testelor

Pentru stabilirea dozei necesare de coagulant – clorură ferică -Donau Klar s- a folosit agitatorul multiplu JAR TEST JLT 6 cu 6 agitatoare .
În fiecare din cele 2 pahare Berzelius s-a introdus apa de tratat (apa brută) cu caracteristicile de mai sus .
Dozele de coagulant s-au ales din 5 în 5 mg/l .
S-a introdus în fiecare pahar Berzelius o doză progresivă de coagulant – clorura ferică , după care adjuvant (sol.1% polielectrolit anionic).
Turbiditatea apei brute , fiind mare s-au încercat următoarele doze: 20 mg/l , 25 mg/l, 30 mg/lşi 35 mg/l si aceeaşi doză de adjuvant , anume 0,20 mg/l .
După introducerea reactivilor în fiecare pahar , cu ajutorul jar testului s-a realizat un amestec rapid cu 160 rot/min timp de 3 minute , apoi un amestec lent cu 60 rot/min timp de 5 minute .
După o perioadă de sedimentare de 15 minute s-au prelevat probe de supernatant din fiecare pahar şi s-au determinat următorii parametri conform tabelului de mai jos:

Doza de clorură ferică (Donau Klar) /doza de polielecterolit mg/l		Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit.pH	Conductivitate µS/cm	Cloruri mg/l	Fier total µg/l	Indice de permang. mgO_2/l	Alcalinitate mmol/l
1	20 / 0,2	70,9	8	7,20	141,7	-	-	-	0,97
2	25 / 0,2	58,6	4	7,11	143,0	-	-	-	0,9
3	30 / 0,2	7,30	3	6,99	147,0	14,89	74	2,24	0.85
4	35 / 0,2	2,95	2	6,88	147,4	15,00	51	2,24	0,8

Deasemeni s-a testat şi sulfatul de aluminiu pe aceeasi apa bruta, obtinandu-se urmatoarele rezultate :

Doza de sulfat de aluminiu /polielectrolit mg/l		Turbiditate UNT	Culoare după filtrare mg Pt/l	pH unit.pH	Conductivitate µS/cm	Cloruri mg/l	Indice de permang. mgO_2/l	Alcalinitate mmol/l
1	35 / 0,2	5,94	2	6,73	144,9	5,32	2,40	0,7

Director,
ing. C...

Responsabil analize,
ing. Leasca Elena

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LABORATORY TESTS

The coagulant ferric chloride, from the company DONAUCHEM Romania, was tested on the 26th of July 2010 in the laboratory for physical-chemical analyses in order to evaluate the products.

On 26th of July 2010, at 12.00 AM, the raw water characteristics at the inlet of the WTP Darmanesti were as it follows:

1. Temperature .....see the original document
2. Colour
3. Turbidity
4. Conductivity
5. PH
6. Alkalinity
7. Index for permanganate
8. Chlorides
9. Total iron

The tests development

For establishing the necessary coagulant dose (ferric chloride-Donau Klar), it has been used the multiple agitator JAR TEST JLT 6 with 6 agitators.
1 l of the water to be treated (raw water), having the above mentioned features, was introduced in each Berzelius glass.
The coagulant dose was chosen as 5 mg/l at the beginning, increasing progressively with 5 mg/l.

A progressive dose of coagulant (ferric chloride Donau Klar) was introduced in each Berzelius glass.
The next doses were tested: 20 mg/l, 25 mg/l, 30 mg/l, 35 mg/l, and 40 mg/l.
After putting the reagents in each glass, based on JAR test, it has been proceeded a quick mixture with 160 rotations/minute, for 3 minutes, followed by a slow mixture with 60 rotations/ minute for 5 minutes.
After 30 minutes period of sedimentation, the samples have been extracted from each glass and the next parameters were established, according to the next table:

PAGES 2- see the numbers in the original tables

Ferric chloride(Donau Klar) dose Mg/l	Turbidity	The real colour after the filtration with filtering diaphragm (porosity of 0,45)	PH	Alkalinity	Conductivity	Chlorides	Total iron	Index for permanganate
See the original document								

It has been also tested the aluminium sulphate on the same raw water. The next results have been established.

Aluminium sulphate dose/polyelectrolyte dose Mg/l	Turbidity	The real colour after the filtration with filtering diaphragm (porosity of 0,45)	PH	Alkalinity	Index for permanganate	Aluminium
See the original document						

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TESTE DE LABORATOR

În data de 26.07.2010 s-a testat coagulantul clorura ferica tip -Donau Klar de la firma DONAUCHEM Romania în laboratorul de analize fizico-chimice în scopul evaluării produsului .
Caracteristicile apei brute la intrarea în STAȚIA DE TRATARE A APEI Dărmănești în data de 26.07.2010 ,ora 12 sunt :

1	Temperatura	- 14, 9 °C
2.	Culoare	- 26 mg Pt/l
3.	Turbiditate	- 48,9 UNT
4.	Conductivitate	- 135,2 µS/cm
5.	pH	- 7,57 unit.pH
6.	Alcalinitate	- 1,1 mmol/l
7	Indice de permanganat	- 6,08 mg O_2/l
8.	Cloruri	- 8,50 mg/l
9	Amoniu	- 0,097 mg/l
10	Nitrați	- 3,24 mg/l
11	Nitriți	- 0,125 mg/l
12.	Fier total	- 303 µg/l

Desfășurarea testelor

Pentru stabilirea dozei necesare de coagulant – clorură ferică -Donau Klar s- a folosit agitatorul multiplu JAR TEST JLT 6 cu 6 agitatoare .
În fiecare pahar Berzelius s-a introdus 1 litru de apă de tratat (apa brută) cu caracteristicile de mai sus .
Dozele de coagulant s-au ales din 5 în 5 mg/l .
S-a introdus în fiecare pahar Berzelius o doză progresivă de coagulant – clorura ferică -Donau Klar
S-au încercat următoarele doze de clorură ferică: 20 mg/l ; 25 mg/l ,30 mg/l 35 mg/l ; 40 mg/l
După introducerea reactivilor în fiecare pahar , cu ajutorul jar testului s-a realizat un amestec rapid cu 160 rot/min timp de 3 minute , apoi un amestec lent cu 60 rot/min timp de 5 minute .
După o perioadă de sedimentare de 30 minute s-au prelevat probe de supernatant din fiecare pahar și s-au determinat următorii parametri conform tabelului de mai jos:

2

	Doza de clorură ferică (Donau Klar) mg/l	Turbidizare UNT	Culoare reală după filtrare prin membrană filtrantă cu porozitate de 0,45µm mg Pt/l	pH unit. pH	Alcalinitate mmol/l	Conductivitate µS/cm	Clorură mg/l	Fier total µg/l	Indice de permanganat mg O_2/l
1	20	32,4	26	7,14	0,95	144,4	10,9	297	5,60
2	25	28,5	7	7,06	0,90	145,1	12,4	237	4,48
3	30	18,7	6	7,02	0,85	147,4	14,2	150	3,68
4	35	3,39	5	6,94	0,80	149,4	16,7	44	2,72
5	40	2,60	1	6,89	0,75	150,8	18,1	22	2,40

Deasemenea s-a testat şi sulfatul de aluminiu pe aceeaşi apă brută şi s-au obţinut următoarele rezultate

	Doza de sulfat de aluminiu/ policlorură mg/l	Turbiditate UNT	Culoare reală după filtrare prin membrană filtrantă cu porozitate de 0,45µm mg Pt/l	pH unit pH	Alcalinitate mmol/l	Indice de permanganat mg O_2/l	Aluminiu µg/l
1	35 /0,2	4,2	5	6,85	0,70	3,04	198

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ing. Grigoraş Valeriu

Şef laborator
ing. chim. Lupeş Maria

Annex 3-6

NRW Reduction Programme

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Aproved,
GENERAL MANAGER
ENG. IVAN GRIGORE GAINA

S.C. COMPANIA REGIONALĂ DE APĂ BACĂU S.A.

THE STRATEGY OF REDUCING THE WATER LOSSES (NRW)

1. PURPOSE:

The strategy presents the directions, objectives and actions for reducing the level of non-revenue water -NRW, as per areas, systems and localities within the operation scope of Compania Regionala de Apa Bacau.

The purpose is to identify the water losses and their level as per systems, localities and districts in order to establish the short-, medium- long-term steps and repairs and investments programs for permanently reducing the level of NRW, of the operational costs respectively and for improving the consumers' perception.

The actual value of NRW ranges between 50% in Darmanesti and 57% in Targu Ocna, with an average of 54% at the level of the company. The target proposed for 2013 at the level of the regional operator is 46%, including both the rehabilitation works under SOP- Enviroment Application and the investment works to be carried out of the local communities' own funds.

2. SCOPE OF APPLICATION:

It will be applicable within the whole operation scope of Compania Regionala de Apa Bacau.

3. DIRECTIONS:

- Overall understanding of NRW at the level of the company and the general approach of the issue.
- Establishing the management team.
- Methods of controlling the losses
- Establishing realistic objectives based on the available resources.
- Rendering the NRW department responsible
- Investments under the water network

4. OBJECTIVES:

- Monthly completion of the supervision and control program of the water network.
- Consumers metering with 100% target by 2013.
- Replacement of unoperational network valves
  - short-term- entrance-exit of localities
  - medium-term- area measurement
- Data processing and establishing the prioritised investments under the network, reports.

4.1 Control of water losses:

The control of water losses is an essential component of the management of the supply system.

The water losses may be reduced under the reservoirs, in the transport pipelines but especially in the distribution networks.
The losses level exceeding 20% creates economic lucrativeness problems.

4.1.1 Factors affecting the water losses

- Water pressure under the networks
- Soil movements (humidity, changes of temperature, frost)
- Damage of pipes (inner or outer corrosion)
- Poor quality of pipes and reinforcement materials
- Soil characteristics (soil water-tightness)
- Stray electric currents

4.1.2 Methods of controlling the water losses

There are six losses control methods out of which five imply the losses detection and the last method related to the pressure control may be considered as additional to each of the other methods.
Each method requires different capital and operational costs.
Methods:

- Pressure control
- Valves installation or zoning
- Reducing the pressure head of water
- Pressure relief valves
- Passive control
- Routine or regular probing

4.1.3 Measurement of waterlosses

- Area measurement- flowmeters for measuring the water consumption from a specific network area.
- Loss measurement – isolating certain sections from the distribution network by shut-off valves, such that the area is supplied through one pipe.
- Step testing- closing the valves in turn on each pipe and noting the flow variations.

4.1.4 Losses in the reservoirs

- the regular inspection of overflows, of the draining systems and of the structure condition.
- Testing the reduction of water level with the reservoir fully isolated by measuring the reduction of water level within a determined period.

4.1.5. Losses in the transport pipeline

- Flow measurement
- Regular inspections

4.2 Control programs of water losses:

4.2.1 Supervision and control program of the network

4.2.2 Metering program (by fixing the metering target 100%)

4.2.3 Program of replacing the defective networks valves and of installing new valves for the network sectorization *(short-, medium- and long-term)*

4.2.4 Flowmeters installation program

- short-term- entrance-exit of localities
- medium- and long-term- area measurement

4.2.5 Monitoring and network pressure measurement program

4.2.6 Program of monitoring the water losses as per localities and areas for determining the NRW

The registration of values is made according to the following model:

No.	Locality or part of locality provided with network watermeter	Water volume provided to localities or area - thousands of m^3		Water volume consumed within the locality - thousands of m^3-						NRW %	
				Invoiced		Not invoiced		Total		Current month	Cumulative
		Current month	Cumulative	Current month	Cumulative	Current month	Cumulative	Current month	Cumulative		

Calculation formula

$$NRW = \frac{\text{Water volume provided to the netowtk} - \text{Consumed water volume}}{\text{Water volume provided to the netowtk}} \times 100$$

4.3 Short-, medium- and long-term investments in order to reduce the water losses

- Costs assessment for fulfilling the programs under point 4.2.
- Short-term investments (maximum 3 years) are established on the basis of the number of damages, of the pipes age and of the pipes wear. The Cost-Benefit Analysis after the commissionning.
- Medium- and long-term investments- on the basis of measuring the water losses and of the cost-benefit analysis.

5. PHASES OF DRAFTING AND APPLICATION OF STRATEGY ON THE PERMANENT REDUCTION OF NON-REVENUE WATER LEVEL (NRW)

PHASE 1 ORGANISATION	**1.1 Management of water losses**	
	- organization chart	- Technical management
	- coordination between sectors and divisions	- Area Management
	1.2 Data registration and processing, drawing up reports on the water losses	- Area Management - Head of Water Department - Head of Monitoring Office
PHASE 2 CONTROL OF WATER LOSSES	**2.1 Supervision and control of the water network**	- Area Management - Head of Water Department
	2.2 Inventory of meters installed to domestic consumers and owners associations	- Area Management - Subscribers Division
	2.3 Metering of all consumers	- Area Management - Subscribers Division
	2.4 Replacement of unoperational network valves	- Area Management - Head of Water Department
	2.5 Metrological verification on due date of flowmeters under intake areas and localities areas	- Area Management - Head of Intake sector - Head of Water Department - Metrology Division
	2.6 Flowmeters installation at the entrance and exit of the area system localities	- Area Management - Head of Water Department - Head of Subscribers Sector
	2.7 Network sectorization inside the localities (districts)	- Area Management - Head of Water Department - Head of Technical Office
	2.8 Installation of valves for isolating the sector (district)	- Area Management - Head of Water Department - Head of Technical Office
	2.9 Installation of district flowmeters	- Area Management - Subscribers Division - Metrology Division - Head of Monitoring Office
	2.10 Monitoring of water losses as per localities and districts, and of uninvoiced water volumes	- Area Management - Head of Water Department - Head of Monitoring Office
PHASE 3 INVESTMENT LIST	**3.1 List of water networks as per streets subject to the level of water level**	- Area Management - Head of Technical Office
	3.2 Prioritising works and execution thereof per years	- Area Management - Head of Technical Office
	3.3 Incorporation of works into the yearly investments programs	- Area Management - Head of Technical Office

6. ACTIONS

6.1. Area managements:

Every operation area will draw up:

- A program for monitoring and reducing the non-revenue water level as per the framework strategy (point 4.2).
- Short- and medium term Investments proposals for reducing the losses (point 4.3).
- Regular reports on the conclusions and measures as applied following the performance of programs for reducing the losses level based on the Cost-Benefit analysis.

6.2. Regional Management:

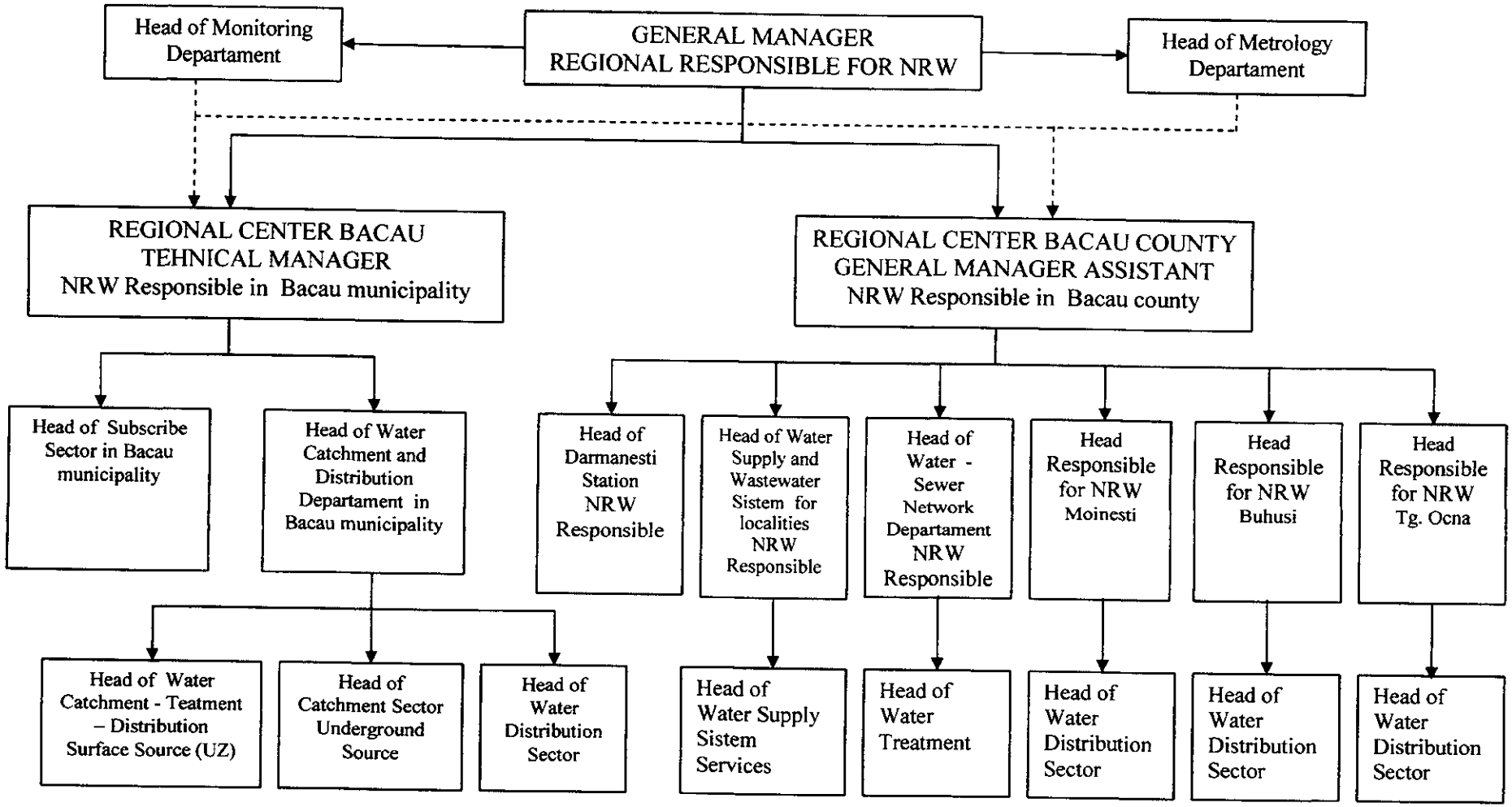
- Will ensure the required conditions for completing the approved investments through SOP – Enviroment program.
- Will ensure the conditions for completing the necesary investments for performing the programs of reducing the water losses from water supply network (approx. 5.5 million euro – Annex nr.2) and to reach a connection rate of 100% (approx. 3.8 million euro – Annex nr.3).
- Will monitor the completion of area programs by drawing up regular reports at the level of the company regarding the obtained results.

