MUNICIPALITY OF PEJA

DEVELOPMENT PLAN FOR WATER SUPPLY AND SEWERAGE INFRASTRUCTURE

Prepared by:
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Peja, April 2008

1.0 Introduction

1.1 Background

Based on the initiative of the Peja Municipality Mayor, on March 2008 has been established the Experts Group for Water Supply and Sewerage with the main purpose to solve the rising problems in this field of Infrastructure.

Furthermore, idea was to prepare document with the proper cost benefit analyzes which should be presented to the potential donors during the first Business and Investment Summit planned for beginning of July 2008. However, this document will be used as frame for future planning of investments in the Infrastructure of Municipality of Peja.

1.2. The role and the responsibilities of the Municipality in the Public Infrastructure Development

Management of the water supply and the sewerage system for the Peja municipality is under the responsibility of Regional Water Company „Hidrodrini“ based on the Service Agreement with the Municipality and is licensed for this purpose. Management and the maintenance of the sewerage and atmospheric waters are done by the Municipality through the engaged contractors.

Having in mind, the importance and impact of the above mentioned infrastructure on the quality of life, economical and social development of the municipality, this issue must be treated very seriously by all relevant subjects inside Municipality and Kosovo Government.

This considers, first of all, responsibility and the interest of the Municipality to offer qualitative services for the one’s citizens and extension of this infrastructure in the uncovered zones as well.

Consequently, the development and urban planes have to be harmonized with the capital investments plans for refurbishment and extension of the infrastructure in own administrative region.

In this context, the professional group was lead by the principle that all projects of the water supply and sewerage treated in this document have to be result of the close consultations and collaboration with the KRU „Hidrodrini“ and have to correspond with the investment plans of this company and the development planes of the Municipality as well.

On the other hand, atmospheric sewerage infrastructure is a direct responsibility of the Municipality, with lack of responsible public company or Municipal department

which deals with management and maintenance of this part of infrastructure. As a consequence, is missing the review of the existing situation and the future plans or proposed projects for this infrastructure. Therefore, the Group has consulted for this part of infrastructure, the study prepared by Hydroproject-Praha in 1976 and later projects as well.

1.3. Existing situation of the Water Supply and Sewerage

Water supply

The water system of Peja is supplied from two springs (well of „Uji i Bardhë“ and well of „Drinit të Bardhë“) and this system provide water for city of Peja and 18 villages of the Municipality as well. Except these 18 villages, two other villages of the Municipality (villages of Lubeniq and Vranoc) are supplied with water from small local water systems managed by respective communities.

Capacity of these two main springs for Municipality supply is about Q=1,200 l/s. Despite this big capacity of both wells, during summertime appear problems with water supply, especially in the critical points of the system (high zones and far consumers). The main reasons for these problems consist in the high percentage of water losses in transmission and distribution system- about 70%.

These losses present the differences between produced quantity and invoiced quantity of the water. This includes commercial and physical/technical losses. Proportion between these two categories are not exactly known but is estimated that should be 50%/50%. The main factors which impact the losses at high level are estimated to be: (obsolete distribution net, illegal connections, lack of consumption measuring etc.).

Water treatment is realized in disinfection system with chlorination of water according standards and laws.

The distribution system is divided into 2 zones: (i) the upper zone which is supplied through pumping system and (ii) the lower zone with the water through gravitation.

Particular problem seems to be the shortage of the reservoirs for drinking water. (actually exists only one with the volume of 1,500 m3), requested for production balance of the consumption for the urgent needs.

Water sewerage- black waters

Sewerage system for the city of Peja is designed at 1976 as separate type system: separate system for extraction of the black waters from the atmospheric waters. This system is under construction since 1976. Estimated design period for dimensioning of the pipes was choosing year 1995 (already exceeded).

The total length of the sewerage net is about 73 km and this net covers about 63% of the urban population. In the rural zones, except two villages (villages of Rashiq and Vranoc) this net, practically doesn’t exists.

The main problems of the sewerage system of the Peja Municipality are identified as: (i) uncovering of the urban zones, (ii) uncovered rural zones and (iii) inadequate dimensioning of the distribution net (demographic changes).

System for treatment of the black waters

The treatment of the sewerage waters before they let to the recipient (river) is necessary having in mind their impact on the environment and public health without such treatment and releasing directly into the river. Moreover, this treatment is obliged according the Law for Water (from 2004) and according European standards.

Unfortunately, Peja as almost all cities in Kosovo haven't system for black water treatment and actually all sewerage is released directly to the river without any previous treatment.

Infrastructure of the atmospheric waters sewerage

In the city of Peja does not exist functional system for diverting of the atmospheric waters in the sense of designed or built system according technical norms. Except the narrow center of the city where the pipe system for atmospheric sewerage exists, in other parts of the city this system is missing or exists open channels which has been used for this purpose or as happens, often floods streets and properties of the citizens.

This situation becomes unacceptable because of decreasing of the quality of life and as permanent danger from the flooding even after small precipitations.

1.4. Proposed technical solutions and Implementation concept

Experts group, after the detailed analyze of the existing situation based on the technical documentation and investigations done on the terrain, has concluded for the necessity of the considerable investment in designing and building of the functional water and sewerage infrastructure which is a determinant factor for the economical and social development of Municipality taking into consideration environment protection and the public health.

These investments includes preparing of the studies and main design for specific identified projects and particularly investments for implementation of such projects in building of infrastructural projects of water supply and sewerage.

It is necessary to mention that in this document are treated: (i) existing situation, (ii) identification of the problems, (iii) analyzing of the optional solutions, and (iv) recommendation for priorities in developments of the water supply and sewerage for the period till 2030.

Experts group has treated this infrastructure in 4 separate entireties:

Water supply

The projects which deals with the developing of the water supply have been divided into the two sub groups:

(a) Reduction of the water losses
(b) Extension of the water supply net for the rural zones

a) Reduction of the technical losses

Reduction of the water losses is the central issue in problem of water supply for the management of the KRU „Hidrodrini". Having in mind that these losses actually are in very high level (about 70%) their reduction is in the focus of the company's activities. Reduction of these losses at the acceptable level (about 30%) is one of the prerequisite for qualitative water supply and for any kind of extension of water supply net in rural zone. KRU „Hidrodrini" is engaged with his own capacities and with the help of the donors (KfW) to achieve improvements in the water lose reduction field.

In the scope of this document it is foreseen the investment of **290,000 EUR** for managing of the above mentioned losses. These investments are planned for establishing of the metering areas (DMA – „District Metering Areas") which is known method for identification and optimal managing of water losses.

b) Extension of the water supply net for the rural zones

Extension of the water supply net for the rural zones, which are not included in the existing public system of water supply is identified by experts group as issue with high priority in the context of developing of the water supply infrastructure. This, because the fact of the pollution from black waters, the consumed water in the rural zones is often contaminated and consists bacteria and thus is unacceptable. This fact is established by National Institute for the Public Health (IKSHP). This kind of contamination is permanent source of hydro disease and frequent epidemics in these zones.

Therefore, with this document it is foreseen the extension of the water supply net for the **19 villages** of the Peja Municipality. 8 of them are located on the left side of the river Lumbardhi (mainly located along road axe Pejë-Prishtinë) and other 8 on the right side of the river Lumbardhi. The whole population which is included in this extension is approximately **25,000 inhabitants**. The total cost of building of the water supply net for these 19 villages is estimated at: **7,124,365 EUR**.

In this calculated value are included 10 % for all expenses for engineering (geodesic survey, main design and supervision) at the value of 712,436 EUR. Equally are included 5% for unpredictable expenses in value of: 370,718 EUR.

The total costs of infrastructure projects for water supply are estimated in the value: **7,785,083 EUR**.

Sewerage of the black waters

Chapter for rehabilitation and extension of the black water sewerage infrastructure is divided into the 2 subgroups:

a) Rehabilitation of the existing net of black waters sewerage and
b) Extension of the black waters sewerage net in the urban zones

a) Rehabilitation of the existing net of black waters sewerage

Existing black waters sewerage is old fashioned and already exceeded because the design period was estimated to be till 1995. As the consequence, pipe dimensions are inadequate (insufficient) for actual number of inhabitants in Peja Municipality. This has been resulted with often blockage of the sewerage collectors and flooding of citizens properties.

Therefore, experts group highly recommend hydraulic modeling of existing net which will be used for as a basis for redesigning and preparing of final design for demographic increase of the population till 2030.

With the intelligent engineering estimation made by the experts, has been estimated that rehabilitation of the existing sewerage system will cost: 9,750,500 EUR.

This is also estimated as an investment of first class and it is recommended to be completed during the period 2008-2010.

b) *Extension of the black waters sewerage net in the urban zones*

Extension of the black waters sewerage net in the urban zones which are not included in the existing net is, according the conclusions from General development and urban plan for 2006-2025, evaluated as the highest priority and basic prerequisite for Municipalities development.

Estimated value for investments in the extension of the sewerage net is: 10,501,000 EUR. This value includes investments in the urban, industrial, business zones etc.

This investment is predicted as a second stage priority and it is recommended to be realized during the period 2008–2013.

Atmospheric waters sewerage

Based on the identified existing situation and analyzed options for the solving of the atmospheric waters sewerage, experts group propose:

a) *Rehabilitation of the existing open channels*

These open channels have been used for diverting of the atmospheric waters from upper zones of the town and simultaneously serves for connection of the pipe collectors of the atmospheric waters.

The total length of these channels is: 47,550 meters, while value for this investment is estimated at: 3,760,000 EUR. Planned investments are prioritized into three categories.

However, having in mind the importance of these open channels in avoiding of the flooding danger and consequences for inhabitants, this investment is categorized as first scale priority.

b) *Construction of the new pipe collectors net for atmospheric waters*

This system has been used for collection, diverting and draining on river of the atmospheric waters from the urban area.

The total length of the designed atmospheric waters system is: 45,011 meters. The estimated value for construction of this system is: 6,452,722 EUR.

This system is planned to be constructed using the reinforced concrete pipes based on the quality and cost impact of this solution.

This part of project is also considered by experts group as the investment of first scale priority, based on the necessity and importance in avoiding of flooding from the precipitations.

The total estimated value for realizing of the investments in building of the new system for atmospheric waters sewerage is: **11,744,630 EUR**. In this value are included 10 % of engineering costs (geodesic survey, main design and supervision), in value: **1,021,272 EUR**, and 5% for unforeseen works in value: **510,636 EUR**.

<u>System for black waters treatment</u>

Experts group has analyzed possible options for finding of technical solutions for black waters treatment and have recommended most favored solution. This solution is as idea project and of cause as basic information just to have idea about technical and financial construction of investment and to get impression about possible location as well.

This project is considered by experts as second level priority and it is recommended to investigate financial possibilities (through donors) during period 2008-20010 while realization is expected in period 2010-2015.

In this document are also recommended possible zones for building of this system.

Estimated value for project realization is: **38,541,800 EUR**.

1.5. Conclusions and Recommendations

Water supply and sewerage infrastructure in the Peja Municipality is inadequate in the term of quality of services and the distribution network. This situation has resulted with low quality services of the vital services such are water supply and sewerage. Finally, such services have impact on the environment and will be obstacle for economic and social development of the Municipality.

Therefore, it is necessary that responsible institutions (Municipality of Peja and KRU "Hidrodrini") should harmonize their actions in planning and finding of sources for financing of the investments for projects identified by experts group in this document.

Having in mind the total investment value for realizing of mentioned infrastructure (**81,360,768 EUR**) and in other hand limited financial capacities of the Municipality and KRU "Hidrodrini", it seems to be necessary exploring of alternative financing sources for realization of the investments (donors, Government grants, Municipality budget, KRU "Hidrodrini" investments, citizens voluntary contribution etc.)

It is recommended that prioritizing of the specific investments for proposed water supply and sewerage infrastructure should serve as orientation for the responsible institutions to prepare time schedule for implementation of the specific projects based on potential financial sources.

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Drinking Water Supply – Study of Opportunities

2.0 First Part – Drinking Water Infrastructure

2.1 Background

The Infrastructure program – water supply and wastewater Kosovo, aims at sustainable rehabilitation and reconstruction of the infrastructure in Kosovo. The main objective of the project is establishment and organization of the technical and financial municipal water services based on the trade economy principles.

In the Water Company Hidrodrini in Peja, the provision of reliable consumption services in regard to coverage of costs and operation of municipal services as efficient company will be illustrated with examples.

This report deals only with project elements that focus on determination of values in Peja. The report includes the results and conclusions of field studies.

2.2 Studying and drafting of the supply system

For the purpose of verifying the data provided by the workers of the water supply company a review of data was carried out by the (GEUK) team. Where necessary, the data are revised and corrected. Approximately 70% of the existing system was controlled.

The systemized maps provided at the scale 1:5,000 are quite accurate, and for the city surface the maximum difference may be 5m from reality.

2.3 Actual state

The raw water for Peja is ensured by sources, which means that from the zone of water intakes Drini i Bardhë at 564 m.s.l. and Uji i Zi at 542 m.s.l. At the sources the raw water is treated with gas chlorine. The third source, Uji i Bardhë, near source Uji i Zi along the river Bistrica e Pejës (or Lumi i Bardhë), during the summer time has the capacity of 20 l/s, which does not reach (is not included) to the water supply system due to unsuitable conditions of elevation.

