

Feasibility Study Regional Solid Waste Management System Toplica District



European Agency for Reconstruction (EAR) in Belgrade

19 December 2007

Final Report

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EXECUTIVE SUMMARY

Introduction

The EAR commissioned MIASP in June 2007 to conduct a Feasibility Study to investigate and assess a proposed new solid waste regional landfill project for the Toplica district.

The main objective of this project is to improve living conditions for the people of the municipalities of Prokuplje, Žitorađa, Blace and Kuršumlija (Toplica district). Especially the existing landfill of Prokuplje creates unsafe and unhealthy situations.

This project aims at realising a new regional sanitary landfill in the rural area near Prokuplje in order to cease the landfill activities in the four municipalities and especially the one close to Prokuplje town. However, this project does not target on revitalisation of the area of the present landfill near Prokuplje town.

This feasibility study supports defining the project, and the operational and institutional arrangements required to secure financing.

Scope of the Feasibility Study

- A basis for financial project appraisal by the EAR;
- Compose a plan for the institutional, organisational and financial setting of new solid waste regional sanitary landfill near Prokuplje;
- Compose a plan for the construction and operation of the new landfill in accordance with Serbia's and EU's legal, regulatory and environmental legislation.

In 2002 the first initiatives started by the municipality of Prokuplje regarding a new city sanitary landfill because of the huge health problem due to the existing non-sanitary landfill, that is operated without a license. As of 2003 the necessary documents were prepared by the Institute "Kirilo Savić" for a new sanitary landfill. The "Utrine" site, out of seven proposed and investigated locations, was selected as the most suitable site for the new sanitary landfill.

The original idea has been changed during the period of 2003-2007 – from city to regional landfill site, and the conceptual design, the Strategic EIA (S-EIA) and the Detailed Urban Plan were elaborated and approved by the Municipal Assembly of Prokuplje on June 1, 2007. The main designs and the EIA were prepared in June 2007 and the EIA was approved by the Municipal Administration of Prokuplje -Department for Environmental Protection on September 21, 2007. The construction permit is issued on November 14, 2007.

The four municipalities reached an inter-municipal agreement on 24th of November 2006 with respect to building a regional sanitary landfill with a recycling center on "Utrine" site and to establishing the new PUC that shall manage the regional sanitary landfill and its related activities. The PUC "Čistoća" of Prokuplje municipality will coordinate all activities until the new regional PUC is established.

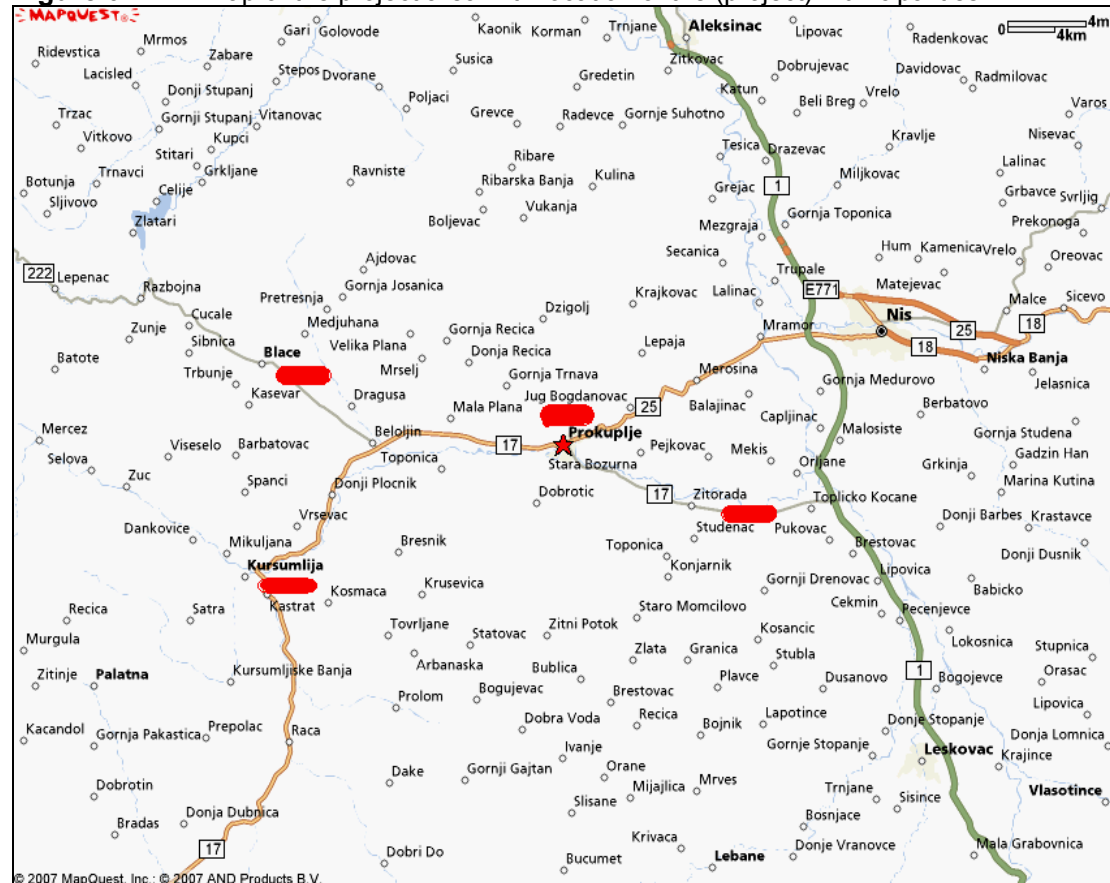


Project area

Toplica district

The Toplica district is located in central-southern part of Serbia. Seat of the District is in the city of Prokuplje. The distance from the other municipalities to Prokuplje is as follows: Žitorađa 13 km, Blace 29 km and Kuršumljia 33 km.

Figure 0-1 Map of the project area with location of the (project) municipalities



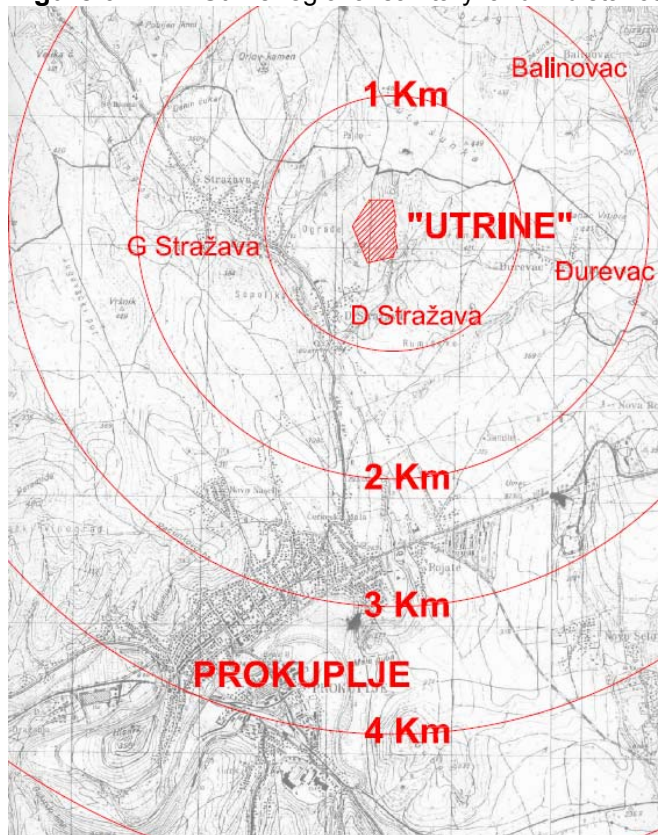
The total population of the project area according to official 2005 estimate is almost 100,000 people, corresponding to 1.33% of Serbia's total population. The Municipality of Prokuplje is the largest in the project area and according to 2005 estimates has almost 48,000 inhabitants.

"Utrine" landfill

The future landfill site "Utrine", situated in a remote valley depression, is 3.5 km (air-direction) north of the city of Prokuplje.

The transport route from the centre of Prokuplje to 'Utrine' is about 4 to 5 km, out of which 2 km via a main road, M-25, and 3 km by local non-asphalt road. This non-asphalt road needs to be reconstructed in order to become a proper access road for the landfill. The future landfill site has a surface of 12.4 hectares.

Figure 0-2 Utrine regional sanitary landfill distances from settlements and Prokuplje.



Technical analysis

The Consultant has reviewed all studies & investigations available to confirm whether this location represents the best solution both economically and environmentally in accordance with local requirements and EU Directives.

The consultant concludes that all relevant permitting requirements are fulfilled.

With respect to *waste collection* the main findings are:

- The collected waste is presently not weighed. Only the collection truck capacity in cubic meters is counted. As different types of trucks are used, a/o collection compactor trucks, this results in different specific weights of the collected wastes;
- The waste composition is not known;
- No waste growth scenarios are present;
- The waste collection vehicles are old and obsolete. There is also a lack of containers. There are no budgets to solve these shortcomings;
- The coverage of waste collection in 'urban' areas varies from 14% (Žitorađa) to more than 80% (other municipalities), whereas the rural areas are not or slightly covered;
- Separate collection of PET bottles started recently in three municipalities (except Kuršumlija). USAID donated hydraulic presses and mills for PET compression/granulating;
- Collection boxes for PET have been placed in the villages in Žitorađa and Blace;

- In all municipalities there is a informal sector, mainly Roma ethnic individuals who are involved in PET and metal collection.

Regarding the *present landfills (dumps)* in the four municipalities the main findings are:

- All landfill sites are in fact uncontrolled dump sites lacking any basic environmental protection facility;
- None of the sites are legal / have permissions;
- Non-compliance with environmental legislation;
- Problems do exist regarding fires and smell. The fires were reported to be lit by people living nearby. Leachate problems were not reported due to lack of measurements. However it can be expected that the groundwater is contaminated. Drinking water wells are not located near any of the dumpsites;
- Illegal dumping frequently occurs due to lack of permanent surveillance;
- Many small illegal dumping occurs in the rural areas. Current situation with solid waste is that "waste is dumped on the roadside, in the forest, in rivers etc.";
- Blace has developed a plan for closure of its already closed dumpsite as well as Prokuplje for closure and extension of its existing dumpsite near the city centre (until Utrine opens). No plans are under development regarding the closure of the dump sites after the new regional sanitary landfill in Utrine is open.