We attach herewith "The operational organization chart regarding the strategy of reducing the water losses" – Annex nr.1

TECHNICAL MANAGER
Eng. Radulescu Petrus

Program Officer for reducing the NRW
at the regional level
Eng. Negurita Gabriel

ORGANIZATION CHART
ON THE STRATEGY OF REDUCING THE WATER LOSSES (NRW)



Annex nr.2

Additional Investments to reduce tehnical losses for water supply

[illegible]	[illegible]			
[illegible]	2011	2012	2013	
all costs in € [Net investment constant prices], cost base is year 2009				
[illegible]				
Rehabilitation old network parts and main pipes* (approx. 17 km)		1,260,833	1,260,833	**2,521,667**
[illegible]				
Rehabilitation old network parts* (approx. 8 km)	100,000	560,000	560,000	**1,220,000**
[illegible]				
Rehabilitation network (AC parts and old parts)* (approx. 5 km)		406,667	406,667	**813,333**
[illegible]				
Rehabilitation network * (especially pressure controlling and monitoring)	100,000	100,000	100,000	**300,000**
[illegible]				
Rehabilitation network parts* (approx. 5 km)		343,333	343,333	**686,667**

* all measures include also improvement of metering and billing system

[illegible]	2011	2012	2013
	200,000	**2,670,833**	**2,670,833**
TOTAL		**5,541,667**	

Annex nr.3

Additional Investments to reach a Connection Rate close to 100 %

[illegible]	[illegible]
Bacau	2,692
Moinesti	724
Buhusi	252
Darmanesti	186
Targu Ocna	0 **
TOTAL	3,854

[illegible]	[illegible]
Bacau	18
Moinesti	5
Buhusi	2
Darmanesti	1
Targu Ocna	0
TOTAL	26

[illegible]	Implementation plan			TOTAL
YEAR	2011	2012	2013	[illegible]
[illegible]	774	1,540	1,540	[illegible]

*all costs in 1000 € [Net investment constant prices], cost base is year 2009
** already close to 100% Connection Rate for water supply

Agglomeration Bacau

No	Description	Quantity	Unit	Unit cost EUR	Total EUR
1	**Network extensions**				
	Sewer DN 250 (depth 2,00 m Asphalt road) Margineni	3,494	m	187	654,465
	Sewer DN 250 (depth 2,50 m Asphalt road) Bacau	17,125	m	172	2,940,107
	Sewer DN 250 (depth 2,50 m Asphalt road) Letea Veche	4,096	m	202	829,403
	Sewer DN 250 (depth 2,50 m w/o Asphalt) Bacau	8,400	m	150	1,260,000
	Sewer DN 250 (depth 3,50 m Asphalt road) Hemeius	9,371	m	234	2,191,418
		42,486		**Sub-Sum:**	**7,875,393**
	Total Sewer Length	**42,486**	**m**		
	House Connections				
	House Connections	**1,060**	pcs.	1,000	1,059,652
				Sub-Sum:	**1,059,652**
	Manholes				
	Depth 2,00 m	58	pcs.	1,026	59,739
	Depth 2,50 m	494	pcs.	1,206	595,313
	Depth 3,50 m	156	pcs.	1,516	236,753
				Sub-Sum:	**891,805**
	Total Manholes	**708**	**pcs.**		
	Total Sewer Extension			**Sum**	**9,826,850**
2	**Pumping Stations**				
	Secondary Network DN 250-300 Civil parts Bacau	5	pcs.	18,000	90,000
	Secondary Network DN 250-300 E/M parts Bacau	5	pcs.	27,600	138,000
				Sum	**228,000**
3	**Pressure lines**				
	Pressure line DN 100 Bacau	150	m	80	12,000
				Sum	**12,000**
4	**WWTP**				
	Civil parts	1 ump sum		6,419,870	6,419,870
	E/M parts	1 ump sum		6,675,500	6,675,500
				Sum	**13,095,370**
	Total Agglomeration Bacau				**23,162,220**

Agglomeration Moinesti

No	Description	Quantity	Unit	Unit cost EUR	Total EUR
1	**Network extensions**				
	Sewer DN 250 (depth 2,00 m Asphalt road)	11,233	m	172	1,933,941
	Sewer DN 250 (depth 2,50 m Asphalt road)	5,230	m	187	979,820
	Sewer DN 250 (depth 3,00 m Asphalt road)	4,426	m	204	900,806
	Sewer DN 250 (depth 3,50 m Asphalt road)		m	219	0
		20,889		**Sub-Sum:**	**3,814,566**
	Sewer DN 300 (depth 3,00 m Asphalt road)	750	m	221	165,750
		750		**Sub-Sum:**	**165,750**
	House Connections				
	House Connections	597	pcs.	1,000	597,225
				Sub-Sum:	**597,225**
	Manholes				
	Depth 2,00 m	187	pcs.	1,030	192,833
	Depth 2,50 m	87	pcs.	1,210	105,472
	Depth 3,00 m	86	pcs.	1,390	119,911
				Sub-Sum:	**418,216**
	Total Manholes	**361**	**pcs.**		
	Total Sewer Extension	**21,639**		**Sum**	**4,995,757**
2	**Pumping Stations**				
	Secondary Network DN 250-300 Civil parts	2	pcs.	22,500	45,000
	Secondary Network DN 250-300 E/M parts	2	pcs.	34,500	69,000
	Principal Network Civil parts	1	pcs.	36,000	36,000
	Principal Network E/M parts	1	pcs.	26,000	26,000
				Sum	**176,000**
3	**Pressure lines**				
	Pressure line DN 100	3,610	m	80	288,800
				Sum	**288,800**
4	**WWTP**				
	Moinesti-North Civil parts	1	lump sum	3,595,285	3,595,285
	Moinesti-North E/M parts	1	lump sum	2,084,500	2,084,500
				Sum	**5,679,785**
	Moinesti-South Civil parts	1	lump sum	1,296,385	1,296,385
	Moinesti-South E/M parts	1	lump sum	984,129	984,129
				Sum	**2,280,514**
	Total WWTP			**Sum**	**7,960,299**
	Total Agglomeration Moinesti				**13,420,856**

Agglomeration Buhusi					
No	**Description**	**Quantity**	**Unit**	**Unit cost EUR**	**Total EUR**
1	**Network extensions**				
	Sewer DN 250 (depth 2,00 m Asphalt road)	6,922	m	172	1,191,724
	Sewer DN 250 (depth 2,50 m Asphalt road)	6,839	m	187	1,281,182
	Sewer DN 250 (depth 3,00 m Asphalt road)	3,235	m	204	658,502
	Sewer DN 250 (depth 3,50 m Asphalt road)	627	m	219	137,043
	Sewer DN 250 (depth 4,00 m Asphalt road)	97	m	224	21,652
	Sewer DN 250 (depth 4,50 m Asphalt road)	87	m	238	20,819
	Sewer DN 250 (depth 5,50 m Asphalt road)	157	m	266	41,752
		17,963		**Sub-Sum:**	**3,352,675**
	Sewer DN 300 (depth 2,00 m Asphalt road)	228	m	189	43,156
	Sewer DN 300 (depth 2,50 m Asphalt road)	775	m	206	159,547
	Sewer DN 300 (depth 3,00 m Asphalt road)	133	m	221	29,393
	Sewer DN 300 (depth 7.00 m Asphalt road)	4	m	338	1,220
		1,139		**Sub-Sum:**	**233,316**
	Sewer DN 350 (depth 3,50 m Asphalt road)	156	m	242	37,733
		156		**Sub-Sum:**	**37,733**
	Sewer DN 400 (depth 4,50 m Asphalt road)	301	m	275	82,891
	Sewer DN 400 (depth 5,00 m Asphalt road)	71	m	290	20,573
		372		**Sub-Sum:**	**103,464**
	Sewer DN 500 (depth 3,00 m Asphalt road)	248	m	338	83,966
	Sewer DN 500 (depth 4,00 m Asphalt road)	261	m	370	96,629
		510		**Sub-Sum:**	**180,595**
	Total Sewer Length	**20,141**	**m**		
	House Connections				
	House Connections	657	pcs.	1,000	657,060
				Sub-Sum:	**657,060**
	Combined Sewer Overflow (Industrial WWTP)				
	CSO	1	lump sum	70,000	70,000
				Sub-Sum:	**70,000**
	Manholes				
	Depth 2,00 m	119	pcs.	1,030	122,747
	Depth 2,50 m	114	pcs.	1,210	138,184
	Depth 3,00 m	59	pcs.	1,390	81,586
	Depth 3,50 m	16	pcs.	1,520	24,581
	Depth 4,00 m	6	pcs.	1,710	10,199
	Depth 4,50 m	6	pcs.	1,890	12,249
	Depth 5,00 m	1	pcs.	2,070	2,450
	Depth 5,50 m	3	pcs.	2,250	5,877
				Sub-Sum:	**397,873**
	Total Manholes	**324**	**pcs.**		
	Total Sewer Extension			**Sum**	**5,032,717**
2	**Pumping Stations**				
	Secondary Network DN 250-300 Civil parts	10	pcs.	15,000	150,000
	Secondary Network DN 250-300 E/M parts	10	pcs.	23,000	230,000
	Principal Network Civil parts	1	pcs.	36,000	36,000
	Principal Network E/M parts	1	pcs.	26,000	26,000
				Sum	**442,000**
3	**Pressure lines**				
	Pressure line DN 100	2,840	m	80	227,200
				Sum	**227,200**
4	**WWTP**				
	Civil parts (incl. 1.6 km effluent pipe DN 600)	**1**	lump sum	4,418,190	4,864,590
	E/M parts	**1**	lump sum	2,585,000	2,585,000
				Sum	**7,449,590**
	Total Agglomeration Buhusi				**13,151,506**

Agglomeration Darmanesti					
No	**Description**	**Quantity**	**Unit**	**Unit cost EUR**	**Total EUR**
1	**Network extensions**				
	Sewer DN 250 (depth 2,00 m Asphalt road)	20,110	m	172	3,462,312
	Sewer DN 250 (depth 2,50 m Asphalt road)	20,110	m	187	3,767,586
		40,221		**Sub-Sum:**	**7,229,898**
	Sewer DN 300 (depth 3,00 m Asphalt road)	9,232	m	221	2,040,329
		9,232		**Sub-Sum:**	**2,040,329**
	Sewer DN 400 (depth 3,00 m Asphalt road)	918	m	230	211,149
		918		**Sub-Sum:**	**211,149**
	Sewer DN 600 (depth 3,00 m Asphalt road)	461	m	279	128,711
		461		**Sub-Sum:**	**128,711**
	Total Sewer Length	**50,832**	**m**		
	House Connections				
	House Connections	2,067	pcs.	1,000	2,066,647
				Sub-Sum:	**2,066,647**
	Manholes				
	Depth 2,00 m	335	pcs.	1,030	345,227
	Depth 2,50 m	335	pcs.	1,210	405,558
	Depth 3,00 m	177	pcs.	1,390	245,829
				Sub-Sum:	**996,614**
	Total Manholes	**847**	**pcs.**		
	Total Sewer Extension			**Sum**	**12,673,348**
2	**Pumping Stations**				
	Secondary Network DN 250-300 Civil parts	14	pcs.	15,000	210,000
	Secondary Network DN 250-300 E/M parts	14	pcs.	23,000	322,000
				Sum	**532,000**
3	**Pressure lines**				
	Pressure line DN 100	5,000	m	80	400,000
				Sum	**400,000**
4	**WWTP**				
	Darmanesti Civil parts	1	lump sum	3,034,035	3,034,035
	Darmanesti E/M parts	1	lump sum	1,992,485	1,992,485
				Sum	**5,026,520**
	Total Agglomeration Darmanesti				**18,631,868**

Agglomeration Targu Ocna					
No	**Description**	**Quantity**	**Unit**	**Unit cost EUR**	**Total EUR**
1	**Network extensions**				
	Sewer DN 250 (depth 2,50 m Asphalt road)	9,377	m	187	1,756,804
	Sewer DN 250 (depth 3,00 m Asphalt road)	9,377	m	204	1,908,529
		18,755		**Sub-Sum:**	**3,665,333**
	Sewer DN 300 (depth 2,50 m Asphalt road)	2,000	m	206	412,000
	Sewer DN 300 (depth 3,00 m Asphalt road)	3,365	m	221	743,759
		5,365		**Sub-Sum:**	**1,155,759**
	Total Sewer Length	**24,120**	**m**		
	House Connections				
	House Connections	1,005	pcs.	1,000	1,005,409
				Sub-Sum:	**1,005,409**
	Manholes				
	Depth 2,50 m	190	pcs.	1,210	229,443
	Depth 3,00 m	212	pcs.	1,390	295,207
				Sub-Sum:	**524,650**
	Total Manholes	**402**	**pcs.**		
	Total Sewer Extension			**Sum**	**6,351,150**
2	**Pumping Stations**				
	Secondary Network DN 250-300 Civil parts	9	pcs.	15,000	135,000
	Secondary Network DN 250-300 E/M parts	9	pcs.	23,000	207,000
				Sum	**342,000**
3	**Pressure lines**				
	Pressure line DN 100	4,200	m	80	336,000
				Sum	**336,000**
4	**WWTP**				
	Targu Ocna Civil parts	1 lump sum		2,306,776	2,306,776
	Targu Ocna E/M parts	1 lump sum		1,655,354	1,655,354
				Sum	**3,962,130**
	Total Agglomeration Targu Ocna				**10,991,280**

Annex 4.5.3.1 WWTP Bacau

Agglomeration Bacau - WWTP Bacau
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	966,750	966,750
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**966,750**
2	**Distribution Chamber 4**				
2.1	**Civil Works**				
2.1.1	Adjustment of existing distribution chamber to required flow ratio	lump sum	1.00	70,000	70,000
2.2	**Mechanical Equipment**				
2.2.1	Stop valves DN 1000	pieces	3.00	20,000	60,000
2.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 4**			**130,000**
3	**Activated Sludge Tank 1**				
3.1	**Civil Works**				
3.1.1	Demolition of existing civil structures	m^3	200.00	60	12,000
3.1.2	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	100.00	200	20,000
3.1.3	Reinforcement Steel, average 130 kg/m^3 concrete	t	13.00	1,000	13,000
3.1.4	Dismantling of existing fine bubble aeration system in aerobic tank 1	lump sum	1.00	40,000	40,000
3.2	**Mechanical Equipment**				
3.2.1	Adjustment/Installation of fine bubble aeration systems, total air flow 12,000 m^3/h	lump sum	1.00	420,000	420,000
3.3	**Electrical Equipment**				
3.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
3.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	114,250	114,250
	Subtotal	**Activated Sludge Tank 1**			**639,250**
4	**Activated Sludge Tank 2**				
4.1	**Civil Works**				
4.1.1	Demolition of existing civil structures	m^3	7,000.00	60	420,000
4.1.2	Excavation, transportation to stockpile	m^3	14,300.00	6	85,800
4.1.3	Backfilling, transportation from stockpile	m^3	5,720.00	9	51,480
4.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	1,340.00	40	53,600
4.1.5	Dewatering of trenches	lump sum	1.00	180,000	180,000
4.1.6	Sheeting of trenches	m^2	1,529.00	100	152,900
4.1.7	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	2,200.00	140	308,000
4.1.8	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	1,400.00	200	280,000
4.1.9	Reinforcement Steel, average 130 kg/m^3 concrete	t	468.00	1,000	468,000
4.1.10	Grates - HDG 24kg/m2 incl. Frames	m^2	600.00	300	180,000
4.1.11	Railing, Galvanized Steel, Height 1.10 m	m	900.00	50	45,000
4.2	**Mechanical Equipment**				
4.2.1	Recirculation system incl. Pumps etc.	pieces	3.00	70,000	210,000

