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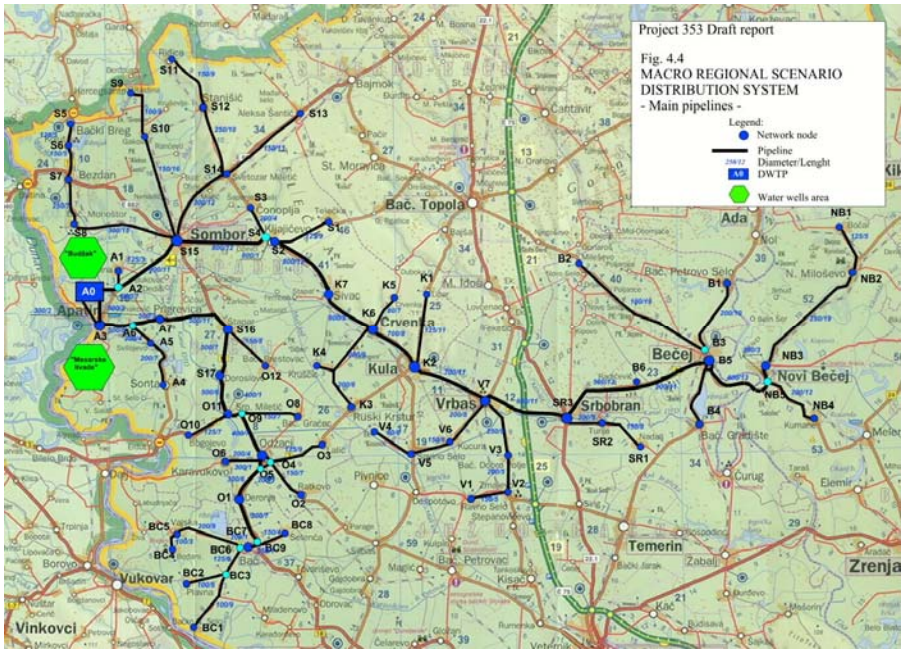

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Project# 353

FINAL REPORT: SUSTAINABLE SOLUTIONS TO IMPROVE THE QUALITY OF DRINKING WATER AFFECTED BY HIGH ARSENIC CONTENTS IN 3 VOJVODINIAN REGIONS

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City of Vienna MA 31

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3. Water supply survey in Vojvodina, including geographical maps, Jaroslav Cerni, Institute for Development of Water Resources, Belgrade, May 2004
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xi. List of Abbreviations

BMLUFW	Federal Ministry of Agriculture and Forestry Environment and Water Management
BOT	Build Operate Transfer
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
ERM	Environmental Resource Management
IFI	International Financing Institute
O&M	Operation and Maintenance
PM	Project Management
PPP	Private Public Partnership
PSP	Private Sector Participation
SPC	Special Purpose Company
UNIDO	United Nations Industrial Development Organization
VG	Vojvodinian Government
WB	World Bank
WHO	World Health Organization
WTF	Water Treatment Facility

1 EXECUTIVE SUMMARY

1.1 Introduction

The water supply of Vojvodina derives today mainly from groundwater sources. The exploitation of the groundwater is higher than its natural renewal, this leads to a lowering of the groundwater level of the aquifers on the territory of Bačka and Banat. Due to quaternary sediments in some parts of Vojvodina high concentrations of arsenic have been found in the groundwater, which exceed limits of both EU and SCG drinking water directives. Analytical results have shown arsenic concentrations up to 150 µg/l which is more than 15 fold above EU and SCG drinking water directives (currently: 10 µg/l). Additionally to arsenic, naturally high concentrations of iron, manganese, ammonium and organic materials have been found in some areas in Vojvodina. Over 700,000 inhabitants are affected, meaning that a minimum of 100,000 m³ of drinking water per day needs to be treated adequately**.**

The Vojvodinian drinking water supply pre-feasibility study is one component of a joint programme of the Vojvodinian Provincial Secretariat for Environment and Sustainable Development (Vojvodinian PSESD) and City of Vienna, Department of Water Management (MA 31) aimed at the integration and improvement of drinking water access and distribution in Vojvodina. BLUEWATERS, Environmental Consultants (BLUEWATERS) were assigned by MA 31 to conduct the pre-feasibility study in order to develop a best solution scenario.

1.2 Scope and Objectives

1.2.1 Scope

The scope of the pre-feasibility study was to investigate existing water supply systems and to produce a realistic picture of the current situation to create the base for future analysis. Furthermore it is essential to look at the region in a comprehensive way and clarify legal structures, ownerships and technological targets for selected water sources. However, only one of the most affected regions will be chosen as a pilot for the investigation and solution scenarios. The results of the pilot region will lead the way for the other affected regions in Vojvodina.

The scope is confined to a detailed elaboration in the affected pilot region of the following issues:

- Groundwater Source Capacities and Quality of Groundwater,
- Water Treatment Effectiveness,
- Distribution System Integrity,
- Economy of Scale and Scope,
- Water Price and Tariff System,
- Socio-Economic Concerns,
- Drinking Water Service Aggregation.

1.2.2 Objectives

The overall objective is to meet the existing qualitative directives and produce sufficient drinking water for all Vojvodinian regions. In order to reach this overall objective this study will choose a pilot region, where technical and financial tools will be created and ways of building drinking water associations presented. These tools and guidelines can be used for the other affected Vojvodinian regions.

The main objectives for the pre-feasibility study are:

- Defining technical variants to alleviate the problem,
- Not going for expensive, oversized systems, but adapting the rural structure of the region. To reach an economy of scale, municipalities will be instructed in mechanisms of founding water associations for tackling their water problems jointly.
- Preparing the structures for a Public-Private-Partnership model,
- Delivering a bankable project document for investors and financing institutions.

There are also existing sub-objectives for the first phases of the project, like for the water sources assessment and for the water treatment solutions which are:

- Defining maximum resource possibilities,
- Assessing future water quality,
- Defining the adequate treatment solutions by eliminating all chemical parameters of concern from the groundwater,
- Elaborating cost-benefit analysis and economy of scale and scope effects,

- Supplying all participating communities with drinking water of sufficient capacity and quality,
- The comprehensive regional study will include target figures for water quantity, quality and affordability.

Further objectives of the pre-feasibility study are about clustering the water service providers. This will be demonstrated on the pilot region with advantages (drivers) and disadvantages (constrains) of water associations for regional supply systems. In order to implement water association workshops will be organised with political and technical representatives of the pilot region.

The succeeding investment project will base on this groundwork of studies. The objectives for the implementation of the water supply system are:

- Supplying 700.000 inhabitants with good healthy drinking water,
- Main implementation of the results in a pilot region,
- Constructing new wells, pipes and pumping stations where appropriate,
- Installing new equipment for the removal of parameters of concern in drinking water,
- Operating water works on a sound financial and technical basis, within the joint legal framework of water associations.

1.3 Methodology

This study has to obtain four different areas of activity, a legal, environmental, technical, and financial and organisational part. In order to always keep the problems and objectives in mind and to have a thread throughout the whole paper the consistency of the methodology plays a considerable role in this study.

The pre-feasibility study comprises six work phases with different topics (shown in Table 1.3.1), whereof four cope with the already mentioned areas of activity (Work phase II to Work phase V). Moreover, Work phase I displays the activities in the field of project management (PM) which has its necessity in defining scope and objectives for the project as well as defining the methodology for the whole study from the very beginning to the final documentation. The Table 1.1 illustrates additionally the working steps within these phases. However, the working steps and phases may overlap or may be treated at the same time.

Work phase I PM	Work phase II Legal and organisational feasibility	Work phase III Technical feasibility	Work phase IV Environmental Aspects	Work phase V Financial Feasibility	Work phase VI Bankable Document
I.1 Project handbook	II.1 Collect data	III.1 Collect data	IV.1 Collect data	V.1 Collect data	VI.1 Prepare adequate project description
I.2 Kick-off	II.2 Assessment of legal data	III.2 Assessment of technical data	IV.2 Assess data	V.2 Estimate Cost on the basis of technical feasibility	VI.2 Prepare implementation plan
I.3 PM	II.3 Creating water association models	III.3 Discussion on future wells	IV.3 Assess synergies with other projects in the region	V.3 Elaborate operational cost structure	VI.3 Elaboration of marketing strategy
I.4 Draft Report	II.4 Creating PPP and BOT models	III.4 Technical treatment options	IV.4 Compile environmental aspects and action plan	V.4 Elaborate tariff structure	VI.4 Elaboration of public awareness campaign
I.5 Final Report	II.5 Conduct workshops with municipalities	III.5 Logistics	IV.5 Compile aspects of sustainable development	V.5 Elaborate cost-benefit analysis	VI.5 Prepare final bankable document and final report
I.6 Project Closure	II.6 Elaboration of Variants	III.6 Elaboration of Variants for comprehensive solutions		V.6 Elaborate financing options	

Table 1.1. Work Phases.

The methodology for Work phase II to V is very similar, although they have a different content the objectives for the findings correspond. This working scheme is a repetitive procedure after what every phase has to be carried out, to obtain same directed objectives.

Based on the study scope and objectives and work phases following methodology was developed:

1. Identify the problem-challenge and additional challenges.
2. Define work phase, scopes and objectives.
3. Data collection, field investigation and filling the data gaps.
4. Data analysis.
5. Identify solution scenarios.
6. Define best solution scenarios.
7. Adapt scenario for pilot region.
8. Summarize the conclusions and recommendations.

Firstly, the selective identification of the problems and challenges has to be carried out. This description already happened in the project handbook and was adapted in the interim report according to changing situations.

The succeeding point is to define the scopes and objectives to solve and handle these problems and challenges.

The data collection and assessment results in recommendations for technical equipment, legal structures for different scenarios in the proposed pilot region.

The specific working programme for each Work Phase is presented in Table 1.2.

WP 1	PROJECT MANAGEMENT AND COORDINATION Objectives: • To keep the project on track within the given budget and time constraints. Methods/Outcomes: • 1.1 Project handbook • 1.2 Kick-off meeting • 1.3 PM & Controlling • 1.4 Project closure
WP 2	LEGAL AND ORGANIZATIONAL FEASIBILITY Objectives: • To raise awareness of the legal situation • To be able to work with the legal situation in mind Methods: • 2.1 Collect legal data • 2.2 Assessment of legal data • 2.3 Creating water association models • 2.4 Creating PPP & BOT models • 2.5 Conduct workshops with municipalities • 2.6 Elaboration of variants Outcomes: • Comprehensive legal and organizational feasibility report
WP 3	TECHNICAL FEASIBILITY Objectives: • The investigation of general and special technical aspects of: o new and old well sites o treatment systems, and o regional pipes distribution system. Methods: • 3.1 Collect technical data o Investigate existing reports o Elaborate questionnaire in English o Conduct field investigations • 3.2 Assessment of technical data o Create spreadsheet listing all municipalities and drinking water supply related data ▪ Include field investigations and Questionnaire results ▪ Include data from Jaroslav Cerni reports ▪ Include data from other existing reports o Assess if additional data is needed ▪ If yes, get additional data ▪ Incorporate additional data into spreadsheet

	o Analyse data and results o Prepare report with results (comprehensive regional study) • 3.3 Discussion on future wells o Discuss location of future wells & specifications based on ▪ The results report and ▪ Expert input (e.g. Cerni) ▪ Set target figures (quantity, quality, affordability, technology, capacity) • 3.4 Technical treatment options o Discuss location of future treatment systems & specifications based on ▪ The results report and ▪ Expert input (e.g. Cerni) ▪ Set target figures (quantity, quality, affordability, technology, capacity) • 3.5 Logistics o Discuss future logistics and storage systems based on ▪ The results report and ▪ Expert input ▪ Set target figures (quantity, quality, affordability, technology, capacity) • 3.6 Elaboration of variants o Phasing, sifting, technological, logistics & storage options o Write Summary Report with all specs (Variants for implementation). Outcomes: • Structured survey on existing drinking water supplies • Comprehensive regional study • Target figures • Variants for implementation (Interim report)
WP 4	ENVIRONMENTAL ASPECTS Objectives: • The investigation of general and special environmental aspects like water balance, regional traffic, etc. • possible contributions: o to the demand of protecting water resources Methods: • 4.1 Collect environmental data • 4.2 Assess environmental data • 4.3 Assess synergies with other projects in the region • 4.4 Compile environmental aspect and action plan • 4.5 Compile aspects of sustainable development Outcomes: • Report on synergies with other projects in the region • Report on environmental aspects • Action plan • Report on sustainable development aspects
WP 5	FINANCIAL FEASIBILITY Objectives: • To gain an overview over: o Investment and exploitation structures in time o What resources are out there and available. Methods: • 5.1 Collect financial data, incl. institutional assessment • 5.2 Estimate cost on the basis of technical feasibility • 5.3 Elaborate operational cost structure • 5.4 Elaborate tariff structure • 5.5 Elaborate cost-benefit analysis

	• 5.6 Elaborate financial options Outcomes: • A comprehensive financial report
WP 6	BANKABLE DOCUMENT Objectives: • To create a bankable document that has the potential to raise the necessary funding for the project. Methods: • 6.1 Prepare adequate project description • 6.2 Prepare implementation plan • 6.3 Elaboration of marketing strategy • 6.4 Elaboration of public awareness campaign • 6.5 Prepare final bankable document and final report Outcomes: • Project description • Implementation plan • Marketing strategy • Awareness campaign • Bankable document • Final report

Table 1.2. Working Programme.