As to the *new regional sanitary landfill 'Utrine'*, the landfill is filled up in three phases with a volume of 330,000 m³ each. It is assumed that the regional landfill will start operating at the beginning of 2010. Its life-time is calculated to be 11 years for the first phase, 8 year for phase 2 and some 7 years for phase 3, totalling some 26 years.

Modern land filling technique of filling per cell, levelling, compacting and covering will be applied. The land filling technique is according to modern practices.

In this Feasibility Study the shortcomings and findings have been addressed a/o:

- waste scenarios have been developed;
- proposal has been made for collection vehicles and equipment;
- proposal and costs estimates are given for the closure of the dumps;

The construction of the new landfill meets all the requirements. However, the consultant makes the following remarks:

- The access road is hilly, narrow, in poor condition and is not suitable for trucks;
- The electrical connection (via a 10/0.4 kV, 250 kVA transformer station), to the grid is missing in the design;
- An impermeable top liner (final covering) is applied. A drainage layer of around 400 mm is foreseen. This will not completely fulfil EU Directive 1999/31/EC on land filling of waste. Proposed is to follow the requirements of the EU Directive on land filling of waste as to top cover measures;
- It shall be avoided to mix municipal solid waste with other wastes. Household hazardous waste, hazardous industrial waste, slaughter waste and hospital waste should be banned from the landfill. A waste acceptance procedure must be drawn up for this purpose and shall be strictly applied;
- A maximum slope inclination of 1:3 (vertical : horizontal) shall be applied.
- A top soil layer for protection of the cover construction and grassing of the top surface of the closed and covered landfill is foreseen. The material is local available

soil, but preferably a kind of soil, suitable to grow vegetation and with some resistance against erosion should be chosen. The thickness of the top soil layer shall be at least 0.5 m.

- Land filled waste produces landfill gas (LFG). The implementation of LFG extraction and utilization is worked out for the Utrine landfill but cannot be fully realised prior to 2020 (final closure of Phase I);
- An organisation needs to be formed to manage the construction and operation of the new landfill;
- Modern IT applications is required to ensure that Utrine landfill complex will be managed adequately as a system in its various aspects.

Transfer Stations

A financial/economical analysis shows that in neither of the villages a Transfer Station is cost effective. Although for Kuršumlja the difference is limited. As Kuršumlja has a strong wish to erect a Transfer Station it can be considered. A basic technical set-up with a cost estimate is given.

Recycle line (separation plant)

A basic financial/economical analysis shows that separation plant at Utrine landfill site cannot be justified.

It is recommended that the PUC's focus on primary separate collection of PET bottles by further supporting, or participating in, the on-going initiatives. Expanding the separate collection to paper/cardboard and aluminium cans shall be considered.

Composting

In order to get a good quality of compost the bio-waste (green waste from households, gardens etc.) must be gathered through a separate collection system. Bio-waste from a separation line will be too contaminated for good quality compost. As no separate bio-waste collection is foreseen in the near future a composting plant is not further considered here.

On the longer term the separate collection of the organic waste fraction with the purpose of composting it, shall be considered.

(Regional) Waste Management Strategy

A Regional Waste Management Strategy does not exist. It is recommended that all municipalities participate in drawing a (Regional) Waste Management Strategy that sets a/o targets for separate collection.

Environmental and Social Analysis

Environmental and social aspects of this project are reviewed in view of the applicable requirements. An Environmental Impact Assessment (EIA) has been carried out (Institute 'Kirilo Savić', reported in 2007).

Closure of the existing landfills will have a positive impact on the environment, health and social well-being of the inhabitants in the area. This is especially the case for the existing landfill near the centre of Prokuplje, since it is the most critical one as to health, safety and environment.

The new regional landfill will not affect surface and groundwater quality, or pose a threat to the natural ecological environment. The appliance of new landfill practices (as set forth by requirements) will prevent deterioration of air quality and deterioration of soil quality.

In order to ensure health protection through environmental protection (water, air and soil) specific procedures will be implemented during construction and operation of the new landfill.

During the exploitation phase a monitoring program will be carried out to ensure (by measurements) that the landfill does not affect the environment (especially air, groundwater and surface water). Monitoring points have to be defined. By the establishment of protective green belts, the landfill will be aesthetically adjusted to the surrounding environment.

Inhabitants of the area live at a minimum distance of 0.6 km of the landfill. The transport of waste from the municipalities of Blace, Žitorađa and Kuršumlija will take place through the town centre of Prokuplje. It is estimated that an additional number of 2 trucks will cross the town centre daily.

The construction and operation of the landfill will create job opportunities. People that are scavenging the landfills for recyclable items will lose their source of income. The tariffs for waste collection services will increase, since the operation costs of the landfill will be much higher than they are now.

With respect to the *procedures* undertaken, the EIA has been approved by the Serbian competent authority (i.e. the administration of the municipality of Prokuplje) in September 2007.

The public of Prokuplje was informed by announcement about the requirements for the EIA.

After a public hearing, the technical commission of the municipality of Prokuplje advised the administration of Prokuplje to approve the EIA. The detailed urban plan and the Strategic EIA have also undergone the similar procedure prior to being accepted.

In a so-called *gap analysis* it is judged that the EIA covers nearly all requirements set forth by Serbian legislation, and covers all requirements of the EAR. Only minor gaps were encountered for the construction and operational phase. The consultant has made remarks and proposes the following mitigation measures:

- A tentative monitoring plan (air and water) needs to be drawn up and implemented for the construction and operational phase and for the period after closure (aftercare);
- Include HSE plans (occupational health and safety) in construction protection measures. Necessary training of employees and a list of contingencies needs to be included.

It is concluded that the location of the landfill is suitable for land filling. The new landfill takes away the unhealthy and unsafe existing landfill in Prokuplje as well as the other three existing landfills (Žitorađa, Blace and Kuršumlija) and one closed landfill in Blace. The investments needed for the new landfill prevent further deterioration of the surface water quality of the Toplica river, force back health risks and offer the necessary means to a protective way of land filling.

Financial assessment Toplica district solid waste public utility companies

Main findings:

- The PUCs in Zitoradja and Kursumlija operate below 0% net profit, while the PUCs Cistoca, Prokuplje and PUC Blace generate profit from their operating activities;
- Substantial operational subsidies are received from all the municipalities to fund non revenue generating activities, such as street cleaning and green park management;
- In general, solid waste service collection rates are unsustainably low at 57% average for all PUCs combined. The collection rates are marginally above this average in PUC Prokuplje (61%) and PUC Blace (62%). The situation is much worse in the PUCs in Zitoradja and Kursumlija, which recorded collection rates of respectively 20% and 40%;
- For all the PUCs, current tariffs just cover operating costs, although the level of operational subsidies and the costs which they are supposed to cover is difficult to assess in the absence of a cost centre based financial management system
- None of the observed PUC's makes provisions for doubtful debts;
- The PUC's prepare annual plans and budgets, in conformity with guidelines provided by the Ministry of Finance. However, there is no multi year planning, integrated with this annual planning & budgeting cycle;

Main recommendations:

- Dramatically improve collection rates of all PUCs in Toplica district by i.a. establishing a bad debt policy, introducing interest payment for delays in payments, introduction of performance related/ pay for cash collectors, improving the billing department by introducing better working methods and procedures (computer software/hardware, educate the employees).
- Get the full support of the municipality to resolve outstanding debt issues;
- Clean up debtors database and introduce provisioning of uncollectible debt in accounts;
- Introduce a multi year planning, based on better projection methods. Cooperate closely with the financial departments of the Municipalities and their projected budget planning and integrate it with annual plans;
- Cost centre/cost accounting management system. The existing financial management systems have to be improved for the purpose of better cost management. This implies also a more precise definition on segregation of duties/departments. A more decentralized budgeting would also be needed;
- Through the improved financial management start considering full cost based tariffs;
- Apply adequate policy on depreciation by comparing physical database of the fixed assets and their financial register. Regular revaluation and writing off of fixed assets should be respected.

Creditworthiness assessment Toplica district municipalities

- The budgets of all four municipalities are balanced during the period 2004 to 2007;
- The districts total municipal capital investment amounted to RSD 299 million during the year 2006 (€ 3.8 million), up 100% compared to the year 2005. The planned 2007 capital investment budget is almost equivalent to that of 2006 at RSD 291 million. The municipality of Prokuplje realized more than 50% of total Toplica District capital expenditures;
- Both Prokuplje and Kursumlija municipalities have taken commercial bank loans in order to finance their capital expenditure budgets;
- The remaining legal borrowing capacity of these municipalities is therefore limited. For all municipalities combined, outstanding 2007 borrowing capacity amounts to RSD 268 million (€ 3.4 million);
- Projections of Prokuplje municipal revenue and costs show that it would have substantial financial room to finance solid waste infrastructure from its budget during the period 2008 to 2009;
- In addition to this, additional commercial borrowing is possible for Prokuplje municipality during the period 2008 to 2009, estimated to range between € 3.0 to 3.2 million and assuming a base case macro-economic scenario. The increased borrowing capacity is caused by growth of municipal revenues.