Annex 4.5.3.1 WWTP Bacau

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
4.2.2	Installation of fine bubble aeration systems, total air flow 12,000 m³/h	lump sum	1.00	420,000	420,000
4.2.3	Aeration piping	lump sum	1.00	120,000	120,000
4.3	**Electrical Equipment**				
4.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
4.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	114,250	114,250
	Subtotal	**Activated Sludge Tank 2**			**3,109,030**
5	**Chemical Phospor Precipitation**				
5.1	**Civil Works**				
5.1.1	Foundation, filling area, storage tank	lump sum	1.00	105,000	105,000
5.2	**Mechanical Equipment**				
5.2.1	Phosphor Precipitation Unit (Pumps, Pipiping)	lump sum	1.00	100,000	100,000
5.3	**Electrical Equipment**				
5.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	114,250	114,250
	Subtotal	**Chemical Phospor Precipitation**			**319,250**
6	**Mechanical Sludge Thickening (Primary and Secondary Sludge)**				
6.1	**Civil Works**				
6.1.1	n/a				0
6.2	**Mechanical Equipment**				
6.2.1	Slugde dewatering machine primary sludge 70 m³/h	pieces	1.00	490,000	490,000
6.2.2	Polymer Station	lump sum	1.00	80,000	80,000
6.2.3	Slugde dewatering machine secondary sludge 70 m³/h	pieces	1.00	490,000	490,000
6.2.4	Polymer Station	lump sum	1.00	80,000	80,000
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	228,500	228,500
	Subtotal	**Mechanical Sludge Thickening (Primary and S**			**1,368,500**
7	**Anaerobic Digester**				
7.1	**Civil Works**				
7.1.1	Civil Works for 2,000 m³ digester, incl. machinery hall	lump sum	1.00	749,000	749,000
7.1.2	Adjustment to existing piping and heating system	lump sum	1.00	100,000	100,000
7.2	**Mechanical Equipment**				
7.2.1	Mechanical Equipment for 2,000 m³ digester (Piping, Mixing, Heating etc.)	lump sum	1.00	913,000	913,000
7.3	**Electrical Equipment**				
7.3.1	Electrical Equipment for 2,000 m³ digester (Low Voltage Equipment, SCADA, Cabling, Probes)	lump sum	1.00	166,000	166,000
	Subtotal	**Anaerobic Digester**			**1,928,000**
8	**Process Water Tank**				
8.1	**Civil Works**				
8.1.1	Excavation, transportation to stockpile	m³	1,400.00	6	8,400
8.1.2	Backfilling, transportation from stockpile	m³	900.00	9	8,100
8.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	150.00	40	6,000
8.1.4	Dewatering of trenches	lump sum	1.00	10,000	10,000
8.1.5	Sheeting of trenches	m²	384.00	100	38,400
8.1.6	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	380.00	200	76,000
8.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	49.40	1,000	49,400
8.1.8	Grates - HDG 24kg/m2 incl. Frames	m²	49.00	250	12,250
8.1.9	Railing, Galvanized Steel, Height 1.10 m	m	100.00	50	5,000
8.1.10	Stairs	lump sum	1.00	4,000	4,000
8.1.11	Pump sump for process water pumping station	pieces	1.00	45,000	45,000
8.2	**Mechanical Equipment**				
8.2.1	Process water pumps 11 l/s, hman 10 m incl. valves, internal piping etc.	pieces	2.00	50,000	100,000
8.2.2	Piping DN 150	lump sum	1.00	57,000	57,000
8.3	**Electrical Equipment**				
8.3.1	Supersonic Level Meter	pieces	1.00	2,000	2,000
8.3.2	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	45,750	45,750
	Subtotal	**Process Water Tank**			**467,300**

Annex 4.5.3.1 WWTP Bacau

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
9	**Extension of Sludge Dewatering Building**				
9.1	**Civil Works**				
9.1.1	Machinery hall, massive construction, lump sum cost for converted space	m³	1,440.00	150	216,000
9.2	**Mechanical Equipment**				
9.2.1	Slugde dewatering machine 30 m³/h incl. Polymer station as backup	pieces	1.00	405,000	405,000
9.2.2	Transport belts	pieces	2.00	20,000	40,000
9.2.3	Containers 10 m³ incl. Relocation equipment	lump sum	1.00	44,000	44,000
9.3	**Electrical Equipment**				
9.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	228,500	228,500
	Subtotal	**Extension of Sludge Dewatering Building**			**717,500**
10	**Extension of Blower Building**				
10.1	**Civil Works**				
	n/a				0
10.2	**Mechanical Equipment**				
10.2.1	Rotary piston blower 7,400 m³/h, pressure head 600 mbar as a standby blower	pieces	1.00	67,500	67,500
10.2.2	Adjustment of existing stuctures	lump sum	1.00	100,000	100,000
10.3	**Electrical Equipment**				
10.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	45,750	45,750
	Subtotal	**Extension of Blower Building**			**213,250**
11	**Sludge Storage Area**				
11.1	**Civil Works**				
11.1.1	Sludge Storage Area	m²	7,000.00	50	350,000
11.1.2	Concrete Retaining Walls, height 2.00 m	m³	200.00	200	40,000
11.1.3	Reinforcement Steel, average 130 kg/m³ concrete	t	26.00	1,000	26,000
11.2	**Mechanical Equipment**				
	n/a			0	0
11.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Sludge Storage Area**			**416,000**
12	**High Water Pumping Station**				
12.1	**Civil Works**				
12.1.1	Excavation, transportation to stockpile	m³	2,600.00	6	15,600
12.1.2	Backfilling, transportation from stockpile	m³	1,710.00	9	15,390
12.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	300.00	40	12,000
12.1.4	Dewatering of trenches	lump sum	1.00	30,000	30,000
12.1.5	Sheeting of trenches	m²	300.00	100	30,000
12.1.6	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	210.00	200	42,000
12.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	27.30	1,000	27,300
12.1.8	Interior work	lump sum	1.00	43,500	43,500
12.2	**Mechanical Equipment**				
12.2.1	High Water Pumps, 3,100 m³/h, hman 6 m	pieces	3.00	60,000	180,000
12.2.2	Valves piping DN 1000	lump sum	1.00	150,000	150,000
12.3	**Electrical Equipment**				
12.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	68,750	68,750
	Subtotal	**High Water Pumping Station**			**614,540**
13.	**General Electric Equipment**				
13.1	**Civil Works**				
	n/a			0	0
13.2	**Mechanical Equipment**				
	n/a			0	0
13.3	**Electrical Equipment**				
13.3.1	Extension of Low Voltage Equipment, restoration of existing lightning protection system, SCADA, Cabling, Probes	lump sum	1.00	941,000	941,000
13.3.2	Extension of exterior illumination	lump sum	1.00	40,000	40,000
	Subtotal	**General Electric Equipment**			**941,000**

Annex 4.5.3.1 WWTP Bacau

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
14	**Piping**				
14.1	**Civil Works (earth works, pipes)**				
14.1.1	General Piping DN 80	m	750.00	43	32,250
14.1.2	Piping DN 100	m	640.00	51	32,640
14.1.3	Piping DN 600	m	540.00	197	106,110
14.1.4	Piping DN 800 (Air supply for aeration tanks)	m	200.00	160	32,000
14.1.5	Sludge piping DN 150, PE-HD (Earthworks, pipes)	m	700.00	80	56,000
14.1.6	Potable Water Piping, DN 80, PE-HD (Earthworks, pipes)	m	200.00	50	10,000
14.1.7	Heating piping (Earthworks, pipes)	m	350.00	100	35,000
14.1.8	Diversion Pipe DN 1000 (Earthworks, pipes)	m	200.00	500	100,000
14.1.9	Gas piping DN 150 (Earthworks, pipes)	m	250.00	160	40,000
14.2	**Mechanical Equipment**				
	n/a			0	0
14.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Piping**			**444,000**
15	**Miscellaneous and Equipment**				
15.1	Laboratory equipment and rehabilitation of laboratory building	lump sum	1.00	200,000	200,000
15.2	Truck for sludge transport (container vehicle)	pieces	1.00	70,000	70,000
15.3	Hydro cleaner for wastewater network (combined flushing / suction vehicle)	pieces	1.00	130,000	130,000
15.4	Auto drains for wastewater network (suction vehicle)	pieces	2.00	70,000	140,000
15.5	Observation Wells	pieces	5.00	5,000	25,000
				0	0
	Subtotal	**Miscellaneous and Equipment**			**565,000**

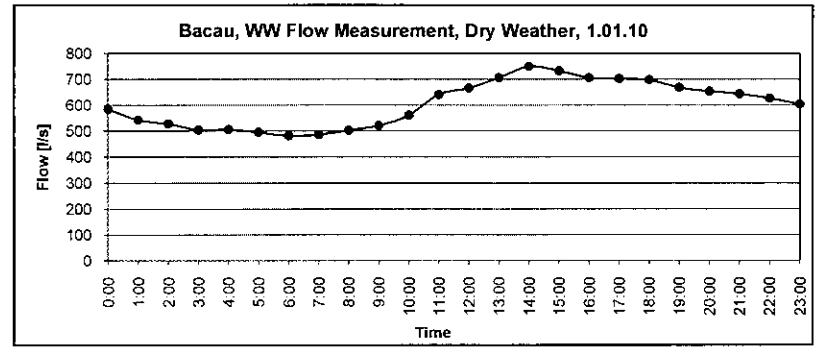
	Total Civil Works				6,419,870
	Total Mechanical Equipment				4,526,500
	Total Electrical Equipment				2,149,000
	TOTAL:				**13,095,370**

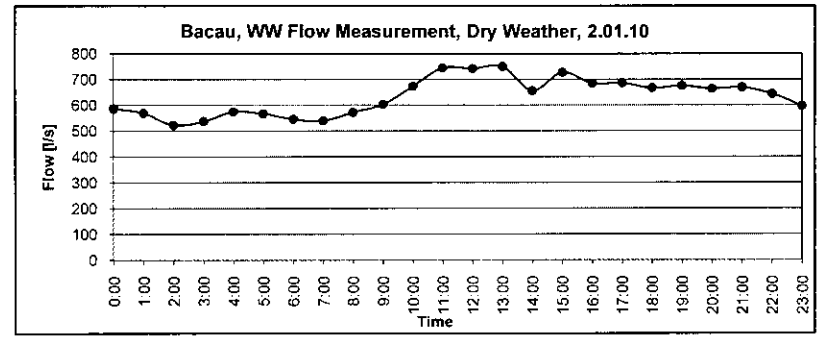
Agglomeration Bacau - Wastewater Flow Measurements - Dry Weather

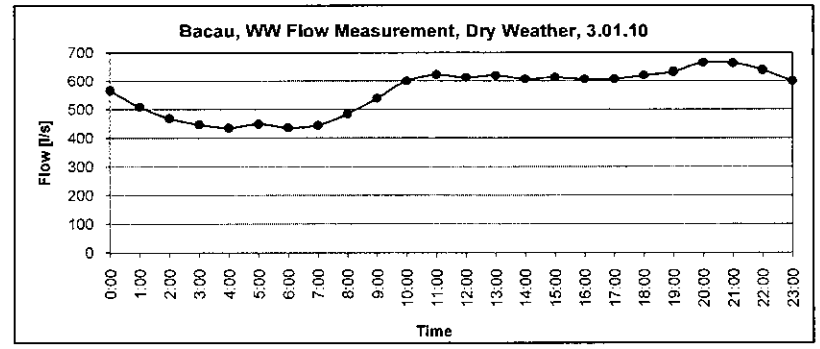
Date	01.01.10	02.01.10	03.01.10
Time	Flow [l/s]	Flow [l/s]	Flow [l/s]
0:00	584	587	567
1:00	543	569	509
2:00	527	523	468
3:00	504	537	447
4:00	506	574	435
5:00	495	567	449
6:00	482	546	436
7:00	486	540	444
8:00	503	572	484
9:00	521	603	539
10:00	560	673	600
11:00	641	744	622
12:00	666	742	613
13:00	706	750	620
14:00	749	656	607
15:00	733	727	613
16:00	706	685	606
17:00	702	687	607
18:00	698	667	620
19:00	668	676	632
20:00	654	665	664
21:00	644	670	662
22:00	627	645	638
23:00	604	598	600

Min	482	523	435
Max	749	750	664
Average	605	633	562

Total m³/d	52,232	54,730	48,534





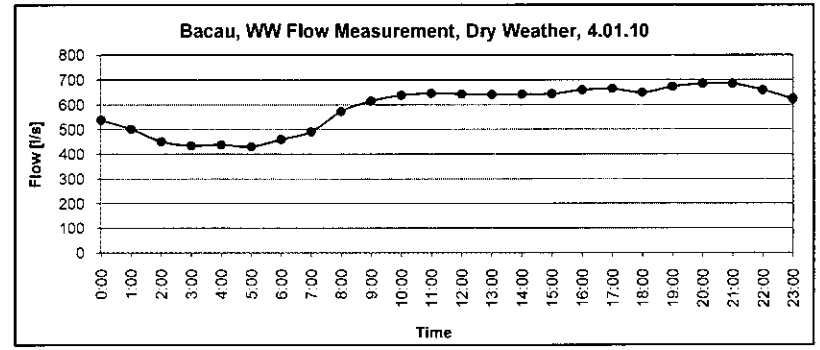


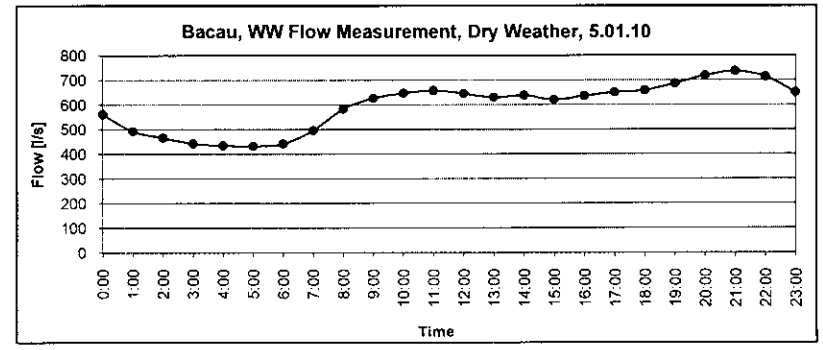
Agglomeration Bacau - Wastewater Flow Measurements - Dry Weather

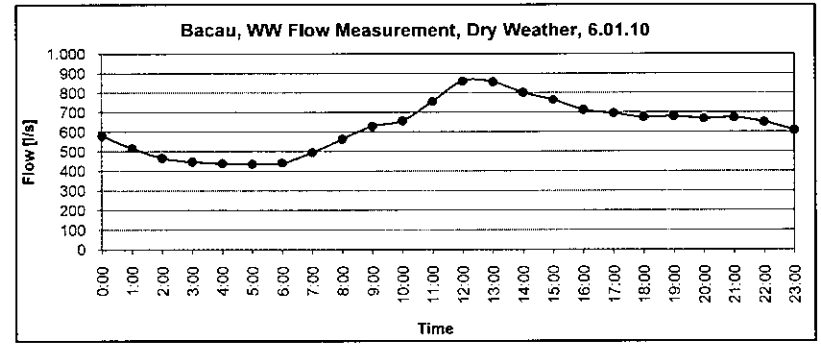
Date	04.01.10	05.01.10	06.01.10
Time	Flow [l/s]	Flow [l/s]	Flow [l/s]
0:00	538	561	580
1:00	501	493	516
2:00	451	466	466
3:00	434	443	447
4:00	438	435	439
5:00	431	432	435
6:00	460	442	441
7:00	491	496	495
8:00	573	583	563
9:00	616	627	629
10:00	639	648	657
11:00	647	658	755
12:00	644	646	860
13:00	642	630	856
14:00	643	639	801
15:00	644	621	764
16:00	660	637	713
17:00	664	651	695
18:00	649	659	675
19:00	673	686	680
20:00	685	718	668
21:00	684	736	673
22:00	659	714	649
23:00	624	651	608