1.4 Legal Feasibility

1.5 Regulations and Directives

Since Vojvodina as a part of SCG is in the preparation to adjust local regulations to the European Commissions EU Drinking Water Directives (e.g. 98/83/EC) in this report most stringed of EU and SCG directives and regulations will be applicable.

1.5.1 European Drinking Water Directive

The European Commission (EC) determinates in its EU Drinking Water Directive 98/83/EC limits for arsenic in drinking water in compliance with the World Health Organization (WHO) to 0.01mg/l.
Further substances which are also endangering the drinking water in West Backa like, iron, manganese, organic materials and ammonium, are presented with applicable limits in Table 1.3:

Ammonium	500 µg/l
Iron	200 µg/l
Manganese	50 µg/l
Arsenic	10 µg/l

Table 1.3. Selected Limits for harmful substances in Drinking Water according to European Drinking Water Directive.

1.5.2 Regulations for Groundwater Protection

Applicable standards for drinking wells and groundwater protection include three zones as specified in SCG regulations. First is a sanitary zone, which is usually drinking well head and protection cover (facility or house). Second is the drinking well protection surrounding zone which has to be protected with a fence. Third is the drinking well and aquifer recharge zone. In this zone there should be only controlled agricultural activities.

1.5.3 World Health Organisation (WHO)

The WHO issued an important report on "Guidelines for drinking water quality" in 2004. Main topics treated are parameters for drinking water pollution, analysis methods for samples and impact of harmful substances on the human being as well as treatment processes for polluted water.
The also do have own recommended "guideline values" for harmful substances like it is 40 µg/l for manganese.

1.5.4 Legal framework

The major laws in SCG that define the regulatory and ownership frameworks for the water sector are at the Republic, rather than Federal, level. There are four key laws applicable to utilities and/or communal activities in Serbia. These are:

- the Law on Public Companies and Activities of Public Interest (Official Journal of the Republic of Serbia no.25/00),

- the Law on Communal Services (Official Journal of the Republic of Serbia no.16/97 and 42/98),
- the Law on Public Services (Official Journal of the Republic of Serbia no.42/91 and 71/94),
- the Law on Assets Owned by the Republic of Serbia (Official Journal of the Republic of Serbia no.53/95, 3/96, 54/96 and 32/97).

A key concept in understanding the ownership framework for public utilities in Serbia is the distinction that is made between the 'founder' and the 'owner' of a public company. Both the Republic-level Government and the municipalities may establish (or 'found') public companies. However, under the Law on Assets Owned by the Republic of Serbia public companies founded by the municipalities are owned by the Republic of Serbia.

Given the legal distinction between the 'founder' and the 'owner', a critical issue is the nature of the powers that may be exercised by each of these parties. Under the Law on Public Companies and Activities of Public Interest, it is the founder of the public company (rather than the owner) that has powers that most closely resemble those of a shareholder. However, where a municipal 'founder' cannot reach a decision or does not take action, the Republic of Serbia has the power to take the relevant decision. In other areas, the approval of both the municipality and the Government of the Republic of Serbia is required for certain activities.

The relationship between municipal utilities, the municipalities and the Republic, as embodied in the Law on Public Companies and Activities of Public Interest is, however, quite different to that encompassed in the Law on Communal Services. The Law on Communal Services does not provide for any involvement by the Republic in the oversight of municipal utilities. Under this law, the municipalities are solely responsible for organising the provision of these services (through public communal enterprises).

The major direct conflict between these two laws appears to be in the area of tariffs, where the Law on Communal Services states that tariffs are to be set by agreement between the municipal utility and the municipal assembly. This compares to the Law on Public Companies and Activities of Public Interest (described above) where the agreement of both the municipality and the Republic is required.

Municipal resolutions on water or wastewater provide a greater level of detail concerning the activities of a water utility than is specified in the general utility sector legislation.

1.6 Preliminary data collection results

Preliminary data collection results for the area of West Bačka are summarised in this section and presented in Annex A Table 1.5.
Based on the received information it is assumed that population in this region will slightly but permanently decrease.
In general households are the major users of drinking water with much less use for agriculture and industry. The water supply systems were generally developed in 1970-ies with very simple components such as the well itself, hydrofores and reservoirs for pressure and quantity equilibration and typical ring type distribution systems. In most of the municipalities reservoirs are not sized for daily maximum usage.

Based on the field investigation and data analysis quantitative and qualitative monitoring data results are not of high quality. There are usually no exploitation measurements at groundwater sources, the only information about exploitation is from the water usage measurements or derive from assumptions based on the working hours of the water pumps. However, due to the old distribution systems (over 30 years), it is assumed that in some cases losses of drinking water are up to approximately 60 %.

Due to losses and very low water prices the assumed approximate drinking water use per day is up to 50 % higher than on EU recommended average of 150 l/cap/d. However, due to poor water production measurements it is not secured that the actual water consumption is that high.
The price for drinking water is only 0.1 to 0.3 Euro/m³ (7 to 24 din/m³) for households and 0.1 to 0.4 Euro/m³ (7 to 34 din/m³) for industry, which is in some municipalities 10 times less than the actual production and distribution costs per m ³.
A sound analysis on that issue will follow in Book 5 (financial feasibility).

Detailed information about water quality (with all relevant parameters) was only available from 30 % of the communities due to SCG regulations and high costs of chemical analysis. However, mostly in this region, water quality does not meet the EU and SCG directives and standards for arsenic, iron, manganese, organic materials, etc. Additionally, only six communities have water treatment facilities. In almost all municipalities drinking water wells do not have properly identified sanitary protection zones. They are usually in the middle or in the periphery of the communities, in zones with septic tanks or/and not adequately isolated abandoned wells.

1.7 Tentative technical solutions

Different technical solutions can be found for this pilot region-investigation area (Presented in Figure 1.1) and in this section the most suitable are presented.

Figure 1.1. Investigation Area for the Pilot Region in West Backa.

Due to new challenges (high concentration of iron, manganese, etc.) more complex technical and financial solutions are needed. Project solutions scenarios are based on implementation of the water management of Serbia – Vojvodinian master plan, the water supply company solutions and on combinations of them as well as on new scenarios.

In order to meet the objectives of the project, prerequisites for all solution scenarios are as follows:

- Water users associations should be founded.
- The water losses in the water supply distribution systems should be reduced.
- The usage of drinking water should be reduced to EU average- the technical usage of drinking water should be minimised.
- The water reservoirs or solutions for daily maximum usage in every community should be found.
- The price for drinking water should incorporate real production and distribution costs.

Generally there are three project solution scenarios, which all of them demand to build adequate drinking water treatment facilities:

- Separate scenario – usage of all existing groundwater sources in municipalities.
- Macro regional scenario – new regional water sources at rivers Danube, Tisa and Sava with two sub scenarios:
    - Usage of groundwater alluvium,
    - Usage of surface water from rivers.
- Micro regional scenario, with connecting several cities or municipalities with two regionally dependent possibilities:
    - Usage of existing groundwater sources with additionally building new sources.
    - Building new water sources from rivers Danube, Tisa and Sava alluvium.

1.7.1 Separate Scenario

The separate scenario would use all the existing groundwater sources in municipalities with no connection between the distribution systems. It would be necessary to invest into each separate groundwater source and into treatment facilities for each municipality.

The groundwater will require additional treatment and would even increase the high investments costs for groundwater treatment.

The advantage (driver) for separate scenario is that there is no need to invest in new regional pipe lines.

On the contrary the disadvantage (constrains) points are:

- Huge investments for new adequate drinking water treatment facilities,
- High operating costs,
- High costs for QA/QC,
- High costs to build and control groundwater protection zones,
- Management and groundwater supply systems will stay separate.

1.7.2 Macro regional scenario

The macro regional scenario would involve developing new regional water sources at rivers Danube, Tisa and Sava and production of adequate water treatment facilities with two sub-scenarios:

- Usage of groundwater alluvium. This will incorporate production of new water wells whose would capture the groundwater from the alluvium of the rivers.
- Usage of surface water from rivers. This will incorporate production of new capture facilities at the rivers.

The major advantage for surface water sources scenario is less investments for water source facilities than for groundwater sources.

The major disadvantage for surface water sources scenario is high uncertainty of surface water quality than for groundwater sources which involves high frequency, costs of sampling and treatment technology.

The advantages (drivers) for regional scenarios are as follows:

- Provides opportunities for improved efficiency of service delivery through economies of scale and scope.
- Small investments in small villages.
- Low operating and QA/QC costs.
- Ideally for building water user associations.

On the contrary the disadvantage (constrains) points are:

- High costs to build and control the groundwater protection zones.

- Huge investments for new regional pipelines.
- High investments are constrains for society
- Long period for project realisation.
- Past negative experience and constraints with huge projects.

The advantages from all above scenarios were incorporated in order to select the best scenario. Further, need for quick solutions were one of the very important factors, in order to define the best scenario because of health and political implications. Also, all stakeholders should agree with the best scenarios decision. Due to the very difficult financial times best scenarios should be compatible with current and future systems and be able to be build in stages.

1.7.3 Micro regional scenario

The micro regional scenario would involve production of new adequate water treatment facilities with connecting several cities or municipalities with two regionally dependent sub-scenarios:

- Usage of existing groundwater sources with additionally building new sources.
- Building new water sources from rivers Danube, Tisa and Sava alluvium.

The micro regional scenarios would incorporate the municipalities into regional drinking water supply systems with fewer investments for usage of existing groundwater sources for new pipe lines or less operating costs in alluvium scenarios.
Which sub scenarios would be used is dependent on the distance from the municipalities to the alluvium ground water source.

Micro regional scenarios advantages (drivers) are as follows:

- Aggregation provides opportunities for improved efficiency of service delivery through economies of scale and scope.
- Small investments in small villages.
- Cost sharing through aggregation can mitigate the impact of high cost systems. Optimum or low operating and QA/QC costs.
- Ideally for building water user associations.
- Compatible and possibility to phase the building stages.

- Aggregation facilitates enhanced professional capacity in service providers. Positive structural changes in water supply companies.
- Central governments can assist, mandate or provide incentives for the aggregation process.

Micro regional scenarios disadvantages (constrains) are as follows:

- High costs to build and control groundwater protection zones.
- Medium investments for new regional pipe lines.
- Long period for realization.
- Past negative experience and constrains with huge projects.

In the general comparison presented in Table 1.4 the micro regional scenarios were selected as the best one (no red cells). However, the final conclusion will come out as combination of technical and socio-economic parameters and results in technical and financial chapters.

		Macro (MARS)	Separate (SRS)	Micro (MIRS)
Technical	technical expenses local	low	very high	low
	technical expenses regional	very high	very low	high
Financial	investments in piping	very high	low	high
	investments in facilities	low	very high	medium
	O&M costs	low	very high	medium
Socio-Economic	political feasibility	medium	high	medium
	QA/QC	high	medium	high
Realisation Period		long	medium	medium
Structural Change of Organisation		high	low	high

Legend:
- superior benefit
- advantage
- disadvantage
- increasing disadvantage

Table 1.4. Comparison of the solution scenarios.

1.7.4 Pilot region

As presented in the methodology section pilot region – West Bačka was identified based on the fact that this region needs solutions urgently. The water supply of settlements in this region (municipalities of Sombor, Apatin, Bezdan, Sonta, Odzaci and Kula) is done by using groundwater, and local wells that exist in each settlement. There are 36 settlements in West Bačka which are all supplied via an

organised distribution system. The chemical irregularity is due to the increased concentration of iron, manganese and arsenic. In the municipality of Odzaci the presence of arsenic is highlighted, and this problem, though not recorded, must have existed already long ago.

First successful hydrogeological investigations in region Apatin have already been undertaken. It is assumed that the groundwater quantity from these resources will be sufficient for the region but will show qualitative problems and it will need treatment facilities and high investment costs for drinking water pipelines. Further, hydrogeological investigations in this region showed very good hydrogeological characteristics for a new groundwater source with a maximum capacity of 1.9 m^3/s. On this pilot region it is possible to compare several scenarios:

- 1 macro regional water source (Apatin),
- 2 micro regional groundwater sources (Sombor and Bezdan) with new treatment facilities,
- Incorporation of all above scenarios.