Financial Analysis

- A tariff policy is proposed, consisting of the following elements:
 - A new landfill tipping fee to be introduced in the year 2010, which is to be paid to be paid by the four solid waste collection PUCs from Prokuplje, Žitorađa, Kursumlija and Blace. The initial landfill tipping fee is proposed to be set at RSD 2,150 per ton of waste delivered at the Utrine landfill site or the transfer station and only would need to be adjusted for inflation thereafter;
 - A new transfer station tipping fee to be introduced in the year 2010, which is solely to be paid by the solid waste collection company of Kursumlija and Blace. The initial transfer station tipping fee is proposed to be set at RSD 1,500 per ton of waste delivered at the transfer station and would need to be adjusted for inflation thereafter;
 - An *additional* solid waste collection fee on top of the existing collection fee to cover incremental costs of upgraded collection equipment and monitoring costs of closed local dumpsites. Incremental costs of upgraded equipment is set at the same level as incremental unit costs, whereas it is proposed only to charge for direct monitoring costs of closed local dumpsites, without depreciation costs. The total additional charge is differentiated per municipality but in 2010 amounts to on average RSD 994/ton to cover the additional costs of upgraded solid waste equipment and RSD 156/ton for monitoring of closed local dumpsites.
- The tariff policy results in a real cumulative increase for domestic users of the overall solid waste fee of 130% by the year 2010 and a cumulative 193% by the year 2035;
- However, this tariff increase remains within affordability constraints. A maximum of 1.0% of household income is forecasted to be spent on solid waste management fees during the year 2010, up from 0.5% during the year 2006.
- The proposed tariff structure will generate sufficient cash flow for the Regional PUC to fully fund from internal sources the extension and closure of the landfill, as well as re-investment in mobile electrical/mechanical equipment of both landfill and transfer station;

- On the basis of the proposed tariff policy, a financial analysis was conducted. Assuming a macro economic base case scenario, the analysis results in a nominal internal rate of return on total invested capital (FIRR/C) of 0.5% and a financial net present value of € -6,897 thousand;
- This financial result justifies grant funding, like EU-IPA. Using the “modified formula”, a grant rate percentage of 77.6% is calculated. This would result in a maximum grant of € 8,035 thousand;
- The grant rate determination methodology applicable to ERDF/CF funded projects during the 2007-2013 programming period leads to different results. Assuming a 75% grant rate would result in a EU grant of € 5,709 thousand, while a lower nominal discount rate of 7% would result in an EU grant amounting to € 5,377 thousand;
- The project is financially sustainable, since the cumulative project cash flow in each year is positive;
- The financial rate of return on national invested capital is in principle *not* acceptable, since it is at a level lower than the nominal discount rate of 8%. FIRR/K is 5.0% and FNPV/K is negative at € -1,562 thousand. However, considering the fact Toplica district is one of the most underdeveloped regions in Serbia and bearing in mind positive external benefits and a FIRR/K which is still positive, but below the threshold, it can be argued to continue with the project;
- The sensitivity analysis shows that a variation of +/-1% in selected key variables does not cause fluctuations higher than 5% in FNPV/C. There are therefore no critical variables requiring further risk assessment;
- The project is most sensitive to variations in the discount rate;
- The project creates considerable positive external effects. The quantitative economic analysis shows on average positive results, even though not all external effects could be monetized: EIRR on average amounts to 17.4% while the low/high estimate of external benefits ranges between respectively 6.2% and 30.8%. The ENPV is on average € 11,399 thousand and the average Cost Benefit ratio amounts to 1.55;
- An optional investment in a landfill gas to electricity component shows that this activity is not feasible if the validity of the Clean Development Mechanism (CDM) which ends in the year 2012 is taken as the project horizon. However, if the carbon credits are assumed to generate revenues after the year 2012 up to the end of the project in the year 2035, the optional project component becomes financially feasible.

Project implementation schedule

The designer has proposed three construction phases for the new landfill. The consultants detailed the tasks and timetable required for implementation of phase I of the project as given in the Project Implementation and Procurement Schedule (PI&PS). Phase I is divided into two lots:

- Lot 1 (2008)
- Construction (of the 1st phase) of the regional sanitary landfill at Utrine.
- Lot 2 (2009):
 - Closure of the existing landfill in Prokuplje, Žitorađa, Kuršumljia and Blace (2 sites).
 - Construction of a transfer station;
 - Procurement of mobile waste compacting and waste collection / transport equipment including containers and laboratory equipment.



This feasibility study proposes to phase the project as follows:

- **Phase I-lot 1** comprising construction of phase I of the landfill body (out of three phases) with complete infrastructure where the construction would start in 2008;
- **Phase I-lot 2** comprising construction of a transfer station with equipment, closure of the existing dumpsites, purchasing of the laboratory equipment, procurement of waste compacting and transport means on landfill site and waste collection vehicles, procurement of long-haul trucks and containers, where the construction and purchasing would start in August of 2009;
- **Phase II** comprising of construction of phase II of the landfill body and top capping and re-cultivation works of phase I;
- **Phase III** comprising of construction of phase III of the landfill body and top capping and re-cultivation works of phase II;
- **Phase IV** comprising of top capping and re-cultivation works of phase III.

Phase I is defined as the priority project. Lot 1 would be financed by the municipalities and the Eco-fund, while Lot 2 would be targeted for EU-IPA assistance.

Ultimo November 2007 the Toplica district is already in the process of procuring the detail design works for phase I, Lot 1. Contracting is expected in December 2007.

Financing and investment

- The total investment cost for phase I, lots 1 and 2 amounts to € 10,946 thousand;
- The Serbian Government's Ecofund has committed itself in writing to provide a state grant of approximately RSD 154 million (€ 1,893 thousand) to co-finance construction of the Utrine sanitary landfill;
- The Development Fund, managed by the Ministry of Economy and Regional Development, has committed RSD 120 million (€ 1,469 thousand);
- The total grant contribution (EU-IPA, others) is calculated to amount to 77.6% of eligible costs, or up to € 8,035 thousand. This amount is justified in the financial analysis by using the "modified formula" methodology. Since it is proposed to construct the sanitary landfill and other components in two lots, actual grant financing needed amounts to € 6,223 thousand;
- The municipal contribution amounts to € 1,361 thousand, which is to be allocated in the municipalities' 2008 budget;
- It is proposed that the municipal finance will be used during the year 2008 to co-finance along with the Ecofund and Development Fund, the construction and supervision of phase 1 of the Utrine sanitary landfill as well as the access road and connection to the power grid;
- Grant financing (EU-IPA, others) would subsequently be used during the year 2009 to finance 100% of the closure of the existing 5 dumpsites, purchasing of mobile equipment and auxiliary equipment, construction of the transfer station Kuršumlja and related design & construction supervision. Municipalities will finance the purchase of land for transfer station Kuršumlja.

Table 0-1 Overview investment costs Toplica District solid waste management project
(in € '000, 2007 prices)

Description	2008-2009	2020	2028	2035	Total
Access road & landfill phase I	4,891				4,891
Land acquisition transfer station	30				30
Landfill phase II/closure phase I		1,812			1,812
Landfill phase III/closure phase II			1,793		1,793
Closure phase III				1,113	1,113
Upgrade waste collection equipment	729				729
Closure existing dumpsites	3,789				3,789
Transfer station Kursumlija	703				703
Subtotal investments	10,142	1,812	1,793	1,113	14,860
Engineering, supervision, commissioning	601	84	83	52	821
VAT	203	-	-	-	203
Gross total	10,946	1,896	1,876	1,165	15,883

Table 0-2 Identified TA elements (in € '000, 2007 prices)

Regional solid waste management strategy	200
Financial and Operational Performance Improvement Plan (FOPIP)	400
Public awareness campaign	100
TOTAL in 1,000x€	700

Table 0-3 Proposed financing plan phase I (in € '000)

Grants (EU-IPA, other sources)	6,223
Ecofund	1,893
Development fund	1,469
Toplica district municipalities	1,361
TOTAL in 1,000x€	10,946

Risks

The identified high ranked probability risks are mainly related to limited management capacity & capability. This can be mitigated by training and capacity enhancement programs as proposed.

Inadequate tariff policies might endanger the financial position of the Regional PUC. Hence, it is recommended to include an agreed tariff policy and formula in an inter-municipal agreement, which also should form part of an accepted regional solid waste management strategy. In addition, it is recommended to municipal payment guarantees before start of operations.

Table 0.4 summarizes the most important financial, environmental, operational, institutional and socio-economic risks associated with the project and the project implementation. The probability that these risks will occur has been assessed, the severity of the effects has been indicated and mitigation measures are proposed.

In general the risks are limited and manageable.

Table 0-4 Risk matrix

Risk	Category Financial, Environmental, Operational, Institutional Socio-economic Human	Probability H: High M: Moderate L: Low	Adverse effect From: 1 (severe) to 5 (none)	Mitigation measures (for effects 1, 2 and 3 only)
PROJECT PREPARATION				
<i>Acquisition of the remaining land for the landfill unsuccessful</i>	Institutional/ Socio-economic	Low	5	Early start of land acquisition of proposed Transfer Station. No land acquisition for land fill required
<i>Municipalities fail to allocate funds for the project</i>	Financial	Moderate	1	Support municipalities in understanding financial requirements of the project and benefits of the project
<i>Inter- municipal Contract not endorsed</i>	Institutional	Low	4	Endorse one of the acceptable alternatives offered in the Draft Contract
<i>Public acceptance of regional scheme</i>	Institutional/Envir onmental/Financi al	Low	4	Initiate, stimulate and enhance pro-actively the public consultation process related to illegal dumping and tariff setting. Make additional TA support available
<i>Limited management capacity available</i>	Operational/ Institutional	High	2	Training and capacity enhancement programs
<i>Limited capacity of existing landfill in Prokuplje</i>	Environmental	High	1	Availability of funds in time
PROJECT IMPLEMENTATION				
<i>Poor accessibility of landfill</i>	Operational	Moderate	1	Technical and organisational support in order to realise the road in time
<i>Construction delays may occur due to longer than expected unworkable winter periods</i>	Operational	Moderate	4	None possible

OPERATION				
<i>Uncontrolled streams of not accepted waste (industrial, mining, agricultural, construction, hazardous, medical, slaughter, bulky, cars, etc).</i>	Operational	High	1	Implement regional waste management strategy. Assure alternate destinations for not accepted waste.
<i>Enforcement of illegal dumping fails</i>	Institutional	Moderate	3	Incorporate in inter-municipal agreement time action plan + timing of closure. Prepare Regional solid Waste management Plan. Amend/Prepare Municipal Decisions on Communal Arrangements.
<i>Inadequate tariff policies and payment discipline</i>	Institutional	Moderate	3	Ensure adequate tariff policy in inter-municipal agreements. Insist on municipal payment guarantees before operation of scheme. Launch Public Awareness Campaign.
<i>Low HSE standards</i>	Human	Moderate	1	Live up to proper HSE standards
<i>Emissions to groundwater</i>	Environmental	Low	2	Apply proper monitoring program
AFTERCARE				
<i>Emissions to groundwater</i>	Environmental	Low	2	Apply proper monitoring program after closure
<i>Enforcement of illegal dumping fails</i>	Institutional	Moderate	3	Apply strict control on illegal dumping. Agree on enforcement and penalties.