Min	431	432	435
Max	685	736	860
Average	587	595	628

Total m³/d	50,724	51,372	54,233





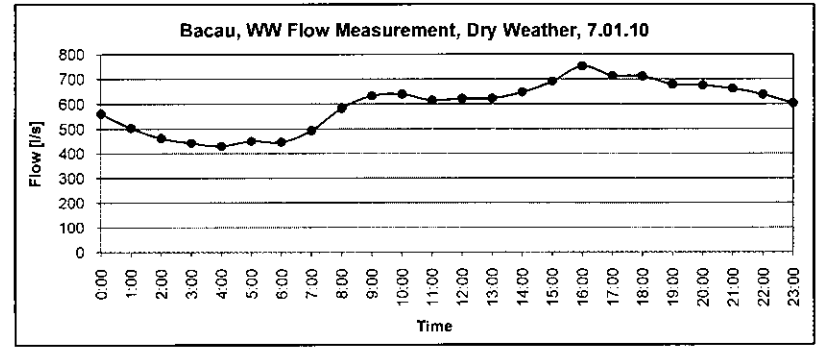


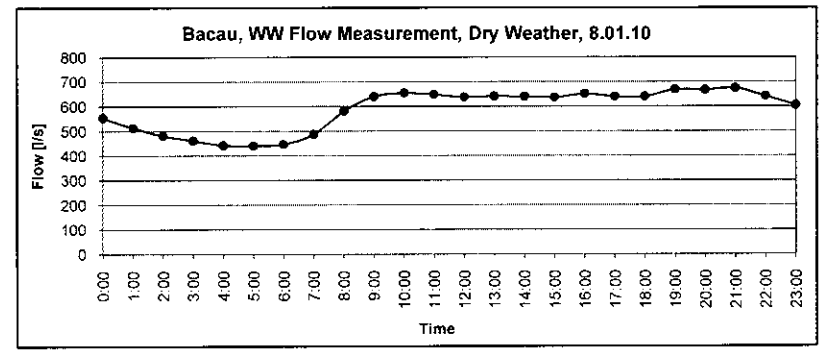
Agglomeration Bacau - Wastewater Flow Measurements - Dry Weather

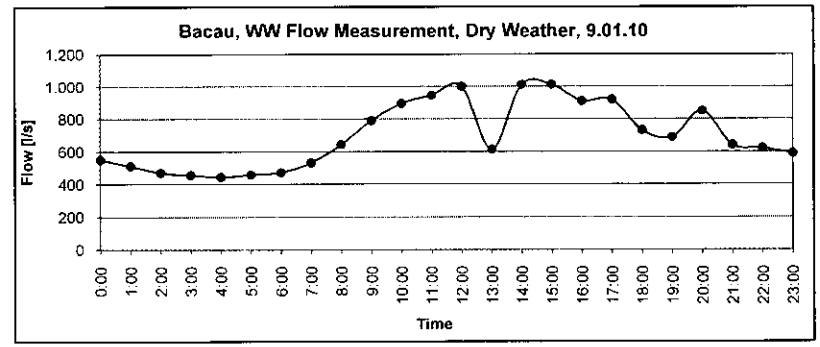
Date	07.01.10	08.01.10	09.01.10
Time	Flow [l/s]	Flow [l/s]	Flow [l/s]
0:00	561	554	551
1:00	503	514	512
2:00	463	481	471
3:00	442	461	456
4:00	430	442	444
5:00	450	440	457
6:00	446	446	473
7:00	493	487	532
8:00	583	580	643
9:00	633	640	790
10:00	639	655	895
11:00	615	648	946
12:00	622	638	1,001
13:00	623	641	613
14:00	648	640	1,012
15:00	691	637	1,013
16:00	753	652	912
17:00	715	641	921
18:00	712	641	733
19:00	679	669	688
20:00	675	667	850
21:00	663	674	641
22:00	638	642	621
23:00	604	605	589

Min	430	440	444
Max	753	674	1,013
Average	595	587	699

Total m³/d	51,415	50,746	60,356





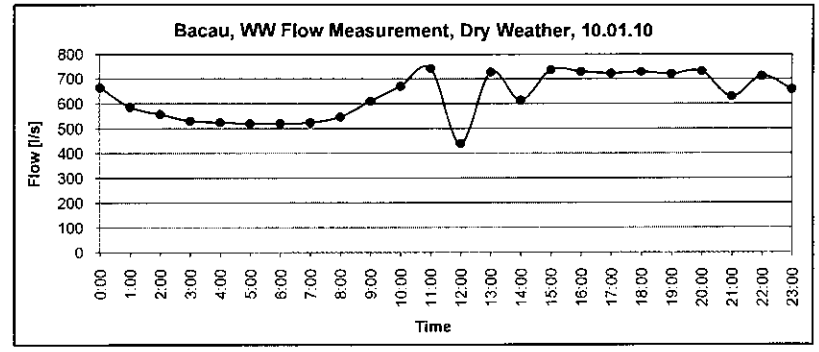


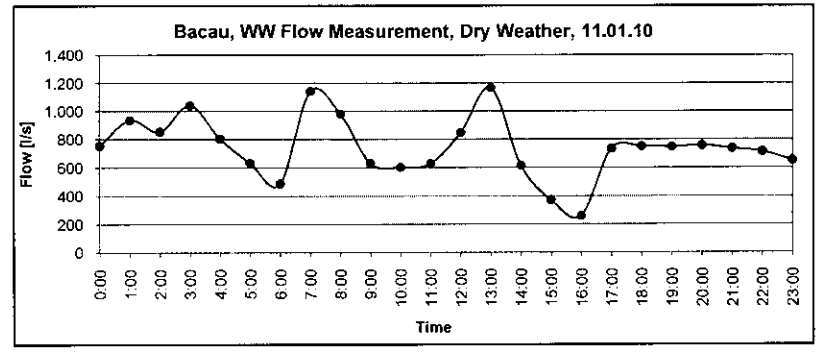
Agglomeration Bacau - Wastewater Flow Measurements - Dry Weather

Date	10.01.10	11.01.10
Time	Flow [l/s]	Flow [l/s]
0:00	665	756
1:00	586	935
2:00	557	853
3:00	530	1,040
4:00	524	805
5:00	519	633
6:00	520	487
7:00	523	1,141
8:00	547	980
9:00	609	632
10:00	671	604
11:00	743	630
12:00	439	848
13:00	727	1,168
14:00	613	616
15:00	737	370
16:00	730	259
17:00	723	734
18:00	729	752
19:00	721	748
20:00	732	758
21:00	628	738
22:00	712	714
23:00	659	653

Min	439	259
Max	743	1,168
Average	631	744

Total m³/d	54,513	64,271





Agglomeration Bacau - Wastewater Flow Measurements - Calculation of Infiltration

Date	-	01.01.10	02.01.10	03.01.10	04.01.10	05.01.10	06.01.10	07.01.10	08.01.10	09.01.10	10.01.10	11.01.10	Average
Connected Capita	cap	143,100	143,100	143,100	143,100	143,100	143,100	143,100	143,100	143,100	143,100	143,100	**143,100**
Minimun Sewage Night Flow per Capita [1]	l/s/1000 cap	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	**0.60**
Minimum Night Flow	l/s	482	523	435	431	432	435	430	440	444	439	259	**456**
Minimum Sewage Night Flow	l/s	86	86	86	86	86	86	86	86	86	86	86	**86**
Infiltration Flow	l/s	396	437	349	345	346	350	344	355	358	353	173	**370**
Daily Infiltration Flow	m³/d	34,212	37,754	30,173	29,787	29,918	30,207	29,722	30,631	30,946	30,506	14,936	**32,009**
Daily Wastewater Flow incl. Infiltration	m³/d	52,232	54,730	48,534	50,724	51,372	54,233	51,415	50,746	60,356	54,513	64,271	**51,971**
Daily Sewage Flow	m³/d	18,020	16,976	18,361	20,937	21,454	24,026	21,692	20,115	29,410	24,007	49,335	**19,962**
Daily specific Sewage Flow	l/cap/d	126	119	128	146	150	168	152	141	206	168	345	**139**
Infiltration as Surplus on Sewage Flow	%	190	222	164	142	139	126	137	152	105	127	30	**164**
Total level of infiltration (BDO Table)	%	65	69	62	59	58	56	58	60	51	56	23	**62**
Infiltration per metre existing sewer network	l/m/d	248	274	219	216	217	219	215	222	224	221	108	**232**

[1] < 5,000 cap.: 0.2 l/s/1000 cap; < 100,000 cap.: 0.3 l/s/1000 cap; > 100,000 cap.: 0.6 l/s/1000 cap.

Agglomeration Bacau - Wastewater Measurements - Chemical Analyzes

Parameter	Date	Jan. 08	Feb. 08	Mrz. 08	Apr. 08	Mai. 08	Jun. 08	Jul. 08	Aug. 08	Sep. 08	Okt. 08	Nov. 08	Dez. 08	Average
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COD	mg/l	283	268	257	272	242	245	258	247	249	242	254	281	258
BOD_5	mg/l	80	86	83	83	83	84	82	83	86	87	85	89	84
TSS	mg/l	166	164	184	145	130	135	131	131	129	135	137	146	144
N	mg/l	24.5	22.8	25.6	26.6	28.0	27.8	26.2	25.0	27.3	25.9	27.2	25.0	26.0
P	mg/l	2.8	2.7	2.6	2.6	2.6	2.6	2.9	2.7	3.0	2.9	3.0	2.7	2.8
Flow	m^3/d	73,440	73,526	72,490	74,650	67,306	72,576	75,514	66,917	63,936	59,616	63,158	55,728	68,238

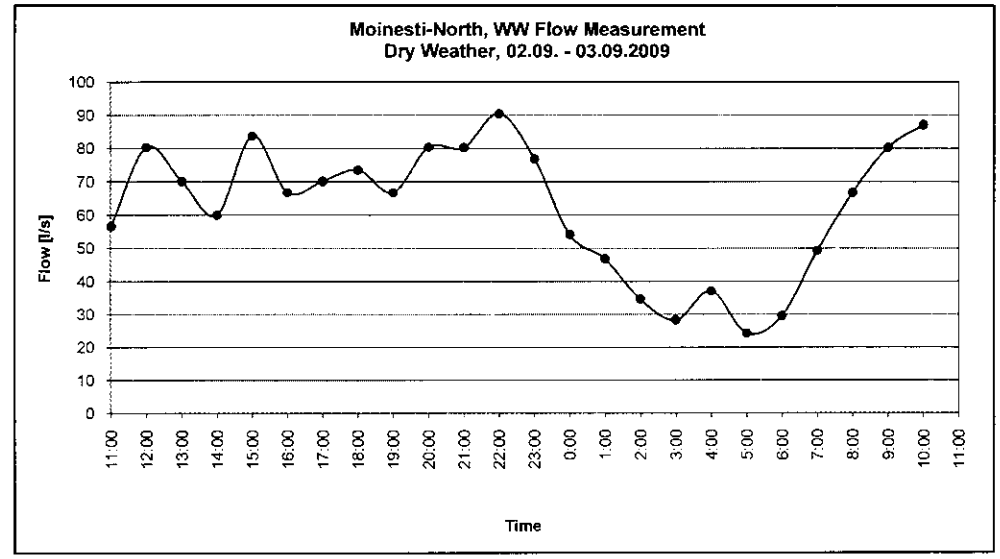
Parameter	Date	Jan. 08	Feb. 08	Mrz. 08	Apr. 08	Mai. 08	Jun. 08	Jul. 08	Aug. 08	Sep. 08	Okt. 08	Nov. 08	Dez. 08	Average
COD	kg/d	20,805	19,710	18,618	20,332	16,297	17,747	19,468	16,559	15,907	14,404	16,057	15,633	17,628
BOD_5	kg/d	5,849	6,326	6,026	6,216	5,556	6,117	6,170	5,572	5,498	5,173	5,352	4,979	5,736
TSS	kg/d	12,174	12,076	13,373	10,854	8,719	9,803	9,870	8,794	8,216	8,056	8,638	8,129	9,892
N	kg/d	1,799	1,676	1,852	1,986	1,884	2,017	1,978	1,674	1,746	1,542	1,715	1,392	1,772
P	kg/d	208	196	188	196	174	192	222	179	193	174	191	150	188

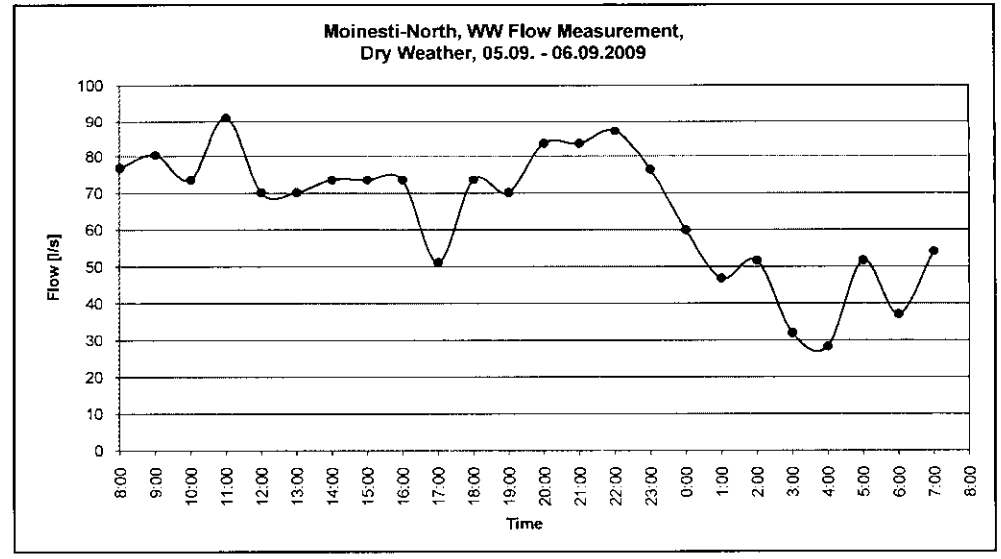
Agglomeration Moinesti-North - Wastewater Flow Measurements - Dry Weather

Date	02.09.09	05.09.09
Time	Flow [l/s]	Flow [l/s]
11:00	57	77
12:00	80	80
13:00	70	74
14:00	60	91
15:00	84	70
16:00	67	70
17:00	70	74
18:00	74	74
19:00	67	74
20:00	80	51
21:00	80	74
22:00	91	70
23:00	77	84
0:00	54	84
1:00	47	87
2:00	35	77
3:00	28	60
4:00	37	47
5:00	24	52
6:00	30	32
7:00	49	28
8:00	67	52
9:00	80	37
10:00	87	54

Min	24	28
Max	91	91
Average	62	65

Total m³/d	5,380	62





Agglomeration Moinesti-North - Wastewater Flow Measurements - Calculation of Infiltration

Date	-	02.09.09	05.09.09	Average
Connected Capita	cap	16,060	16,060	**16,060**
Minimun Sewage Night Flow per Capita [1)]	l/s/1000 cap	0.25	0.25	**0.25**
Minimum Night Flow	l/s	24	28	**26**
Minimum Sewage Night Flow	l/s	4	4	**4**
Infiltration Flow	l/s	20	24	**22**
Daily Infiltration Flow	m³/d	1,753	2,098	**1,925**
Daily Wastewater Flow incl. Infiltration	m³/d	5,380	5,654	**5,517**
Daily Sewage Flow	m³/d	3,627	3,556	**3,591**
Infiltration as Surplus on Sewage Flow	%	48	59	**54**
Daily specific Sewage Flow	l/cap/d	226	221	**224**

[1)] < 5,000 cap.: 0.2 l/s/1000 cap; < 100,000 cap.: 0.3 l/s/1000 cap; > 100,000 cap.: 0.6 l/s/1000 cap.