From Drini i Bardhë through the gravity the water flows directly at the lower part of the system (540 to 450 m.s.l.). 18 villages are supplied by this source. From Uji i Zi the water flows into a storage tank near the pumping station. This storage tank acts only as suction and discharge pump. Pumps installed at this storage tank supply the upper zones of the city (580 to 500 m.s.l.). The remaining water through the gravity from the suction pump flows directly to the lower parts of the city. The existing reservoir “Qyteti I” (1,500 m3) is not in use. 70% of water produced arrives at zones supplied through the gravity lines. The remaining (30%) is pumped to the users.

The supply of the city may be described as insufficient. Water is at the disposal 24 hours a day. During summer, the remaining pressure at weakest points of the city network reaches values between 0,0 and 0,1 bar. In order to supply highest parts of the system are necessary booster stations. During the daytime some of the villages have less or do not have water at all. Some parts of the city are supplied only by one main pipe. In cases of

bursts on this pipe or in case of necessary repairs on the main pipe these parts of the city remain without water supply. A quantity of water is directly pumped in the system. When pumps are switched off, drops in pressure because of pipe bursts, especially in cases of PVC pipes.

Total water production reaches 1,019 l/s during daytime, and 958 l/s during night time. In the supply area we have around 88,000 inhabitants/users. Total daily volume reaches 86,207 m³. From this volume, every day is invoiced only 30% or 28,300 m³. Water losses (UFW) reach 70 %.

Main reasons for inadequate situation with water supply are usage of big quantities of drinking water for irrigation purposes. The percentage of leakages is approximately 30% of the production. Subsequently, 40% of losses are as a result of misuses and irrigation.
Main technical data of supply system are presented below:

- Supply system length: 189 km
- Materials: 41.5 % AC, 34.3 % PVC, 20 % PE, 5.5 % CI, 0.1 % St
- Connections: 18.142 (Household, Business, Institutions)
- Accumulation capacity: 1,500 m³, the reservoir is not in function and very soon it will be put in function.
- Booster stations: 2 public and 9 that operate in a private manner
- Pumping station: 1 with pumping capacity from 360 l/s and 45 m height
- Sources: 2 with total daily production of 86,200 m³

Operation is carried on daily basis and more reactive. Preventive maintenance is being applied.

Existing pipes, existing situation

FI	AC	CI	PE	PVC	ST	Total FI [m]
50			8,371	5,934	155	14,460
65	5,276	1,255	3,832	5,371		15,734
80	16,691	965	8,967	7,253		33,876
100	8,227	3,840	2,500	25,966	101	40,634
125	5,310		696			6,006
150	4,666	1,555	4,459	10,665		21,345
200	13,158	2,476	3,598	2,570		21,802
250	1,371		2,558	2,919		6,848
300	893	158		3,936		4,987
350	6,397					6,397
400	3,699	165				3,864
500	7,332					7,332
600	3,930					3,930
700	1,143					1,143
Total of Material [m]	78,093	10,414	34,981	64,614	257	**188,359**
Total of Material [%]	41.5	5.5	18.6	34.3	0.1	100

2.4 Future development

Taking in consideration the growth percentage of the city from 0.5 %, to 0.25 % for surrounding villages and additional connections of 15 new villages until 2013, as the main base was taken the "Hydraulic Modeling" prepared in 2007 according to which the population will be developed as in the table presented below:

No.	Location	Name	Population 2006	Growth increase (%)	Population 2015	Growth increase (%)	Population 2023	Connection norm	Connected population 2023
1	Extension	Zahaq	1.997	1.26%	2.321	1.15%	2.543	95%	2.416
2	Extension	Nabergjan	3.111	1.26%	3.615	1.15%	3.962	95%	3.764
3	Extension	Llabjen	1.156	1.26%	1.343	1.15%	1.472	95%	1.399
4	Extension	Ramun	683	1.26%	794	1.15%	870	95%	826
5	Extension	Nakell	1.030	1.26%	1.197	1.15%	1.312	95%	1.246
6	Extension	Ruhot	1.335	1.26%	1.551	1.15%	1.700	95%	1.615
7	Extension	Trstenik	1.356	1.26%	1.576	1.15%	1.727	95%	1.640
8	Extension	Lutogllav	1.892	1.26%	2.199	1.15%	2.409	95%	2.289
9	Extension	Vragoc	420	1.26%	488	1.15%	535	95%	508
10	Extension	Milovanc	368	1.26%	428	1.15%	469	95%	445
11	Extension	Babiq	315	1.26%	366	1.15%	401	95%	381
12	Extension	Krstovc	788	1.26%	916	1.15%	1.003	95%	953
13,14....	Extension (Lugu i Baranit)	Raushiq, Zllapek, Doberdol, Turjak, Baran, Gllogjan	9.936	1.26%	11.553	1.15%	12.695	95%	12.060
Total Extension			**23.460**				**31.098**		**27.902**
Grand Total			**140.760**		**170.082**		**186.588**		**167.412**

Supposedly, the usage of drinking water for irrigation will be drastically reduced and misuses will be decreased with implementation of the effective billing system. Until 2015 the existing water losses of 40% caused by irrigation and misuses will be reduced to 10%. Due to proposed rehabilitation measures, leakages will drop from 30% to 15% until 2023. In general, until 2023 the percentage of water losses will remain to 30%.
This will lead to the total demand of approximately 42,000m3 per day, until 2023. Until 2053, the demand for water will not exceed the actual capacity supply from both sources.

Total Cost for secondary and primary network													
					Diameter			Distribution network		House connections		Investment
No.	Village	Total surface (ha)	Specific length (m/ha)	Total length (m)	Min.(mm)	Max.(mm)	Material	Price (€/m)	Subtotal (€)	Price (€/20m)	Subtotal (€)	Price (€)
1	Zahaq	69.03	200	13,806	50	100	PEHD	45	621,270	250	172,575	793,845
2	Nabergjan	107.53	200	21,506	50	100	PEHD	45	967,770	250	268,825	1,236,595
3	Llabjan	39.96	200	7,992	50	100	PEHD	45	359,640	250	99,900	459,540
4	Ramun	23.61	200	4,722	50	100	PEHD	45	212,490	250	59,025	271,515
5	Nakell	35.6	200	7,120	50	100	PEHD	45	320,400	250	89,000	409,400
6	Ruhot	46.14	200	9,228	50	100	PEHD	45	415,260	250	115,350	530,610
7	Trstenik	46.87	200	9,374	50	100	PEHD	45	421,830	250	117,175	539,005
8	Lutogllav	65.4	200	13,080	50	100	PEHD	45	588,600	250	163,500	752,100
9	Vragoc	14.52	200	2,904	50	100	PEHD	45	130,680	250	36,300	166,980
10	Milovanc	12.72	200	2,544	50	100	PEHD	45	114,480	250	31,800	146,280
11	Babiq	10.89	200	2,178	50	100	PEHD	45	98,010	250	27,225	125,235
12	Krstovc	27.24	200	5,448	50	100	PEHD	45	245,160	250	68,100	313,260
13	Lugu i Baranit	-	-	24,000	l/s	l/s	PEHD	45	315,000	250	87,500	1,380,000
Total cost for secondary and primary network												7,124,365
Total Cost of implementation of District Metered Areas – DMA in the existing network												290,000

2.5 Justification of projects

Name of the project: **Reduction of technical losses, base project for network extension.** (Implementation of District Metered Areas – DMA in the existing network)

First phase: 01

Location: The project will be implemented in the urban zone of the city of Peja

Cost: Total cost: **290,000€;**

Short description of the project: According to the data provided by RWC "Hidrodrini" and for the purpose of reducing water losses in the Water Company, the consulting company involved in the project financed by KfW together with staff of Hidrodrini have projected establishment of District Metered Areas (DMA) for urban zones of Peja, since DMAs for rural zones were implemented in the past. The project involves construction of 25 chambers for zonal meters with all necessary fittings. The project will be implemented in the urban zones of the city of Peja. About 77% of clients supplied by Hidrodrini are concentrated in the urban zone of the city of Peja. This part of the network is considered to be the part with highest water losses within Hidrodrini network, since losses in this part are at about 72%. The total water supply for the urban zone of the city of Peja is around 1,500,000m^3/month. Based on the scale of water losses which is 75%, we can state that only 375,000m^3/month is being billed.

It is feasible to cover the investments within a period of 6 months, after water losses are reduced and water services have been expanded.

Benefits: With reduction of water losses from 75% to 50% Hidrodrini will be in a position to spare an amount of additional 375,000m^3/month, and by this Hidrodrini would be enabled to extend water services to other zones in which inhabitants continue to consume water from wells.

Name of the project: **Water Supply Network for the villages of the Municipality of Peja positioned along the main road Peja-Prishtina, Phase (I)**

Second phase: 02

Cost: Total cost: **4.992.610 €**

Short description of the project: The project involves construction of the new pipeline and construction of the water supply network,

According to the Hydraulic Modeling, there are sufficient amounts of water to supply these villages. The water supply network for these villages will be connected to the existing water network of Peja, which is with gravity.

The project will be implemented in six villages of the Municipality of Peja: Zahaq, Llabjan, Ramun, Lutogllavë, Nakëll and Nabërgjan, and also Ramun, Ruhot, Trstenik situated in the Eastern part of the city of Peja 7-11 km distant from the city of Peja.

Inhabitants in these villages use water from wells for consumption and according to the Institute of Public Health in Prishtina this water doesn't fulfill the required standards for drinkable water, since it contains bacteriological pollution thus represents hazard for the health of inhabitants of these villages. Very often epidemiology cases appeared in these zones.

Through this project approximately 14.596 inhabitants or 2.435 households will benefit.

Benefits: With extension of the water supply network the in one hand the Company will increase the number of its clients resulting with increase in its revenues, and on the other hand inhabitants will be supplied with good quality drinking water, in this way the Municipality will fulfill its investment program for the infrastructure of the water supply.

Name of the Project:	**Water Supply Network for villages: Vragoc, Millovanc, Babiq, Krstivc, and also Lugu i Baranit with villages, Phase (II)**
Third phase:	03
Cost:	Total cost: **2.131.755€**
Short description of the project:	The project involves construction of the new pipeline and construction of the water supply network, with various pipe lengths and diameters, The project will be implemented in the village Raushiq, which is situated in the Southern part of the city of Peja. Actually inhabitants in these villages are being supplied from their wells, which is contaminated and very often in these zones as well appeared epidemiology cases. Through this project approximately 10.259 inhabitants or 1700 households will benefit.
Benefits:	With extension of the water supply network, Municipality and RWC "Hidrodrini" will increase number of its clients, and as a result increase its revenues, moreover inhabitants of these villages will be supplied with good quality drinking water, and in this way more than 98% of villages within Municipality of Peja will be included in the Water Supply System.

2.6 Implementation phases

The proposed investment program for extension of the network and reduction of water losses will be divided in three main phases:

Phase 1: Implementation of district metered areas (DMA) in the existing network with **290.000 €**, provision and supply of materials, works will be implemented by RWC"Hidrodrini" - Pejë.

Phase 2: Water supply network for villages situated in the Eastern part of the Peja Municipality with **4.992.610€**, price includes preparation of detailed Projects (years 2009-2011)

Phase 3: Water Supply Network for villages: Vragoc, Millovanc, Babiq, Krstivc, and also Lugu i Baranit with villages: Raushiq, Zllapek, Doberdol, Baran.....until Gllogjan with **2.131.755 €,** price includes preparation of detailed Projects (years 2010-2013)