1 INTRODUCTION

1.1 Preliminary

The European Agency for Reconstruction (EAR) commissioned MIASP in June 2007 to conduct a Feasibility Study to investigate and assess the proposed Regional Solid Waste Management Project for the Toplica district. This would enable the EAR to consider the possibility to provide grant funds through the European Union's new financing instrument IPA (Instrument for Pre-Accession).

The Project Area (the Toplica district) comprises four municipalities: Prokuplje, Kuršumljia, Blace and Žitorađa, located in the central-southern part of Serbia.

The main objective of this project is to improve living conditions for the people of Prokuplje, Žitorađa, Blace and Kuršumljia. This objective is realised by preparing a new landfill in the rural area near Prokuplje and to cease the landfill activity close to Prokuplje town centre.

This study is only assessing the feasibility of the new landfill. This is a key measure in order to improve the living conditions for the inhabitants of Prokuplje town. This objective is realised by preparing a new landfill in the rural area near Prokuplje, to cease the landfill activities close to the Prokuplje town and in other municipalities and to upgrade the collection solid waste equipment of individual four local solid waste utilities.

At national level, construction of regional sanitary landfills is a priority in the environmental sector. Presently there are no regional sanitary landfills in the territory of Serbia. The National Waste Management Strategy (NWMS), approved in 2003, provides a comprehensive policy framework for rational and sustainable waste management in the country. The existing dumpsites in all four municipalities are categorised as sites that should be closed.

The National Waste Management Strategy is confirmed in the draft National Environmental Strategy (NES) and the corresponding National Environmental Action Plan (NEAP).

The NEAP component dealing with Waste Management for the period 2005 – 2009 identifies policy objectives and actions. The policy objectives which are most relevant for the Toplica district Regional Solid Waste Management Project are the following: to construct sanitary landfills in each region by 2014 according to the technical and operational requirements of the Landfill Directive 99/31/EC; to develop integrated waste management plans; to (safely close and) re-cultivate dumpsites that pose the greatest environmental risks and to increase recovery and recycling of packaging waste (glass, paper, cardboard, metal and plastics) to 25% of their volume.

1.2 Project objective

The **overall objective** of the project is to improve environmental protection, delivery of solid waste services and also to improve sanitary and health conditions in the municipalities of the Toplica district, particularly the existing dumpsite near Prokuplje town centre.



This feasibility study proposes to phase the project as follows:

- **Phase I-lot 1** comprising construction of phase I of the landfill body (out of three phases) with complete infrastructure where the construction would start in 2008;
- **Phase I-lot 2** comprising construction of a transfer station with equipment, closure of the existing dumpsites, purchasing of the laboratory equipment, waste compacting and transport means on landfill site and waste collection vehicles, long-haul trucks and containers, where the construction and purchasing would start in August of 2009;
- **Phase II** comprising of construction of phase II of the landfill body and top capping and re-cultivation works of phase I;
- **Phase III** comprising of construction of phase III of the landfill body and top capping and re-cultivation works of the II phase;
- **Phase IV** comprising of top capping and re-cultivation works of phase III.

Phase I is defined as the priority project. Lot 1 would be financed by the municipalities and the Eco-fund, while lot 2 would be targeted for EU-IPA assistance.

Justification for this phasing is that proposed regional landfill site is too large to be constructed in one phase and because of the need for a rapid solution for huge health problem in Prokuplje due to the existing dumpsite.

Specific objectives for phase I are:

- To provide sanitary disposal of municipal solid waste for 100,000 residents of Toplica district;
- To extend the solid waste collection coverage to 100% by 2010-2011 in urban areas.
- To improve significantly the quality of life with many indirect impacts, improved sanitation and reduced risks to public health;
- To prevent pollution of the areas in vicinity of the river Toplica;
- To provide compliance with short-term policy objectives in accordance with the National Solid Waste Management strategy and the National Environmental Strategy (NES);
- To ensure implementation of a priority project in accordance with the National Environmental Action Plan (NEAP) and National Environmental Action Plan (NES);
- To make a major step towards complying with the Landfill Directive 99/31/EC;
- To develop integrated waste management plans;
- To (safely close and) re-cultivate dumpsites that pose the greatest environmental risks;
- To increase recovery and recycling of packaging waste (glass, paper, cardboard, metal and plastics).

Scope of the Feasibility Study

- A basis for financial project appraisal by the EAR;
- Compose a plan for the institutional, organisational and financial setting of the solid waste system in participating municipalities;
- Compose a plan for the construction and operation of the regional solid waste system in accordance with Serbia's and EU's legal, regulatory and environmental legislation.

1.3 Project Development Plan and Technical Assistance

It is envisaged that the Project will be developed and prepared in 2 phases. The first phase is this Feasibility Study, and the second phase will be subject to the findings and results of the first phase.

Phase 1: Feasibility study. An assessment of the project has been made; a detailed project structure has been developed.

Phase 2: Implementation Support. Following the recommendations and conclusions of this study and to be in line with the requirements of the national authorities, the municipalities agreed to undertake the following actions:

- Elaboration of all documentation needed for construction of the proposed transfer station: The study, the evaluation and selection of the site, the Detailed Urban Plan, the EIA, Main designs with construction permit;
- Construction of LOT 1 of the first phase of the regional landfill construction;
- Elaboration of the main designs for closure of all five dumpsites.

Preparation of the tender documents for EU financing for LOT 2 of phase I and assistance in the tender process will require technical assistance.

1.4 Retrospective

In 2002 the first initiatives started by the municipality of Prokuplje regarding a new sanitary landfill because of the huge health problem due to the existing non-sanitary landfill.

The study, the evaluation and selection of a site was finalized in July 2003. The "Utrine" site, out of seven proposed and investigated locations, was selected as the most suitable site for the new sanitary landfill.

In the same year, 2003, the municipality Prokuplje started with plans to develop a regional landfill on the "Utrine" site for the Toplica district, in line with the National Solid Waste management Strategy (N-SWMS) issued in July 2003. According to this National Solid Waste Management Strategy, Toplica district with its four municipalities Prokuplje, Kuršumljia, Žitorađa and Blace and with about 100,000 inhabitants is planned to have a common regional sanitary landfill. Neither transfer station nor recycling center is foreseen in Toplica district.

The municipality of Prokuplje signed the contract in the first half of 2003 with the design Institute "Kirilo Savić" for elaboration of all necessary documents for a new sanitary landfill: The study, evaluation and selection of the site for the new sanitary landfill, the Detailed Urban Plan for the selected location, the Strategic Environmental Impact Assessment, the main designs and the Environmental Impact Assessment.

2 SOCIO – ECONOMIC CONSIDERATIONS

2.1 Socio-economic structure

Table 2-1 Geography

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumlja
Total area in km ²	88,361	55,968	2,231	759	306	214	952
Do, as % of total	100.0%	63.3%	2.5%	0.9%	0.3%	0.2%	1.1%
Agricultural area as % of total	66%	59%	53%	59%	58%	84%	40%

Source: Municipalities of Serbia 2005, Statistical Office of Republic of Serbia March 2006

Table 2-1 illustrates the main indicators of the geography of the project area. The project area includes four municipalities of Prokuplje, Blace, Žitorađa and Kuršumlja and they are territorially grouped in the Toplica district, located in the South-East of Serbia. These four project municipalities occupy approximately 2.5% of the total area of Serbia. The relative share of the agricultural area in Toplica district is lower if compared to both Central Serbia and Serbia. To the contrary, Žitorađa municipality has a substantially higher share of agricultural land than the other three municipalities.

Table 2-2 Demography

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumlja
Population 1991 census	7,576,837	5,606,642	109,608	51,808	15,209	19,223	23,368
Urban	4,126,728	3,025,802	45,439	27,777	5,106		12,556
Other	3,450,109	2,580,840	64,169	24,031	10,103	19,223	10,812
Population 2002 census	7,498,001	5,466,009	102,075	48,501	13,759	18,207	21,608
Urban	4,225,896	3,073,601	46,928	27,673	5,465		13,790
Other	3,272,105	2,392,408	55,147	20,828	8,294	18,207	7,818
Annual growth 1991-2002	-0.10%	-0.23%	-0.65%	-0.60%	-0.91%	-0.49%	-0.71%
Urban	0.22%	0.14%	0.29%	-0.03%	0.62%		0.86%
Other	-0.48%	-0.69%	-1.37%	-1.29%	-1.78%	-0.49%	-2.90%
Population estimate 30-6-2000	7,516,346	5,484,920	93,655	49,066	14,012	18,523	22,054
Population estimate 30-6-2005	7,440,769	5,427,851	99,288	47,653	13,185	17,720	20,730
Annual growth 2000-2005	-0.20%	-0.21%	-0.86%	-0.58%	-1.21%	-0.88%	-1.23%
Population density (2004, in persons/km ²)	84	97	45	63	43	83	22

Source: Municipalities of Serbia 2005, Population Census 2002, Statistical Office of Republic of Serbia

The total population of the project area according to official 2005 estimate is 99,288 people, corresponding to 1.33% of Serbia's total population. The Municipality of Prokuplje is the largest in the project area and according to the same 2005 estimates has 47,653 inhabitants, about half of the total population of Toplica district. The smallest of the analysed municipalities is Blace, with a share of only 13% of the total Toplica district population.