Agglomeration Moinesti - Wastewater Measurements - Chemical Analyzes

Parameter	Date	29.01.2009	23.02.2009	09.03.2009	13.04.2009	25.06.2009	09.07.2009	27.08.2009	Average
pH	-								#DIV/0!
COD	mg/l	225	233	228	270	260	244	234	242
BOD_5	mg/l	168	156	167	152	163	160	168	162
TSS	mg/l		72	92	57	92	96	62	79
N	mg/l	16.2	17.0	16.2	16.4	16.0	17.1	16.9	16.5
P	mg/l								
Flow	m^3/d	5,593	5,193	5,817	5,381	5,967	5,147	5,681	5,540

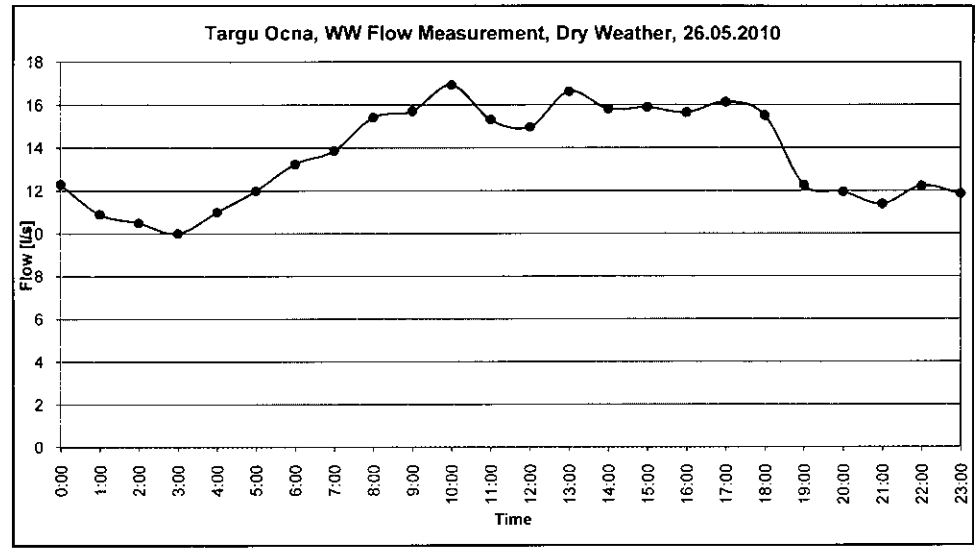
Parameter	Date	29.01.2009	23.02.2009	09.03.2009	13.04.2009	25.06.2009	09.07.2009	27.08.2009	Average
COD	kg/d	1,256	1,209	1,325	1,455	1,551	1,256	1,329	1,340
BOD_5	kg/d	940	810	971	818	973	824	954	899
TSS	kg/d	0	374	535	307	549	494	352	373
N	kg/d	91	88	94	88	95	88	96	92
P	kg/d	0	0	0	0	0	0	0	0

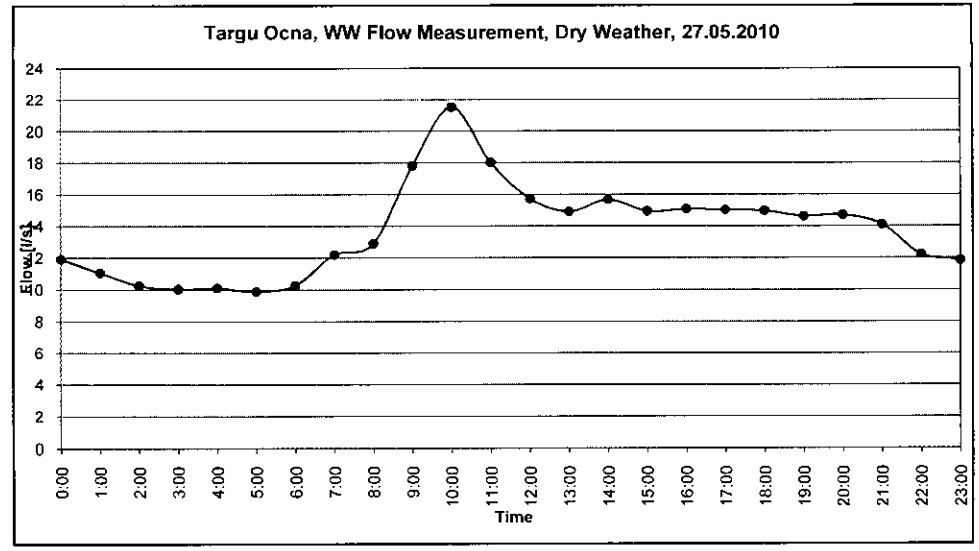
Agglomeration Targu Ocna - Wastewater Flow Measurements - Dry Weather

Date	26.05.10	27.05.10
Time	Flow [l/s]	Flow [l/s]
0:00	12	12
1:00	11	11
2:00	11	10
3:00	10	10
4:00	11	10
5:00	12	10
6:00	13	10
7:00	14	12
8:00	15	13
9:00	16	18
10:00	17	22
11:00	15	18
12:00	15	16
13:00	17	15
14:00	16	16
15:00	16	15
16:00	16	15
17:00	16	15
18:00	16	15
19:00	12	15
20:00	12	15
21:00	11	14
22:00	12	12
23:00	12	12

Min	10	10
Max	17	22
Average	14	14

Total m³/d	1,179	1,188





Agglomeration Targu Ocna - Wastewater Flow Measurements - Calculation of Infiltration

Date	-	26.05.10	27.05.10	Average
Connected Capita	cap	6,600	6,600	**6,600**
Minimun Sewage Night Flow per Capita [1)]	l/s/1000 cap	0.10	0.10	**0.10**
Minimum Night Flow	l/s	10	10	**10**
Minimum Sewage Night Flow	l/s	0.7	0.7	**0.7**
Infiltration Flow	l/s	9	9	**9**
Daily Infiltration Flow	m³/d	807	798	**802**
Daily Wastewater Flow incl. Infiltration	m³/d	1,179	1,188	**1,183**
Daily Sewage Flow	m³/d	372	390	**381**
Daily specific Sewage Flow	l/cap/d	56	59	**58**
Infiltration as Surplus on Sewage Flow	%	217	205	**211**
Total level of infiltration (BDO Table)	%	68	67	**68**
Infiltration per metre existing sewer network	l/m/d	52	52	**52**

[1)] < 5,000 cap.: 0.2 l/s/1000 cap; < 100,000 cap.: 0.3 l/s/1000 cap; > 100,000 cap.: 0.6 l/s/1000 cap.

Agglomeration Targu Ocna - Wastewater Measurements - Chemical Analyzes

Parameter	Date	Jan. 09	Feb. 09	Mrz. 09	Apr. 09	Mai. 09	Jun. 09	Jul. 09	Aug. 09	Sep. 09	Okt. 09	Nov. 09	Dez. 09	Average
pH	-	6.5	6.6	6.6	6.6	6.5	6.5	6.6	6.6	6.6	6.5	6.5	6.6	6.6
COD	mg/l	461	462	445	425	431	442	437	460	462	425	448	452	446
BOD_5	mg/l	289	291	290	288	292	294	290	286	292	288	293	295	291
TSS	mg/l	397	401	418	462	421	435	457	431	463	431	442	508	439
N	mg/l	58.0	56.0	61.0	65.0	62.0	57.0	60.0	59.0	56.0	60.0	62.0	65.0	60
P	mg/l													
Flow	m^3/d	1,250	1,398	1,403	1,187	1,312	1,514	1,403	1,293	1,470	1,267	1,383	1,451	1,361

Parameter	Date	Jan. 09	Feb. 09	Mrz. 09	Apr. 09	Mai. 09	Jun. 09	Jul. 09	Aug. 09	Sep. 09	Okt. 09	Nov. 09	Dez. 09	Average
COD	kg/d	576	646	624	504	565	669	613	595	679	538	620	656	611
BOD_5	kg/d	361	407	407	342	383	445	407	370	429	365	405	428	384
TSS	kg/d	496	561	586	548	552	659	641	557	681	546	611	737	528
N	kg/d	73	78	86	77	81	86	84	76	82	76	86	94	75
P	kg/d	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex 4.5.3.2.1 WWTP Moinesti North

Agglomeration Moinesti - WWTP Moinesti North
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	394,000	394,000
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**394,000**
2	**Inlet Pumping Station, Screening Building**				
2.1	**Civil Works**				
2.1.1	Demolition of existing civil structures	m^3	200.00	25	5,000
2.1.2	Excavation, transportation to stockpile	m^3	750.00	6	4,500
2.1.3	Backfilling, transportation from stockpile	m^3	440.00	9	3,960
2.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	100.00	40	4,000
2.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	240.00	200	48,000
2.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	31.20	1,000	31,200
2.1.7	Grates - HDG 24kg/m2 incl. Frames	m^2	35.00	250	8,750
2.1.8	Railing, Galvanized Steel, Height 1.10 m	m	20.00	50	1,000
2.1.9	Machine hall construction, massive construction, lump sum cost for converted space	m^3	1,120.00	150	168,000
2.2	**Mechanical Equipment**				
2.2.1	Archimedic screw pumps	pieces	3.00	20,000	60,000
2.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
2.2.3	Slab crane	pieces	1.00	20,000	20,000
2.2.4	Fine screen	pieces	2.00	40,000	80,000
2.2.5	Screw conveyor	pieces	1.00	15,000	15,000
2.2.6	Screenings press	pieces	1.00	18,000	18,000
2.2.7	Reception station for septic sludge	pieces	1.00	35,000	35,000
2.2.8	Containers 5 m^3 relocation equipment	pieces	3.00	5,000	15,000
2.2.9	relocation equipment	pieces	1.00	12,000	12,000
2.2.10	Air condition	pieces	1.00	1,000	1,000
2.3	**Electrical Equipment**				
2.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	83,000	83,000
	Subtotal	**Inlet Pumping Station, Screening Building**			**641,410**
3	**Aerated Grit and grease Chamber**				
3.1	**Civil Works**				
3.1.1	Demolition of existing civil structures	m^3	200.00	25	5,000
3.1.2	Excavation, transportation to stockpile	m^3	710.00	6	4,260
3.1.3	Backfilling, transportation from stockpile	m^3	310.00	9	2,790
3.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	90.00	40	3,600
3.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	160.00	200	32,000
3.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	20.80	1,000	20,800
3.1.7	Grates - HDG 24kg/m^2 incl. Frames	m^2	12.00	250	3,000
3.1.8	Railing, Galvanized Steel, Height 1.10 m	m	50.00	50	2,500
3.2	**Mechanical Equipment**				
3.2.1	Scraper bridge width 11 m, two chambers	pieces	1.00	35,000	35,000

Annex 4.5.3.2.1 WWTP Moinesti North

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
3.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
3.2.3	Air piping DN 80	lump sum	1.00	23,000	23,000
3.2.4	Sand and grease pumps	lump sum	1.00	14,000	14,000
3.2.5	Rotary piston blower, 120 m³/h, pressure head 400 mbar	pieces	2.00	6,000	12,000
3.2.6	Sand classifier	pcs	1.00	20,000	20,000
3.3	**Electrical Equipment**				
3.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	42,000	42,000
	Subtotal	**Aerated Grit and grease Chamber**			**247,950**
4	**Distribution Chamber 1**				
4.1	**Civil Works**				
4.1.1	Demolition of existing civil structures	m³	100.00	25	2,500
4.1.2	Excavation, transportation to stockpile	m³	190.00	6	1,140
4.1.3	Backfilling, transportation from stockpile	m³	140.00	9	1,260
4.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
4.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	50.00	200	10,000
4.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	6.50	1,000	6,500
4.1.7	Grates - HDG 24kg/m2 incl. Frames	m²	22.00	250	5,500
4.1.8	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
4.1.9	Stairs	lump sum	1.00	2,500	2,500
4.2	**Mechanical Equipment**				
4.2.1	Lowering penstocks, w = 2000 mm, H = 1000 mm, 1.4571	pieces	2.00	8,000	16,000
4.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 1**			**47,300**
5	**Activated Sludge Tanks 1+2**				
5.1	**Civil Works**				
5.1.1	Demolition of existing civil structures	m³	1,000.00	25	25,000
5.1.2	Excavation, transportation to stockpile	m³	15,700.00	6	94,200
5.1.3	Backfilling, transportation from stockpile	m³	4,300.00	9	38,700
5.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	850.00	40	34,000
5.1.5	Dewatering of trenches	lump sum	1.00	54,000	54,000
5.1.6	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	1,200.00	140	168,000
5.1.7	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	1,100.00	200	220,000
5.1.8	Reinforcement Steel, average 130 kg/m³ concrete	t	299.00	1,000	299,000
5.1.9	Grates - HDG 24kg/m2 incl. Frames	m²	300.00	300	90,000
5.1.10	Railing, Galvanized Steel, Height 1.10 m	m	300.00	50	15,000
5.2	**Mechanical Equipment**				
5.2.1	Submersible mixers, 5 kW incl. Lifting device	pieces	8.00	11,000	88,000
5.2.2	Installation of fine bubble aeration systems, total air flow 2,200 m³/h	lump sum	1.00	77,000	77,000
5.2.3	Aeration piping	lump sum	1.00	60,000	60,000
5.3	**Electrical Equipment**				
5.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
5.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	42,000	42,000
	Subtotal	**Activated Sludge Tanks 1+2**			**1,324,900**
6	**Return Sludge / Excess Sludge Pumping Station**				
6.1	**Civil Works**				
6.1.1	Excavation, transportation to stockpile	m³	1,740.00	6	10,440
6.1.2	Backfilling, transportation from stockpile	m³	1,140.00	9	10,260
6.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	200.00	40	8,000
6.1.4	Dewatering of trenches	lump sum	1.00	18,000	18,000

Annex 4.5.3.2.1 WWTP Moinesti North

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
6.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	140.00	200	28,000
6.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	19.00	1,000	19,000
6.1.7	Interior work	lump sum	1.00	29,000	29,000
6.2	**Mechanical Equipment**				
6.2.1	Return sludge pumps, 400 m^3/h, hman 3 m	pieces	3.00	16,500	49,500
6.2.2	Valves piping DN 300	lump sum	1.00	150,000	150,000
6.2.3	Excess sludge pumps	pieces	2.00	1,000	2,000
6.2.4	Valves piping DN 150	lump sum	1.00	68,000	68,000
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	124,000	124,000
	Subtotal	**Return Sludge / Excess Sludge Pumping**			**516,200**
7	**Distribution Chamber 2**				
7.1	**Civil Works**				
7.1.1	Excavation, transportation to stockpile	m^3	190.00	6	1,140
7.1.2	Backfilling, transportation from stockpile	m^3	140.00	9	1,260
7.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	10.00	40	400
7.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	50.00	200	10,000
7.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	6.50	1,000	6,500
7.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	22.00	250	5,500
7.1.7	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
7.1.8	Stairs	lump sum	1.00	2,500	2,500
7.2	**Mechanical Equipment**				
7.2.1	Stop valves DN 350	pieces	2.00	4,000	8,000
7.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 2**			**36,800**
8	**Secondary Settling Tanks 1+2**				
8.1	**Civil Works**				
8.1.1	Demolition of existing civil structures	m^3	3,000.00	25	75,000
8.1.2	Excavation, transportation to stockpile	m^3	4,600.00	6	27,600
8.1.3	Backfilling, transportation from stockpile	m^3	2,400.00	9	21,600
8.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	200.00	40	8,000
8.1.5	Dewatering of trenches	lump sum	1.00	40,000	40,000
8.1.6	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	600.00	200	120,000
8.1.7	Reinforcement Steel, average 130 kg/m^3 concrete	t	78.00	1,000	78,000
8.1.8	Overflow weir 1.4571, baffle	m	130.00	400	52,000
8.2	**Mechanical Equipment**				
8.2.1	Scraper bridge width 20 m, incl. Flotated sludge pump, skim system	pieces	1.00	60,000	60,000
8.3	**Electrical Equipment**				
8.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	21,000	21,000
	Subtotal	**Secondary Settling Tanks 1+2**			**503,200**
9	**Chemical Phospor Precipitation**				
9.1	**Civil Works**				
9.1.	Foundation, filling area, storage tank	lump sum	1.00	35,000	35,000
9.2	**Mechanical Equipment**				
9.2.1	Phosphor Precipitation Unit (Pumps, Pipiping)	lump sum	1.00	40,000	40,000
9.3	**Electrical Equipment**				
9.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	21,000	21,000
	Subtotal	**Chemical Phospor Precipitation**			**96,000**