2.7 Approximate price (cost) and investment program

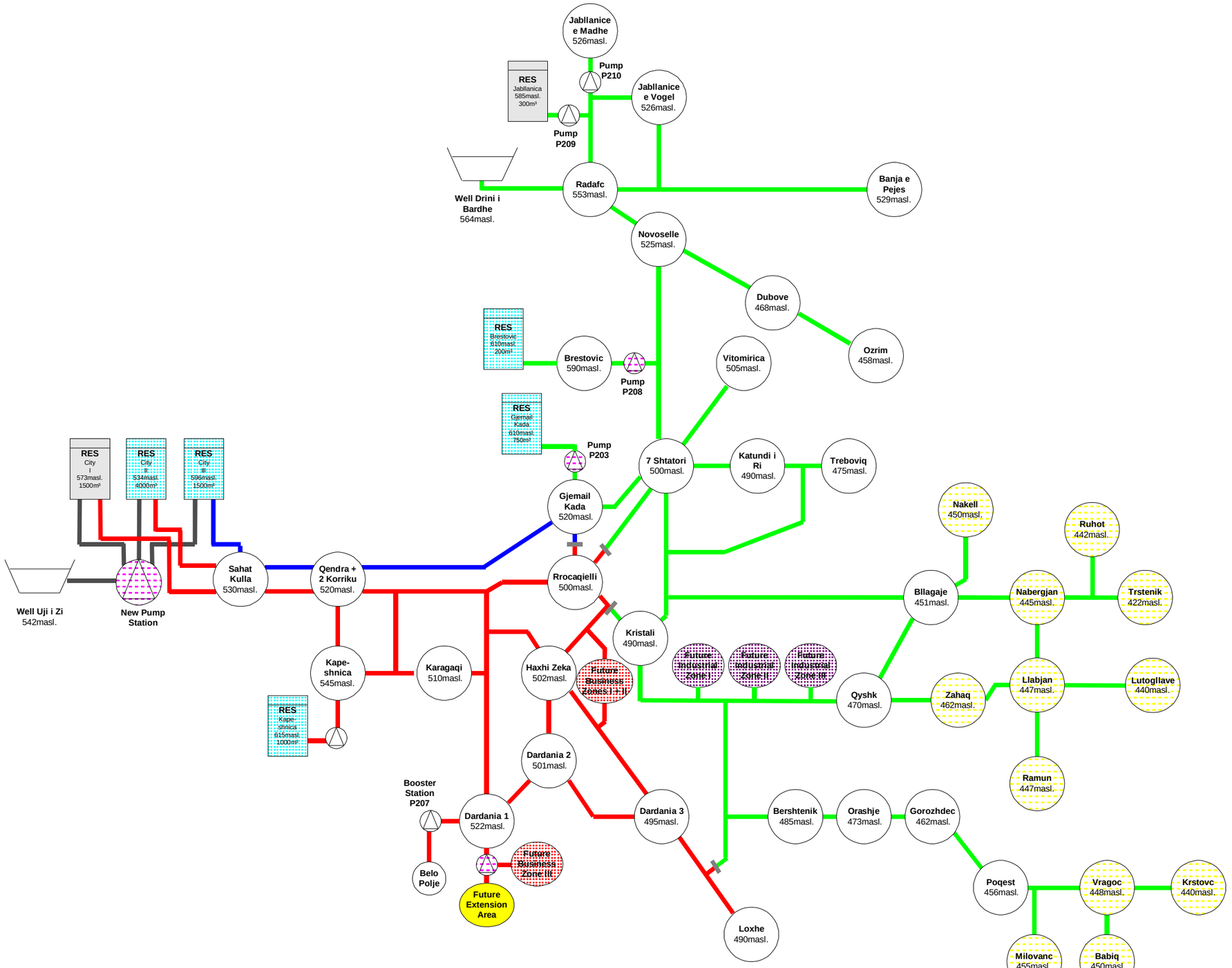
Based on assessments conducted by GEUK, to provide a reliable water supply system costs for rehabilitation and extension shall be calculated at an approximate value of 7.8 million Euros. This responds to specific investments of ~50 Euro per inhabitant.
Assessed measures covering the period up to 2013, are divided in 3 phases, together with the overall supply capacity and possibilities of certain operational costs.

Phases	**Cost (Euro)**
Phase 1 - Reduction Implementation of District Metered Areas (DMA)	290.000
Phase 2 – Extension in villages	4.992.610
Phase 3 – Extension in villages	2.131.755
Investments for 3 Phases	**7.414.365**
Engineering is counted (included)	-
Unforeseen costs 5 %	370.718
Total Investments	**7.785.083**

Total costs of rehabilitation and extension

Drawing 4.1

Scheme of the future water supply system 2023
Skema e sitemit të Ujësjellsit në të ardhmen 2023



LEGEND/LEGJENDA:

- Transmission Main to the new Pumping Station and to Reservoir City I,II,III
  Transmetimi kryesor deri te Stacion Pompues i ri dhe Rezervuari i qytetit I,II,III
- Zone 1+2: supply from Reservoir City I + II
  Zona 1+2: furnizuar nga Rezervuari i Qytetit I+II
- Zone 3: Reservoir City III
  Zona 3: Rezervuari i Qytetit III
- Zone 4: Supply by gravity from Well/Spring Drini i Bardhe
  Zona 4: furnizuar me gravitet nga Pusi /Burimi Drini i Bardhe
- New Resevoir
  Rezervuari I Ri
- Existing Reservoir
  Rezervuari Ekzistues
- New and Rehabilitated Pump and Booster Stations
  Riparimi i Pompes dhe Stacionit përforcues i Ri
- Reuse of existing Pump and Booster Stations
  Ripërdorimi i Stacionit Pompues dhe stacionit përforcues
- Well
  Puse
- City area and villages connected to the existing water supply system (2006)
  Zonat qytetare dhe lidhja e fshatrave tek sistemi ekzistues I Ujësjellsit (2006)
- Villages which will be connected to the extended water supply system (2023)
  Fshatrat të cilat do të lidhen deri te sistemi i zgjatur i Ujësjellsit (2023)
- Future extension area
  Zgjerimi I zonës në të ardhmen
- Future Business Zones
  Zonat biznesi në të ardhmen
- Future Industrial Zones
  Zonat industriale në të ardhmen
- Zone Valves
  Rubinet zona

Consulting Engineer

Kittelberger Consult | SETEC Engineering | ARCOTRASS | HIDROING-DK

Client

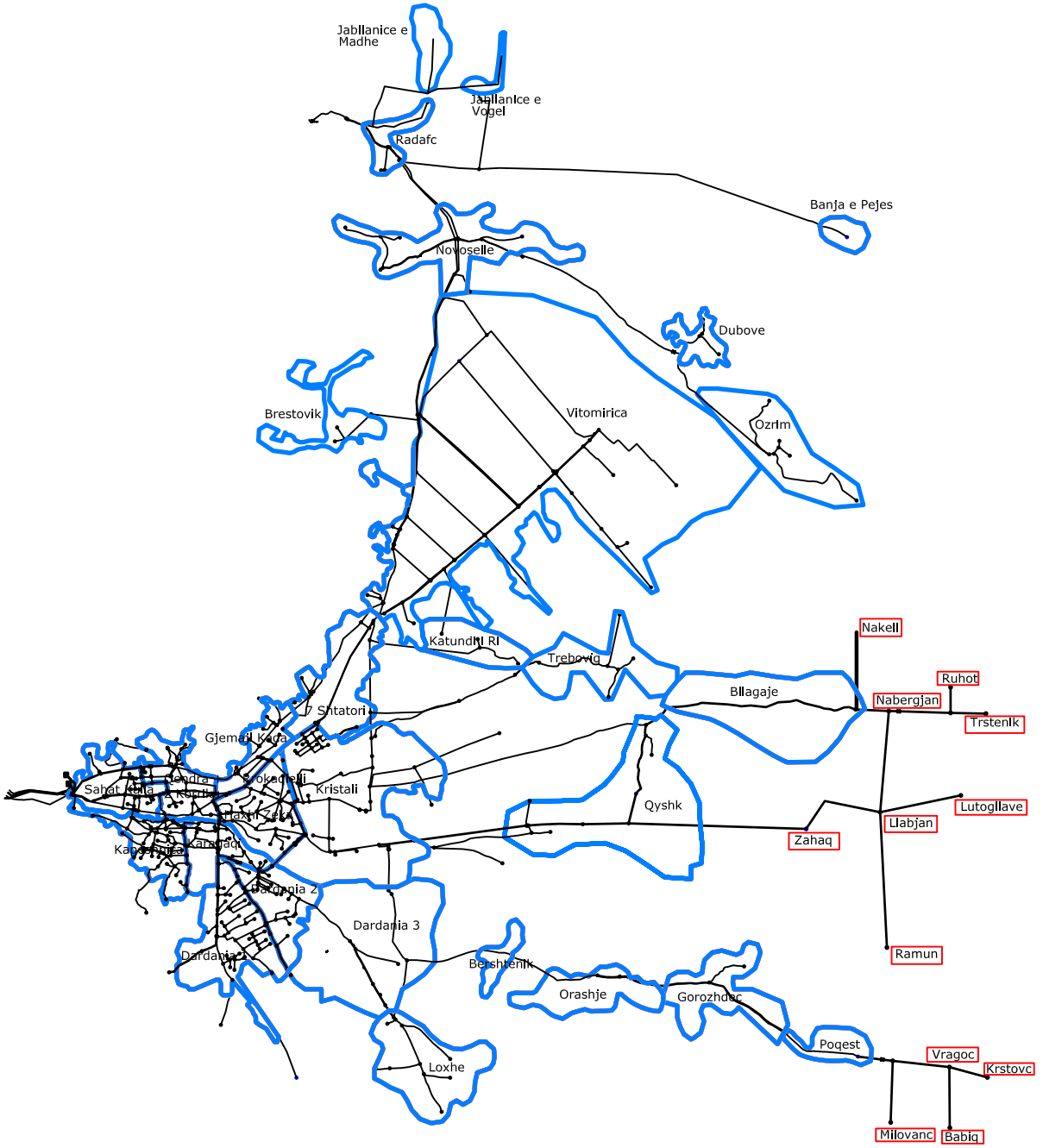
Kosovo Trust Agency, Hidroregjioni Jugor, Prizren
Hidrodrini, Peja
Agjensini Kosovar i Mirëbesimit

Financing

Kreditanstalt für Wiederaufbau

Project Urban Water Supply Rehabilitation Programme V - Phase 2
Hydraulic Modelling Peja
Programi për Rehabilitimin e ujësjellsit urban V - Faza 2
Modelimi Hidraulik Peja

Contract No.			Scheme of the future water supply system 2023 Skema e sitemit të Ujësjellsit në të ardhmen 2023	Scale
13370/240/10866				no scale
Worked out	10.07	Chs	Drawing-Status Conceptional Phase Faza Konceptuale	Drawing No. 4.1
Drawn	10.07	Pr		
Checked	10.07	Chs		Documents Nr.


Jabllanice e Madhe
Jabllanice e Vogel
Radafc
Banja e Pejes
Novoselle
Dubove
Brestovik
Vitomirica
Ozrim
Katundi I Ri
Trebovic
Nakell
Ruhot
Bllagaje
Nabergjan
Trstenik
Shtatori
Gjemaj Kafa
Sahat Kula
Kristali
Qyshk
Lutogllave
Llabjan
Zahaq
Karadaci
Dardania 2
Dardania 3
Ramun
Bershtenik
Orashje
Gorozhdec
Poqest
Vragoc
Krstovc
Loxhe
Milovanc
Babiq

Peja Sewerage Project – Study of Opportunities

(Technical, economic and environmental comparison and selection of options)

3.0 Second Part – Wastewater Network Infrastructure

3.1 Problems:

- Insuficient collection of sewerage,
- Discharge of sewerage waters without any prior treatment,

3.2 Consequences:

- Environmental and sanitary problems arising from disposal of untreated sewerage waters,
- The sanitation issues (problems) of collection and insufficient and inadequate disposal of wastwaters,
- Frequent floods in some parts of the city.

3.3 General Aims of the Project

(satisfactorily improvement of wastewater infrastructure situation in Peja in mid term and long term)

- Replacement and improvement of the drainage structures of the wastewater system,
- Extension of structures for collection of wastewaters,
- Construction of water treatment structures (plants).

3.4 Project Components

Aims and Results

- Development of mid-term and long-term concepts for wastewaters in order to achieve a convenient, safe and sustainable improvement of the dranaige situation of wastewaters.

3.5 Project Phases

Phase 1: Preparatory Works

Evaluation of the existing situation and determination of options

Phase 2: Conceptual Projection

Development and conceptual projection of Options,
Preliminary calculations,
Assessment of the impact on environment,
Technical and economic comparison of options.

Phase 3: Study of options

- Idea planning of selected options,
- Implementation deadline (schedule),
- Development of an implementation concept.

Structure:

1. Existing situation,
2. Projection citeria,
3. Presentation of selected options,
4. Wastewater treatment options,
5. Assessment of the impact on environment,
6. Conclusions,
7. Reccomendations.

---

1. Existing situation

Wastewater System Characteristics

- Combined Wastewater System,
- Coverage scale: approximately 63% of the population,
- Wastewater network constructed in the beginning of 70s until today,
- Total length: about 73 km (primary and secondary network), Tab.(1)
- 2 main zones North and South (dams),
- Existing pipeline at most of the parts is laid through private properties,
- Two main discharge points.

Picture; left side of the Lumi i Bardhë – North Part (Point 1)

Picture; right part of Lumi i Bardhë – Southern Part (Point 2)

Tab.(1) Wastewater System in Peja

Material	DN	Year of construction					Total
		1960 - 70	1970 - 80	1980 - 90	1990 - 00	00 - 08	
AC	100		73				73
AC	200	243	1,770	11,069	6,602		19,684
AC	250		1,651	10,818	5,484	2,355	20,308
AC	300		3,139	2,475	257	273	6,144
AC	350		842	1,870			2,712
AC	400		4,057	355			4,412
AC	450		1,623	319			1,942
AC	500		1,900				1,900
AC	600		96				96
AC	800		150	752			902
AC	1000		1,424				1,424
PVC	150					67	67
PVC	200			483	1,232	1,908	3,623
PVC	250				558	2,037	2,595
PVC	300				124	987	1,111
PVC	350			727			727
PVC	400			408			408
CON	300		445			1,030	1,475
CON	350					1,520	1,520
CON	600					520	520
CON	1000					798	798
VCL	150	264					264
Total:		507	17,170	29,276		11,495	72,705

Main disfunctions

- Too many discharge points,
- Poor quality of pipe materials and construction structures,
- Lack of general concept for development of the wastewater,
- Inadequate drainage of surface waters,
- Lack of maintenance (drainage, wastewater and surface waters structures blocked with solid materials),
- Wastewaters with partial access,
- No treatment of wastewaters.