For Central Serbia, recorded increase in population between the census years 1991 and 2002 was negative at -0.23%. The national average for the same period was also negative at -0.10%. For the project area this negative trend in population decrease was even sharper at -0.65%. The negative trend is most significant in the Municipality of Blace, at -0.91%. In all the municipalities it could be observed that the rural population is moving from the villages to the cities, so that the urban population actually records a positive growth. However, in the Municipality of Prokuplje, the largest of analysed municipalities, this urban trend is also negative at -0.03%, which means that the population is migrating to other bigger cities in search for better employment and living conditions. The overall negative trend in the project area follows the pattern present in Serbia in general.

Population growth in the project area during the period 2002 - 2005 shows an even sharper decline if compared to the census years 1991 and 2002 with -0.86%.

The population density in the project area is 45 persons per sq. km, which is almost half below the country average of 84 sq. km. According to the 2005 estimate analysed, the project municipalities are not highly populated areas. Only the Municipality of Žitorađa with 83 persons per sq. km exceeds the country average. The lowest density is recorded in the Municipality of Kuršumljia with only 22 people per sq. km.

Table 2-3 (Un)employment

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumljia
Total employed persons (2005 average)	2,068,964	1,524,198	18,407	10,755	2,056	1,334	4,262
Do, as % of total population	27.8%	28.1%	18.5%	22.6%	15.6%	7.5%	20.6%
Do, as % of labour force	69.8%	71.0%	57.1%	59.3%	52.9%	41.4%	60.9%
Total unemployed persons (2005 average)	895,697	622,305	13,825	7,369	1,834	1,886	2,736
Do, as % of total population	12.0%	11.5%	13.9%	15.5%	13.9%	10.6%	13.2%
Do, as % of labour force	30.2%	29.0%	42.9%	40.7%	47.1%	58.6%	39.1%
(Un) Employed as % of total population	39.8%	39.5%	32.5%	38.0%	29.5%	18.2%	33.8%
Active Population age (15-64) - 2005	4,991,743	3,620,446	62,738	30,567	7,885	10,816	13,470
% of active population in total population	66.6%	66.2%	61.5%	63.0%	57.3%	59.4%	62.3%
Total unemployed persons (2005 average)	895,697	622,305	13,825	7,369	1,834	1,886	2,736
(Un) Employed as % in Active population	17.9%	17.2%	22.0%	24.1%	23.3%	17.4%	20.3%
# of adult persons receiving social welfare	220,262	150,909	4,706	1,899	1,203	1,112	492
Do, as % of total population	3.0%	2.8%	4.7%	4.0%	9.1%	6.3%	2.4%

Source: Municipalities of Serbia 2005, Statistical Office of Republic of Serbia March 2006

The 2005 data show that the number of employed people per 1,000 inhabitants for the project area is 185, which is substantially below the national, average of 278. The average employment in the project area ranges from 75 to 226 per 1,000 inhabitants. The leading municipality of Toplica district, Prokuplje, has an employment rate closest to the national level at 226 per 1,000 inhabitants, versus a national average of 278. The other municipalities are below this. According to 2005 data published by the Republic of Serbia

Development Bureau, employment in Toplica district has the lowest employment rate in Serbia. Also the total labour force (employed plus registered unemployment) as a ratio of total population is very low at 32% versus a national average of almost 40%. Especially Žitorađa has a very low total labour force with 18% of total population.

Surprisingly, the ratio of the active population (people aged between 15 and 64) compared to the total population, is not that much below the national average at respectively 62% versus 67%. Apparently a large number of people either work in the informal sector or did not register themselves as being unemployed. Although the unemployment ratio, defined as the ratio between registered unemployed and active population, is high at 22%, this is not that much worse than the national average of 18%.

Another way to assess the socio-economic situation is to analyze data on social welfare recipients. Here, we can conclude that project municipalities have social welfare recipients that at 5% exceed the national average of 3%. The worst situation is in the Municipality of Blace, where 9% of the total population receives social welfare. This would indicate that substantial socio-economic problems do exist and that simply a large number of people are not registered.

This situation is illustrated by the fact that up to September 2007, 17 socially owned companies were privatised and 10 companies were targeted to be privatised (Privatization Agency data). The largest privatised companies are:

- Prokupac, production of spirits;
- Hisar, confectionery production;
- MIN Holding, manufacturing agricultural machines, metal constructions for rail wagons and mining equipment.

In general, socially owned companies which have not been privatized so far are in bad economic position. These companies frequently do not operate anymore, or only at a level substantially below installed capacity. They frequently still formally employ people, however salary arrears are large and/or salaries are not paid at all.

Table 2-4 Employment by sector

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumlija
Agriculture, Fisheries & forestry	65,058	25,822	601	211	40	135	215
Do, as % of total	3.1%	1.7%	3.3%	2.0%	1.9%	10.1%	5.0%
Manufacturing/processing industry	490,502	361,224	5,115	2,749	710	274	1,382
Do, as % of total	23.7%	23.7%	27.8%	25.6%	34.5%	20.5%	32.4%
Energy & other utilities	45,554	36,533	435	266	30	9	130
Do, as % of total	2.2%	2.4%	2.4%	2.5%	1.5%	0.7%	3.1%
Construction	88,063	67,108	420	146	198	4	72
Do, as % of total	4.3%	4.4%	2.3%	1.4%	9.6%	0.3%	1.7%
Trade	204,730	157,063	1,377	597	209	107	464
Do, as % of total	9.9%	10.3%	7.5%	5.6%	10.2%	8.0%	10.9%
Tourism	26,964	23,347	222	70		-	103
Do, as % of total	1.3%	1.5%	1.2%	0.7%	2.4%	0.0%	2.4%



Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumljija
Logistics	115,961	89,760	574	352	30	28	164
Do, as % of total	5.6%	5.9%	3.1%	3.3%	1.5%	2.1%	3.8%
Commercial services	92,206	72,636	179	135	21	5	18
Do, as % of total	4.5%	4.8%	1.0%	1.3%	1.0%	0.4%	0.4%
Public administration & social sector	417,433	312,230	5,182	3,172	476	440	1,094
Do, as % of total	20.2%	20.5%	28.2%	29.5%	23.2%	33.0%	25.7%
Entrepreneurs & sole proprietors	522,493	378,475	4,302	3,057	293	332	620
Do, as % of total	23.0%	24.1%	22.7%	15.5%	14.3%	24.9%	14.5%
Total	2,050,854	537,146	46,118	18,186	2,056	1,334	4,262
Do, as % of total	100%	100%	100%	100%	100%	100%	100%

Source: Municipalities of Serbia 2005, Statistical Office of Republic of Serbia March 2006

When analyzing the employment number by economic sector for the project area (Table 2-4), the most striking feature is the large size of the manufacturing and public administration and social sector in overall employment, both accounting for 28% of total employment. This is considerably higher than the National average. The manufacturing share of employment is especially high in Blace and Kuršumljija municipalities.

The labour market is rather dependent on the manufacturing sector, since, a number of industries that are operational at limited level, still employ the majority of the labour force.

Table 2-5 National income 2004

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumljija
National income (in '000 RSD, nominal)	918,732,972	627,669,494	5,869,142	2,749,209	1,191,393	811,656	1,116,884
Do, as % of total	100,0%	68,3%	0,6%	0,3%	0,1%	0,1%	0,1%
Do, as % of total project area			100,0%	46,8%	20,3%	13,8%	19,0%
National income per capita	123,473	115,639	59,112	57,692	90,360	45,805	53,878

Source: Municipalities of Serbia 2005, Statistical Office of Republic of Serbia March 2006

The 2004 national income in the project area was 0.6% of Serbia's total national income. The Municipality of Prokuplje had the highest contribution to the national income of 0.3%, while other three municipalities contributed with only 0.1%. In respect to the total project area the Municipality of Prokuplje contributes with 47% of the total per capita income, municipalities of Blace and Kuršumljija with 20% and 19% respectively, and the Municipality of Žitorađa was with the lowest national income contribution at 14%.

Table 2-6 National income by sector

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Žitorađa	Kuršumlija
Agriculture. Fisheries & forestry	153,909,290	90,864,200	2,292,590	929,589	455,385	586,113	321,503
Do, as % of total	17.3%	14.5%	39.1%	33.8%	38.2%	72.2%	28.8%
Manufacturing /processing industry	259,152,928	186,741,532	1,103,849	637,389	182,937	45,812	237,711
Do, as % of total	29.2%	29.8%	18.8%	23.2%	15.4%	5.6%	21.3%
Energy & other utilities	43,053,993	9,232,455	238,321	139,460	30,661	19,711	48,489
Do, as % of total	4.8%	1.5%	4.1%	5.1%	2.6%	2.4%	4.3%
Construction	62,426,798	54,277,231	867,434	241,782	366,386	9,868	249,398
Do, as % of total	7.0%	8.6%	14.8%	8.8%	30.8%	1.2%	22.3%
Trade	219,635,212	162,631,439	775,533	428,654	91,964	121,039	133,876
Do, as % of total	24.7%	25.9%	13.2%	15.6%	7.7%	14.9%	12.0%
Tourism	16,709,320	13,517,479	126,621	54,063	14,160	6,949	51,449
Do, as % of total	1.9%	2.2%	2.2%	2.0%	1.2%	0.9%	4.6%
Logistics	91,612,237	75,344,323	410,578	278,070	41,495	20,164	70,849
Do, as % of total	10.3%	12.0%	7.0%	10.1%	3.5%	2.5%	6.3%
Commercial services	38,068,609	31,833,440	38,050	30,569	2,682	1,640	3,159
Do, as % of total	4.3%	5.1%	0.6%	1.1%	0.2%	0.2%	0.3%
Public administration & social sector	3,455,169	3,227,395	16,166	9,633	5,723	360	450
Do, as % of total	0.4%	0.5%	0.3%	0.4%	0.5%	0.0%	0.0%
Total	888,023,556	627,669,494	5,869,142	2,749,209	1,191,393	811,656	1,116,884
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The national income by sector data does not confirm the employment patterns: the agriculture contributes the largest share to the total income of the project area with 39%, and largely exceeds the national share of 17% and of the Central Serbia at 15%. The most significant share in this sector was recorded by the Municipality of Žitorađa with 72%. Second largest sector is manufacturing with a share of 19%. The latter is low compared to the high employment generated by this sector. This would indicate that either salaries paid are low and/or a large share of employees is only nominally employed.