Annex 4.5.3.2.1 WWTP Moinesti North

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
10	**Gravity Thickener (reconstruction)**				
10.1	**Civil Works**				
10.1.1	Demolition of existing civil structures	m³	100.00	25	2,500
10.1.2	Rehabilitation of concrete (removal of loose structures, high pressurre cleaning 400 bar, injection of fissures, reconstruction of concrete surface)	m²	1,700.00	40	68,000
10.1.3	Sealing of concrete (paint coating on cement base type Maxseal or similar)	m²	1,700.00	15	25,500
10.1.4	Filling of former settling tanks hoppers	pieces	2.00	2,000	4,000
10.1.5	Overflow weirs, 1.4571	m	60.00	250	15,000
10.1.6	Pump sump for process water pumping station	pieces	1.00	10,000	10,000
10.1.7	Railing, Galvanized Steel, Height 1.10 m	m	50.00	50	2,500
10.2	**Mechanical Equipment**				
10.2.1	Sludge Pumps 2 l/s, hman 10 m incl. Valves, piping	pieces	2.00	15,000	30,000
10.2.2	Process water pumps 2 l/s, hman 10 m incl. Valves, piping	pieces	2.00	10,000	20,000
10.3	**Electrical Equipment**				
10.3.1	Supersonic Level Meter	pieces	1.00	2,000	2,000
10.3.2	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	21,000	21,000
	Subtotal	**Gravity Thickener (reconstruction)**			**200,500**
11	**Sludge Dewatering / Blower Building / Low Voltage Switchgear, Medium Voltage**				
11.1	**Civil Works**				
11.1.1	Machinery hall, massive construction, lump sum cost for converted space	m³	1,440.00	150	216,000
11.2	**Mechanical Equipment**				
11.2.1	Belt filter press 6 m³/h incl. Polymer station	pieces	1.00	135,000	135,000
11.2.2	Transport belts	pieces	1.00	20,000	20,000
11.2.3	Containers 10 m³ incl. Relocation equipment	pieces	1.00	34,000	34,000
11.2.4	Rotary piston blowers 1,100 m³/h, pressure head 600 mbar each	pieces	3.00	15,000	45,000
11.3	**Electrical Equipment**				
11.3.1	Extension of Low Voltage Equipment, restoration of existing lightning protection system, SCADA, Cabling, Probes	lump sum	1.00	206,000	206,000
	Subtotal	**Sludge Dewatering / Blower Building / Low**			**656,000**
12	**Sludge Storage Area**				
12.1	**Civil Works**				
12.1.1	Sludge Storage Area	m²	2,000.00	50	100,000
12.1.2	Concrete Retaining Walls, height 2.00 m	m³	104.00	200	20,800
12.1.3	Reinforcement Steel, average 130 kg/m³ concrete	t	13.52	1,000	13,520
12.2	**Mechanical Equipment**				
	n/a			0	0
12.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Sludge Storage Area**			**134,320**
13	**Operation Building**				
13.1	**Civil Works**				
13.1.1	Operation building, massive construction, lump sum cost for converted space incl. Equipment	m³	2,040.00	200	408,000
13.2	**Mechanical Equipment**				
13.2.1	Laboratory Equipment	lump sum	1.00	40,000	40,000
13.2.2	Workshop equipment	lump sum	1.00	20,000	20,000
13.3	**Electrical Equipment**				
13.3.1	Central control room	lump sum	1.00	124,000	124,000
	Subtotal	**Operation Building**			**592,000**
14	**Roads**				
14.1	**Civil Works**				
14.1.1	New Asphalt roads	m²	1,050.00	50	52,500
14.1.2	Fence h = 2.0 m, incl. Gate w = 6 m	m	200.00	50	10,000
14.2	**Mechanical Equipment**				
	n/a			0	0
14.3	**Electrical Equipment**				

Annex 4.5.3.2.1 WWTP Moinesti North

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
	n/a			0	0
	Subtotal	**Roads**			**62,500**
15	**Piping**				
15.1	**Civil Works (earth works, pipes)**				
15.1.1	Piping DN 80	m	500.00	43	21,500
15.1.2	Piping DN 100	m	320.00	51	16,320
15.1.3	Piping DN 250, 1.4571	m	55.00	201	11,055
15.1.4	Piping DN 350, 1.4571	m	30.00	311	9,330
15.1.5	Piping DN 250	m	40.00	51	2,040
15.1.6	Piping DN 300	m	360.00	56	20,160
15.1.7	Piping DN 400	m	300.00	151	45,300
15.2	**Mechanical Equipment**				
	n/a			0	0
15.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Piping**			**125,705**
15	**Miscellaneous**				
15.1	Observation Wells	pieces	3.00	5,000	15,000
15.2	Fencing	m	200.00	80	16,000
15.3	Auto drain for wastewater network (suction vehicle)	pieces	1.00	70,000	70,000
				0	0
	Subtotal	**Miscellaneous**			**101,000**

	Total Civil Works				3,595,285
	Total Mechanical Equipment				1,378,500
	Total Electrical Equipment				706,000
	TOTAL :				**5,679,785**

Annex 4.5.3.2.2 WWTP Moinesti South

Agglomeration Moinesti - WWTP Moinesti South
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	133,314	133,314
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**133,314**
2	**Inlet Pumping Station, Screening Building**				
2.1	**Civil Works**				
2.1.1	Excavation, transportation to stockpile	m^3	270.00	6	1,620
2.1.2	Backfilling, transportation from stockpile	m^3	90.00	9	810
2.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	70.00	40	2,800
2.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	100.00	200	20,000
2.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	13.00	1,000	13,000
2.1.6	Grates - HDG 24kg/m^2 incl. Frames	m^2	18.00	250	4,500
2.1.7	Railing, Galvanized Steel, Height 1.10 m	m	10.00	50	500
2.1.8	Machine hall construction, massive construction, lump sum cost for converted space	m^3	500.00	150	75,000
2.2	**Mechanical Equipment**				
2.2.1	Archimedic screw pumps	pieces	4.00	16,000	64,000
2.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	2.00	7,000	14,000
2.2.3	Fine screen	pieces	1.00	28,000	28,000
2.2.4	Screw conveyor	pieces	1.00	10,500	10,500
2.2.5	Containers 5 m^3	pieces	3.00	5,000	15,000
2.2.6	Air condition	pieces	1.00	1,000	1,000
2.3	**Electrical Equipment**				
2.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	27,609	27,609
	Subtotal	**Inlet Pumping Station, Screening Building**			**278,339**
3	**Aerated Grit and grease Chamber**				
3.1	**Civil Works**				
3.1.1	Excavation, transportation to stockpile	m^3	350.00	6	2,100
3.1.2	Backfilling, transportation from stockpile	m^3	140.00	9	1,260
3.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	40.00	40	1,600
3.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	80.00	200	16,000
3.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	10.40	1,000	10,400
3.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	10.00	250	2,500
3.1.7	Railing, Galvanized Steel, Height 1.10 m	m	40.00	50	2,000
3.2	**Mechanical Equipment**				
3.2.1	Scraper bridge width 6 m, one chamber	pieces	1.00	24,500	24,500
3.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
3.2.3	Air piping DN 80	lump sum	1.00	16,100	16,100
3.2.4	Sand and grease pumps	lump sum	1.00	8,400	8,400

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
3.2.5	Rotary piston blower, 28 m³/h, pressure head 400 mbar	pieces	2.00	2,800	5,600
3.3	**Electrical Equipment**				
3.1.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	13,805	13,805
	Subtotal	**Aerated Grit and grease Chamber**			**132,265**
4	**Distribution Chamber 1**				
4.1	**Civil Works**				
4.1.1	Excavation, transportation to stockpile	m³	120.00	6	720
4.1.2	Backfilling, transportation from stockpile	m³	40.00	9	360
4.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
4.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	30.00	200	6,000
4.1.5	Reinforcement Steel, average 130 kg/m³ concrete	t	3.90	1,000	3,900
4.1.6	Grates - HDG 24kg/m2 incl. Frames	m²	8.00	250	2,000
4.2	**Mechanical Equipment**				
4.2.1	Lowering penstocks, w = 500 mm, H = 1500 mm, 1.4571	pieces	1.00	4,000	4,000
4.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 1**			**17,380**
5	**Activated Sludge Tank**				
5.1	**Civil Works**				
5.1.1	Excavation, transportation to stockpile	m³	4,500.00	6	27,000
5.1.2	Backfilling, transportation from stockpile	m³	1,470.00	9	13,230
5.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	230.00	40	9,200
5.1.4	Dewatering of trenches	lump sum	1.00	24,000	24,000
5.1.5	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	300.00	140	42,000
5.1.6	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	400.00	200	80,000
5.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	91.00	1,000	91,000
5.1.8	Grates - HDG 24kg/m2 incl. Frames	m²	100.00	300	30,000
5.1.9	Railing, Galvanized Steel, Height 1.10 m	m	100.00	50	5,000
5.2	**Mechanical Equipment**				
5.2.1	Submersible mixers, 5 kW incl. Lifting device	pieces	4.00	9,900	39,600
5.2.2	Installation of fine bubble aeration systems, total air flow 550 m³/h	lump sum	1.00	19,250	19,250
5.2.3	Aeration piping	lump sum	1.00	24,000	24,000
5.3	**Electrical Equipment**				
5.3.1	Oxygenmeter	pieces	2.00	5,000	10,000
5.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	13,805	13,805
	Subtotal	**Activated Sludge Tank**			**428,085**
6	**Return Sludge / Excess Sludge Pumping Station**				
6.1	**Civil Works**				
6.1.1	Excavation, transportation to stockpile	m³	700.00	6	4,200
6.1.2	Backfilling, transportation from stockpile	m³	460.00	9	4,140
6.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	120.00	40	4,800
6.1.4	Dewatering of trenches	lump sum	1.00	12,000	12,000
6.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	100.00	200	20,000
6.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	13.00	1,000	13,000
6.1.7	Interior work	lump sum	1.00	17,400	17,400
6.2	**Mechanical Equipment**				

Annex 4.5.3.2.2 WWTP Moinesti South

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
6.2.1	Return sludge pumps, 100 m³/h, hman 3 m	pieces	3.00	8,000	24,000
6.2.2	Valves piping DN 150	lump sum	1.00	90,000	90,000
6.2.3	Excess sludge pumps	pieces	2.00	1,000	2,000
6.2.4	Valves piping DN 100	lump sum	1.00	47,600	47,600
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	41,414	41,414
	Subtotal	**Return Sludge / Excess Sludge Pumping**			**280,554**
7	**Secondary Settling Tank**				
7.1	**Civil Works**				
7.1.1	Excavation, transportation to stockpile	m³	1,400.00	6	8,400
7.1.2	Backfilling, transportation from stockpile	m³	300.00	9	2,700
7.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	100.00	40	4,000
7.1.4	Dewatering of trenches	lump sum	1.00	16,000	16,000
7.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	300.00	200	60,000
7.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	39.00	1,000	39,000
7.1.7	Overflow weir 1.4571, baffle	m	50.00	400	20,000
7.2	**Mechanical Equipment**				
7.2.1	Scraper bridge width 16 m, incl. Flotated sludge pump, skim system	pieces	1.00	48,000	48,000
7.3	**Electrical Equipment**				
7.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	6,902	6,902
	Subtotal	**Secondary Settling Tank**			**205,002**
8	**Chemical Phospor Precipitation**				
8.1	**Civil Works**				
8.1.1	Foundation, filling area, storage tank	lump sum	1.00	21,000	21,000
8.2	**Mechanical Equipment**				
8.2.1	Phosphor Precipitation Unit (Pumps, Pipiping)	lump sum	1.00	24,000	24,000
8.3	**Electrical Equipment**				
8.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	6,902	6,902
	Subtotal	**Chemical Phospor Precipitation**			**51,902**
9	**Secondary Sludge Gravity Thickener**				
9.1	**Civil Works**				
9.1.1	Excavation, transportation to stockpile	m³	400.00	6	2,400
9.1.2	Backfilling, transportation from stockpile	m³	200.00	9	1,800
9.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	20.00	40	800
9.1.4	Dewatering of trenches	lump sum	1.00	6,000	6,000
9.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	60.00	200	12,000
9.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	7.80	1,000	7,800
9.1.7	Overflow weir 1.4571, baffle	m	20.00	400	8,000
9.1.8	Grates - HDG 24kg/m2 incl. Frames	m²	11.00	250	2,750
9.1.9	Railing, Galvanized Steel, Height 1.10 m	m	20.00	50	1,000
9.1.10	Stairs	lump sum	1.00	4,000	4,000
9.2	**Mechanical Equipment**				
9.2.1	Rakes w = 5 m, d = 3.5 m	pieces	1.00	22,500	22,500
9.2.2	Piping DN 150	lump sum	1.00	28,500	28,500
9.3	**Electrical Equipment**				
9.3.1	Ultrasonic Level Meter	pieces	1.00	2,000	2,000
9.3.2	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	6,902	6,902
	Subtotal	**Secondary Sludge Gravity Thickener**			**106,452**
10	**Sludge Dewatering / Blower Building / Low Voltage Switchgear, Medium Voltage**				
10.1	**Civil Works**				
10.1.1	Machinery hall, massive construction, lump sum cost for converted space	m³	900.00	150	135,000
10.2	**Mechanical Equipment**				

Annex 4.5.3.2.2 WWTP Moinesti South

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
10.2.1	Belt filter press 2 m³/h incl. Polymer station	pieces	1.00	81,000	81,000
10.2.2	Transport belts	pieces	1.00	20,000	20,000
10.2.3	Containers 10 m³	pieces	2.00	7,000	14,000
10.2.4	Rotary piston blowers 530 m³/h, pressure head 600 mbar each	pieces	2.00	10,500	21,000
10.3	**Electrical Equipment**				
10.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	69,023	69,023
	Subtotal	**Sludge Dewatering / Blower Building / Low**			**340,023**
11	**Sludge Storage Area**				
11.1	**Civil Works**				
11.1.1	Sludge Storage Area	m²	500.00	50	25,000
11.1.2	Concrete Retaining Walls, height 2.00 m	m³	52.00	200	10,400
11.1.3	Reinforcement Steel, average 130 kg/m³ concrete	t	6.76	1,000	6,760
11.2	**Mechanical Equipment**				
	n/a			0	0
11.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Sludge Storage Area**			**42,160**
12	**Operation Building**				
12.1	**Civil Works**				
12.1.1	Operation building, massive construction, lump sum cost for converted space incl. Equipment, incl. Laboratory	m³	400.00	200	80,000
12.2	**Mechanical Equipment**				
12.2.1	Workshop equipment	lump sum	1.00	6,000	6,000
12.3	**Electrical Equipment**				
12.3.1	Central control room	lump sum	1.00	55,218	55,218
	Subtotal	**Operation Building**			**141,218**
13	**Roads**				
13.1	**Civil Works**				
13.1.1	New Asphalt roads	m²	420.00	50	21,000
13.1.2	Fence h = 2.0 m, incl. Gate w = 6 m	m	420.00	50	21,000
13.2	**Mechanical Equipment**				
	n/a			0	0
13.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Roads**			**42,000**
14	**Piping**				
14.1	**Civil Works (earth works, pipes)**				
14.1.1	Piping DN 80	m	200.00	43	8,600
14.1.2	Piping DN 100	m	190.00	51	9,690
14.1.3	Piping DN 250, 1.4571	m	33.00	201	6,633
14.1.4	Piping DN 300, 1.4571	m	18.00	311	5,598
14.1.5	Piping DN 200	m	70.00	51	3,570
14.1.6	Piping DN 250	m	150.00	51	7,650
14.1.7	Piping DN 300	m	180.00	56	10,080
14.2	**Mechanical Equipment**				
	n/a			0	0
14.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Piping**			**51,821**
15	**Miscellaneous**				
15.1	Observation Wells	pieces	2.00	5,000	10,000
15.2	Laboratory Equipment	lump sum	1.00	20,000	20,000
				0	0
	Subtotal	**Miscellaneous**			**30,000**

	Total Civil Works				1,296,385
	Total Mechanical Equipment				730,550
	Total Electrical Equipment				253,579
	TOTAL :				**2,280,514**

Annex 4.5.3.3 WWTP Buhusi

Agglomeration Buhusi - WWTP Buhusi
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	629,204	629,204
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**629,204**
2	**Inlet Pumping Station, Screening Building**				
2.1	**Civil Works**				
2.1.1	Excavation, transportation to stockpile	m^3	750.00	6	4,500
2.1.2	Backfilling, transportation from stockpile	m^3	440.00	9	3,960
2.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	100.00	40	4,000
2.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	240.00	200	48,000
2.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	31.20	1,000	31,200
2.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	35.00	250	8,750
2.1.7	Railing, Galvanized Steel, Height 1.10 m	m	20.00	50	1,000
2.1.8	Machine hall construction, massive construction, lump sum cost for converted space	m^3	1,120.00	150	168,000
2.2	**Mechanical Equipment**				
2.2.1	Archimedic screw pumps	pieces	4.00	20,000	80,000
2.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
2.2.3	Slab crane	pieces	1.00	20,000	20,000
2.2.4	Fine screen	pieces	2.00	40,000	80,000
2.2.5	Screw conveyor	pieces	1.00	15,000	15,000
2.2.6	Screenings press	pieces	1.00	18,000	18,000
2.2.7	Reception station for septic sludge	pieces	1.00	35,000	35,000
2.2.8	Containers 5 m^3 relocation equipment	pieces	3.00	7,000	21,000
2.2.9	relocation equipment	pieces	1.00	12,000	12,000
2.2.10	Air condition	pieces	1.00	15,000	15,000
2.3	**Electrical Equipment**				
2.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	158,000	158,000
	Subtotal	**Inlet Pumping Station, Screening Building**			**751,410**
3	**Aerated Grit and grease Chamber**				
3.1	**Civil Works**				
3.1.1	Demolition of existing civil structures 4 m below ground level, backfilling of excavation	m^3	800.00	60	48,000
3.1.2	Excavation, transportation to stockpile	m^3	790.00	6	4,740
3.1.3	Backfilling, transportation from stockpile	m^3	350.00	9	3,150
3.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	90.00	40	3,600
3.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	190.00	200	38,000
3.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	24.70	1,000	24,700
3.1.7	Grates - HDG 24kg/m^2 incl. Frames	m^2	15.00	250	3,750
3.1.8	Railing, Galvanized Steel, Height 1.10 m	m	60.00	50	3,000
3.2	**Mechanical Equipment**				
3.2.1	Scraper bridge width 10 m, two chambers	pieces	1.00	40,000	40,000