Also to build new facilities and infrastructure can be done in phases and eventually connect both micro regional systems. Moreover, there is a possibility of regional system extension into Middle Bačka. A very important factor is the willingness of this region to be involved in this pilot project.

Due to the Vojvodinian Provincial Secretariat for the Environment's initiatives and BLUEWATERS' activities in the region, there are already indications for clustering the municipalities and facilitating their founding associations.

1.8 Environmental Aspects

1.8.1 Environmental Impact

The environmental assessment was conducted to investigate the potential impact of septic tanks at areas of assumed environmental concern in the vicinity of groundwater resources and areas of aquifer recharge. In most of the settlements there is no basic protection for drinking water wells, and they are in the vicinity of the old and septic tanks in use. Some of the old drinking water wells were "transformed" into septic tanks. That is unfortunately a very good hydraulic connection from contaminated water to the aquifer used for the drinking resource.

There is the evidence of decreasing groundwater elevation in the aquifers in investigation area which could influence the groundwater flow direction from potential contamination sources to the drinking wells.

In the future by implementing of treatment plants it would be necessary to assess following potential impacts:

- Influence from groundwater table decrease in the resource areas around Apatin. This impact was calculated with groundwater model as not significant in the J. Cerni hydrogeological study.
- After implementing the treatment plants arsenic and other concentrated chemicals in the treatment effluent sludge and water from the back flash should be properly disposed at special landfills.

1.9 General Preliminary Conclusions and Recommendations

The Hydrogeological investigations showed that the two groundwater sources at the Danube north and south of Apatin have maximum combined capacity of 1,9 m^3/s with a groundwater quality that needs treatment. Based on the fact that water supply quantitative and qualitative monitoring data results are not high quality it is assumed that due to the old distribution systems (over 30 years) approximate losses of drinking water are up to 60% and use per day is up to 50% more then EU average. Price of drinking water is only 0.1 to 0.3 Euro/m^3 (7 to 24 din/m^3), which is in some municipalities 10 times less then actual production and distribution costs per m^3. Results of the investigation showed that drinking water wells do not have properly defined sanitary protections zones.

Water supply companies and services are separated politically and due to the difficult political situation in the country there is very small positive correlation between them.

In the next phase the investigation of the hydrogeological characteristics of new drinking well locations (location Kovin-Dubovac, etc.) will be conducted. Further, the chemical analysis for arsenic is finishing in the region of west Backa, which will produce more accurate arsenic results concentrations in the aquifers in the area and influence the appropriate technological treatment for groundwater in communities with high arsenic concentration.

In terms of technological solutions, the detailed development of the solutions scenarios will be conducted, with general analysis of construction and exploitation costs in Books II, III and IV. Due to new challenges more complex technical solutions are required. This will involve also investigation for the extension of the existing water sources and treatment facilities.

The financial aspects including investment possibilities, payment of grants and credits, exploitation costs calculations etc. will be addressed in Book V.

More detailed preparation of stakeholders and users for PPP models will be required to explain the potential benefits of aggregation and identify potential constraints. Further socio-political drivers and constraints to aggregation will be accurately identified and steps of implementation will be defined, including meetings and workshops with the municipalities.

ANNEX A

TABLE 1.5. Water Supply and Community Data

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Census Information											
Number of residents in 2002	(capit)		5.990				10.567	2.924	2.889	4.114	3.663
Number of resident in 2005	(capit)		5.300,00		5500	9460	10.000	2940	2850	4100	
Number of connected persons	(capit)						40.000		2850	4100	35000
Population residing within the city	(capit)				5500	9460	40.000	2940		4100	34000
Holiday resididents	(capit)					nemamo podatak	zanemarljivo		ne		1000
Change in number of residents	(+/- capit)			Smanjenje	Smanjivanje -450	Smanjivanje	stagnacija	negativna stopa rasta	stagnacija I blago opadanje	smanjenje za 200	smanjivanje
Expected increase in population				ne ocekujemo porast stanovnika	Trend smanjivanja	Smanjivanje	ocekuje se opadanje	ocekiva se otvaranje preradj. Industrije, na taj nacin zadrzavanje osipanja broja stanovnika	stagnacija ako ne I smanjenje	u opadanju	3400
Population density	(capit/km^2)			2,7	786	430	975		53		270
Settlement structure (compact towns and villages oder scattered housing)			kompaktno selo	kompaktno-selo	Kompaktno selo	selo kompaktno	kompaktno	kompaktno	selo usorenog tipa	kompaktno selo	kompaktno selo
Owner of the waterworks			Mesna Zajednica Sonta	MZ	MZ	MZ	korisnik JKP	MZ	MZ	M.Z.Ratkovo	Mesna Zajednica
Owner of the parcels where is the waterworks and infrastructures			MZ Sonta	MZ	Opstina	Drzavna imovina RS -Opstina Kula	Drzava, korisnik JKP	MZ	Republika Srbija, korisnik MZ	Katolicka crkva, DVD Ratkovo, Drzava, mreza je na drustvenom, a postrojenja na zemlji katolicke crkve	Mesna Zajednica
Who is responsible to maintenance of watersupply			MZ Sonta - stalno zaposleni radnici	MZ	MZ	JKP "Radnik" Sivac	JKP"Usluga" u Odzacima, u okolnim mestima MZ-e	MZ	MZ	M.Z.Ratkovo	Mesna Zajednica (Stankovic Zoran)

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
Who are the users of the water supply system										13	
Households	(num. of conn.)		1882	693	2150	3007	2.050	900	805	1308	1100
Industry	(num. of conn.)		1	3	50	12	36			7	1
Tourist business entities	(num. of conn.)		44	2		18			6	7	15
Public buildings	(num. of conn.)		1	5	4	10	10	2	4	10	2
Agricultural farms	(num. of conn.)					170					
Households	(m^3/d)			2						1	1
Households	(m^3/s)		700	510	498	1035	1.090	450	500	400	
Industry	(m^3/d)										
Industry	(m^3/s)		1,5	15		11	167			50	
Tourist business entities	(m^3/d)										
Tourist business entities	(m^3/s)		43	15					16	20	
Public buildings	(m^3/d)										
Public buildings	(m^3/s)		5,5	15			85		5	20	
Agricultural farms	(m^3/d)			20						10	
Agricultural farms	(m^3/s)					11					
Water supply infrastructure											
Does a water works exist?			da	da	da	DA	da	da	da	da	da
Number of connected households	(-)		1882	693	2150	3007	2.918	900	805	1350	1100
Number of connected persons	(-)		5300			9412			2850		
Number of not connected households	(-)		150			15	ne	ne	3	1348	ne
Number of not connected persons	(-)					48					
Maximum capacity	(m^3/d)				800	1440	2.500	1440	1000	1000	8,3
Average water supply	(m^3/d)		750	465		1285	1.650	700	520	500	300
Average water supply	(l/s)										
Age of water supply	(year)		1982	1971	1974		1970	1983	1965	1971	1970
Year of last restructure	(year)		2003	1996	1990	2004	2.004	1996		2001	1987

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Comment for last restructure			zamena minarala u filtrima	izbusen bunar sa povezom I opremom		Rekonstrukcija dela vodovodne mreze, elektro opremanje za upravljanje radom bunara na izvoristu, hidromasinsko opremanje	pusten u rad postrojenje za preradu vode				
Losses in last 3-5 years	(% or m^3)			45						500	
Comment						ne postoje cvorovi I merni instrumenti za kontrolu I utvrdjivanje gubitaka na vodovodno mrezi izuzev vodomera potrosaca	distributivna mreza je stara, neki delovi I preko 30godina, tako da su relativno veliki gubici vode oko 20%	U letnjem periodu nema vode, kvalitet vode zbog velikih vrucina se narusavas zbog povecanog broja aerobnih bakterija	vrlo satra instalacija koja puca, a takodje I pumpe u crpnoj stanici kao I rezervoar za vodu koji je izbusen od korozije		zbog zastarelosti mreze, propusnih ventila
In case that a water works, which has been constructed together with another municipality exists:											
List of names of municipalities									ne		
Distance to water works	(km)										
Pipe type (steel, PVC,…)											
Length	(km)										
Diameter 1 DN	(mm)										
Diameter 2 DN	(mm)										
Diameter 3 DN	(mm)										
Average flow	(m^3/s)										
Age 1											
Age 2											
Age 3											

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
Drinking water sources											
How many drinking water sources are their in the community?	(-)		2	3	4	6	2	3	2	6	2
Type of source 1				buseni	subarterski	eksploatacioni		vertikalni	Arteski, buseni bunar	arterski	
Type of source 2				buseni	subarterski	eksploatacioni		vertikalni	Arteski, buseni bunar	arterski	
Type of source 3				buseni	subarterski	eksploatacioni		vertikalni		arterski	
Type of source 4					subarterski	eksploatacioni				arterski	
Type of source 5						eksploatacioni				arterski	
Type of source 6						eksploatacioni				arterski	
Type of source 7											
Age of source (well) 1	(year)		1980	1969	1974	1993	1987	1986	28	1971	
Age of source (well) 2	(year)		1980	1971	1978	1976	2002	1989	25	1977	
Age of source (well) 3	(year)			1996	1983	1983		1996		1984	
Age of source (well) 4	(year)				1990	1987				1988	
Age of source (well) 5	(year)					1989				1994	
Age of source (well) 6	(year)					1998				2001	
Age of source (well) 7	(year)										
Average depth to groundwater level well 1	(m)		3,5	6	19	11	4,50	5	6	zatvorena	4
Average depth to groundwater level well 2	(m)		3,5	6	19	10,83	4,50	5	6	zatvorena	4
Average depth to groundwater level well 3	(m)			4	19	11		5		11,2	
Average depth to groundwater level well 4	(m)				19	8				11,2	
Average depth to groundwater level well 5	(m)					4,8				11,2	
Average depth to groundwater level well 6	(m)					8				11,2	
Average depth to groundwater level well 7	(m)										
Average decreasing of Groundwater elevation	(m/year)				0,5	0,5			nema promena		nema podataka
Average well depth 1	(m)		89,2	168	225	0,5	81	140	323	zatvorena	110
Average well depth 2	(m)		58,5	120	225	0,5	81,50	140	304	zatvorena	110
Average well depth 3	(m)			120	225	0,5		140		120	
Average well depth 4	(m)				225	0,5				122	
Average well depth 5	(m)					0,5				205	
Average well depth 6	(m)					0,5				148	
Average well depth 7	(m)										
Average well screen depth 1	(m)			148	190	40	50	36	298		110
Average well screen depth 2	(m)			108	190	90	53	36	274		110
Average well screen depth 3	(m)			108	190	65		36		100	
Average well screen depth 4	(m)				190	90				100	
Average well screen depth 5	(m)					93				188	
Average well screen depth 6	(m)					82				117	
Average well screen depth 7	(m)										

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
Well/screen diameter 1	(mm)		300	323/132	140	323	323/ 219	200	273/ 219/ 140		820 / 508
Well/screen diameter 2	(mm)		300	323/132	140	323	323/ 219	200	323/ 219/ 190		820 / 508
Well/screen diameter 3	(mm)			323/132	140	323		200		323	
Well/screen diameter 4	(mm)				140	323				323	
Well/screen diameter 5	(mm)					323				323	
Well/screen diameter 6	(mm)					323				323	
Well/screen diameter 7	(mm)										
Typ of screen				Gavrilko	rebrasta konstrukcija, plasticno sito	mosticavi sa pvc sitom			rebrasto		rebrasto metal.konstr.oba vijena sitom, 0.5*0.5mm
Typ of pump 1			pleuger	upa 61-10	dubinska	dubinska	bpd302-5	upa 82-7	dubinska,	UPA-84-5	dubinska
Typ of pump 2			pleuger	pc 6-10	dubinska		bpd302-5	upa 82-7	dubinska,	UPA-1508-	dubinska
Typ of pump 3				upd 84-4	dubinska			upa 82-7			
Average energy use 1	(kWh/day)		50	216	112		184	45	11		110
Average energy use 2	(kWh/day)		50		112		184	45	11		
Average energy use 3	(kWh/day)				112			45		15	
Average energy use 4	(kWh/day)				112					15	
Average energy use 5	(kWh/day)									11	
Average energy use 6	(kWh/day)									7,5	
Average energy use 7	(kWh/day)										
Average summ of energy use	(kWh/day)					1064					
Average capacity of pump 1	(l/s)		33	540	4,7	3,95	17,50	10	13		6
Average capacity of pump 2	(l/s)		33	360	4,7	2,9	17,50	10	8		
Average capacity of pump 3	(l/s)			560	4,7	3		10		9	
Average capacity of pump 4	(l/s)				4,7	4				9	
Average capacity of pump 5	(l/s)					3,95				8	
Average capacity of pump 6	(l/s)					4				8	
Average capacity of pump 7	(l/s)										
Max capacity of pump 1	(l/s)		33,3	650	6,7	5,1	21	15	7		8,3
Max capacity of pump 2	(l/s)		33,3	460	6,7	3,7	21	15	7		
Max capacity of pump 3	(l/s)			640	6,7	3,9		15		11	
Max capacity of pump 4	(l/s)				6,7	5,2				11,5	
Max capacity of pump 5	(l/s)					5,1				11	
Max capacity of pump 6	(l/s)					5,2				10	
Max capacity of pump 7	(l/s)										
Pump exploatation capacity 1	(l/s)		33,3	450			17	12	5		7,4
Pump exploatation capacity 1	(m^3/d)				66				240	500	
Pump exploatation capacity 2	(l/s)		33,3	360			17	12	5		
Pump exploatation capacity 2	(m^3/d)				66				220	500	
Pump exploatation capacity 3	(l/s)			550				12			
Pump exploatation capacity 3	(m^3/d)				66					500	
Pump exploatation capacity 4	(l/s)										
Pump exploatation capacity 4	(m^3/d)				66					500	
Exploatation capacity	(m^3/d)		375		264						
Average water source exploatation capacity	(l/s)					12,37					
Minimum water source exploatation capacity	(l/s)					8,27					