Exceeding the national average was the construction sector with 15%, versus a national average of only 7%.

It can thus be concluded that the project area's economy is dominated by agricultural sector, but followed closely by the manufacturing and construction sectors.

2.2 General and Detailed urban plans

Urban plan

Based on Articles 39 and 54 of the Law on Planning and Construction ("Official Gazette of RS", No. 47/03), all the urban plans for the Municipality of Prokuplje were reviewed and a number of decisions were made on determining parts of the regulatory plans that

would be applied before a general urban plan is finally produced. For the purpose of building the sanitary landfill, a plan on detailed regulation of the regional sanitary landfill of the solid communal waste is made.

Memorandum on 2007 Budget and economic status of the Municipalities

By the directives of the Memorandum on the 2007 Budget (Based on the Law on Budget system, the Government adopts a Memorandum on the Budget), within its Projections for the years 2008 and 2009 and the policy on the Public finances, local communities are entitled to a share of 1.7% of total non-categorical transfers of the GDP.

The total of non categorical transfers for the year 2007 amounts to RSD 29.7 billion. The Republic of Serbia is divided in 141 municipalities and 4 cities. Municipalities are apportioned RSD 18.5 billion and the share for the 4 cities amounts to RSD 1.2 billion.

Local communities are also entitled to a share of RSD 2.0 billion of categorical transfers for financing investments in healthcare and operating of tax authorities.

Based on the above provisions, the share of non categorical transfer for the municipalities of the Toplica district for the year 2007 is in total RSD 393 million (approximately € 5 million). This is a 240% increase if compared to the total transfers apportioned for that district in 2006.

Table 2-7 Budget Transfers (RSD '000)

Municipality 1	2006 2	2007 3	Index 4 (3/2)
Prokuplje	71,259	170,088	238.7
Blace	21,419	57,890	270.3
Žitorađa	24,023	68,024	283.2
Kuršumlija	47,382	97,489	205.8
Total	164,083	393,481	239.8

Source: Serbian Bureau of Statistics

2.3 Maximum affordability waste tariffs

Surprisingly little is published about the maximum affordable level of solid waste tariffs, in contrast to water & waste water tariffs. For the purposes of this report, we use a maximum affordable level of 1.5% of *average* household income or expenditure, a figure which is used in assessing maximum affordability of a number of EU-ISPA financed waste management projects in Romania. This maximum affordable level is low in comparison to other utility charges, like electricity, (district) heating and water and wastewater. A recent study¹ sets the maximum affordability of all utility services *combined* at 25% of average household income/expenditure with the following break down per service:

- Electricity: 10 percent of household expenditures;
- Heating: 10 percent of household expenditures;
- Water and waste water: 5 percent of household expenditures

¹ *Can poor consumers pay for energy and water?*, Samuel Frankhauser, Tatjana Tepic (2005)



Table 2-8 summarises affordability levels used by various institutes or governments. Note that expenditure on waste is not included in the calculation.

Table 2-8 Benchmarks maximum affordability utility services (in %)

Source	Electricity	Heating	Water	All utility bills
World Bank (2002)	10-15		3-5	
WHO (2004)	10			
IPA Energy (2003)	10	20		
UN/ECE		15		
UK government		10	3	
US government		6	2.5	
Asian Development Bank			5	
Ukraine government				20

Source: Can poor consumers pay for energy and water? Samuel Frankhauser, Tatjana Tepic (2005)

To assess the maximum affordable level of the solid waste tariff in the project area, an estimate of the average household income is required. Since 2003, the Statistical Office of the Republic of Serbia publishes data on household income and expenditure, based on a survey of more than 4,000 households. The latest available data refer to the year 2006, which will be the basis of household income estimate for the project area in this study.

The household survey shows that the average monthly household income for Serbia during the year 2006 was RSD 35,263 (€ 446) with expenditure slightly lower at RSD 33,910 (€ 429). These data are further broken down in Central Serbia without Belgrade, Belgrade and Vojvodina, with the following results:

Table 2-9 Household income and expenditure in Serbia (2006)

Description	Republic of Serbia	Central Serbia			Vojvodina
		Total	Excluding Belgrade	Belgrade	
Income	35,263	35,771	32,422	43,102	33,939
Expenditure	33,910	34,191	32,432	38,039	33,175

Source: Communication No. 72, Statistical Office of the Republic of Serbia 30/3/2007

Largest component of income consists of salaries and wages (45%), followed by cash transfers from government organisations (state pensions, social welfare) amounting to 24%. Also, 94% of the income is received in cash. The remaining 6% is received in kind and mainly consists of natural consumption, mainly comprised of self consumed agricultural production.

Expenditures are dominated by food & non-alcoholic beverages with 39%, with the next largest item spent on dwelling and utility services (16%). The latter can be compared with the maximum 25% affordability level for utility services, although it includes expenditure on housing like rent and interest.

Unfortunately, no further breakdown of these data is available for municipalities, nor are data available showing income distribution patterns. There is however a breakdown between urban and rural population available, which shows that rural population income is 91% and urban 106% of total average income. The expenditure is even less skewed: the urban population spends 102% of the average expenditure, whereas the rural population spends 97% of the average. This would indicate that income distribution is not very skewed, assuming that the rural population would have relatively more people with a lower income than urban population.

To estimate the household income for Toplica District, the available 2006 household survey data are adjusted for salary level differences, which are known for individual municipalities. The table below summarizes gross and net salaries actually paid during the years 2005 and 2006:

Table 2-10 Nominal salaries

Indicator	Serbia	Central Serbia	Project area	Prokuplje	Blace	Zitoradja	Korsumlija
Jan - Dec 2005							
Gross salaries	25,514	25,179	15,646	16,932	10,281	24,578	12,194
Nett salaries	17,442	17,214	10,896	11,937	7,029	16,728	8,309
Jan - Dec 2006							
Gross salaries	31,745	31,509	20,112	21,691	14,196	28,424	16,378
Nett salaries	21,707	21,560	13,729	14,826	9,744	19,353	11,122
Growth rate							
Gross salaries	24%	25%	29%	28%	38%	16%	34%
Nett salaries	24%	25%	26%	24%	39%	16%	34%

Source: Communication no. 11, Statistical Office of Republic of Serbia, 23 January 2007

From the table it can be concluded that the average 2006 net salary of all municipalities in Toplica District are substantially lower than the national average at on average 37%. Large differences exist between municipalities, with the lowest net salaries being paid in Blace. Growth rate of nominal salaries in the project area is in line with the national average at 26%. Blace municipality realized the largest increase, however it came from a low absolute level.

The following approach is used to adjust the household income:

- Basis is the 2006 household income data for Serbia;
- For all municipalities the household *income* data will be used. It is acknowledged that actual expenditure data will likely be the best proxy for total available income, since people in general underestimate their real sources of income. However, since the difference between income and expenditure is very small, this study will be based on income data (cash and in kind);
- The salary component of the household income data, including pensions, is recalculated by multiplying it with the ratio between the net salary in the four municipalities of Toplica District and Serbia;
- The non salary components are assumed to be the same as the average in Serbia.

For the years 2007 and later, the household income data are estimated by escalating the data with the assumed inflation rate and real wage increase (see also chapter 5 – financial and economic analysis)

The table below sums up the result of the adjustments:

Table 2-11 Household income estimates Sremska Mitrovica and Šabac municipalities

	2005 RSD	2006 RSD	2005 €	2006 €	Increase (%)
Serbia	26,952	35,263	317	446	31%
Central Serbia without Belgrade	24,924	32,422	293	410	30%
Project Area	21,947	29,415	258	372	34%
Prokuplje	22,743	30,219	268	383	33%
Žitorađa	26,406	33,538	311	425	27%
Kuršumlija	19,969	27,504	235	348	38%
Blace	18,989	26,494	223	335	40%

Thus, *average* monthly household income in the project area is estimated to amount to RSD 29,415/€ 372 during the year 2006.

The next step is to calculate the maximum affordable tariff. Using the 1.5% threshold, the maximum solid waste tariff for the project can be estimated at **RSD 441 per month for the year 2006**. Details per municipality vary between RSD 397 and RSD 503 as detailed in the table below.

Table 2-12 Maximum affordable solid waste tariff (2006)

Municipality	HH income	Max. affordable SW tariff	
	Monthly (RSD)	RSD	%
Prokuplje	30,219	453	1.5%
Žitorađa	33,538	503	1.5%
Kuršumlija	27,504	413	1.5%
Blace	26,494	397	1.5%
Total	29,415	441	1.5%

The 2006 actual household expenditure on waste services is estimated at RSD 140 per month (including VAT), or 0.5 % of monthly household income, as set out in the table below. This would leave some room for tariff adjustments. One should, however, remember that this is an average indicator and does not necessarily reflect the affordability of waste tariffs to low income groups. On the other hand, tariffs are paid per m² floor space and not by the number of occupants or actual waste produced. Assuming that low income households live in smaller than average dwellings, their actual solid waste bill would be lower than average and thus increase the affordability of tariffs.

Table 2-13 2006 tariffs and affordability domestic users

Municipality	Average tariff per m ² /1	total invoiced per month /1	Number of households	avg tariff per HH	HH income	
					Monthly (RSD)	%
Prokuplje	2.53	1,387,710	7,496	185	30,219	0.6%
Žitorađa	2.38	30,240	142	213	33,538	0.6%
Kuršumlija	2.70	341,460	4,561	75	27,504	0.3%
Blace	2.20	212,490	1,876	113	26,494	0.4%
Total		1,971,900	14,074	140	29,415	0.5%

/1 including 8% VAT

/2 population census 2002, extrapolated to 2006

The number of households served is based on estimates from the utilities, as opposed to a calculation from total number of people served and average household sizes, since this is considered to be a more reliable estimate. Estimates for future growth in number of households will, however be based on the average size of a household as elaborated upon in the table below.