Annex 4.5.3.3 WWTP Buhusi

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
3.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
3.2.3	Air piping DN 80	lump sum	1.00	23,000	23,000
3.2.4	Sand and grease pumps	lump sum	1.00	14,000	14,000
3.2.5	Rotary piston blower, 148 m³/h, pressure head 400 mbar	pieces	2.00	6,000	12,000
3.2.6	Sand classifier	pcs	1.00	30,000	30,000
3.3	**Electrical Equipment**				
3.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	53,000	53,000
	Subtotal	**Aerated Grit and grease Chamber**			**328,940**
4	**Distribution Chamber 1**				
4.1	**Civil Works**				
4.1.1	Demolition of existing civil structures	m³	50.00	25	1,250
4.1.2	Excavation, transportation to stockpile	m³	228.00	6	1,368
4.1.3	Backfilling, transportation from stockpile	m³	180.00	9	1,620
4.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
4.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	120.00	200	24,000
4.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	15.60	1,000	15,600
4.1.7	Grates - HDG 24kg/m2 incl. Frames	m²	26.00	250	6,500
4.1.8	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
4.1.9	Stairs	lump sum	1.00	2,500	2,500
4.2	**Mechanical Equipment**				
4.2.1	Lowering penstocks, w = 2000 mm, H = 1000 mm, 1.4571	pieces	2.00	8,000	16,000
4.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 1**			**70,738**
5	**Activated Sludge Tanks 1+2**				
5.1	**Civil Works**				
5.1.1	Demolition of existing civil structures	m³	3,600.00	25	90,000
5.1.2	Excavation, transportation to stockpile	m³	16,200.00	6	97,200
5.1.3	Backfilling, transportation from stockpile	m³	3,300.00	9	29,700
5.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	990.00	40	39,600
5.1.5	Dewatering of trenches	lump sum	1.00	78,000	78,000
5.1.6	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	1,300.00	140	182,000
5.1.7	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	1,100.00	200	220,000
5.1.8	Reinforcement Steel, average 130 kg/m³ concrete	t	312.00	1,000	312,000
5.1.9	Grates - HDG 24kg/m2 incl. Frames	m²	300.00	300	90,000
5.1.10	Railing, Galvanized Steel, Height 1.10 m	m	300.00	50	15,000
5.2	**Mechanical Equipment**				
5.2.1	Submersible mixers, 5 kW incl. Lifting device	pieces	8.00	11,000	88,000
5.2.2	Installation of fine bubble aeration systems, total air flow 3,000 m³/h	lump sum	1.00	105,000	105,000
5.2.3	Aeration piping	lump sum	1.00	66,000	66,000
5.3	**Electrical Equipment**				
5.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
5.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	53,000	53,000
	Subtotal	**Activated Sludge Tanks 1+2**			**1,485,500**
6	**Return Sludge / Excess Sludge Pumping Station**				
6.1	**Civil Works**				
6.1.1	Demolition of existing civil structures	m³	50.00	25	1,250
6.1.2	Excavation, transportation to stockpile	m³	1,740.00	6	10,440
6.1.3	Backfilling, transportation from stockpile	m³	1,140.00	9	10,260
6.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	200.00	40	8,000
6.1.5	Dewatering of trenches	lump sum	1.00	26,000	26,000
6.1.6	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	140.00	200	28,000

Annex 4.5.3.3 WWTP Buhusi

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
6.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	19.00	1,000	19,000
6.1.8	Interior work	lump sum	1.00	29,000	29,000
6.2	**Mechanical Equipment**				
6.2.1	Return sludge pumps, 500 m³/h, hman 3 m	pieces	3.00	18,000	54,000
6.2.2	Valves piping DN 350	lump sum	1.00	195,000	195,000
6.2.3	Excess sludge pumps	pieces	2.00	1,000	2,000
6.2.4	Valves piping DN 150	lump sum	1.00	68,000	68,000
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	158,000	158,000
	Subtotal	**Return Sludge / Excess Sludge Pumping**			**608,950**
7	**Distribution Chamber 2**				
7.1	**Civil Works**				
7.1.1	Demolition of existing civil structures	m³	50.00	25	1,250
7.1.2	Excavation, transportation to stockpile	m³	190.00	6	1,140
7.1.3	Backfilling, transportation from stockpile	m³	140.00	9	1,260
7.1.4	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
7.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	50.00	200	10,000
7.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	6.50	1,000	6,500
7.1.7	Grates - HDG 24kg/m2 incl. Frames	m²	22.00	250	5,500
7.1.8	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
7.1.9	Stairs	lump sum	1.00	2,500	2,500
7.2	**Mechanical Equipment**				
7.2.1	Stop valves DN 350	pieces	2.00	4,000	8,000
7.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 2**			**38,050**
8	**Secondary Settling Tanks 1+2**				
8.1	**Civil Works**				
8.1.1	Excavation, transportation to stockpile	m³	5,600.00	6	33,600
8.1.2	Backfilling, transportation from stockpile	m³	2,500.00	9	22,500
8.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	300.00	40	12,000
8.1.4	Dewatering of trenches	lump sum	1.00	52,000	52,000
8.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	700.00	200	140,000
8.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	91.00	1,000	91,000
8.1.7	Overflow weir 1.4571, baffle	m	140.00	400	56,000
8.2	**Mechanical Equipment**				
8.2.1	Scraper bridge width 20 m, incl. Flotated sludge pump, skim system	pieces	1.00	60,000	60,000
8.3	**Electrical Equipment**				
8.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	53,000	53,000
	Subtotal	**Secondary Settling Tanks 1+2**			**520,100**
9	**Chemical Phospor Precipitation**				
9.1	**Civil Works**				
9.1.1	Demolition of existing civil structures	m³	100.00	25	2,500
9.1.2	Foundation, filling area, storage tank	lump sum	1.00	42,000	42,000
9.2	**Mechanical Equipment**				
9.2.1	Phosphor Precipitation Unit (Pumps, Pipiping)	lump sum	1.00	48,000	48,000
9.3	**Electrical Equipment**				
9.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	53,000	53,000
	Subtotal	**Chemical Phospor Precipitation**			**145,500**
10	**Gravity Thickener (reconstruction)**				
10.1	**Civil Works**				
10.1.1	Demolition of existing civil structures	m³	100.00	25	2,500
10.1.2	Rehabilitation of concrete (removal of loose structures, high pressurre cleaning 400 bar, injection of fissures, reconstruction of concrete surface)	m²	1,700.00	40	68,000

Annex 4.5.3.3 WWTP Buhusi

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
10.1.3	Sealing of concrete (paint coating on cement base type Maxseal or similar)	m²	1,700.00	15	25,500
10.1.4	Filling of former settling tanks hoppers	pieces	2.00	2,000	4,000
10.1.5	Overflow weirs, 1.4571	m	60.00	250	15,000
10.1.6	Pump sump for process water pumping station	pieces	1.00	10,000	10,000
10.1.7	Railing, Galvanized Steel, Height 1.10 m	m	60.00	50	3,000
10.2	**Mechanical Equipment**				
10.2.1	Sludge Pumps 2 l/s, hman 10 m incl. Valves, piping	pieces	2.00	15,000	30,000
10.2.2	Process water pumps 2 l/s, hman 10 m incl. Valves, piping	pieces	2.00	10,000	20,000
10.3	**Electrical Equipment**				
10.3.1	Ultrasonic Level Meter	pieces	1.00	2,000	2,000
10.3.2	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	53,000	53,000
	Subtotal	**Gravity Thickener (reconstruction)**			**233,000**
11	**Sludge Dewatering / Blower Building / Low Voltage Switchgear, Medium Voltage**				
11.1	**Civil Works**				
11.1.1	Machinery hall, massive construction, lump sum cost for converted space	m³	2,000.00	150	300,000
11.2	**Mechanical Equipment**				
11.2.1	Belt filter press 7 m³/h incl. Polymer station	pieces	1.00	128,500	128,500
11.2.2	Transport belts	pieces	1.00	20,000	20,000
11.2.3	Containers 10 m³ incl. Relocation equipment	pieces	1.00	34,000	34,000
11.2.4	Rotary piston blowers 1,500 m³/h, pressure head 600 mbar each	pieces	3.00	16,500	49,500
11.3	**Electrical Equipment**				
11.3.1	Low Voltage Equipment, Lightning Protection, SCADA, Cabling	lump sum	1.00	263,000	263,000
	Subtotal	**Sludge Dewatering / Blower Building / Low**			**795,000**
12	**Sludge Storage Area**				
12.1	**Civil Works**				
12.1.1	Demolition of existing civil structures	m³	200.00	25	5,000
12.1.2	Sludge Storage Area	m²	2,200.00	50	110,000
12.1.3	Concrete Retaining Walls, height 2.00 m	m³	108.00	200	21,600
12.1.4	Reinforcement Steel, average 130 kg/m³ concrete	t	14.04	1,000	14,040
12.2	**Mechanical Equipment**				
	n/a			0	0
12.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Sludge Storage Area**			**150,640**
13	**Operation Building**				
13.1	**Civil Works**				
13.1.1	Operation building, massive construction, lump sum cost for converted space incl. Equipment and Laboratory	m³	2,720.00	200	544,000
13.2	**Mechanical Equipment**				
13.2.1	Laboratory Equipment	lump sum	1.00	72,000	72,000
13.2.2	Workshop equipment	lump sum	1.00	26,000	26,000
13.3	**Electrical Equipment**				
13.3.1	Cenral control room	lump sum	1.00	158,000	158,000
	Subtotal	**Operation Building**			**800,000**
14	**Roads**				
14.1	**Civil Works**				
14.1.1	New Asphalt roads	m²	1,580.00	50	79,000
14.1.2	Fence h = 2.0 m, incl. Gate w = 6 m	m	660.00	50	33,000
14.2	**Mechanical Equipment**				
	n/a			0	0
14.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Roads**			**112,000**
15	**Piping**				
15.1	**Civil Works (earth works, pipes)**				
15.1.1	Piping DN 80	m	750.00	43	32,250
15.1.2	Piping DN 100	m	480.00	51	24,480
15.1.3	Piping DN 250, 1.4571	m	82.50	201	16,583

Annex 4.5.3.3 WWTP Buhusi

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
15.1.4	Piping DN 350, 1.4571	m	45.00	311	13,995
15.1.5	Piping DN 300	m	60.00	56	3,360
15.1.6	Piping DN 400	m	540.00	151	81,540
15.1.7	Piping DN 500	m	450.00	171	76,950
15.1.8	Effluent Pipe DN 600 incl. Manholes	m	1,600.00	279	446,400
15.2	**Mechanical Equipment**				
	n/a			0	0
15.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Piping**			**695,558**
16	**Miscellaneous**				
16.1	Observation Wells	pieces	3.00	5,000	15,000
16.2	Auto drain for wastewater network (suction vehicle)	pieces	1.00	70,000	70,000
				0	0
	Subtotal	**Miscellaneous**			**85,000**

	Total Civil Works				4,864,590
	Total Mechanical Equipment				1,561,000
	Total Electrical Equipment				1,024,000
	TOTAL :				**7,449,590**

Annex 4.5.3.4 WWTP Darmanesti

Agglomeration Darmanesti - WWTP Darmanesti
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	319,480	319,480
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**319,480**
2	**Inlet Pumping Station, Screening Building**				
2.1	**Civil Works**				
2.1.1	Excavation, transportation to stockpile	m^3	750.00	6	4,500
2.1.2	Backfilling, transportation from stockpile	m^3	440.00	9	3,960
2.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	100.00	40	4,000
2.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	240.00	200	48,000
2.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	31.20	1,000	31,200
2.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	35.00	250	8,750
2.1.7	Railing, Galvanized Steel, Height 1.10 m	m	20.00	50	1,000
2.1.8	Machine hall construction, massive construction, lump sum cost for converted space	m^3	880.00	150	132,000
2.2	**Mechanical Equipment**				
2.2.1	Archimedic screw pumps	pieces	3.00	20,000	60,000
2.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
2.2.3	Slab crane	pieces	1.00	20,000	20,000
2.2.4	Fine screen	pieces	2.00	40,000	80,000
2.2.5	Screw conveyor	pieces	1.00	15,000	15,000
2.2.6	Screenings press	pieces	1.00	18,000	18,000
2.2.7	Reception station for septic sludge	pieces	1.00	35,000	35,000
2.2.8	Containers 5 m^3 relocation equipment	pieces	3.00	5,000	15,000
2.2.9	relocation equipment	pieces	1.00	12,000	12,000
2.2.10	Air condition	pieces	1.00	1,000	1,000
2.3	**Electrical Equipment**				
2.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	72,180	72,180
	Subtotal	**Inlet Pumping Station, Screening Building**			**589,590**
3	**Aerated Grit and grease Chamber**				
3.1	**Civil Works**				
3.1.1	Excavation, transportation to stockpile	m^3	570.00	6	3,420
3.1.2	Backfilling, transportation from stockpile	m^3	250.00	9	2,250
3.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	60.00	40	2,400
3.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	130.00	200	26,000
3.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	16.90	1,000	16,900
3.1.6	Grates - HDG 24kg/m^2 incl. Frames	m^2	10.00	250	2,500
3.1.7	Railing, Galvanized Steel, Height 1.10 m	m	50.00	50	2,500
3.2	**Mechanical Equipment**				
3.2.1	Scraper bridge width 10 m, two chambers	pieces	1.00	35,000	35,000
3.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
3.2.3	Air piping DN 80	lump sum	1.00	18,400	18,400

Annex 4.5.3.4 WWTP Darmanesti

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
3.2.4	Sand and grease pumps	lump sum	1.00	12,600	12,600
3.2.5	Rotary piston blower, 84 m³/h, pressure head 400 mbar	pieces	2.00	6,000	12,000
3.2.6	Sand classifier	pcs	1.00	20,000	20,000
3.3	**Electrical Equipment**				
3.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	36,090	36,090
	Subtotal	**Aerated Grit and grease Chamber**			**218,060**
4	**Distribution Chamber 1**				
4.1	**Civil Works**				
4.1.1	Excavation, transportation to stockpile	m³	190.00	6	1,140
4.1.2	Backfilling, transportation from stockpile	m³	140.00	9	1,260
4.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
4.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	50.00	200	10,000
4.1.5	Reinforcement Steel, average 130 kg/m³ concrete	t	6.50	1,000	6,500
4.1.6	Grates - HDG 24kg/m2 incl. Frames	m²	22.00	250	5,500
4.1.7	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
4.1.8	Stairs	lump sum	1.00	2,500	2,500
4.2	**Mechanical Equipment**				
4.2.1	Lowering penstocks, w = 2000 mm, H = 1000 mm, 1.4571	pieces	2.00	8,000	16,000
4.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 1**			**44,800**
5	**Activated Sludge Tanks 1+2**				
5.1	**Civil Works**				
5.1.1	Excavation, transportation to stockpile	m³	10,600.00	6	63,600
5.1.2	Backfilling, transportation from stockpile	m³	2,500.00	9	22,500
5.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	610.00	40	24,400
5.1.4	Dewatering of trenches	lump sum	1.00	54,000	54,000
5.1.5	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	800.00	140	112,000
5.1.6	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	900.00	200	180,000
5.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	221.00	1,000	221,000
5.1.8	Grates - HDG 24kg/m2 incl. Frames	m²	200.00	300	60,000
5.1.9	Railing, Galvanized Steel, Height 1.10 m	m	200.00	50	10,000
5.2	**Mechanical Equipment**				
5.2.1	Submersible mixers, 5 kW incl. Lifting device	pieces	8.00	11,000	88,000
5.2.2	Installation of fine bubble aeration systems, total air flow 1900 m³/h	lump sum	1.00	66,500	66,500
5.2.3	Aeration piping	lump sum	1.00	54,000	54,000
5.3	**Electrical Equipment**				
5.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
5.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	36,090	36,090
	Subtotal	**Activated Sludge Tanks 1+2**			**1,012,090**
6	**Return Sludge / Excess Sludge Pumping Station**				
6.1	**Civil Works**				
6.1.1	Excavation, transportation to stockpile	m³	1,560.00	6	9,360
6.1.2	Backfilling, transportation from stockpile	m³	1,030.00	9	9,270
6.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	170.00	40	6,800
6.1.4	Dewatering of trenches	lump sum	1.00	18,000	18,000
6.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	130.00	200	26,000
6.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	17.00	1,000	17,000
6.1.7	Interior work	lump sum	1.00	26,100	26,100
6.2	**Mechanical Equipment**				
6.2.1	Return sludge pumps, 300 m³/h, hman 3 m	pieces	3.00	15,000	45,000