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Maximum water source exploatation capacity	(l/s)					16,25					
Main contaminants ofr concern	(mg/l)						ne		ne		
Parameters which doesn't meet the standards Well 1								B2	dotrajala instalacija		
Name of the well			buseni bunar B1	B1	B1 izvoriste		B8 I B9			Bunar5 u Crkvenoj Porti	Binar 6
Colour		5			25		30,00				
Turbidity		1	17				17,00				
pH		6.8-8.5		8,69							
Organic matter - KMnO4	(mg/l)		8,6	9,1	30,7	14,8	10,32	15,3		48	
Arsen As	(mg/l)	0,01	0,013	0,03	0,09					0,272	0,06
Oxygen	(%)	50	80								
Electro conductivity	(µS/cm)	1000	1040				1102,00				
Hydrogen sulfid		0									
Hardness sum	dH	6,6	24,8								
Ammonium	(mg/l)	0,1	1,33			0,6	1,55				
Nitrite	(mg/l)	0,03	0,072								
Nitrate	(mg/l)	50									
Chloride	(mg/l)						60,80				
Sulfate	(mg/l)						10,00				
F	(mg/l)	1,2									
Fe	(mg/l)	0,3	2,9			3,04	1,80				
Mn	(mg/l)	0,05	0,136				0,11				
Na	(mg/l)	150									
K	(mg/l)										
Mg	(mg/l)						37,90				
Natural gas	(mg/l)										
Methane CH4	(mg/l)										
Bor	(mg/l)	0,3									
Radon	(Bq/l)	0,05									
Chloride	(mg/l)									258	
Does the water sample meet the standards for drinking water?				ne			ne			ne	ne
Parameters which doesn't meet the standards Well 2											
Name of the well			buseni bunar	B2	B3 izvoriste			B3		Bunar 4	Bunar 5
Colour		5		25	20						
Turbidity		1	26	4,2							
pH				8,62							
Organic matter - KMnO4	(mg/l)			8,8	19,4			17			
Arsen As	(mg/l)	0,01	0,24		0,13					0,32	0,095
Oxygen	(%)	50									
Electro conductivity	(µS/cm)	1000	1120								
Hydrogen sulfide		0	0,08								
Hardness sum	dH	6,6	27,2								
Ammonium	(mg/l)	0,1	1,5								

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Nitrite	(mg/l)	0,03	0,161								
Nitrate	(mg/l)	50									
Fe	(mg/l)	0,3	1,1	1,19							
Mn	(mg/l)	0,05	0,09	0,13							
Mg	(mg/l)	50	50,3								
As	(mg/l)										
Chloride	(mg/l)									258	
Does the water sample meet the standards for drinking water?				ne				da			ne
Parameters which doesn't meet the standards Well 3											
Name of the well					B4 izvoriste			B4			
Colour		5			25						
Turbidity		1									
pH					8,55						
Organic matter - KMnO4	(mg/l)				25,2			20			
Arsen As	(mg/l)	0,01			0,11						
Oxygen	(%)	50									
Electro conductivity	(µS/cm)	1000									
Parameters which doesn't meet the standards Well 4											
Name of the well					B5 izvoriste						
Colour		5			35						
Organic matter - KMnO4	(mg/l)				35,7						
Arsen As	(mg/l)	0,01			0,06						
Electro conductivity	(µS/cm)	1000			2530						
Chloride	(mg/l)	200			214,8						
Irom Fe	(mg/l)	0,3			2,06						
Category of water(origin) (surface, ground, freatic, artesian, alluvium, etc.)			podzemna	podzemna voda, subarterska	Subarterska	podzemna		subarterska izdan	arteska, subarterka	podzemna subarteska	subarterska
Comments									aerobno mezofine bakterije	bez problema	
Does the water sources have sanitary protection?			da	da	da	da	ne	da	da	da	da
Are there sources of contamination in sanitary zones of water sources and their distance to water sources?			ne (najbliza septicka jama je udaljena oko 150 m od bunara)	ne	ne	deponija smeca (1300m), bivsa deponija smeca (600m)	septicke jame, najbliza oko 50m	septicke jame 100m	u bliskoj okolini nema, sem za slivanj eatmosferskih voda na oko 50m	septicke jame 50m, radi se kanalizacija	deponija smeca na udaljenosti od 1 km. Mesno groblje na udaljenosti od 600m

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Are there sources of contamination in community and their distance to water sources?			septicke jame	ne	ne	septicke jame domacinstva	postoji hemijska industrija na 5km	septicke jame	nema, sem septickih jama po selu koje su na udaljenosti 100 metara dalje	ne	septicke jame 1 km
Pump stations, hydrofores											
Number of pumping stations?			1			1	2		4	2	
Sum of pumping station or hydrofores capacity?	(m^3/d or m^3)		2000			2733	10.368		2500	500	600
Sum of pumping stations energy use?	(kWh/day)		1000							500	
Average pumping stations energy use?	(kWh/day)		338							350	
Number of hydrofores?	(-)		0	4			1		2	2	hidroforske posude 2*5,000lit
Sum of hydrofores capacity?	(m^3)			12					2 hidrofora 10m3		pumpe su u bunarima
Average age of pumping stations and hydrofores (build)			1980			1974	sve pumpne stanice I hidrofor zavrsene 2004.godine		1977	1971	1987
Year of last modernisation?	(year)		2003							1998	
Average age of hydrofores	(year)			1971						1994	
Year of last modernisation?	(year)										
Comments				dotrajalnost hidrofora					28 godina sa povremenim remostima I izmenama, odrzavanjima I remontima		
Reservoirs/Watertowers											
Number of reservoirs	(-)		0				3		1	2	ne
treated water	(-)						1				
pretreated water	(-)						2				
Number of watertowers	(-)		1					1	nema		
Maximum sum volume (effective)	(m^3)		500				1.170	200	45	160	
Sum capacity of treated water	(m^3)						890				

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Sum capacity of pretreated water	(m^3)						280				
Type of construction			vodotoranj, visina 40 m				rezervoar ciste vode delimicno ukopan, visine 3.5m-celicna konstrukcija,	vodotoranj je na visini od 45m, kugla je zasticena staklenom	celicna zatrpana zemljom, povrsinska cisterna 60m3 metalna	poluukopani-podzemni, celicni	
Average age reservoirs (build)	(year)		1982					1990	1977	1971	1987
treated water	(year)						1972				
pretreated water	(year)						2003				
Year of last modernisation?	(year)									1994	
Water treatment facilities											
Is there Water treatment facility?			da, fabrika vode "Culligan", proivodnje USA				da	ne	ne	ne	Nema sistema za preciscavanje, ima "Eko cesma" u centru grada
General characteristics of water treatment facility			Sistem za deferizaciju vode " Culligan" USA - Bologna (Italija)				Oksidacija amonijaka, gvozdja I mangana putem hlora. Zatvoran sistem filtracije			nanofiltracija sa 7 filtera	
Capacity of water treatment facility											
maximum	(l/s)		30				30				0,03
maximum	(m^3/d)		2000							30	0,1
minimum	(l/s)						10				0,03
minimum	(m^3/d)										
average	(l/s)		750				19			30	0,1
average	(m^3/d)										
Type of construction			filteri - "Culligan" (zatvoren sistem)				Kaligan (zatvoren sistem)			rebrasta filterska konstrukcija I bunarska konstrukcija	

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Age	(year)		1983				2004			2002 I 2004	2005
Year of last modernisation?	(year)		2003								
Quality of water before treatment facility-influent (control parameters whose doesn't meet the standards)											
Ammonium	(mg/l)						2,04				
Fe	(mg/l)						1,12				
Mn	(mg/l)						0,10				
Turbidity											
KMnO4											
Quality of water after treatment facility-effluent (control parameters whose doesn't meet							Da				prilozena kopija "Eko cesma"
Name of sampling location 1			Izvoriste	Trgovina L&Z	SUR Kod Femke		Izvoriste	Osnovna Skola		Eko cesma, Javna cesma	
Temperature	(°C)						15				
Colour		5									
Turbidity		1	0,68								
pH		6.8-8.5		8,6							
KMnO4	(mg/l)	8	10,6	8,9	8,5			17			
Dry matter after 105°C											
Electro conductivity 20'c	(µS/cm)	1000	1392				1.268				
Oxygen O2	(mg/l)										
Dissolved oxygen		50									
Cyanide CN	(mg/l)	0,05									
Residual chlor RCI Cl	(mg/l)	0,5									
Amonijum jon NH3	(mg/l)	0,1		0,4							
Nitrite NO2	(mg/l)	0,03									
Nitrate NO3	(mg/l)	50									
Arsen	(mg/l)	0,01		0,04	0,11						
Chloride	(mg/l)	200									
Fluoride F	(mg/l)	1,2									
Detergents	(mg/l)	0,1									
Fenolic materijals	(mg/l)	0,001									
Mineral oils	(mg/l)	0,01									
Aluminijum Al	(mg/l)	0,2									
Iron Fe	(mg/l)	0,3									
Mangan Mn	(mg/l)	0,05									
Potencijal THM	(mg/l)	0,1									
Hloroform	(mg/l)	0,04									
Dihlorbrommetan	(mg/l)	0,015									
Dibromhlormetan	(mg/l)										
Bromoform	(mg/l)										
Trihloretilen	(mg/l)	0,07									
Tetrahloretilen	(mg/l)	0,04									

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Does the effluent water meet the standards for drinking water?								bakterioloski neispravno		da	
Name of sampling location 2			V.Kar 28		Izvoriste u (B1,B3,B4,B5 u			STR Koliba		Izvoriste naliza pijace	
Temperature	(°C)										
Colour		5			10					jako zuta	
Turbidity		1									
pH		6.8-8.5									
KMnO4	(mg/l)	8	10,9		19,6			21,7		48	
Dry matter after 105 °C										1196	
Electro conductivity 20'c	(µS/cm)	1000	1337					1100		1879	
Oxygen O2	(mg/l)										
Dissolved oxygen		50									
Cyanide CN	(mg/l)	0,05									
Residual chlor RCI Cl	(mg/l)	0,5									
Amonijum jon NH3	(mg/l)	0,1								0,85	
Nitrite NO2	(mg/l)	0,03									
Nitrate NO3	(mg/l)	50									
Chloride	(mg/l)	200								256	
Fluoride F	(mg/l)	1,2									
Detergents	(mg/l)	0,1									
Fenolic materijals	(mg/l)	0,001									
Mineral oils	(mg/l)	0,01									
Aluminijum Al	(mg/l)	150			190,5						
Iron Fe	(mg/l)	12			17,8						
Aluminijum Al	(mg/l)	0,2									
Arsen	(µg/l)	10			87,5						
Fe	(mg/l)	0,3									
Mangan Mn	(mg/l)	0,05									
Potencijal THM	(mg/l)	0,1									
Hloroform	(mg/l)	0,04									
Dihlorbrommetan	(mg/l)	0,015									
Dibromhlormetan	(mg/l)										
Bromoform	(mg/l)										
Trihloretilen	(mg/l)	0,07									
Tetrahloretilen	(mg/l)	0,04									
Does the effluent water meet the standards for drinking water?										ne	
Name of sampling location 3			Karadjordje					pise samo voda za pice		jcr Pavlo,jcc Dusan, jc Voj S	
Temperature	(°C)										
Colour		5						20			
Turbidity		1									
pH		6.8-8.5									
KMnO4	(mg/l)	8						17,4			
Dry matter after 105 °C											
Electro conductivity 20'c	(microS/cm)	1000	1326								