Table 2-14 2006 Size of households

Municipality	Census 1991	Census 2002	Number of HH		Average HH size		Annual growth %
			1991	2002	1991	2002	
Prokuplje	51,808	48,501	16,641	16,204	3.11	2.99	-0.36%
Žitorađa	19,223	18,207	5,441	5,167	3.53	3.52	-0.02%
Kuršumlija	23,368	21,608	7,711	7,693	3.03	2.81	-0.69%
Blace	15,209	13,759	5,098	4,873	2.98	2.82	-0.50%
Average	109,608	102,075	34,891	33,937	3.14	3.01	-0.39%

Source: 2002 Census, Statistical Bureau Serbia

The average household size in the project area is decreasing from 3.13 during the year 1991 to 3.01 during the year 2002. This corresponds to an annual decrease of 0.39%, or approximately 0.01/year. An annual decline of on average 0.39% in household size will be assumed, down to minimum of 2.7 members in a household.

For 2007, tariff increases are restricted by the National Authorities to maximum 7.5% of December 2006 tariffs. It is assumed that all utilities will increase their tariffs with this maximum percentage, so the average 2007 solid waste tariff is estimated at RSD 151/month including VAT. Because household income is expected to grow faster than 7.5%, the average share of 2006 solid waste tariffs in household income will drop.

3 TECHNICAL ANALYSIS

3.1 Project description, current level of service delivery, demand and project objectives and justification

3.1.1 Introduction

This section will analyse the technical aspects of solid waste management in the district of Toplica in Southern Serbia. Issues considered include the following:

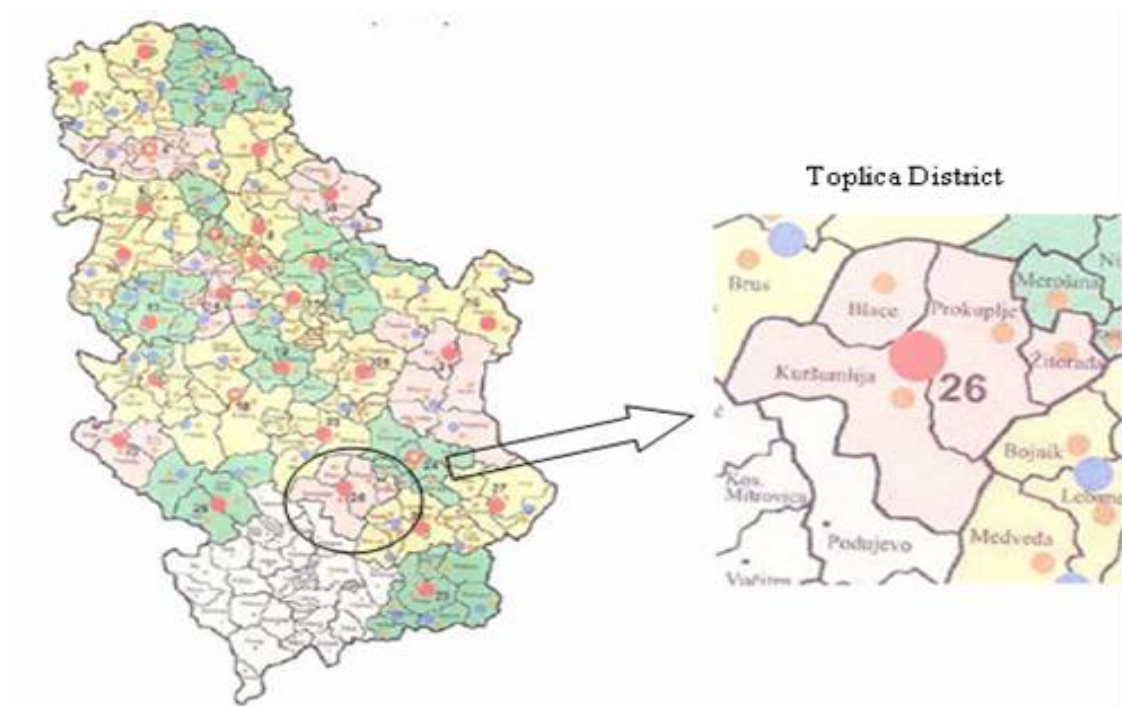
- Description of the current solid waste practises in the municipalities;
- Assessment of the dumpsites and proposal for closure;
- Assessment of and proposals for the collection, recycling and transportation system;
- Assessment of and proposals for the technical design for the new sanitary landfill.

3.1.2 Project area

Macro location

The Toplica district is located in central-southern part of Serbia (see map). It has four municipalities, Prokuplje, Kuršumljia, Blace and, Žitорађа that compromises a total of 263 villages. The total land area is 223,100 ha. It has a population of approx. 102,075 out of 46,928 is urban and 55,147 is rural (census 2002) and has been named after the river Toplica. Seat of the District is in the city of Prokuplje (figure 3.1: District map of Serbia)

Figure 3-1 District map of Serbia



The Municipality of **Prokuplje** has a land area of 75,900 ha, surrounded with Jastrebac Mountain on north, Kopaonik on west, Radan on south, and divided in a northern and southern part by Toplica River. It consists of city of Prokuplje, located along Toplica river banks and between Hisar hill on the southwest, Guba hill on the southeast, Borovnjak on the northwest and Sokolica hill on the northeast, as well as 107 villages. Total number of inhabitants is 48,501 (2002 statistics) out of which 27,673 is urban (city of Prokuplje) and 20,828 is rural. Population annual growth in the period 1991-2002 was -0.60% for the municipality, -0.03%% for urban area and -1.29% for rural area.

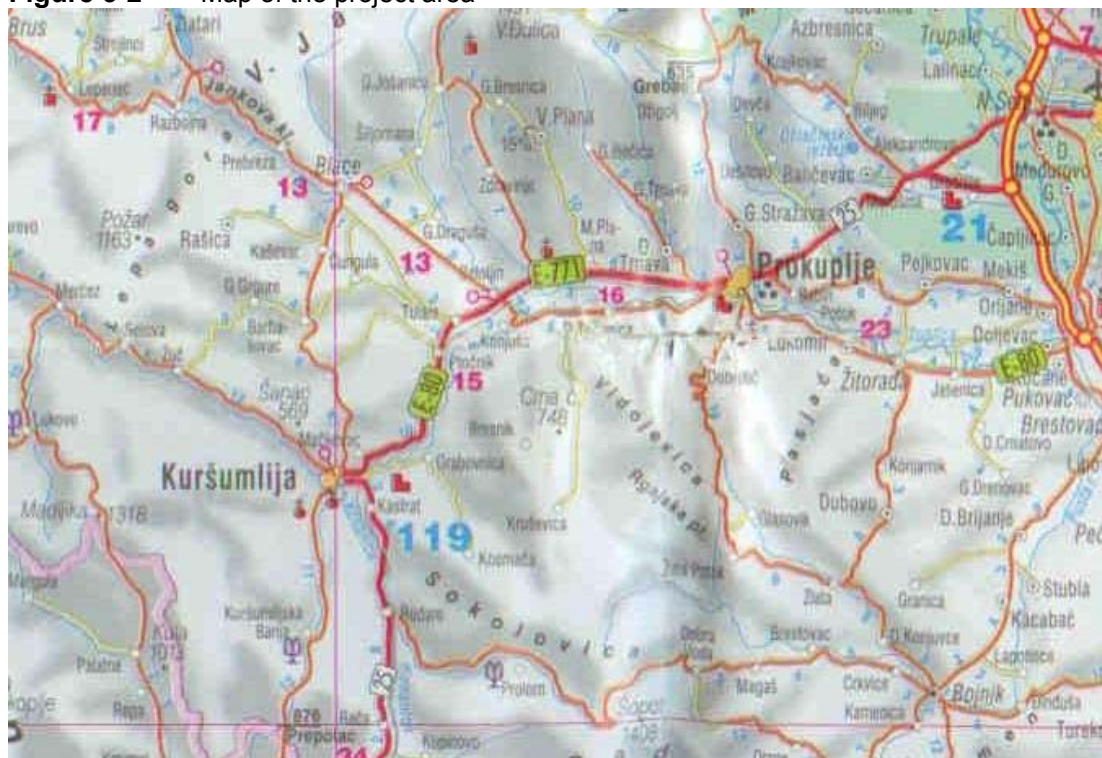
The municipality of **Kuršumlja** is located nearby the rivers Toplica, Kosanica and Banjska, on the southeast of Kopaonik Mountain, and northwest of Radan Mountain. It seats on the area of 95,200 ha. Kuršumlja municipality includes one urban (Kuršumlja) city, and 89 rural settlements. According to the 2002 census there are 21,608 inhabitants in the municipality, 7,818 rural, 13,790 urban. The population annual growth in the period 1991-2002 was -0.71% for the whole municipality, +0.86% for the urban area, and -2.90% for the rural area.

The municipality of **Blace** is located on the east of mountain Kopaonik and the southwest of mountain Jastrebac. It includes Blace city and 40 villages. In 2002, the population of the town was 5,465, while the population of the whole municipality was 13,759, out of which 8,294 rural. The land area of the municipality is 30,600 ha. The annual population growth in the period 1991-2002 was -0.91% for the municipality, +0.62%% for the urban area and -1.78% for the rural area.

Žitorađa village is located east of Prokuplje. It has a population of 3,543, the total municipal population is 18,207 (rural population settled in 30 villages). The annual population growth in the period 1991-2002 was slightly negative (-0.50%) for the municipality.

The distance between Prokuplje and Kuršumlja is 33 km, between Prokuplje and Blace is 29 km, between Prokuplje and Žitorađa is 13 km. The map of the project area is given on Figure 3.2.

Figure 3-2 Map of the project area



Micro location

The future landfill site, named “**Utrine**”, has been chosen within the borders of the Municipality of Prokuplje at the slopes and natural valley depression of Drenjak hill with an elevation between 360 and 420 m above the sea level. It is 3.5 km (air-direction) north of the city of Prokuplje 0.6 km north – east of the village of Donja Stražava and more than 1 km north – west of the village of Đurevac. Total transport route from the centre of Prokuplje is about 5 km, out of which 2 km via a main road, M-25, provided with asphalt base, and 3 km by local non-asphalt and hilly road through the village of Đurevac. By acquiring a piece of land a shortcut can be realized of some 500 m. The village Đurevac is located at a distance of 1 km. Straževska River is more than 1,000 m away from the site. There is no any water supply or monuments of culture or protected natural heritage within 1.5 km radius of the future landfill site. Within 2 km radius of landfill there are no medical-inpatient clinics, natural health resorts, food industry. No buildings are located close to the site and no residents live nearby.