2. Projection criteria

Calculation basis for the wastewater network

- Planning period: 2030,
- Domestic water consumption: 120 l/person d,
- Additional water consumption for businesses and institutions: 20l/person d,
- Wastewaters production scale: 90%,
- Surface waters scale: 80%,
- Industrial production of wastewaters:1 l/s. ha,

3. Presentation of selected options

Wastewater Collection Options

- Modification of the combined wastewater network system on the left side of Lumi i Bardhë in one separate system is porposed because of:
  - High connection of surface waters,
  - Collection suburb zones connected to the wastewater system,
  - Too many discharges of wastewaters into Lumi i Bardhë (a new main wastewater system is required),
- The combined wastewater system should be separated,
- Pirority should be given to the separate system for the purpose of extending the network.

4. Options for the Wastewater Network

- Rehabilitation works of the wastewater network

  - Verification of the hydraulic capacity of the wastewater network (hydraulic modeling),
  - Evaluation of Rehabilitation Works,
  - Precalculations-Comparsion of Options,
  - Summary of Rehabilitaton Costs.
- Wastewater Network extension works,

Hydraulic Modeling-Metodology

- Geodesic recording of the primary and secondary network,
- Definition of the water collection zones with consideration to extension areas,
- Characticis of water collection zones: surface, population density, slope cooeficinet, area coverage scale,.....,
- Development of the model,
- Computerised hydraulic modeling.

Precalculation-Comparison of Options
The option selected by the (GEUK) team is the separate one.

Precalculation – Summary of Rehabilitation Costs

No.	Zones	Investment costs (Euro)
KR1	Left side of Lumi i Bardhë	5.550.000
	Right side of Lumi i Bardhë	4.200.500
	Rehabilitation costs:	**9.750.500**

*In this cost is also calculated construction of the new collector **(KR1),***
(This collector will include two zones, center (North and South).

- Extension Works for the Wastewater network - Precalculations

Projection criteria:

- Wastewater extensions based on forcasted development of the urbanist and population planning period 2030),
- Urban development according to the General Urbanistic Plan, new development zones:
  - Inhabited zones in North-East,
  - Inhabited zones in South-East,
  - Industrial Zones,
  - Business Zones,
  - Education and sports Zones,
  - Station Zones,
  - Reserved Zones for Extension

  (see Urban Development Plan 2006-2025)
- Wastewater line according to the main existing or projected roads,
- As much as possible gravito connections to the Wastewater Treatment Infrastructure,
- Separate system for the Industrial Zones.

Extention Works on the Wastewater Network – New Collector (KR2 and KR3)

Lines and Zones:
The new collector **(KR2)** will include lines or zones:

- Inhabited zones, morth ~ east – 1,
- Industrial zones - 3,
- Business zones - 4,
- Station zones - 6,

New collector **(KR3)** will include lines or zones:

- Inhabited zones, South~east – 1,
- Reserved zones for extension - 7,

Precalculation - Summary of Extension Costs

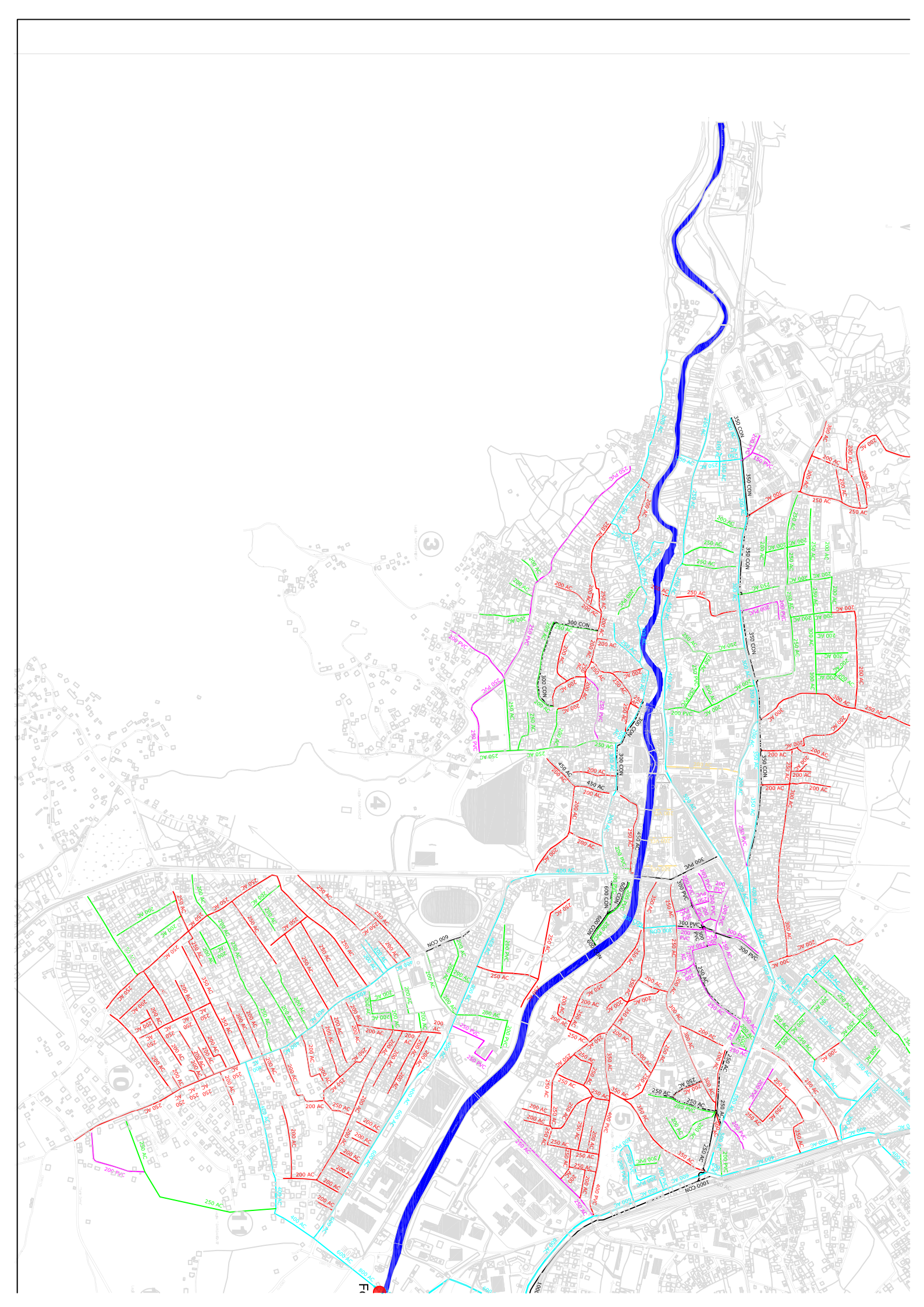
Investment costs include: primary, secondary and tretiary network, domestic connections

No.	Zones	Investment costs (Euro)
KR2	Inhabited (north ~ east) – 1, Industrial - 3, Business- 4, Station- 6,	5.800.500
KR3	Inhabited (South~east)– 1, Resrved for extension- 7,	4.700.500
	Costs for extension:	**10.501.000**

*In this cost is also calculated construction of two new collectors **(KR2** and **KR3)***

Wastewater Network Planning Rehabilitation and Extension Costs

Planning for Wastewater	Investment Costs (Euro)
Total for rehabilitation	9.750.500
Total for extension	10.501.000
Investment total:	**20.251.500**
Engineering 10%	2.025.150
Unforeseen expenses 5%	1.012.575
Total of investments in wastewater network	**23.289.225**



Project for Wastewater Network - Open Canals and Surface Waters – Study of Opportunities

(Technico-economic and environmental comparison and selection of options)

4.0 Third Part – Infrastructure of Open Canals and Surface Waters Network

A) – Open canals infrastructure

4.1 Project basis

1. Problems:

- Uncontrolled presence of a big quantity of surface waters into these opened canals
- Floods and discharge of waters from these opened and uncontrolled canals to different parts of the city.

2. Consequences:

- Environmental and sanitary problems as a result of floods from these canals during rains
- Frequent floods in some streets and parts of the city

4.2 General Aims of the Project

(satisfactorily improvement of the existing situation of open canals in Peja in a midterm and longterm)

- Improvement of the existing sistem for collection and disposal of surface waters
- Construction of the new sistem for collection and disposal of surface waters including the city as a whole.

4.3 Project Components:

Aims and results

Development of midterm and longterm technical concepts for rehabilitacion of open canals in order to achieve satisfactorily, safe and sustainable improvement of the condition of open canals.

4.4 Project phases:

Phase 1: Preparatory works

- Evaluation of the existing situation and definicion of options

Phase 2: Conceptual Projection

- Development and conceptual projection of options
- Preliminary calculations

Approval period

Phase 3: Study of Options

- Project idea of selected options
- Implementation deadline (schedule)
- Development of an implementation concept

Structure:

1. Existing situation,
2. Projection criteria,
3. Presentation of selected options,
4. Treatment options of surface waters
5. Assessment of impact on environment
6. Conclusions
7. Recommendations

1 Existing situation,

Characteristics of open canals

- Within the territory of the Municipality of Peja there are 19 open canals as presented in the table below;

REGISTRY OF OPEN CANALS WITHIN THE TERRITORY OF PEJA							
CANALS		LENGTH	PROJECTED QUANTITY OF WATER	TYPE OF THE CANAL			CONDITION
		L = m1	Q (m3/sec)	concrete	soil	tunel	
1	Canal of Seravis	11000	2.50	5000	6000		Improved L = 5000 m1
2	Canal at Sanatoriumi	850	13.00	100	750		Improved L = 100 m1
3	Canal at Gjimnazi	350	0.75	100	250		Improved L = 100 m1
4	Canal at Qokalices	2500	13.5	1250	1000	250	Improved L = 1500 m1
5	Canal at the Police Station	750				650	Improved
6	Canal at Tarolliti	500	0.40	150	350		Improved L = 150 m1
7	Canal at Gjemajl Kada	2000	0.40	1250	750		Improved L =1250 m1
8	Canal at Fidanishte I	500	0.25	150	350		Partially Improved
9	Canal at Fidanishte II	500	0.4	150	350		Partially Improved
10	Canal at Economic School	4000	5.0	1000	3000		Partially Improved
11	Canal of Llazoviqve	2500	1.5	500	2500		Partially Improved
12	Canal of Ruhot	10000	10.00		10000		Partially Improved
13	Canal of Gubavec	1500	0.72		1500		Partially Improved
14	Canal at Gjamija e kuqe (Mosque)	1700	0.41	1200	500		Partially Improved
15	Canal of Bellopojes	4000	10	4000			Improved
16	Canal of Taphones	1500	2.5		1500		Not Improved
17	Canal at Zatra	1800	3.50		1800		Not Improved
18	Canal at Firefighter Brigade	1250	0.5	500	750		Partially Improved
19	Canal at TMK (KPC)	350	0.25	350			Improved
TOTAL :		**47550.00**	**65.58**	**15700**	**31350**	**900**	

- These canals are supplied with water from some of the springs (sources) and also from rains.
- The slope is quite big which creates conditions for transporting various materials and occurrence of erozions.
- Exactly this is the fact that influences the decision making for improvements on these canals
- Improvement of these canals has started during 70s and is still ongoing but without a clear concept.
- Lack of respective funds influences the construction manner.

- During this timeline most of them are beng improved partially.

4.5 Main network problems:

- Lack of a general development concept during projection and improvement of these canals.
- Poor quality of materials (pipes, concrete) and also construction works.
- Besides this there is a lack of proper maintenance and due to this these canals often are blocked by remains which reduces respective profile of these canals,
- Various ussurpations (of bridges, facilities) by the side of irresponsible citizens often result with blockades on these canals, especially during or after rainy days with floods which overflow them.
- With the lack of responsibility inhabitants aside these canals connect their sewerage pipes into these canals.
- With the lack of improvements on these canals and with the presence of erosions, roads aside these canals are being destroyed constantly and are in an alarming condition.
- In the existing condition each rain creates floods followed by flooding of the streets and facilities aside these canals,

- As timeframe for the planning period is foreseen until 2050, during which period analyses will be continuously performed on the possibilities of growth of the city in new zones as well.

4.6 Presentation of the selected options

After having analysed the existing situation of these respective opened canals we have decided to follow the koncept presented below:

Since all the canals are discharged into respective canals we have decided to systemize them.
Depending on the field configuration of the city of Peja, all canals are systemized in three groups named as **"main collectors"**.
These collectors practicaly are being transformed into three main dams of surface waters' collection.
In the table below it is visibly clear that this system which is composed of three main collectors equipped with secondary canals.
These collectors are ordered based on the dangerousness (likeloihood) of floods on their respective canals.

After having presented this system we will present some principles used for deciding on the appropriate works required for improvement of these canals.

- The following tasks are planned for the purpose of rehabilitation of the canals:

  - Various repairs in the construction of the canal.

- Deinstallation and removal of any existing objects above or aside these canals (such as bridges, shops, toilets, etc).
- Disconnection of wastewater connections.