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
Oxygen O2	(mg/l)										
Dissolved oxygen		50									
Cyanide CN	(mg/l)	0,05									
Residual chlor RCI Cl	(mg/l)	0,5									
Amonijum jon NH3	(mg/l)	0,1									
Nitrite NO2	(mg/l)	0,03									
Nitrate NO3	(mg/l)	50									
Chloride	(mg/l)	200									
Fluoride F	(mg/l)	1,2									
Detergents	(mg/l)	0,1									
Fenolic materijals	(mg/l)	0,001									
Mineral oils	(mg/l)	0,01									
Aluminijum Al	(mg/l)	0,2									
Iron Fe	(mg/l)	0,3									
Mangan Mn	(mg/l)	0,05									
Potencijal THM	(mg/l)	0,1									
Hloroform	(mg/l)	0,04									
Dihlorbrommetan	(mg/l)	0,015									
Dibromhlormetan	(mg/l)										
Bromoform	(mg/l)										
Trihloretilen	(mg/l)	0,07									
Tetrahloretilen	(mg/l)	0,04									
Does the effluent water meet the standards for drinking water?			da				da	ne, zbog ovecane koncentracije Utroska KMnO4		da	
Comments-Problems?			povecan utrosak KMnO4 u filtriranoj vodi		Ne postoji sistem za preciscavanje vode		velika tvrdoca vode, u letnjem periodu dolazi do nestasice vode, iskljucivanje potrosaca na 3 sata dnevno			placanje odrzavanja	Vodovodni ststem ima mali kapacitet u odnosu na broj stanovnika
Distribution system											
Distribution system length	(km)		53		45	85		27	10	36	
Pipe type-steal			1								
>DN500	lenght (km)										
>DN250	lenght (km)										
>DN100	lenght (km)					8					
<DN100	lenght (km)					5					
PVC			52								
>DN500	lenght (km)										
>DN250	lenght (km)									1,1	3
>DN100	lenght (km)				2		4	20			
<DN100	lenght (km)			15	42,5		11,50	7	8,5	35	1
Azbest-concreate											
>DN500	lenght (km)										

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
>DN250	lenght (km)			0,5	0,5						
>DN100	lenght (km)			1		19	8		0,5		5
<DN100	lenght (km)			1		53	26,50		1		5
Pipe type											
>DN500	lenght (km)										
>DN250	lenght (km)										
>DN100	lenght (km)										
<DN100	lenght (km)										
losses, pipe leakage)			Dotrajalost celicnih cevi na raskrsnicama ispod puteva I ventila		Problemi manjeg obima, Curenje na ventilu vodomera domacinstva 7-8 godisnje	zastarelost mreze, pucanje cevi, gubici	postoje gubici umrezi do 20%. Pucanje cevi je smanjeno posle izgradnje postrojenja. Veoma lose	U zimskom periodu dolazi do pucanja cevi koje istog momenta popravljamo ili menjamo celu	Gubici u mrezi nisu veliki,a problema sa pucanjem cevi ima dosta	ima pucanja na prikljuccima domacinstava najvise, redje od slegania	Zastarelost mreze I propusnih ventila u sahtama
List of needed projects and reconstructions											
Project description and costs	(din)			Zbog pojave arsena na postojecim bunarima predvideli smo busenje jednog bunara na plicim vodonosnim	Probna busotina na 80km		Nabavka jos 1 para filtera (multimedijalni+ aktivni ugalj) za vodu tipa :kaligan" 15l/sec			za istrazivanje tri busotina I za ekspoataciju tri bunara (20.797.000, 00 Din)	Dve eko cesme, vodotoranj, zamena dela mreze
Water supply systems	(din)								ne		
Pumping stations	(din)								ne		
Distribution systems	(din)							da	ne		Zamena dela mreze
Reservoirs/water towers	(din)								ne		Vodotoranj
Water sources	(din)						bunar 10 (nedostaje upotrebna dozvola)		ne	izmestanje bunara van naselja	
Project documentation											

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Project description and costs of planned works				5,000,000.00 Busenje jednog bunara fi 323/219	Postavljanje prcistaca za vodu ili trazenje novih izvorista, probna busotina 350,000.00		vrednost troskova izdavanja upotrebne dozvole	rekonstrukcija razvoda sa renoviranjem ulicnih sahtova u kojima su ventili dotrajali I potrebna je njihova zamena. Ako bude finansijskih mogucnosti radile bi se parcijalno glavne ulice I vodovi			Izgradnja dve eko cesme. Planirani troskovi 2,800,000.00din
Water supply systems	(din)								ne	idejni projekat mikrobiolosko g istrazivanja	
Water sources	(din)								ne		
Pump stations	(din)								ne		
Reservoirs/water towers	(din)								ne		

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Distribution systems	(din)							projekti su u fazi izrade	ne		
Natural environment											
Topography			ravno	ravno	ravan teren	ravno bregasta	pretezno ravan teren	ravno	ravno	ravno	ravno
Geology- Lithology				lesna terasa	plodno tlo, crnica	crnica	lesoidne gline, peskoviti les do 17m dubine a nakon toga pesak	crnica	0.00-1.00m humus, 1.00-17.00zuta glina, 17-76m sivi krupno zrnski	crnica	
Communities Meteres above see levels Differences	(m)				3				5	87	
Max Metres above see levels	(m)		87,803	82		30	85	84			
Min Metres above see levels	(m)		86,4786	81		25	83	82			
Ground configuration					Ravni teren		pretezno ravan teren	ravno	ravno sa neznatnom visinskom razlikom	ravnica	ravno
Distance between center of the communiti to the end of the community	(km)		5,5			2,6				2.5km	
Resources of Community											
Is there a space for new water supply infrastructures				ne	ne	ne	ne		u generalnom urbanistickom planu DA	ne	ne
Who ownes these properties?									Republika Srbija korisnik MZ	P.P.AD Ratkovo	
Where is the location of that parcel in community?									na periferiji 1.5-2km	blizu centra	
Distance from these parcels to next adequate drinking water sources	(km)								ne		
Sewage system											
Is there a sewage system?			ne			ne	da	ne	ne	u izgradnji	ne
Who is the owner of the sewage system?							korisnik je JKP "Usluga"	MZ	ne	M.Z. Ratkovo	
Is there a sewage treatment system?			ne				ne		ne	u izgradnji "mokro polje"	

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Who is the recipient of waste water							Kanal van naselja			septicka a ubuduce kanalizacija	
Distance between recepient of waste water and center of community?	(km)										
Distance between waste water effluent location and drinking water sources:	(km)						1,60	5			
Drinking water prices-tarife structure											
Current drinking water fees for families	(din/m³)		20	14	17,7	18,4	16	9	9,6	7,5	8
Comment											
Current drinking water fees for industry	(din/m³)		40	28	53,1	55	48	27	28,8	22,5	24
Comment											
Percentage of payment for hausholds	(%)		70	55	70	28,72	64	42	95	60	40
Percentage of payment for industry	(%)		80	40	60	4,37	35		97	50	50
Actual expenses for water supply system					15						
Current cost of water abstraction, provision and treatment:	(din/m³)					26	25,07	8	9,6		

Table 1. 5. Water supply and community data

Municipality			SO Apatin	SO Kula	SO Kula	SO Kula	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci	SO Odžaci
Name of the City			Sonta	Kruscic	Ruski Krstur	Sivac	Odzaci	Backi Gracac	Deronje	Ratkovo	Srpski Miletic
	Unit	SCG drinking water directives									
Waste water drainage and treatment system costs	(din/m³)						9,52		ne		
Waste water drainage and treatment system costs for households	(din/m³)										
Waste water drainage and treatment system costs for industry	(din/m³)										
Ability or willingness of population to pay for drinking water and sewage	(din/m³)										3,2
a.) For drinking water	(din/m³)		35		30	26		9	9,6		
b.) For sewage	(din/m³)		0								
The percentage of payment for drinking water in last 5 years	(%)			60					98	70	30
2005	(%)		70			24,66	83				
2004	(%)		60		70	44,91	77				
2003	(%)		65		75	57,98	80				
2002	(%)		70			57,98	73				
2001	(%)		75		80		70				
2000	(%)				87		64				
Comment								naplata je isla sa poteskocama l			
Current production and distribution costs or procentage											
Salaries	(%)	(din/m³)			46	47	24,11		65	25	78,65
Parts	(%)	(din/m³)	10		7	5	8,34		20	5	11,45
Maintenance	(%)	(din/m³)	33		15	6		90	5	24	2,45
Chemicals	(%)	(din/m³)	25		4	2	15,90	10	10	1	
Administration	(%)	(din/m³)	2		10	4	8,55			10	5,00
Other expenses	(%)	(din/m³)	30		18	36	43,06			55	2,45
Average income per household:	(din/month)		7000,00		12.000,00		16.533				8.000,00
Comment											siva ekonomija: 13,000.00
Average dispensable income per household:	(din/month)						fali				2.000,00

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Adequate drinking water source data:											
What is the distance from the town centre to the next suitable drinking water sources in km?	(km)		2	0,5	10	2			ne	42	
Description of this source (these sources):											
Name and location of source			bunar 1; bunar 3	B1, B2 ,B3		Kudeljarsko polje Sivac				Sombor, periferija Ratkova	
Depth to groundwater 1	(m)		3,5	4		11					
Depth to groundwater 2	(m)		3,5	4							
Depth to groundwater 3	(m)			3,50							
Expected yield well 1	(m^3/d)		2592	550		2733					
Expected yield well 1	(l/s)										
Expected yield well 2	(m^3/d)		3456	350							
Expected yield well 3	(m^3/d)			550							
Is there a risk of flooding?			da - od sliva kanala DTD	ne		ne			ne		
Is there a risk of pollution in case of flooding?			da	da	ne	ne			ne		
Legal constraints											
Who are the relevant government agencies that are responsible for planning and implementing water related projects (please list names and responsibilities)?						so Kula	Opstina	Mesna Zajednica	Skupstina Opstine: fond za gradjevinsko zemljiste, zavod za urbanizam, Republicki fond gradjevinskog zemljista		Opstina, Zavod za urbanizam, Vodoprivredna organizacija
What are special legal constraints the municipality must consider when engaging in water projects?							Pozitivni zakonski propisi u oblasti planiranja I izgradnje		Pravne norme iz zakona o vodama		Zakon o javnim nabavkama, Zakon o planiranju I izgradnji, Ministarstvo za minaralne sirovine

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Does community have investment autonomy					da	MZ Sivac	opstina ima	da	donekle	da	Da, Mesna zajednica, Opstina
Does community have tariffe autonomy					ne	SO Kula	opstina ima	da	da	ne	Mehanizam donosenja odluke o ceni
What type fines are to be expected in case of regulation non compliance?							Propisane pozitivnim zakonskim propisima		po zakonu		Prema zakonu o javnim nabavkama, Zakonu o planiranju I izgradnji sanitarni prekrsaji, Nepostovanje ekoloskih propisa
What official permits need to be obtained?						urbanisticko tehnicke uslove I sve saglasnosti po "UTU" a posle gradjevinsku dozvolu	gradjevinska dozvola, upotrebna dozvola		UTU uslovi, projekat, dozvola za gradnju		Akt o urbanist uslovima, idejni projekat, Glavni projekat, Dozvola za gradnju, Sanitarna saglasnost, Ekoloska saglasnost
Will existing permits expire in the near future?							dozvole su trajne		nemo		ne
If yes, which ones and when?									ne		