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
6.2.2	Valves piping DN 250	lump sum	1.00	150,000	150,000
6.2.3	Excess sludge pumps	pieces	2.00	1,000	2,000
6.2.4	Valves piping DN 150	lump sum	1.00	68,000	68,000
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	108,270	108,270
	Subtotal	**Return Sludge / Excess Sludge Pumping**			**485,800**
7	**Distribution Chamber 2**				
7.1	**Civil Works**				
7.1.1	Excavation, transportation to stockpile	m^3	190.00	6	1,140
7.1.2	Backfilling, transportation from stockpile	m^3	140.00	9	1,260
7.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	10.00	40	400
7.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	50.00	200	10,000
7.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	6.50	1,000	6,500
7.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	22.00	250	5,500
7.1.7	Railing, Galvanized Steel, Height 1.10 m	m	30.00	50	1,500
7.1.8	Stairs	lump sum	1.00	2,500	2,500
7.2	**Mechanical Equipment**				
7.2.1	Stop valves DN 350	pieces	2.00	4,000	8,000
7.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 2**			**36,800**
8	**Secondary Settling Tanks 1+2**				
8.1	**Civil Works**				
8.1.1	Excavation, transportation to stockpile	m^3	4,200.00	6	25,200
8.1.2	Backfilling, transportation from stockpile	m^3	1,900.00	9	17,100
8.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	300.00	40	12,000
8.1.4	Dewatering of trenches	lump sum	1.00	36,000	36,000
8.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	600.00	200	120,000
8.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	78.00	1,000	78,000
8.1.7	Overflow weir 1.4571, baffle	m	120.00	400	48,000
8.2	**Mechanical Equipment**				
8.2.1	Scraper bridge width 20 m, incl. Flotated sludge pump, skim system	pieces	1.00	60,000	60,000
8.3	**Electrical Equipment**				
8.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	18,045	18,045
	Subtotal	**Secondary Settling Tanks 1+2**			**414,345**
9	**Chemical Phospor Precipitation**				
9.1	**Civil Works**				
	36,900.00	lump sum	1.00	35,000	35,000
9.2	**Mechanical Equipment**				
9.2.1	Phosphor Precipitation Unit (Pumps, Pipiping)	lump sum	1.00	36,000	36,000
9.3	**Electrical Equipment**				
9.3.1	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	18,045	18,045
	Subtotal	**Chemical Phospor Precipitation**			**89,045**
10	**Secondary Sludge Gravity Thickeners 1+2**				
10.1	**Civil Works**				
10.1.1	Excavation, transportation to stockpile	m^3	720.00	6	4,320
10.1.2	Backfilling, transportation from stockpile	m^3	200.00	9	1,800
10.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	40.00	40	1,600
10.1.4	Dewatering of trenches	lump sum	1.00	10,000	10,000
10.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	150.00	200	30,000
10.1.6	Reinforcement Steel, average 130 kg/m^3 concrete	t	19.50	1,000	19,500
10.1.7	Overflow weir 1.4571, baffle	m	40.00	400	16,000
10.1.8	Grates - HDG 24kg/m2 incl. Frames	m^2	22.00	250	5,500

Annex 4.5.3.4 WWTP Darmanesti

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
10.1.9	Railing, Galvanized Steel, Height 1.10 m	m	50.00	50	2,500
10.1.10	Stairs	lump sum	1.00	4,000	4,000
10.2	**Mechanical Equipment**				
10.2.1	Rakes w = 6 m, d = 3.5 m	pieces	2.00	25,000	50,000
10.2.2	Piping DN 150	lump sum	1.00	57,000	57,000
10.3	**Electrical Equipment**				
10.3.1	Supersonic Level Meter	pieces	2.00	2,000	4,000
10.3.2	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	18,045	18,045
	Subtotal	**Secondary Sludge Gravity Thickeners 1+2**			**224,265**
11	**Sludge Dewatering / Blower Building / Low Voltage Switchgear, Medium Voltage**				
11.1	**Civil Works**				
11.1.1	Machinery hall, massive construction, lump sum cost for converted space	m^3	1,440.00	150	216,000
11.2	**Mechanical Equipment**				
11.2.1	Belt filter press 4 m^3/h incl. Polymer station	pieces	1.00	76,000	76,000
11.2.2	Transport belts	pieces	1.00	20,000	20,000
11.2.3	Containers 10 m^3 incl. Relocation equipment	pieces	1.00	34,000	34,000
11.2.4	Rotary piston blowers 940 m^3/h, pressure head 600 mbar each	pieces	3.00	13,500	40,500
11.3	**Electrical Equipment**				
11.3.1	Low Voltage Equipment, Lightning Protection, SCADA, Cabling	lump sum	1.00	180,450	180,450
	Subtotal	**Sludge Dewatering / Blower Building / Low**			**566,950**
12	**Sludge Storage Area**				
12.1	**Civil Works**				
12.1.1	Sludge Storage Area	m^2	1,350.00	50	67,500
12.1.2	Concrete Retaining Walls, height 2.00 m	m^3	84.00	200	16,800
12.1.3	Reinforcement Steel, average 130 kg/m^3 concrete	t	10.92	1,000	10,920
12.2	**Mechanical Equipment**				
	n/a			0	0
12.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Sludge Storage Area**			**95,220**
13	**Operation Building**				
13.1	**Civil Works**				
13.1.1	Operation building, massive construction, lump sum cost for converted space incl. Equipment and Laboratory	m^3	2,040.00	165	336,600
13.2	**Mechanical Equipment**				
13.2.1	Laboratory Equipment	lump sum	1.00	72,000	72,000
13.2.2	Workshop equipment	lump sum	1.00	20,000	20,000
13.3	**Electrical Equipment**				
13.3.1	Cenral control room	lump sum	1.00	108,270	108,270
	Subtotal	**Operation Building**			**536,870**
14	**Roads**				
14.1	**Civil Works**				
14.1.1	New Asphalt roads	m^2	1,050.00	50	52,500
14.1.2	Fence h = 2.0 m, incl. Gate w = 6 m	m	600.00	50	30,000
14.2	**Mechanical Equipment**				
	n/a			0	0
14.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Roads**			**82,500**

Annex 4.5.3.4 WWTP Darmanesti

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
15	**Piping**				
15.1	**Civil Works (earth works, pipes)**				
15.1.1	Piping DN 80	m	500.00	43	21,500
15.1.2	Piping DN 100	m	320.00	51	16,320
15.1.3	Piping DN 250, 1.4571	m	55.00	201	11,055
15.1.4	Piping DN 350, 1.4571	m	30.00	311	9,330
15.1.5	Piping DN 250	m	40.00	51	2,040
15.1.6	Piping DN 300	m	360.00	56	20,160
15.1.7	Piping DN 400	m	300.00	151	45,300
15.2	**Mechanical Equipment**				
	n/a			0	0
15.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Piping**			**125,705**
16	**Miscellaneous**				
16.1	Observation Wells	pieces	3.00	5,000	15,000
16.2	Auto drain for wastewater network (suction vehicle)	pieces	1.00	70,000	70,000
16.3	Dismantling of old WWTP	lump sum	1.00	100,000	100,000
				0	0
	Subtotal	**Miscellaneous**			**185,000**

	Total Civil Works				3,034,035
	Total Mechanical Equipment				1,373,000
	Total Electrical Equipment				619,485
	TOTAL:				**5,026,520**

Agglomeration Targu Ocna - WWTP Targu Ocna
Cost Estimate

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
1	**Non-construction Activities**				
1.1	**Civil Works**				
1.1.1	Mobilisation cost, including Site preparation, reconstruction of access roads, establishment of Contractor's office and accommodation, office equipment, Demobilisation cost, including reinstatement and clearance of Site, Sign boards, tests on completion, insurances, inspection and testing during construction, survey tasks, permits, as-built documentation	lump sum	1.00	208,530	208,530
1.2	**Mechanical Equipment**				
	n/a			0	0
1.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Non-construction Activities**			**208,530**
2	**Inlet Pumping Station, Screening Building**				
2.1	**Civil Works**				
2.1.1	Excavation, transportation to stockpile	m^3	700.00	6	4,200
2.1.2	Backfilling, transportation from stockpile	m^3	210.00	9	1,890
2.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	100.00	40	4,000
2.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	192.00	200	38,400
2.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	24.96	1,000	24,960
2.1.6	Grates - HDG 24kg/m2 incl. Frames	m^2	35.00	250	8,750
2.1.7	Railing, Galvanized Steel, Height 1.10 m	m	20.00	50	1,000
2.1.8	Machine hall construction, massive construction, lump sum cost for converted space	m^3	700.00	150	105,000
2.2	**Mechanical Equipment**				
2.2.1	Archimedic screw pumps	pieces	3.00	18,000	54,000
2.2.2	Channel penstock with manual operation D = 700 mm, AISI304	pieces	4.00	5,000	20,000
2.2.3	Fine screen	pieces	2.00	36,000	72,000
2.2.4	Screw conveyor	pieces	1.00	15,000	15,000
2.2.5	Reception station for septic sludge	pieces	1.00	35,000	35,000
2.2.6	Containers 5 m^3	pieces	3.00	7,000	21,000
2.2.7	Air condition	pieces	1.00	1,000	1,000
2.3	**Electrical Equipment**				
2.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	57,255	57,255
	Subtotal	**Inlet Pumping Station, Screening Building**			**463,455**
3	**Aerated Grit and grease Chamber**				
3.1	**Civil Works**				
3.1.1	Excavation, transportation to stockpile	m^3	570.00	6	3,420
3.1.2	Backfilling, transportation from stockpile	m^3	250.00	9	2,250
3.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m^3	60.00	40	2,400
3.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m^3	110.00	200	22,000
3.1.5	Reinforcement Steel, average 130 kg/m^3 concrete	t	14.30	1,000	14,300
3.1.6	Grates - HDG 24kg/m^2 incl. Frames	m^2	10.00	250	2,500
3.1.7	Railing, Galvanized Steel, Height 1.10 m	m	45.00	50	2,250
3.2	**Mechanical Equipment**				
3.2.1	Scraper bridge width 10 m, two chambers	pieces	1.00	35,000	35,000

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
3.2.2	Channel penstock with manual operation D = 1000mm, AISI304	pieces	4.00	7,000	28,000
3.2.3	Air piping DN 80	lump sum	1.00	20,700	20,700
3.2.4	Sand and grease pumps	lump sum	1.00	12,600	12,600
3.2.5	Rotary piston blower, 71 m³/h, pressure head 400 mbar	pieces	2.00	4,800	9,600
3.3	**Electrical Equipment**				
3.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	28,628	28,628
	Subtotal	**Aerated Grit and grease Chamber**			**183,648**
4	**Distribution Chamber 1**				
4.1	**Civil Works**				
4.1.1	Excavation, transportation to stockpile	m³	190.00	6	1,140
4.1.2	Backfilling, transportation from stockpile	m³	140.00	9	1,260
4.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
4.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	50.00	200	10,000
4.1.5	Reinforcement Steel, average 130 kg/m³ concrete	t	6.50	1,000	6,500
4.1.6	Grates - HDG 24kg/m2 incl. Frames	m²	22.00	250	5,500
4.2	**Mechanical Equipment**				
4.2.1	Lowering penstocks, w = 2000 mm, H = 1000 mm, 1.4571	pieces	2.00	8,000	16,000
4.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 1**			**40,800**
5	**Activated Sludge Tanks 1+2**				
5.1	**Civil Works**				
5.1.1	Excavation, transportation to stockpile	m³	8,400.00	6	50,400
5.1.2	Backfilling, transportation from stockpile	m³	2,500.00	9	22,500
5.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	450.00	40	18,000
5.1.4	Dewatering of trenches	lump sum	1.00	42,000	42,000
5.1.5	Concrete B 20 incl. shuttering, for bottom, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	600.00	140	84,000
5.1.6	Concrete B 20 incl. shuttering, for walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	800.00	200	160,000
5.1.7	Reinforcement Steel, average 130 kg/m³ concrete	t	182.00	1,000	182,000
5.1.8	Grates - HDG 24kg/m2 incl. Frames	m²	200.00	300	60,000
5.1.9	Railing, Galvanized Steel, Height 1.10 m	m	200.00	50	10,000
5.2	**Mechanical Equipment**				
5.2.1	Submersible mixers, 5 kW incl. Lifting device	pieces	8.00	9,900	79,200
5.2.2	Installation of fine bubble aeration systems, total air flow 1400 m³/h	lump sum	1.00	49,000	49,000
5.2.3	Aeration piping	lump sum	1.00	48,000	48,000
5.3	**Electrical Equipment**				
5.3.1	Oxygenmeter	pieces	4.00	5,000	20,000
5.3.2	Low Voltage Equipment, SCADA, Cabling, Probes	lump sum	1.00	28,628	28,628
	Subtotal	**Activated Sludge Tanks 1+2**			**853,728**
6	**Return Sludge / Excess Sludge Pumping Station**				
6.1	**Civil Works**				
6.1.1	Excavation, transportation to stockpile	m³	1,390.00	6	8,340
6.1.2	Backfilling, transportation from stockpile	m³	920.00	9	8,280

Item	Description	Unit	Quantity	Unit Price Euro	Total Price Euro
6.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	150.00	40	6,000
6.1.4	Dewatering of trenches	lump sum	1.00	16,000	16,000
6.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	130.00	200	26,000
6.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	16.90	1,000	16,900
6.1.7	Interior work	lump sum	1.00	26,100	26,100
6.2	**Mechanical Equipment**				
6.2.1	Return sludge pumps, 300 m³/h, hman 3 m	pieces	3.00	15,000	45,000
6.2.2	Valves piping DN 200	lump sum	1.00	104,000	104,000
6.2.3	Excess sludge pumps	pieces	2.00	1,000	2,000
6.2.4	Valves piping DN 150	lump sum	1.00	54,400	54,400
6.3	**Electrical Equipment**				
6.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	85,883	85,883
	Subtotal	**Return Sludge / Excess Sludge Pumping**			**398,903**
7	**Distribution Chamber 2**				
7.1	**Civil Works**				
7.1.1	Excavation, transportation to stockpile	m³	190.00	6	1,140
7.1.2	Backfilling, transportation from stockpile	m³	140.00	9	1,260
7.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	10.00	40	400
7.1.4	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	50.00	200	10,000
7.1.5	Reinforcement Steel, average 130 kg/m³ concrete	t	6.50	1,000	6,500
7.1.6	Grates - HDG 24kg/m2 incl. Frames	m²	22.00	250	5,500
7.2	**Mechanical Equipment**				
7.2.1	Stop valves DN 350	pieces	2.00	4,000	8,000
7.3	**Electrical Equipment**				
	n/a			0	0
	Subtotal	**Distribution Chamber 2**			**32,800**
8	**Secondary Settling Tanks 1+2**				
8.1	**Civil Works**				
8.1.1	Excavation, transportation to stockpile	m³	3,200.00	6	19,200
8.1.2	Backfilling, transportation from stockpile	m³	1,800.00	9	16,200
8.1.3	Import 300 mm of suitable gravel material, compacted to 98% in layers not exceeding 150 mm, thickness 0.30 m	m³	200.00	40	8,000
8.1.4	Dewatering of trenches	lump sum	1.00	32,000	32,000
8.1.5	Concrete B 20 incl. shuttering, for foundations, walls, slabs incl. Openings, water stop bands etc., suitable for wastewater	m³	500.00	200	100,000
8.1.6	Reinforcement Steel, average 130 kg/m³ concrete	t	65.00	1,000	65,000
8.1.7	Overflow weir 1.4571, baffle	m	60.00	400	24,000
8.2	**Mechanical Equipment**				
8.2.1	Scraper bridge width 16 m, incl. Flotated sludge pump, skim system	pieces	2.00	48,000	96,000
8.3	**Electrical Equipment**				
8.3.1	Low Voltage Equipment, SCADA, Cabling	lump sum	1.00	14,314	14,314
	Subtotal	**Secondary Settling Tanks 1+2**			**374,714**
9	**Chemical Phospor Precipitation**				
9.1	**Civil Works**				
9.1.1	Foundation, filling area, storage tank	lump sum	1.00	31,500	31,500
9.2	**Mechanical Equipment**				
9.2.1	Phosphor Precipitation Unit (Pumps, Piping)	lump sum	1.00	36,000	36,000
9.3	**Electrical Equipment**				

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