- New constructions will include the following:

  - in some of the canals will be constructed those parts that are necessary and that were/are missing.
  - improvement of those parts of the canals that need improvements will continue
  - collectors will be completely improved – practically all the way through the connection to the river.

Precalculation of works

IMPROVEMENT (WORKS) ON THE CANAL AS PER PRIORITIES					
	CANALS	Various repairs	New constructions	New constructions	Total
		M1	M1	M1	Euro
1	**PRIORITY I (RECEPIENT CANAL OF SERAVIS)**				
1	Canal of Seravis	1550	6000	5000	905.00,00
2	Canal at Sanatoriumi	100	750	100	130.00,00
3	Canal at Gjimnazi	100	250	100	65.000,00
4	Canal at Qokalices	1500	1000	1500	310.000,00
5	Canal at the Police Station	0	750	750	225.000,00
6	Canal at Tarolliti	350	150	150	115.000,00
7	Canal at Gjemajl Kada	1250	750	1250	175.000,00
8	Canal at Fidanishte I	150	350	150	80.000,00
9	Canal at Fidanishte II	150	350	150	80.000,00
10	Canal at Economic School	0	3500	3500	352.000,00
11	Canal of Llazoviqve	0	0	2750	200.000,00
12	Canal of Ruhot	0	0	100000	225.000,00
				TOTAL PRIORITETI I	2.835.000,00
2	**PRIORITY II (RECEPIENT LUMI I BARDHE)**				
1	Canal of Gubavecit	0	1500	1500	170.000,00
2	Canal at Gjamija e kuqe	1200	1200	500	205.000,00
3	Canal of Bellopojes	4000	4000	0	150.000.00
4	Canal of Taphones	0	12500	1250	285.000,00
				TOTAL PRIORITETI II	810.000,00

3	**PRIORITY III (RECEPIENT CANAL OF BELOPOJES)**				
1	Canal of Zatres	0	1500	1500	220.000,00
2	Canal at Firefighter Brigade	1200	1200	500	85.000,00
3	Canal at TMK (KPC)	250	0	0	10.000,00
				TOTAL OF PRIORITY III	**115.000,00**
				GRAND TOTAL :	**3.760.000,00**

4.7 Hydraulic Modeling - Methodology

- Geodesic recording of main primary and secondary networks,
- Determination of collection zones (dams) with considerations towards the growth of the city,
- Determination of dams surface,
- Development of a model,
- Hydraulic computerized modeling,

Recommendations:

Having in considerations the dangerousness (likelihood) of possible floods that may incur by surface waters, the priority for construction of open canals is given to **Canal of Seravise** together with secondary canals.

B) – Surface Waters Network Infrastructure

4.8 Project basis

1. Problems:

- Insuficcient and uncontrolled collection of surface waters
- Discharge of surface waters without any control on the streets and parts of the city.

2. Consequences:

- Environmental and sanitation problems as a qunsequence of discharge of these waters during rains

- Frequent floods in some parts of the city.

4.9 General aims of the project

(midterm and longterm satisfactorily improvement of existing surface waters network in Peja)

- Improvement of the existing system for collection and disposal of surface waters
- Construction of a new system for collection and disposal of surface water for the whole city.

4.10 Project components:

Aims and results

Development of midterm and longterm concepts for the network of surface waters for the purpose of achieving satisfactorily, safe and sustainable improvement of the existing condition of the network.

4.11 Project phases:

Phase 1: Preparatory works

- Evaluation of the existing situation and determination of options

Phase 2: Conceptual projection

- Development and conceptual projection of options
- Preliminary calculations

Approval period

Phase 3: Study of options

- Project planning of selected options.
- Implementation deadline (schedule).
- Development of an implementation concept.

Structure:

8. Existing situation,
9. Projection criteria,
10. Presentation of selected options,
11. Surface water treatment options
12. Assessment of the impact on the environment,
13. Conclusions,
14. Recommendations.

Existing situation,

Characteristiques of the existing surface waters network

- There is no existing organized network for collection of surface waters but the existing network is constructed as a partial system – at critical parts of the city.
- In most of the cases for the purpose of collecting surface water the wastewater system is used, dimensions of which are not appropriate as far as it concerns water quantity.
- This partial network is constructed startin from 70s until present,
- This network covers only the center of the city,
- Total length: abort 5.50 Km
- This network discharges on the river Lumi i Bardhe

Material	DN	Year of construction				
		1970 – 1980	1980 - 1990	1990 - 2000	2000 - 2008	Total
Concrete	300		150		350	400
Concrete	400				450	450
Concrete	500	500	250		850	1600
Concrete	600					
Concrete	800			550	1250	1800
Concrete	1400	1250				1250
Total		1750	400	550	2900	5500

Main problems of this network:

- Lack of a general development concept during projection and construction (implementations) of these partial networks,
- Poor quality of pipe materials and construction structures,
- Besides this with the lack of proper maintenance these systems are blocked with various remains and solid materials,
- Practically, since some years this network is out of function,
- In the existing condition each rain creates floods followed by flooding of the streets and facilities aside these networks,

Projection criteria

Calculation basis for the surface waters' network

- Hydraulic calculation of the quantity of water is calculated basen on **"rational method"**
- Determination of appropriate coeficients such as:
  - **I** - rain intensities
  - **Y** – drainage koeficient
- Depending on the consequences that are created during floods three return periods are absorbed
  - P = 5 years - center of the city
  - P = 2 years - parts of the city around the center – multistore buildings
  - P = 1 year - parts of the city with low constructions

- As timeframe for the planning period is foreseen until 2050, during which period analyses will be continuously performed on the possibilities of growth of the city in new zones as well.

Presentation of selected options

- During the process of decision making for the pudrose of laying the new network, the existing network will not be taken in consideration
- Creation of 12 collection dams of surface waters
- Determination of recepients (water collectors) where the discharge of surface waters will occur.
- Depending from the importance of urban zones of the city from the perspektive of floods, the whole city is dividend in 5 separate zones.

Hydraulic modelin - Metodology

- Geodesic recording of main primary and secondary network,
- Definition of the water collection zones (dams) with considerations to extension of the city,
- Determination of dam areas (surfaces),
- Development of the model
- Computerised hydraulic modeling

4.12 Premeasures and precalculations

Since the city has been dividend into respective zones according to the damages from floods then even these budget assessments will be carried out according to the following order.

ZONE I.

Dam	Zone	Neighborhood	Material	DN mm	Length m1	Cost Euro
1 3 6	I	Sahat kulla Gjimnazi	Concrete	300	458	
				400	1313	
				500	2805	
				600	637	
				800	1841	
				1000	43	
				TOTAL	**7.097**	**899.092.00**

ZONE II.

Dam	Zone	Neighborhood	Material	DN mm	Length m1	Cost Euro
8 10 11	II	Haxhi Zeka Gjemajl Kada	Concrete	200	820	
				300	1683	
				400	2087	
				500	1997	
				600	1695	
				800	2352	
				1000	215	
				TOTAL	**10.844**	**2.095.484**

ZONE III.

Dam	Zone	Neighborhood	Material	DN mm	Length m1	Cost Euro
2 4 5 7	III	Kapeshnica Karagaqi	Concrete	200	105	
				300	2486	
				400	790	
				500	700	
				600	848	
				800	295	
				1000	100	
				TOTAL	**5.324**	**727.244**

ZONE IV.

Dam	Zone	Neighborhood	Material	DN mm	Length m1	Cost Euro
9 12	IV	Dardania I Dardania II	Concrete	200	1040	
				300	1496	
				400	2212	
				500	1395	
				600	1760	
				800	1625	
				1000	235	
				TOTAL	**9763**	**787.418**

ZONA V.

Dam	Zone	Neighborhood	Material	DN mm	Length m1	Cost Euro
13	V	Fidanishta Kristali	Concrete	200	1090	
				300	1120	
				400	1900	
				500	2047	
				600	2125	
				800	2867	
				1000	165	
				1200	375	
				1400	420	
				TOTAL	**12.109**	**2.094.722**

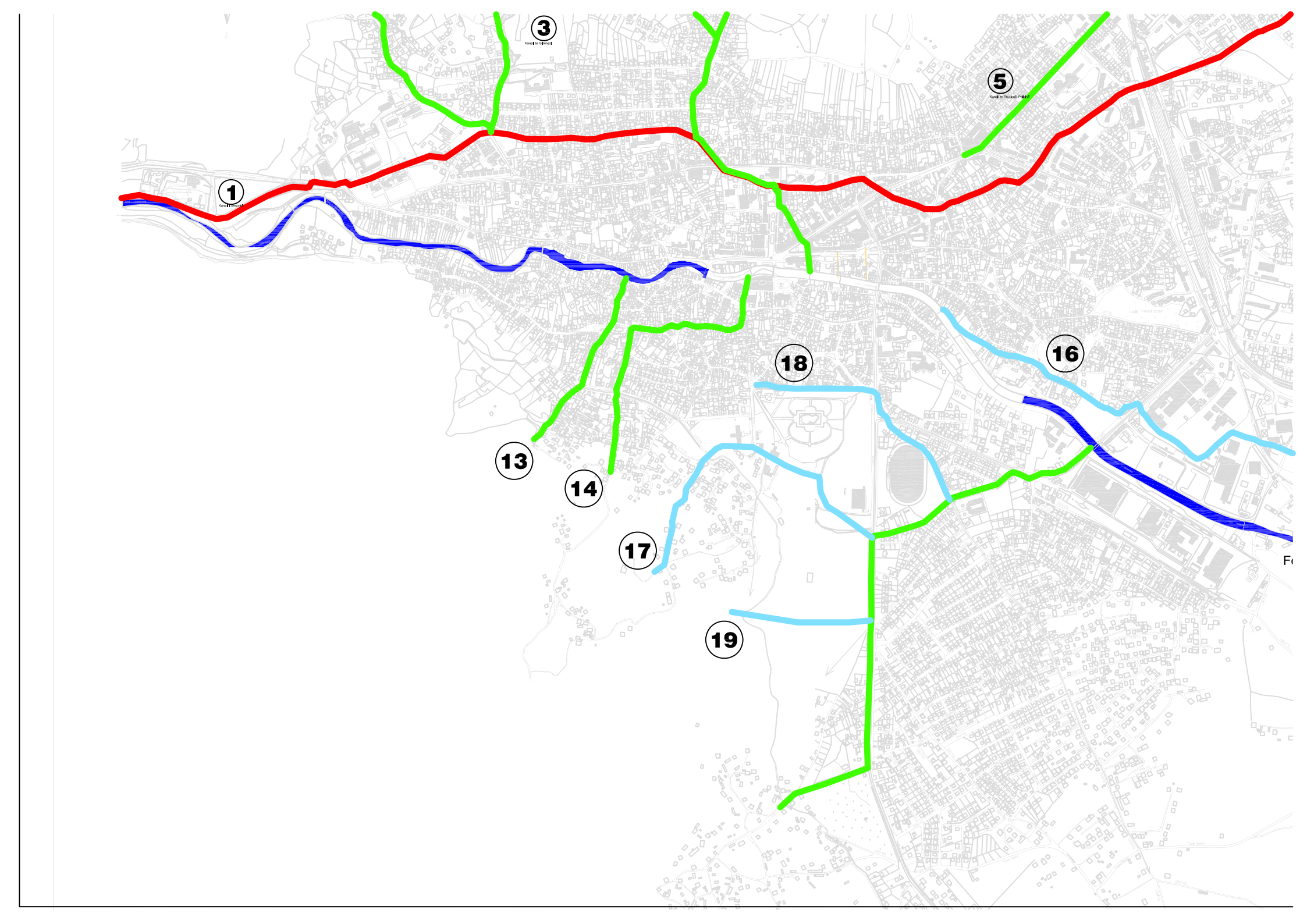
RECAPITULATION OF CONSTRUCTION	Length m1	Total Euro
ZONA I	7.097	899.092
ZONA II	10.844	1.944.484
ZONA III	5.324	727.244
ZONA IV	9.673	787.418
ZONA V	12.109	2.094.722
	45.011	**6.452.722**

Recommendations:

Taking in consideration the dangerousness of possible floods that may incur by falls, priority for construction of the surface waters' network is given to two zones named as **ZONA II** and **ZONA I .**

Planning costs for Open canals and Surface Water's Network

Planning for Open Canals and Surface Water's Networks	Investment Costs (Euro)
Total for open canals	3.760.000
Total for Surface Water's Network	6.452.722
Total investments:	**10.212.722**
Engineering 10%	1.021.272
Unforeseen costs 5%	510.636
Total of investments in Canals and Surface Waters Network	**11.744.630**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Sewerage Treatment for the City of Peja

(Technico-economic and environmental comparisson and selection of Options)

5.0 Fourth Part – Urban Sewerage Treatment, Peja)

5.1 The sewerage and treatment plant for Peja includes:

- Existing situations of the sewerage network
- Constituent parts of the study.
  - Priorities of the development plan.
  - Conclusions of the project.
- Benefitions of the project.

5.2 Existing state of the sewerage network

- The sewerage network remains with numerous technical problems.
- With free fall (gravity) and mixed system.
- With two end points at the main collectors in the Lumi i Bardhë river.