Table 1. 5. Water supply and community data

Municipality			**SO Apatin**	**SO Kula**	**SO Kula**	**SO Kula**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**	**SO Odžaci**
Name of the City			**Sonta**	**Kruscic**	**Ruski Krstur**	**Sivac**	**Odzaci**	**Backi Gracac**	**Deronje**	**Ratkovo**	**Srpski Miletic**
	Unit	**SCG drinking water directives**									
Financing											
Has money been applied for to finance water related projects?				da	Da				ne	ne	
If yes, from which agency or institution, what for, how much and when				od sekretarijata za privredu, poljoprivredu I sumarstvo	Pokrajinski sekretarijat za Vodoprivredu I Sumarstvo						
Have financial contributions already be granted (recent or past)?				da	da				ne		
If yes, from which agency or institution, what for, how much and when?				od sekretarijata za privredu, poljoprivredu I sumarstvo, Novi Sad, 1,500,000.00dinara	Probna busotina za ispitivanje kvaliteta vode I izdasnosti izvora				ne		
Information about official who filled the questionare											
Name and Surname			Antun Zlatar	Vucic Vlahovic	Joakim Nadj		Nenad Stamenkovic	Jovan Zoric	Majstorov Vladimir, Mirko Djukic	Dragisa Cuckovic	Stankovic Zoran
Position			Predsednik Saveta MZ Sonta	Sekretar Mesne Zajednice	Sekretar MZ		Rukovodilac Vodovoda I Kanalizacije	Sekretar MZ	Sekretar MZ	sekretar M.Z. Ratkovo	Vodoinstalater
Institution (company)			MZ Sonta	MZ Kruscic	MZ Ruski Krstur		JKP Usluga	MZ Backi Gracac	MZ Deronje	Mesna Zajednica Ratkovo	MZ Srpski Miletic

Table 1. 5. Water supply and community data

Municipality			**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Census Information													
Number of residents in 2002	(capit)		48.993	1.864	2.267	1.585	4.205	5.472	1.710	2.806	3.292	2.138	**135.746**
Number of resident in 2005	(capit)		51.471			1388	3920	5700	1700	2.569			
Number of connected persons	(capit)		97.263	1900	2200	1388	3920			2.569	3256	2084	
Population residing within the city	(capit)			1900		1388	3920	5700			3156	2084	
Holiday resididents	(capit)						400	U okolina MZ izgradjeno je oko 1500 vikendica				ne	
Change in number of residents	(+/- capit)			Smanjivanje	smanjenje	smanjivanje	7%	U stagnaciji	smanjenje	Smanjivanje 10%	neznatno povecanje od nekih 50ljudi	smanjivanje	
Expected increase in population				Smanjivanje	stagnacija-blagi pad		20%			Ovim tempon razvoja sela 30% manje	Stagnacija, odnosno moguce smanjenje broja stanovnika usled starosti ili preseljenja	Smanjivanje	
Population density	(capit/km²)			46	30		21,7			256		4	
Settlement structure (compact towns and villages oder scattered housing)			kompaktno	selo	selo-razudjeno	kompaktno selo	Kompaktno, selo	kompaktno	kompaktno	Kompaktno selo	kompaktno-selo	kompaktno	
Owner of the waterworks			Drzava	MZ	MZ	Mesna Zajednica Backi Breg	MZ Backi Monostor	drzava	MZ Kolut	MZ Ridjica	MZ Svetoza Miletic	MZ Telecka	
Owner of the parcels where is the waterworks and infrastructures			Opstina, Javno Preduzece	MZ	MZ	Mesna Zajednica Backi Breg	MZ Backi Monostor	drzava	MZ Kolut	Opstina Sombor	MZ Svetoza Miletic	MZ Telecka	
Who is responsible to maintenance of watersupply			JKP Vodokanal Sombor	MZ	obuceno kvalifikovano strucno lice	Mesna Zajednica Backi Breg	Radnik na odrzavanju mesnog vodovoda	KP Vodovod Bezdan	MZ Kolut	MZ Ridjica KV Radnik Bognar Lajos	Vodoinstalater Tar Ferenc	MZ Telecka	

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Who are the users of the water supply system													
Households	(num. of conn.)		10507	753	780	520	1316	1780	570	906	1221	850	
Industry	(num. of conn.)		471	1			1	20		1	mlin (nema vodomer)		
Tourist business entities	(num. of conn.)			1	10		20	10		6		2	
Public buildings	(num. of conn.)		594	4	5	8	2	2	3	5	2	4	
Agricultural farms	(num. of conn.)												
Households	(m^3/d)				6		1	4		3			
Households	(m^3/s)		8573	9000		120	305	500	138	453	291	8	
Industry	(m^3/d)												
Industry	(m^3/s)		2701	17			3	50		2			
Tourist business entities	(m^3/d)												
Tourist business entities	(m^3/s)			15			20	3		3		12,5	
Public buildings	(m^3/d)												
Public buildings	(m^3/s)		470	27		2	2	7		1	190	nema	
Agricultural farms	(m^3/d)												
Agricultural farms	(m^3/s)												
Water supply infrastructure													
Does a water works exist?			da	da	da	da	da	da	da	da	da	da	
Number of connected households	(-)			753	780	520	1316	1780	575	906	1120	850	
Number of connected persons	(-)		49.000	1800			3920	5500	2				
Number of not connected households	(-)			50		16	35				40	50	
Number of not connected persons	(-)		1.000	100			35						
Maximum capacity	(m^3/d)		17.000	21000	1250		1296	2400		1440	1008	38400	
Average water supply	(m^3/d)		11.744	21000	550	120	341	500		464	604,8	19	
Average water supply	(l/s)												
Age of water supply	(year)		1961	1966	1958	1971	1978	1975	1972	1971	1969		
Year of last restructure	(year)		1987	1970			1995	1988		2001		2001	

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	Unit	**SCG drinking water directives**											
Comment for last restructure													
Losses in last 3-5 years	(% or m^3)						2700						
Comment			gubici su oko ~25%	Svi sistemi, pa ni domacinstva (ukupno 715 prikljucka) nisu snabdeveni vodomerima, te se utrosak vode placa pausalno kvartalno	gubici u distributivnoj mrezi, cevovodi od celicnih cevi dotrajavaju, sistem ne zadovoljava potrebe u satu maksimalne potrosnje.			s obzirom da je vodovodna mreza stara preko 30godina gubici su znacajni ali nisu mereni		Stara vodovodna mreza azbestno cementne cevi, sklone pucanju, nedovoljan kapacitet vode u letniem	Kvalitet vode, distributivna mreza-cevi zastareli. Pogledati poslati prilog	Najveci je problem starost vodovodne mreze	
In case that a water works, which has been constructed together with another municipality exists:													
List of names of municipalities					selo aleksa santic	nema	ne		ne	ne		ne	
Distance to water works	(km)				0								
Pipe type (steel, PVC,…)					celik,cement azbest, PVC								
Length	(km)				22,5								
Diameter 1 DN	(mm)				50								
Diameter 2 DN	(mm)				100								
Diameter 3 DN	(mm)				100								
Average flow	(m^3/s)												
Age 1					40								
Age 2					35								
Age 3					20								

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	Unit	SCG drinking water directives											
Drinking water sources													
How many drinking water sources are their in the community?	(-)		1	7	2	2	3		2	3	2	2	
Type of source 1			buseni	vertikalni	buseni cevasti bunari	cevasti bunar			dubinski	reversni	Norton	dubinska	
Type of source 2				vertikalni	buseni cevasti bunari	cevasti bunar			dubinski	reversni	Norton	dubinska	
Type of source 3				vertikalni						reversni			
Type of source 4				vertikalni									
Type of source 5				vertikalni									
Type of source 6				vertikalni									
Type of source 7				vertikalni									
Age of source (well) 1	(year)		20	1970	1995	1979	1979	31	26	18	1984	1972	
Age of source (well) 2	(year)			1970	2001	1986	1979	31	20	16	1999	2001	
Age of source (well) 3	(year)			1970			1995			9			
Age of source (well) 4	(year)			1970									
Age of source (well) 5	(year)			1970									
Age of source (well) 6	(year)			1970									
Age of source (well) 7	(year)			1970									
Average depth to groundwater level well 1	(m)		9,4	8	15	6,86	8	2,7	18	5	5	18	
Average depth to groundwater level well 2	(m)			8	18	6,2	8	2,7	18	5	5	18	
Average depth to groundwater level well 3	(m)			8			25			5			
Average depth to groundwater level well 4	(m)			8									
Average depth to groundwater level well 5	(m)			8									
Average depth to groundwater level well 6	(m)			8									
Average depth to groundwater level well 7	(m)			8									
Average decreasing of Groundwater elevation	(m/year)			1	nema pouzdanih podataka	isti nivo	0			0,3			
Average well depth 1	(m)		55	120	98	60	164	61	135	80	58	105	
Average well depth 2	(m)			120	100	66	72	61	135	80	58	105	
Average well depth 3	(m)			120			164			80			
Average well depth 4	(m)			120									
Average well depth 5	(m)			120									
Average well depth 6	(m)			120									
Average well depth 7	(m)			120									
Average well screen depth 1	(m)			30	85	39,5		29	110	61	4	100	
Average well screen depth 2	(m)			30	86	38,97		29	110	63	4	100	
Average well screen depth 3	(m)			30						61			
Average well screen depth 4	(m)			30									
Average well screen depth 5	(m)			30									
Average well screen depth 6	(m)			30									
Average well screen depth 7	(m)			30									

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	Unit	SCG drinking water directives											
Well/screen diameter 1	(mm)		323	75	323	323/300	323	300/200	320	323/323	500	320	
Well/screen diameter 2	(mm)			75	323	219/139	530	508/412	320	323/323	300	320	
Well/screen diameter 3	(mm)			75			323			323/323			
Well/screen diameter 4	(mm)			75									
Well/screen diameter 5	(mm)			75									
Well/screen diameter 6	(mm)			75									
Well/screen diameter 7	(mm)			75									
Typ of screen			Mosticavi Johnson	Mesing	mosticavi celik, perforirani PVC	celicno I plasticno	mostican		celicni fi 300	0,8*0,8 rebrasti tip hidrosonda		metal, pvc	
Typ of pump 1			dubinska	PC 4-16U	dubinska	Franklin 15	dubinska	sever	pc 6-14	lovara	dubinska	dubinska	
Typ of pump 2				PC 4-16U	dubinska	Franklin 11	dubinska	sever	sajer lovara	sever	dubinska	dubinska	
Typ of pump 3				PC 4-16U			dubinska			lovara			
Average energy use 1	(kWh/day)		ukupno 5400	9	95	85	100	100		180		6,5	
Average energy use 2	(kWh/day)			16,76	95	35	100	100		264	157,2	6,5	
Average energy use 3	(kWh/day)			14,63			100			264			
Average energy use 4	(kWh/day)			21,3									
Average energy use 5	(kWh/day)			17,36									
Average energy use 6	(kWh/day)			20,9									
Average energy use 7	(kWh/day)			4									
Average summ of energy use	(kWh/day)												
Average capacity of pump 1	(l/s)		16	300	8	4,5	10	20	4,6	6		600	
Average capacity of pump 2	(l/s)			300	8	4,5	30	20	4,6	10	700	600	
Average capacity of pump 3	(l/s)			300			8			10			
Average capacity of pump 4	(l/s)			300									
Average capacity of pump 5	(l/s)			300									
Average capacity of pump 6	(l/s)			300									
Average capacity of pump 7	(l/s)			300									
Max capacity of pump 1	(l/s)		30	300	15	6,5		20		6		800	
Max capacity of pump 2	(l/s)			300	15	6,5		20		10	900	800	
Max capacity of pump 3	(l/s)			300						10			
Max capacity of pump 4	(l/s)			300									
Max capacity of pump 5	(l/s)			300									
Max capacity of pump 6	(l/s)			300									
Max capacity of pump 7	(l/s)			300									
Pump exploatation capacity 1	(l/s)		20.000		8	15	12	40	6	216		19	
Pump exploatation capacity 1	(m^3/d)						1036	500					
Pump exploatation capacity 2	(l/s)				8	6,60	30	40		216		19	
Pump exploatation capacity 2	(m^3/d)						2592	500					
Pump exploatation capacity 3	(l/s)						8			864			
Pump exploatation capacity 3	(m^3/d)						691						
Pump exploatation capacity 4	(l/s)												
Pump exploatation capacity 4	(m^3/d)												
Exploatation capacity	(m^3/d)												
Average water source exploatation capacity	(l/s)												
Minimum water source exploatation capacity	(l/s)												