5.3 Alternatives for treatment of Urban Waters

- At prezent in Kosovo, there is no experience in treatment of urban sewerage water.
- Application of the light (extensive) operation technology in the first treatment phase.
- Selection of the approved and widely used technology.
- In compliance to the EU requiremenets.

5.4 Plant Technology for Treatment of Urban Waters, Proposed Options

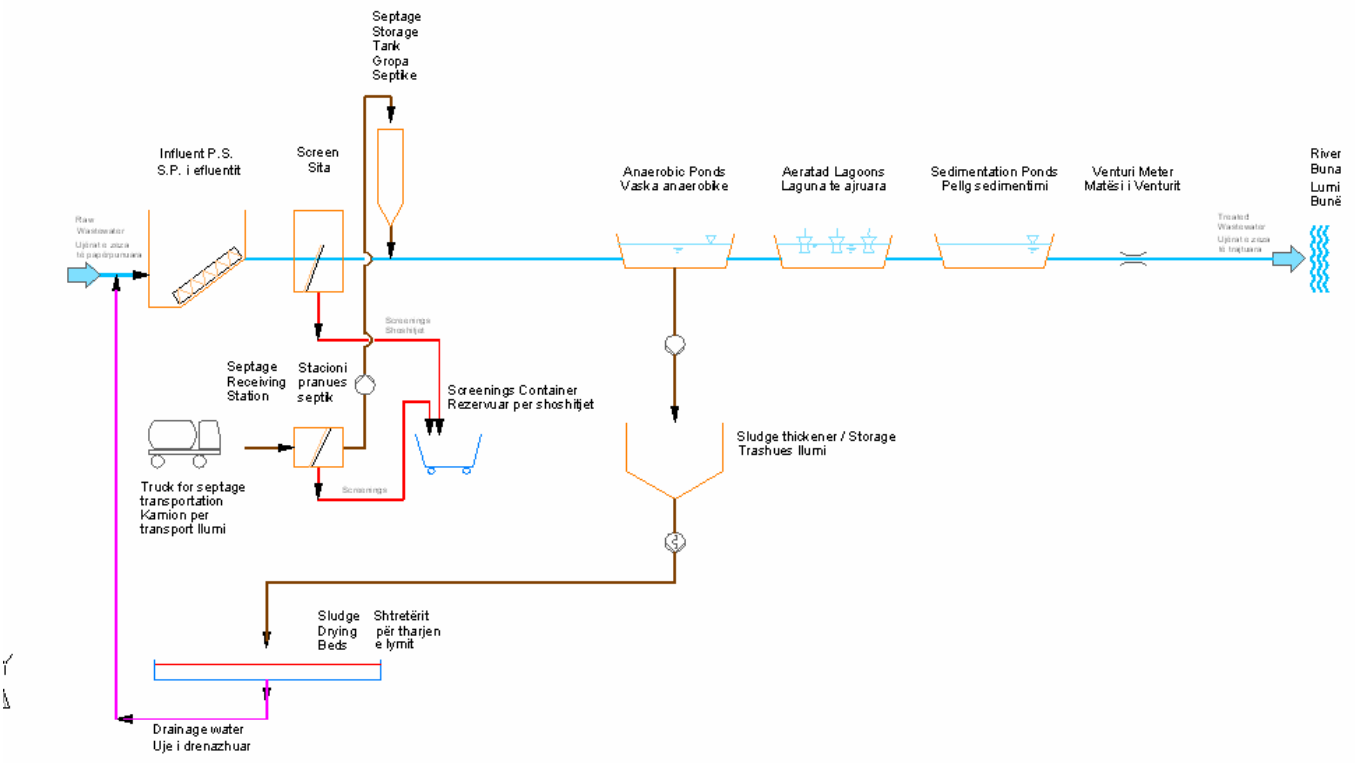
Short-term – longterm application Phases (2015)

- **Alternative 1:** Anaerobic ponds followed by aerated ponds (demand for land 16 ha);
- **Alternative 2:** Anaerobic ponds followed by trickling filters (demand for land 11 ha);
- **Alternative 3:** Treatment with active sludge and extended aeration (demand for land 6 ha);

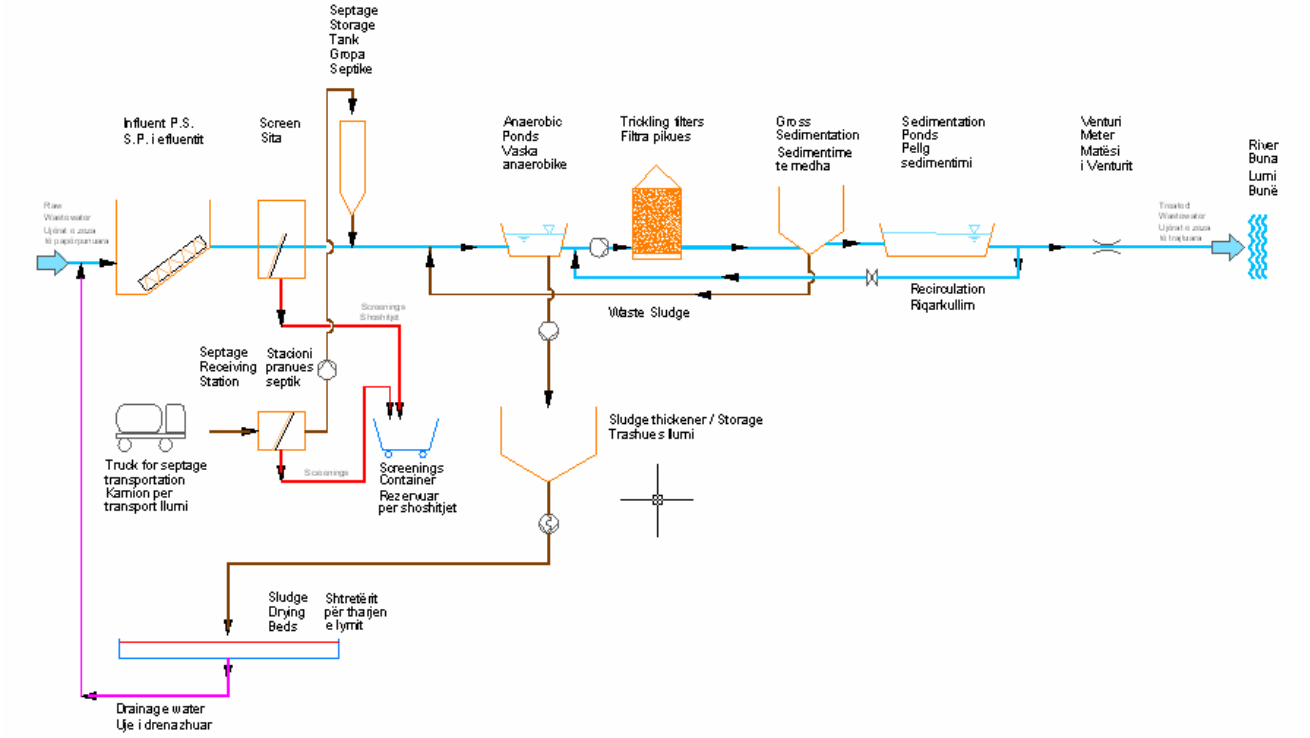
Longterm implementation phase (2030)

- Treatment with active sludge, with anaerobic digester of sludge and removal of Nitrogen and Phosphorous;

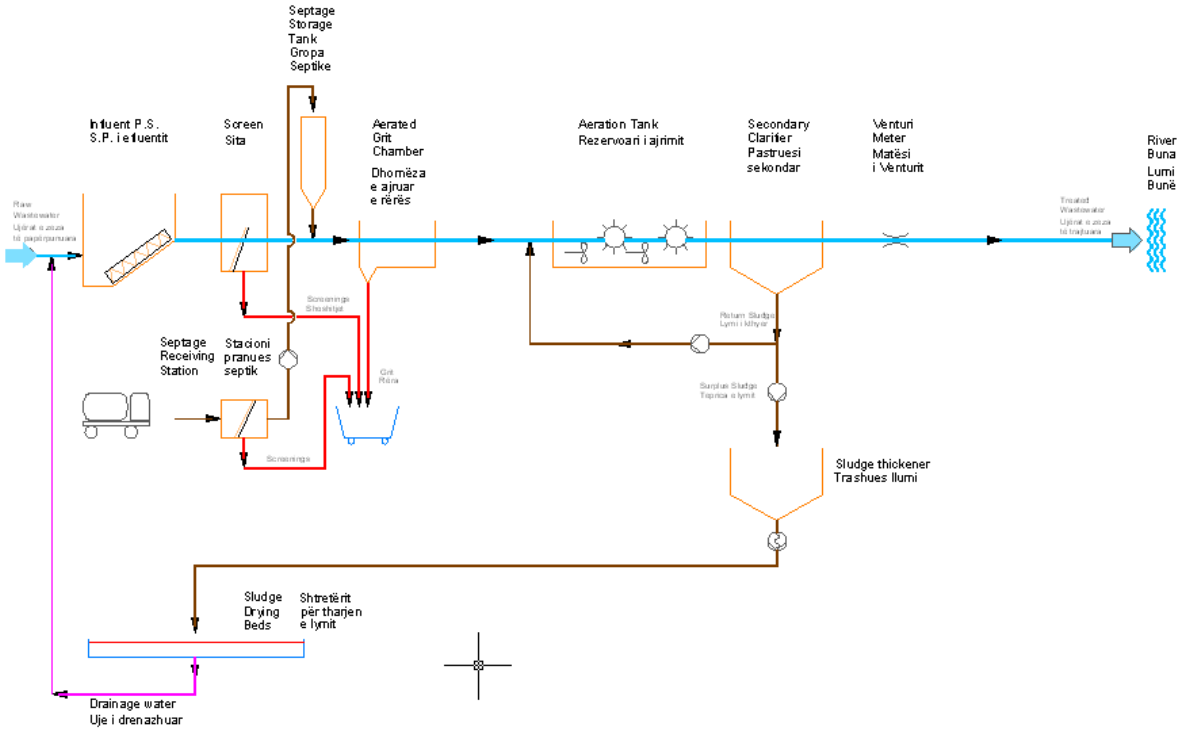
Alternative 1: Anaerobic ponds followed by aerated ponds (demand for land 20 ha, 2015).



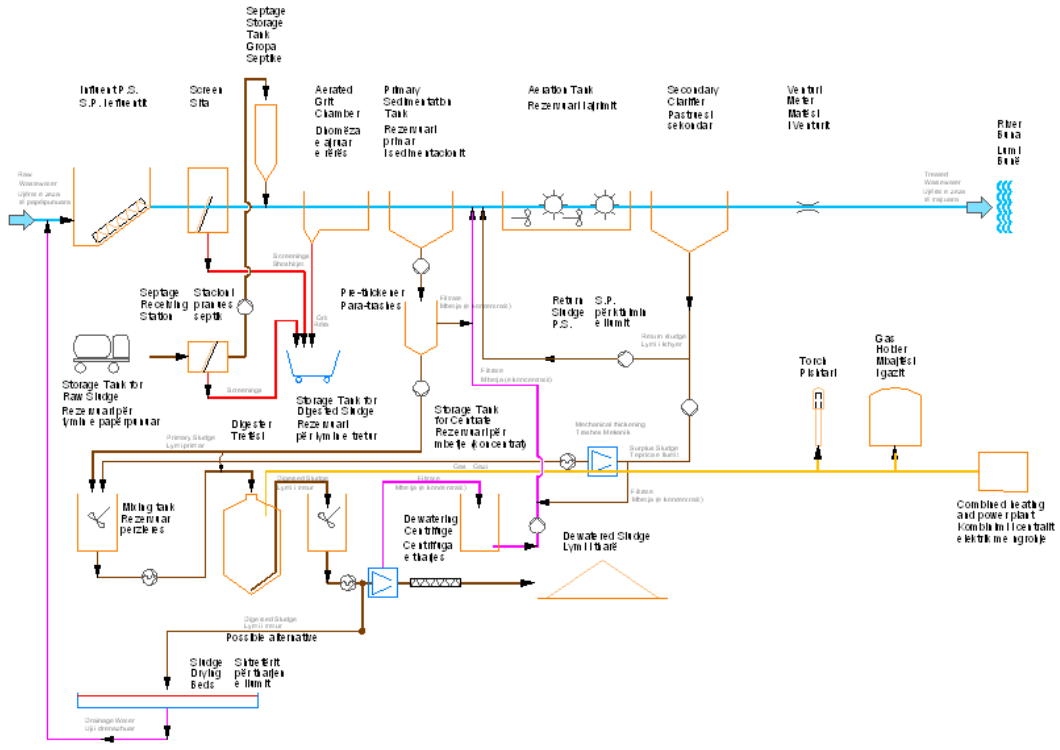
Alternative 2: Anaerobic ponds followed by trickling filters (demand for land15 ha, 2015)