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	Unit	**SCG drinking water directives**											
Maximum water source exploatation capacity	(l/s)												
Main contaminants ofr concern	(mg/l)				nije utvrdjeno		nema				u prilogu hemijske analize	gvozdje, gvozdje	
Parameters which doesn't meet the standards Well 1													
Name of the well					Bunar kod mesne zajednice	Bunar 1	Bunar 1				B 2/1	Bunar 4	
Colour		5										10	
Turbidity		1			3,46						8,8	11,7	
pH		6.8-8.5											
Organic matter - KMnO4	(mg/l)				5,9		14,2						
Arsen As	(mg/l)	0,01			0,026		20					10	
Oxygen	(%)	50											
Electro conductivity	(µS/cm)	1000					1283				1118		
Hydrogen sulfid		0											
Hardness sum	dH	6,6			20,17								
Ammonium	(mg/l)	0,1			1,55						0,6	0,41	
Nitrite	(mg/l)	0,03									0,001		
Nitrate	(mg/l)	50											
Chloride	(mg/l)				6,25								
Sulfate	(mg/l)				10,56								
F	(mg/l)	1,2											
Fe	(mg/l)	0,3			0,73	2,1				0,51	1,5	1,7	
Mn	(mg/l)	0,05			0,072	0,1					0,43	0,06	
Na	(mg/l)	150					293						
K	(mg/l)				0,8								
Mg	(mg/l)				43,65						51,6		
Natural gas	(mg/l)												
Methane CH4	(mg/l)												
Bor	(mg/l)	0,3					0,7						
Radon	(Bq/l)	0,05					2,5						
Chloride	(mg/l)										56		
Does the water sample meet the standards for drinking water?					ne, povecanje amonijaka, gvozdja, arsena l mangana	ne	ne						
Parameters which doesn't meet the standards Well 2													
Name of the well					Crpna stanica 2	Bunar 2						Bunar 1	
Colour		5			15							slabo zuta	
Turbidity		1									6,8	1,1	
pH													
Organic matter - KMnO4	(mg/l)												
Arsen As	(mg/l)	0,01			0,1								
Oxygen	(%)	50											
Electro conductivity	(µS/cm)	1000											
Hydrogen sulfide		0											
Hardness sum	dH	6,6											
Ammonium	(mg/l)	0,1											

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Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Nitrite	(mg/l)	0,03									0,001		
Nitrate	(mg/l)	50											
Fe	(mg/l)	0,3			0,9	2,1				0,51	1,5	1,64	
Mn	(mg/l)	0,05				0,1					0,1		
Mg	(mg/l)	50											
As	(mg/l)												
Chloride	(mg/l)										56		
Does the water sample meet the standards for drinking water?					ne	ne						delimicno, visok nivo Fe I mutnoca	
Parameters which doesn't meet the standards Well 3													
Name of the well													
Colour		5											
Turbidity		1											
pH													
Organic matter - KMnO4	(mg/l)												
Arsen As	(mg/l)	0,01											
Oxygen	(%)	50											
Electro conductivity	(µS/cm)	1000											
Parameters which doesn't meet the standards Well 4													
Name of the well													
Colour		5											
Organic matter - KMnO4	(mg/l)												
Arsen As	(mg/l)	0,01											
Electro conductivity	(µS/cm)	1000											
Chloride	(mg/l)	200											
Irom Fe	(mg/l)	0,3											
Category of water(origin) (surface, ground, freatic, artesian, alluvium, etc.)			podzemna voda	Arterska	podzemna subarterska	podzemna voda	podzemna voda, subarteska	podzemna voda	podzemna, podzemna			podzemna voda	
Comments			Nedovoljan kapacitet, Potrebno osavremenjavanje I poboljsanje preciscavanja	Zemljani gas, Metan	rezerve u kapacitetima, rezervno snabdevanje el.energijom	hemijski kvalitet		zamuljenost bunara		Predvidjeni za likvidaciju		mutnoca	
Does the water sources have sanitary protection?			ne	da	da	da	da	ne	da	da	da	da	
Are there sources of contamination in sanitary zones of water sources and their distance to water sources?			da, 300m	ne	na 100m septicke jame domacinsatava, infiltracija, povrsinske vode sa podrucja	septicke jame	da	da (farma)	da (B3) 10-15m	ne	septicke jame od 200-300m udaljenosti	ne	

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	Unit	**SCG drinking water directives**											
Are there sources of contamination in community and their distance to water sources?			da, 800m	udaljenost septicke jame od bunara najmanje 20m	kao poz 3.2.3	septicke jame	da (septicke)	septicke jame 2km	ne	ne		Ne, postoje stare septicke jame u domacinstvima	
Pump stations, hydrofores													
Number of pumping stations?			1	ne	2	ne	3	4	1	ne	1	2	
Sum of pumping station or hydrofores capacity?	(m^3/d or m^3)		20.000		560		4319	98				38	
Sum of pumping stations energy use?	(kWh/day)							200					
Average pumping stations energy use?	(kWh/day)							200					
Number of hydrofores?	(-)		6	7	4	hidroforska posuda	2		dva	2	2	3	
Sum of hydrofores capacity?	(m^3)			21.000	10	22	10		3000	6		4	
Average age of pumping stations and hydrofores (build)			1965	1966	1965	2004	1987	1988	1972	1971	1988	1986	
Year of last modernisation?	(year)			1970		2005							
Average age of hydrofores	(year)					1971							
Year of last modernisation?	(year)					1995							
Comments								problemi odrzavanja					
Reservoirs/Watertowers													
Number of reservoirs	(-)		3	ne	ne	ne	ne			ne	ne	ne	
treated water	(-)												
pretreated water	(-)												
Number of watertowers	(-)							1					
Maximum sum volume (effective)	(m^3)		4500					500					
Sum capacity of treated water	(m^3)												

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	Unit	**SCG drinking water directives**											
~~Sum capacity of pretreated water~~	~~(m^3)~~												
Type of construction			poluukopani betonski			izvoriste - metalne posude (hidroforske posude)		vodotoranj 52m visine, celik, na izvoristu					
Average age reservoirs (build)	(year)		1987			1971		1988					
treated water	(year)												
pretreated water	(year)												
Year of last modernisation?	(year)					1995		2004					
Water treatment facilities													
Is there Water treatment facility?			da	Ne	ne	ne	ne	sistem culligan			ne	ne	
General characteristics of water treatment facility			aeracija, retenzija, filtracija, I dezinfekcija hlorom					Culligan 30l/sec, otklanja gvozdje, amonijak, mangan I umanjenje kalijum permanganat					
Capacity of water treatment facility													
maximum	(l/s)		200					30					
maximum	(m^3/d)		17.000					2400					
minimum	(l/s)		40										
minimum	(m^3/d)		3.400										
average	(l/s)		160										
average	(m^3/d)		13600					540					
Type of construction								Zatvoren sistem sa mineralima I aktivnim ugljem					

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Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Age	(year)		1987										
Year of last modernisation?	(year)		/										
Quality of water before treatment facility-influent (control parameters whose doesn't meet the standards]							prilog analiza			prilazemo fotokopiju analize			
Ammonium	(mg/l)										0		
Fe	(mg/l)										1,5		
Mn	(mg/l)										0,1		
Turbidity											6,8		
KMnO4											6,6		
Quality of water after treatment facility-effluent (control parameters whose doesn't meet			zadovoljava propise osim po parametru					zadovoljavaju ci					
Name of sampling location 1				izvoriste		izvoriste	izvoriste		Osn Skola			Sipos Dj	
Temperature	(°C)												
Colour		5		jako zuta			zuta					zuta	
Turbidity		1				3,32					21	4,92	
pH		6.8-8.5											
KMnO4	(mg/l)	8		49,3			26,6						
Dry matter after 105°C				1363		668	950		1192			389	
Electro conductivity 20'c	(µS/cm)	1000		2047		1057	1627		1792				
Oxygen O2	(mg/l)												
Dissolved oxygen		50											
Cyanide CN	(mg/l)	0,05											
Residual chlor RCl Cl	(mg/l)	0,5											
Amonijum jon NH3	(mg/l)	0,1		0,82		0,76	0,15				0,6	0,1	
Nitrite NO2	(mg/l)	0,03											
Nitrate NO3	(mg/l)	50											
Arsen	(mg/l)	0,01											
Chloride	(mg/l)	200					272						
Fluoride F	(mg/l)	1,2											
Detergents	(mg/l)	0,1											
Fenolic materijals	(mg/l)	0,001											
Mineral oils	(mg/l)	0,01									0,055		
Aluminijum Al	(mg/l)	0,2											
Iron Fe	(mg/l)	0,3				2,21					2,72	1,5	
Mangan Mn	(mg/l)	0,05				0,1					0,1	0,05	
Potencijal THM	(mg/l)	0,1											
Hloroform	(mg/l)	0,04											
Dihlorbrommetan	(mg/l)	0,015											
Dibromhlormetan	(mg/l)												
Bromoform	(mg/l)												
Trihloretilen	(mg/l)	0,07											
Tetrahloretilen	(mg/l)	0,04											

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	Unit	SCG drinking water directives											
				da		da	ne		da			da	
Does the effluent water meet the standards for drinking water?													
Name of sampling location 2				3ILR 1		jugosl.12	P Drapsina		M Oreskovic			Dec Vrtic	
Temperature	(°C)												
Colour		5		jako zuta			zuta					zuta	
Turbidity		1				4,29					21	2,11	
pH		6.8-8.5											
KMnO4	(mg/l)	8		50,3			25,3					8,2	
Dry matter after 105 °C				1279		654	913		1212			482	
Electro conductivity 20'c	(µS/cm)	1000		2000		1049	1693		1883				
Oxygen O2	(mg/l)												
Dissolved oxygen		50											
Cyanide CN	(mg/l)	0,05											
Residual chlor RCl Cl	(mg/l)	0,5											
Amonijum jon NH3	(mg/l)	0,1		0,78		0,7	0,1				0,6	0,1	
Nitrite NO2	(mg/l)	0,03											
Nitrate NO3	(mg/l)	50											
Chloride	(mg/l)	200					274						
Fluoride F	(mg/l)	1,2											
Detergents	(mg/l)	0,1											
Fenolic materijals	(mg/l)	0,001											
Mineral oils	(mg/l)	0,01									0,055		
Aluminijum Al	(mg/l)	150											
Iron Fe	(mg/l)	12											
Aluminijum Al	(mg/l)	0,2											
Arsen	(µg/l)	10											
Fe	(mg/l)	0,3				2,52					2,72	1,86	
Mangan Mn	(mg/l)	0,05				0,1					0,1	0,05	
Potencijal THM	(mg/l)	0,1											
Hloroform	(mg/l)	0,04											
Dihlorbrommetan	(mg/l)	0,015											
Dibromhlormetan	(mg/l)												
Bromoform	(mg/l)												
Trihloretilen	(mg/l)	0,07											
Tetrahloretilen	(mg/l)	0,04											
Does the effluent water meet the standards for drinking water?				da		da	ne		da				
Name of sampling location 3				Vrtic		Br Radica	Bastovans		S Matic			str Univer	
Temperature	(°C)												
Colour		5		jako zuta			zuta					slabo zuta	
Turbidity		1				3,81					21	2	
pH		6.8-8.5											
KMnO4	(mg/l)	8		45,2			24,7						
Dry matter after 105 °C				1100		670	985		1178				
Electro conductivity 20'c	(microS/cm)	1000		1687		1084	1655		1871				

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Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Oxygen O2	(mg/l)												
Dissolved oxygen		50											
Cyanide CN	(mg/l)	0,05											
Residual chlor RCl Cl	(mg/l)	0,5											
Amonijum jon NH3	(mg/l)	0,1		0,83		0,62					0,6		
Nitrite NO2	(mg/l)	0,03											
Nitrate NO3	(mg/l)	50											
Chloride	(mg/l)	200					256						
Fluoride F	(mg/l)	1,2											
Detergents	(mg/l)	0,1											
Fenolic materijals	(mg/l)	0,001											
Mineral oils	(mg/l)	0,01									0,055		
Aluminijum Al	(mg/l)	0,2											
Iron Fe	(mg/l)	0,3				2,45					2,72	2,12	
Mangan Mn	(mg/l)	0,05				0,1					0,1	0,05	
Potencijal THM	(mg/l)	0,1											
Hloroform	(mg/l)	0,04											
Dihlorbrommetan	(mg/l)	0,015											
Dibromhlormetan	(mg/l)												
Bromoform	(mg/l)												
Trihloretilen	(mg/l)	0,07											
Tetrahloretilen	(mg/l)	0,04											
Does the effluent water meet the standards for drinking water?			Delimicno	da			da	po nasem pravilniku, da	da	ne	ne	delimicno, povecana koncentracija Fe i mutnoca	
Comments-Problems?			Nedovoljni kapacitet, Kvalitet vode se pogorsava u mrezi zbog korozije cevi				kvalitet bunara B23 (hemijski sastav), pritisak u sistemu kod povecanje potrosnje (3-5bar)	odravanje opreme, nedostatak rezervnih delova, nadostatak finansijkih sredtava					
Distribution system													
Distribution system length	(km)		166	22		28		35	14	11		18,311	
Pipe type-steal													
>DN500	lenght (km)											2"-3/4" 5,000m	
>DN250	lenght (km)		3,9										
>DN100	lenght (km)												
<DN100	lenght (km)		9,5		3000								
PVC						2" - 5; 6/4" - 7;							
>DN500	lenght (km)										3/4cola		
>DN250	lenght (km)												
>DN100	lenght (km)		13,5		7000		5	2				4,00	
<DN100	lenght (km)		18	4			25	27				9,31	
Azbest-concreate													
>DN500	lenght (km)		5,5					2					

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
>DN250	lenght (km)		10,3					4					
>DN100	lenght (km)		18,5		10000				3	3	1		
<DN100	lenght (km)		71	3,8		2			11	8	15		
Pipe type													
>DN500	lenght (km)												
>DN250	lenght (km)												
>DN100	lenght (km)												
<DN100	lenght (km)			14,2									
losses, pipe leakage)			Gubici u vodovodnoj mrezi, nedovoljan pritisak u mrezi, pucanje cevi, starost	Zastarelost. Pucanje cevi, najvise problema ima u zimskom periodu	korozija celicnih cevi, pucanje azbest cementnih cevi, neugradjeni vodomeri kod svih potrosaca	pucanje cevi I ispiranje mreze jednom mesecno	gubici 20%, pritisak, kvalitet voda B2	zastareli spojevi I prikljucci koje napada korozija I potrebno je menjati sa	pucanje cevi	pucanje cevi povremeno		1972 god. Je izgradjen I zbog starosti I od drveta zile stalno pucaju cevi	
List of needed projects and reconstructions													
Project description and costs	(din)			Planirana rekonstrukcija vodovoda, Njegovo objedinjavanje u jedan sistem I bisenje centralnog	rekonstrukcija dela vodovodne mreze	20.000.000	nista se ne planira	SO Sombor planira izradu regionalnog projekta snabdevanja stanovnistva vodom bezdana kao			Nemamo izradjenih planova, potreba je za zamenu cevi u distributivnoj mrezi	planiramo promenu cevovoda ali nemamo jos projekat gotov	
Water supply systems	(din)					izgradnja filtera - deferizatora							
Pumping stations	(din)								2 hidroforska posude				
Distribution systems	(din)					rekonstrukcija mreze						promena cevovoda	
Reservoirs/water towers	(din)					ukopani 226 m3							
Water sources	(din)					1 bunar				bunar			
Project documentation						ne							

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			Sombor	Doroslovo	Aleksa Santic	Backi Breg	Backi Bonostor	Bezdan	Kolut	Ridjica	Svetozar Miletic	Telecka	sum
	Unit	SCG drinking water directives											
Project description and costs of planned works								u nadleznosti SO Sombor od kojih treba da prikupite potrebnu dokumentaciju sa kojom oni raspolazu		busenje bunara 3,200,000			
Water supply systems	(din)											ne	
Water sources	(din)						1 bunar			Projektna dokumentacija za bunar		ne	
Pump stations	(din)						1 (slicnih karakt kao postojeca)					ne	
Reservoirs/water towers	(din)											ne	

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Distribution systems	(din)				u toku je izrada gl projekta ~3000							zatrazeno je projekat od strane Vodokanal Sombor	
Natural environment													
Topography			ravan	ravno	ravno-zatalasano	ravno	ravno	ravno	ravno	ravno	ravno, sa malim uzvisenjem prema Stanisicu I Subotici	brezuljci otprilike 10m	
Geology- Lithology			ceriozem	Pesak, Prasak (zemlja)	humus-crnica, peskoviti	pesak, glina	prilog	humus - ilovaca	pesak	pesak		Telecka-Visoravno-Prasina	
Communities Meteres above see levels Differences	(m)					93				15			
Max Metres above see levels	(m)		87,7		125		97		102		90	116	
Min Metres above see levels	(m)		86		115		88		90		88	106	
Ground configuration					ravno zatalasano~10m		ravno	ravno	ravno			kopija u prilogu	
Distance between center of the communiti to the end of the community	(km)					1.3 km	1km	5	1,5				
Resources of Community													
Is there a space for new water supply infrastructures			da	ne	da	novi objekti projektovani na postojecoj lokaciji	da	da	ne	ne	ne	da	
Who ownes these properties?			Javna povrsina		MZ I DPP Aleksa Santic	mesna zajednica Backi Breg	MZ	drzava				MZ Telecka	
Where is the location of that parcel in community?			3km istocno		blizu centra	blizu centra	1	zemljiste izmedju Bezdana I Apatina uz reku Dunav				Blizu centra	
Distance from these parcels to next adequate drinking water sources	(km)				8	2	0,5					1	
Sewage system													
Is there a sewage system?			da	ne	ne	ne	ne	ne	ne	ne	ne	ne	
Who is the owner of the sewage system?			drzava										
Is there a sewage treatment system?			da						ne				

Table 1. 5. Water supply and community data

Municipality			**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	**SO Sombor**	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
~~Who is the recipient of waste~~ water			Na ivici naselja										
Distance between recepient of waste water and center of community?	(km)		4,5										
Distance between waste water effluent location and drinking water sources:	(km)												
Drinking water prices-tarife structure													
Current drinking water fees for families	(din/m³)		15,88			12	16,2	19,5	18	12,96	12		
Comment				100din / mesec	pausalno po clanu							1.tarifa 12.00din;	
Current drinking water fees for industry	(din/m³)		39,7			24	29,16	39	36	25,92	ne	24	
Comment				100din / mesec pausalno	pausalno								
Percentage of payment for hausholds	(%)		72	22,39	65	95	82	65	80	75	30	40	
Percentage of payment for industry	(%)		68	100	50	100	30	80	80	75		100	
Actual expenses for water supply system													
Current cost of water abstraction, provision and treatment:	(din/m³)			49,59		15	1.5mil	6680000din/208000m3			do jula 2005 ukupno je toliko potroseno na vodovod 307,153.02	Rashod 29,000.00-35,000.00 mesecno otprilike naplata vode je 40-60% mesecno	

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			Sombor	Doroslovo	Aleksa Santic	Backi Breg	Backi Bonostor	Bezdan	Kolut	Ridjica	Svetozar Miletic	Telecka	sum
	Unit	SCG drinking water directives											
Waste water drainage and treatment system costs	(din/m³)											ne	
Waste water drainage and treatment system costs for households	(din/m³)		12,7										
Waste water drainage and treatment system costs for industry	(din/m³)		31,76										
Ability or willingness of population to pay for drinking water and sewage	(din/m³)												
a.) For drinking water	(din/m³)			150 /dom	mala		50	ne postoji			12	smatrao da ako bi kazne	
b.) For sewage	(din/m³)						ne	ne postoji				ne	
The percentage of payment for drinking water in last 5 years	(%)		75			svi plate, jedino 5% malo kasni			65	70	40	50	
2005	(%)			22,39		95		65					
2004	(%)			23		95	82	60					
2003	(%)			21,63		95	75	70					
2002	(%)			24,19		95	70	80					
2001	(%)			22,28		95	60	90					
2000	(%)						50						
Comment													
Current production and distribution costs or procentage													
Salaries	(%)	(din/m³)	27	27,64		33	25	33	24	9	34	32,86	
Parts	(%)	(din/m³)	4	47,12		26	4	5	16	2	4	39,94	
Maintenance	(%)	(din/m³)	15	18,51		21	27	30	30	10	39	10,52	
Chemicals	(%)	(din/m³)	3	1,29		5	4	2	16	2	6	13,67	
Administration	(%)	(din/m³)	21	0,86		10	5,5	3	5	11			
Other expenses	(%)	(din/m³)	30	4,58		5	43	27	9	13	10	3,00	
Average income per household:	(din/month)		16.500,00								12000	1.200,00	
Comment												treba cene vode podici	
Average dispensable income per household:	(din/month)												

Table 1. 5. Water supply and community data

Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Adequate drinking water source data:													
What is the distance from the town centre to the next suitable drinking water sources in km?	(km)		3	22		2	6	postojeca	centar	0	15	25	
Description of this source (these sources):						nije istrazena					Javno preduzece Vodokanal ima podatke		
Name and location of source			Jaros	Sombor			Vodovod Bezdan	Vodovod Bezdan Somborski put bb	B3, B4	B4 centar B5 centar B6 centar		Somborsko izvoriste	
Depth to groundwater 1	(m)		60					60	18	5		ne znamo	
Depth to groundwater 2	(m)								18	5			
Depth to groundwater 3	(m)									5			
Expected yield well 1	(m^3/d)		35000						138	216		ne znamo	
Expected yield well 1	(l/s)							80					
Expected yield well 2	(m^3/d)								138	216			
Expected yield well 3	(m^3/d)									864			
Is there a risk of flooding?			podzemne vode	ne		ne	da	da	ne	ne		ne	
Is there a risk of pollution in case of flooding?			da	ne			da	da		ne		ne	
Legal constraints													
Who are the relevant government agencies that are responsible for planning and implementing water related projects (please list names and responsibilities)?			Direkcija za vode RS		SO Sombor (Odeljenje za komunalne delatnosti)		So Sombor, Pokrajinski sekr za poljopriv I vodopriv, Rep. Minis. Za poljopriv I vodoprivredu	lokalna samouprava, SO Sombor			Ministarstvo za Poljoprivredu, Vodoprivredu I Sumarstvo	Opstina Sombor MZ Telecka	
What are special legal constraints the municipality must consider when engaging in water projects?			Pozitivno pravni propisi republike, opstine		Zakon o planiranju I izgradnji			Zakonom obaveza lokalne samouprave			Zakon o Gradnji	Komunalni propisi, Opstinska odluka o vodosnabdevanju, Sanitarni propisi	

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Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			Sombor	Doroslovo	Aleksa Santic	Backi Breg	Backi Bonostor	Bezdan	Kolut	Ridjica	Svetozar Miletic	Telecka	sum
	Unit	SCG drinking water directives											
			da	Savet Mesna zajednica	da	da		ima, ali je ne sprovodi			DA :JP Vodokanal I MZ koje vode brigu o vodovodu	da	
Does community have investment autonomy													
Does community have tariffe autonomy			da	SO Sombor, Savet MZ	ne (saglasnost o ceni daje SO Sombor)	na predlog mesne zajednice SO Sombor odredjuje tarife	ne	drzava odlucuje			Cenu vode odredjuje Opstina-Komunalno odeljenje daje odobrenje	O Sombor-DA, Mesna Zajednica-delimicno	
What type fines are to be expected in case of regulation non compliance?			Pozitivno pravnim propisima utvrdjene novcane kazne, prekrsaji I privredni prestup		Gradjenje bez dozvole je krivicno delo						Kaznene odredbe zakona o gradnji	Nadlezna ustanova: Kaznene odredbe zakona; Potrosac: Sudska (prinudna naplata)	
What official permits need to be obtained?			u oblasti prostorno planske dokumentacije, u oblasti planske dokumentacije za izgradnju		Akt o urbanistickim uslovima, odobrenje za gradnju, prijava pocetka izvodjenja radova, odobrenje za upotrebu	Dozvola za gradjenje; UTU uslovi I dr.; urbanisticke saglasnosti I drugi					Dozvola za izgradnju, TT Uslovi, Elektro uslovi, Sanitarni uslovi	Saglasnost Ministarstva Vodoprivrede I Sumarstva, Sanitarna saglasnost, Elektroenergetska saglasnost	
Will existing permits expire in the near future?						ne						ne	
If yes, which ones and when?													

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Municipality			SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	SO Sombor	
Name of the City			**Sombor**	**Doroslovo**	**Aleksa Santic**	**Backi Breg**	**Backi Bonostor**	**Bezdan**	**Kolut**	**Ridjica**	**Svetozar Miletic**	**Telecka**	**sum**
	Unit	**SCG drinking water directives**											
Financing													
Has money been applied for to finance water related projects?			ne	ne				da		ne	nisu	da	
If yes, from which agency or institution, what for, how much and when								Mudjunarodni crveni krst				Opstina Sombor-za projekat za promenu cevovoda jer bez projekta ne mozemo konkurisati	
Have financial contributions already be granted (recent or past)?			ne					ne		ne		ne	
If yes, from which agency or institution, what for, how much and when?													
Information about official who filled the questionare													
Name and Surname			Predrag Drazic	Turkal Istvan, Komaromi Iren	Milan Vukelic	Zeljko Ilic	Zoran Miler	Milan Repac		Milivoj Stevelic	Borbas Katalin	Sipos Erika	
Position			Tehnicki Direktor	Vodoinstalater, Sekretar MZ	Sekretar Mesne zajednice	Predsednik Saveta MZ Backi Breg	Sekretar MZ	Direktor		Sekretar MZ	Sekretar MZ	Sekretar MZ	
Institution (company)			JKP "Vodokanal" Sombor	MZ Doroslovo	MZ "Aleksa Santic", Aleksa Santic	MZ Backi Breg	MZ Backi Monostor, I.G.Kovacica 26 25272 B Monostor	KP Vodovod Bezdan		MZ Ridjica, Svetog Save 52, 025 856 800	MZ "Svetozar Miletic"	MZ Telecka Trg Oslobodjenja 1, 25222 Telecka, tel 025 864 026	