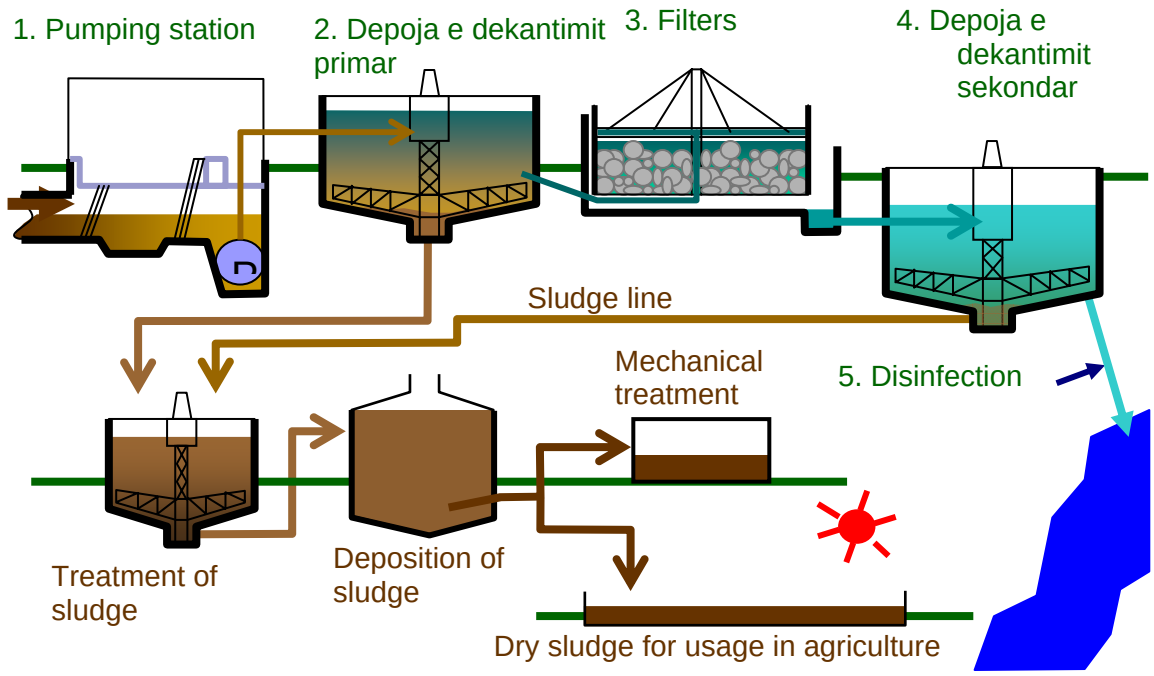
Alternative 3: Treatment with active sludge and extended aeration (demand for land, 9 ha 2015)



Extension phase in 2030



Scheme and pictures for Alternative 2.



Advantages of the trickling - filters method (Alternative 2)

- Energy saving.
- Small volume.
- Small land surface.
- Easy operation and maintenance.

Sewerage tratement parameters

Parameters	**Mg/l**	**The standard**
Raw wastewater (untreated) BOD/SS Conc.	**200/200 mg/L**	
Treated wastewater BOD/SS Conc.	**24/30 mg/L**	**EU standard 25/35 mg/L**
Population	**270.000 inhabitants**	

Filters:

5.5 Conclusions for alternative 2

- It is a longterm project.
- With distribution of capital investments throughout a longer period.
- The overall project value must be determined.
- Foresees construction of pipelines of primary and secondary lines with main collectors, pumping stations and treatment plant.

5.6 Project benefitions

- Processing (treatment) of water of households.
- After the primary and secondary treatment the polluted water results in compliance to the EU requirements.
- Improvement of the quality of water of the Lumi i Bardhë river.
- Improvement of sanitary conditions within the city and throughout the river banks.
- Decrease on the likelihood of illnesses and Zvogëlimi i riskut te sëmundjeve dhe pasurimin e shëndetit njerëzor.
- Përmirësimi i imazhit te qytetit te Pejës.

Kosto e Impiantit për Trajtimin e Ujërave të Zeza

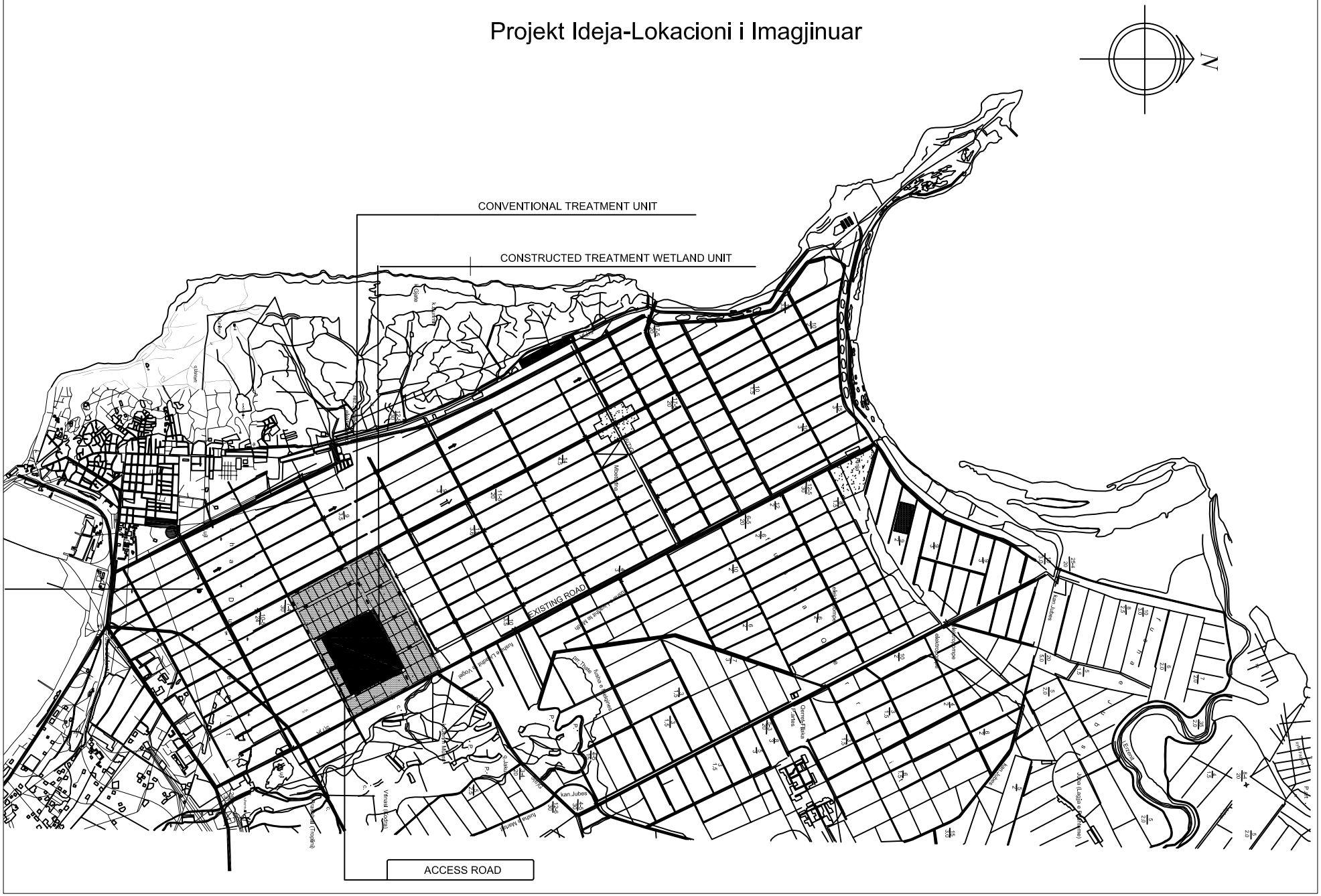
Description	Unit	Option 2 Wastwater Treatment Plant(WWTP)-2
Capacity	p. e	270.000
Investment Costs WWTP	€	33.991.000
Main collectors	€	1.047.000
Investment	**€**	**35.038.000**
Engineering 10%	€	3.503.800
Unforeseen costs 5%	€	1.751.900
Investment total for WWTP	**€**	**38.541.800**
Specific Investment Costs	€ / p.e	~140

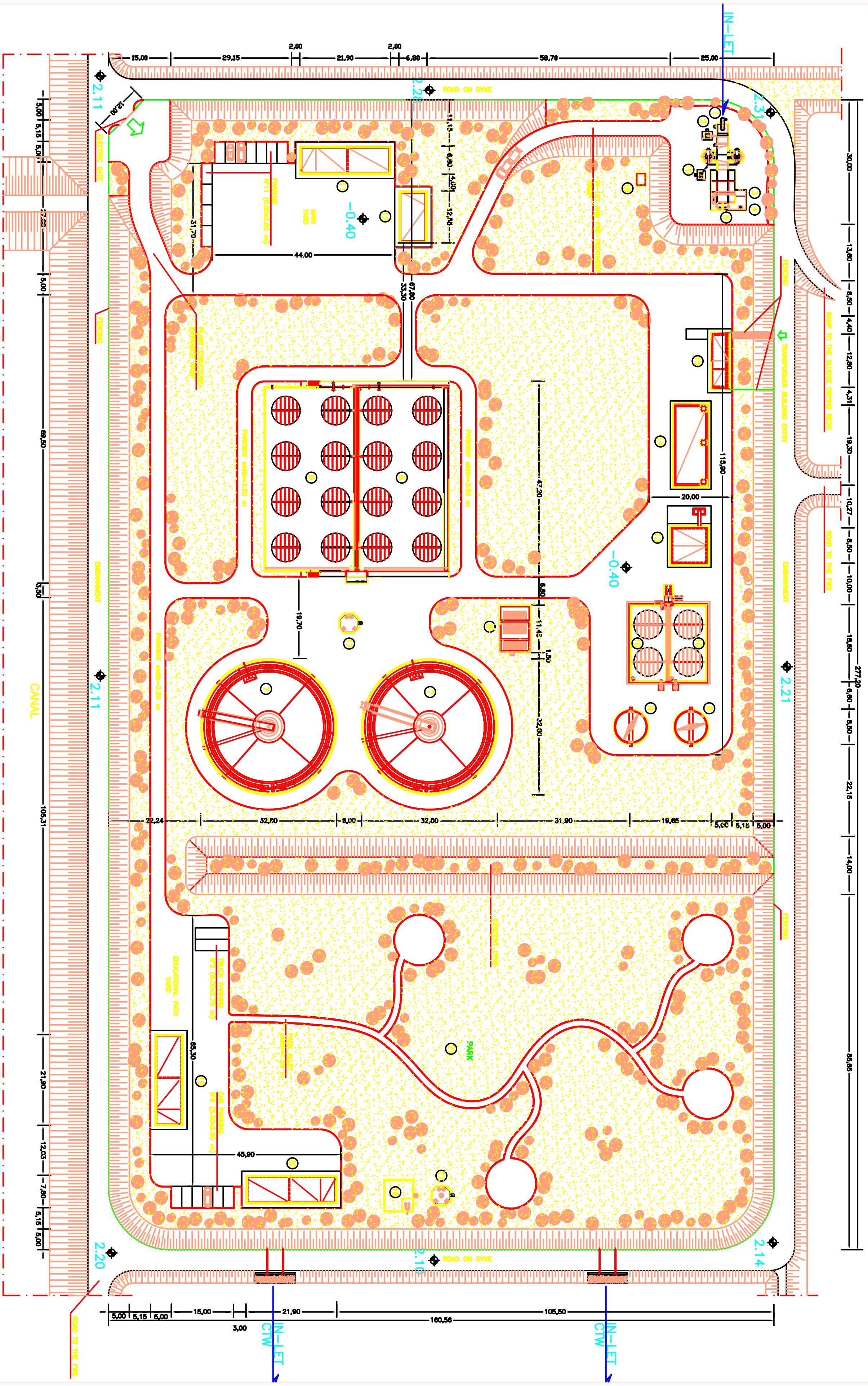
First Part – Drinking Water Infrastructure
Second Part – Wastewater Network Infrastructure
Third Part – Infrastructure of Open Canals and Surface Waters Network
Fourth Part – Urban Sewerage Treatment, Peja)

Parts	Description	Price (€)
I	**First Part – Drinking Water Infrastructure**	**7.785.083**
II	**Second Part – Sewerage network Infrastructure**	**23.289.225**
III	**Third Part – Infrastructure of Opena Canals and Surface Waters Network**	**11.744.630**
IV	**Fourth Part – Urban Sewerage Treatment, Peja**	**38.541.800**
Total of Investments in Water and Wastewater Infrastructure		**81.360.768**

Total for Water and Wastewater Infrastructure is **81.360.768 Euros**, with a specific cost of ~300 € / p.e (with calculation for 270.000 inhabitants).

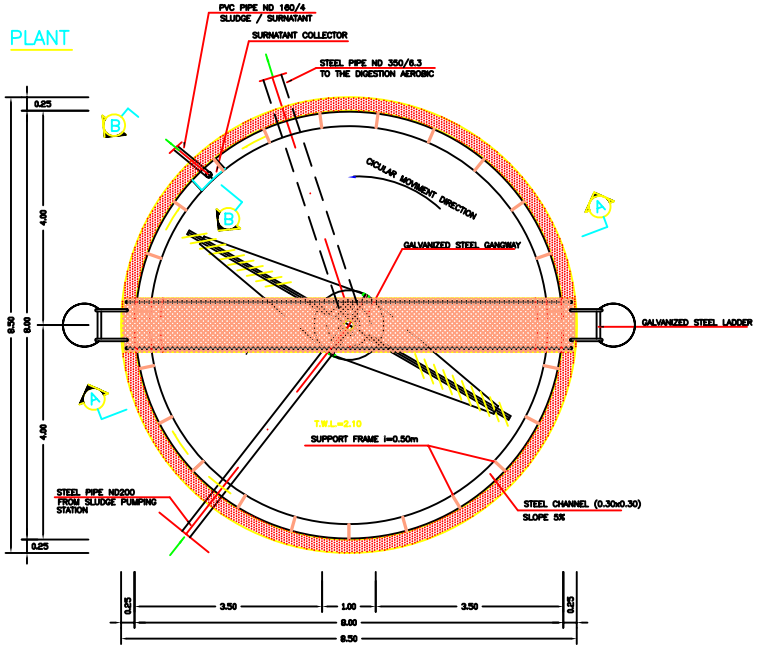
Projekt Ideja-Lokacioni i Imagjinuar



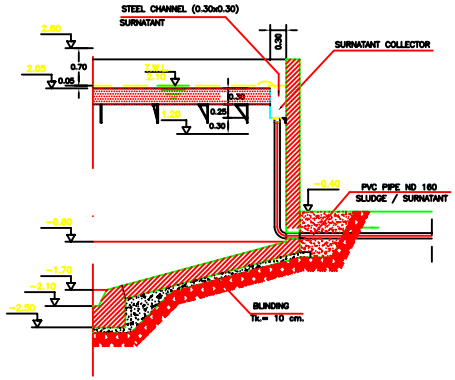


IN-LET
ROAD ON DYKE
CANAL
PARK
-0.40
-0.40
2.11
2.11
2.28
2.31
2.21
2.20
2.16
2.14
IN-LET CTW
IN-LET CTW

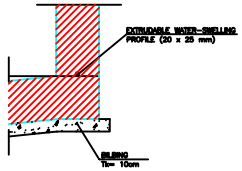
PLANT



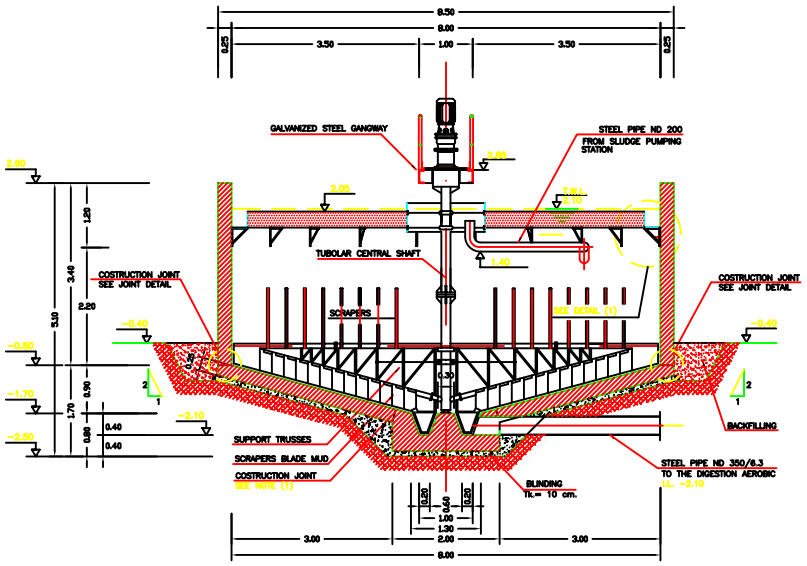
SECTION B–B



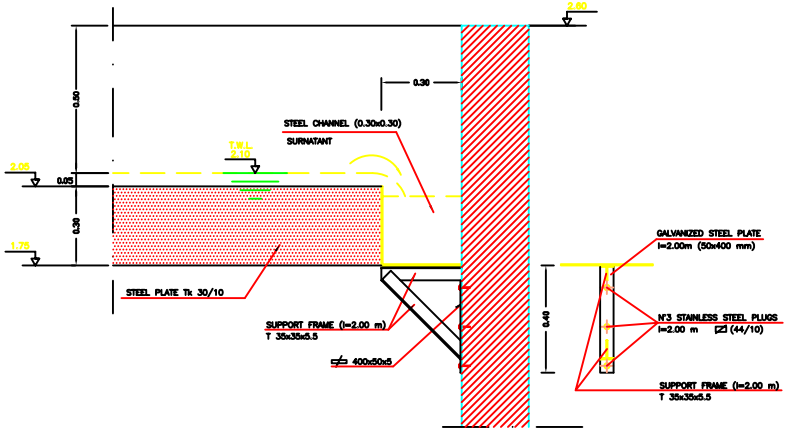
SEAL JOINT



SECTION A–A



DETAIL "1"



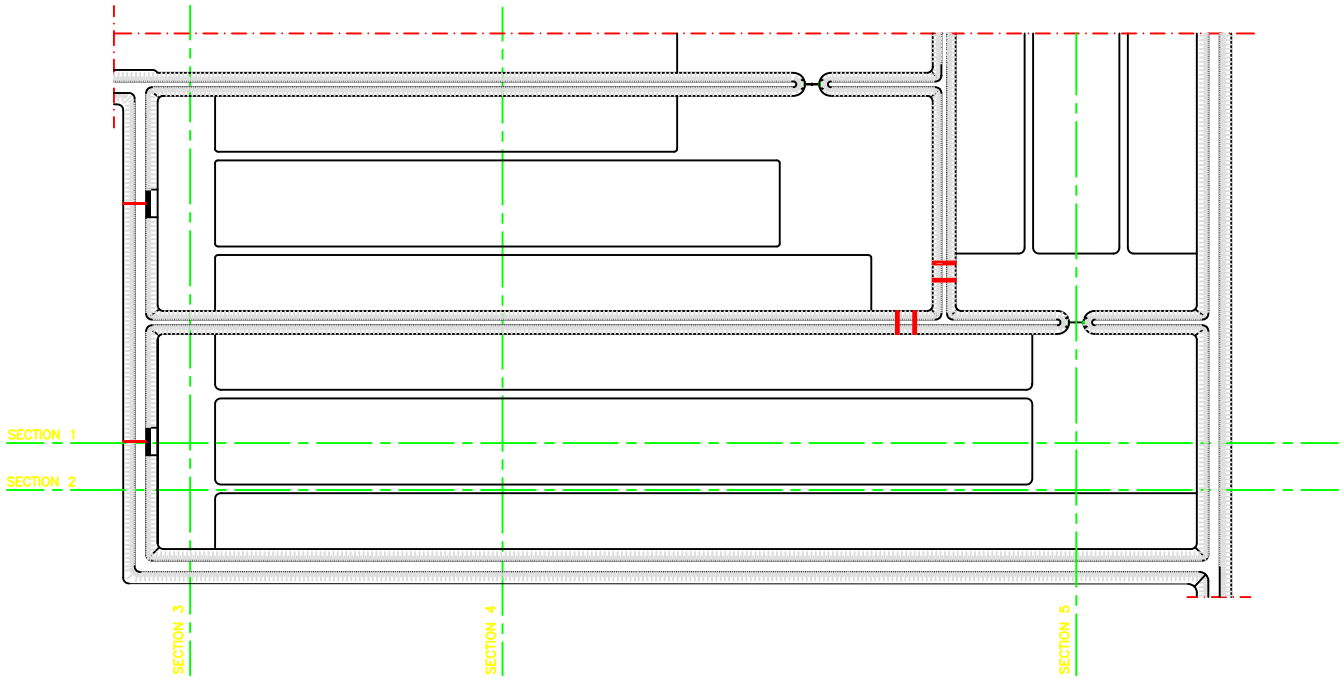
NOTES:

(1)

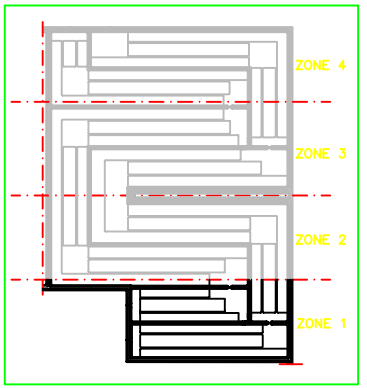
DETAIL TO INSTALL THE MECHANICAL EQUIPMENT WILL BE DEFINED ACCORDING TO THE PROPOSED MANUFACTURER REQUIREMENTS

(2)

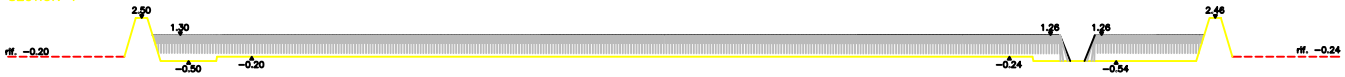
FOR METAL WORK AND STEEL WORK EMBEDMENT IN CONCRETE SEE DWG DETAILS



KEY MAP



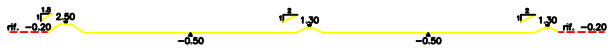
SECTION 1



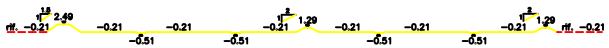
SECTION 1 Scale X=1:1000 Y=1:200

SECTION 2

SECTION 2 Scale X=1:1000 Y=1:200



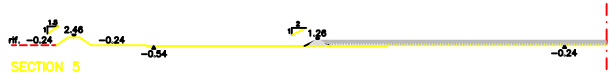
SECTION 3



SECTION 4

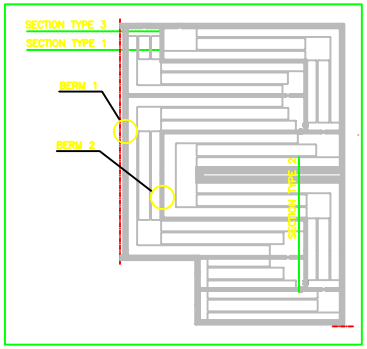
SECTION 3 Scale X=1:1000 Y=1:200

SECTION 4 Scale X=1:1000 Y=1:200



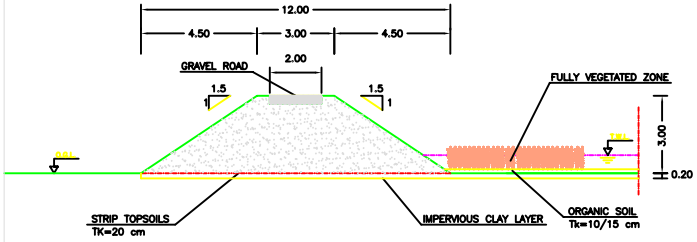
SECTION 5

KEY MAP

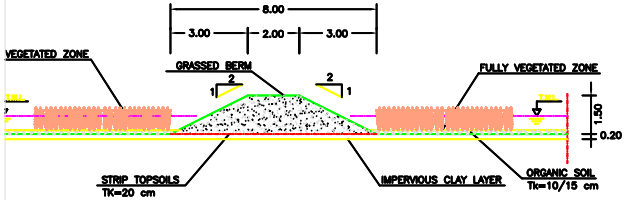


TYPICAL BERM SECTION

EXISTING BERM (1)

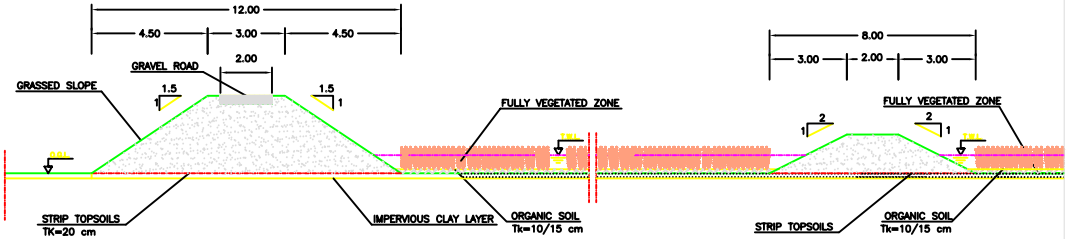


INTERIOR BERM (2)

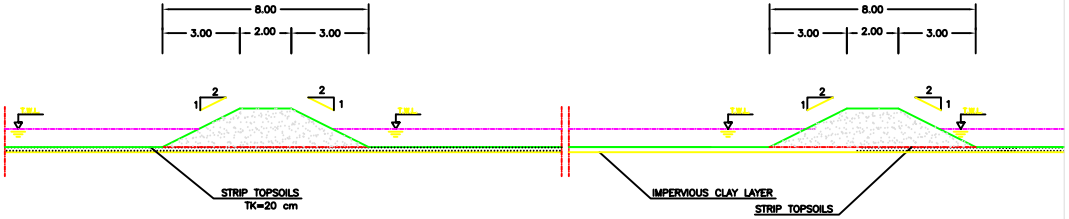


TYPICAL CROSS SECTION

TYPE 1: FULLY VEGETATED ZONE



TYPE 2: OPEN WATER SURFACE



TYPE 3: FULLY VEGETATED ZONE/OPEN WATER SURFACE