The future landfill site has a surface of 12.4 hectares. The possibility of extension is present because whole area has more than 80 ha.

Figure 3-3 Utrine regional sanitary landfill distances from settlements and Prokuplje.

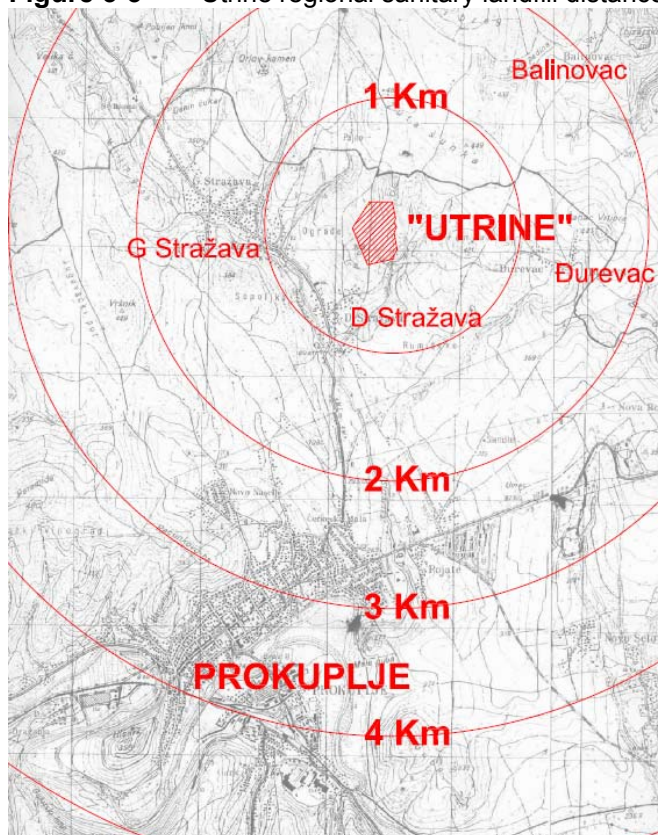


Figure 3-4 View into the valley where Utrine regional sanitary landfill will be situated



Accessibility

The length of the route measured from the city centre of Prokuplje to the new proposed landfill site of “Utrine” amounts approximately 4 to 5 km, of which nearly 3 km consists of a dirt road. This dirt road needs to be reconstructed in order to become a proper access road for the landfill. This road connects to the M-25, connecting Niš - Prokuplje – Kuršumljia.

The length of waste transport route from Žitorađa to the location would be around 17 km, from Blace 33 km and from Kuršumljia 37 km.

The transport of waste from the municipalities of Blace, Žitorađa and Kuršumljia will take place through the town centre of Prokuplje. It is estimated that an additional number of two trucks will cross the town centre daily.

The municipality of Prokuplje is raising funds for constructing a bypass road, thereby avoiding the town centre. It is till date not known if and when such a bypass road will be constructed

3.1.3 Project description and an review of the chosen location

Retrospective

In 2002 the first initiatives started by the municipality of Prokuplje regarding a new city sanitary landfill because of the huge health problem due to the existing non-sanitary landfill. The existing landfill/dumpsite, named “Dunek” opened in 1994 and is operated without a license. The landfill is located next to the city center between the sub rural settlements Babin Potok and Berilje, in the alluvium of Toplica river on an old Toplica river bend that was diverted. There are houses very close to the landfill. The sewage from these houses flows to the old river bend, as well as spring water from an old Turkish fountain that produces some 9 liters/sec that can not be stopped. These waters together with leachate from the dumpsite flows into river Toplica which is adjacent to the landfill. The ground water of old Toplica River bend is connected with ground water of the new river bend. The water supply plant of Prokuplje city uses water from the river Toplica. Residents of Prokuplje do complain over infections. Every one year they have some kind of epidemic of jaundice and pig plaque.

The municipality of Prokuplje signed the contract in the first half of 2003 with the design Institute “Kirilo Savić” for elaboration of all necessary documents for a new sanitary landfill: The study, evaluation and selection of the site for the new sanitary landfill, the Detailed Urban Plan for the selected location, the Strategic Environmental Impact Assessment, the main designs and Environmental Impact Assessment. The study, the evaluation and selection of the site was finalized in July 2003. The “Utrine” site, out of seven proposed and investigated locations, was selected as the most suitable site for the new sanitary landfill.

In the same year, 2003, the municipality Prokuplje started with plans to develop a regional landfill on “Utrine” site for the Toplica district, because National Solid Waste management Strategy (N-SWMS) was issued in July 2003. Up to the N-SWMS, the Toplica district with its four municipalities Prokuplje, Kuršumljia, Žitorađa and Blace and with about 110,000 inhabitants is planned to have a common regional sanitary landfill. Neither transfer station nor recycling center is foreseen in Toplica district.

The conceptual design for the new sanitary landfill was prepared in 2005, the geotechnical and hydro-geological researches were done in 2006, the Strategic EIA (S-



EIA) and the Detailed Urban Plan were elaborated in 2006. Both documents were approved by the Municipal Assembly of Prokuplje on June 1, 2007. The main designs and the EIA were prepared in June 2007. The EIA is approved by the Municipal Administration of Prokuplje -Department for Environmental Protection- on September 21, 2007. The construction permit is issued on November 14, 2007 (Annex 3.3)

Assemblies' decisions were issued by all municipalities in 2005 – 2006: Prokuplje – 27. 06 2005; Blace - 04. 04. 2006, Žitorađa – 07. 09. 2006, Kuršumlija – 03. 11. 2006. The Letter of Intent and an inter-municipal agreement was signed on 24th of November 2006. The main content of the signed agreement is: to build a regional sanitary landfill with a recycling center on "Utrine" site and to establish the new PUC that shall manage the regional sanitary landfill and its related activities. The PUC "Čistoća" of Prokuplje municipality will coordinate all activities till the new regional PUC is established.

Landfill site selection

The National SWM Strategy identified a group of municipalities in the Toplica district suitable to co-finance a regional sanitary landfill but the strategy does not identify suitable sites. Because of that reason the municipality Prokuplje ordered the study, the evaluation and the selection of a site. This was finalized in July 2003.

The proposed locations were:

1. "Kondželj – Beloljin";
2. "Umac";
3. "Velika Guba";
4. "Monin Breg";
5. "Šanac";
6. "Vidojevački kamen";
7. "Utrine".

Part of site evaluation and selection analysis is given in the next table.

Table 3-1 Sites evaluation and selection analysis

No	Characteristics of the location	Location						
		1	2	3	4	5	6	7
1	Geographical position	+	+	-	-	-	-	++
2	Morphology characteristics	+	+	+	+	+	+	++
3	Hydrology characteristics	+	+	+	+	+	+	+
4	Geological characteristics	+	+	+	+	+	+-	++
5	Pedological characteristics	+	-	-	-	-	+	++
6	Distance from the houses	+	+	-	+	+	+	+
7	Distance from the transmission lines	+	-	+	+	+	+	+
8	Road connection with the settlements	++	++	+-	++	+	-	++
9	Access road from the main road to the site	+	+	+	+	+	+	++
10	Connection to electric power supply and water supply	-	+-	+	+-	+-	+-	+
11	Required capacity of the landfill	+	+	+	+	+	+	++
12	Site research possibility	+	+-	+-	+	+	+	++

Note: ++ very acceptable, + acceptable, +- conditionally acceptable, - non – acceptable

Three locations: "Velika Guba", "Umac" and "Vidojevački kamen" were rejected because they did not fulfill the main necessary conditions. "Velika Guba" is not on a distance more than 1.5 km from the city Prokuplje as well as more than 500 m from the Toplica river bend. "Umac" is 400 m next to military area and it is in an area for a future gas pipe line. "Vidojevački kamen" is located in an area that is in the winter period difficult accessible due to snow.

Based on detailed evaluation the "Utrine" site, out of seven proposed and investigated locations, was selected as the most suitable site for the new sanitary landfill. The conceptual design was prepared in 2005; the geotechnical and hydro-geological researches/investigations of the site were done in 2006. The S-EIA and the Detailed Urban Plan for the regional sanitary landfill to be constructed on the site "Utrine" were prepared by the Institute "Kirilo Savić" in November 2006.

Review of the selected location

Technical assessment

The new landfill site "Utrine", located in the municipality Prokuplje, north-east of the city of Prokuplje, has been found by all four Toplica district' municipalities as the most suitable location for the regional sanitary landfill. The Consultant has reviewed all investigations available to confirm whether this location represents the best solution both economically and environmentally.

Public consultation forms an important part of the site selection process. The Consultant has reviewed the site selection process in accordance with local requirements and EBRD environmental rules for category "A"-screened projects (see Chapter 4).

The Consultant has considered whether the location is acceptable from an environmental/technical point of view based on the Serbian legal requirements and EU Directives (also see Chapter 4).

The following technical documentation has been assessed:

- The Study, the evaluation and selection of the location for the sanitary landfill for solid waste disposal for the municipality of Prokuplje, The Institute "Kirilo Savić", a.d, Beograd, July 2003;
- Conceptual design of the regional sanitary landfill "Utrine" in Prokuplje, The Institute "Kirilo Savić", a.d, Beograd, 2005;
- Design on geotechnical and hydrogeological research of the selected terrain (research executed in May 2006), prepared by "Geoprojekt", d.o.o., Niš, Enterprise for geological research, May 2006, with revision prepared by "Geotehnički biro", Niš, Enterprise for geological research, consulting and engineering, June 2006;
- Study on geotechnical and hydrogeological researches of the selected terrain (research executed in April-May 2006), prepared by The Institute "Kirilo Savić", a.d, Beograd, June 2006;
- Strategic Environmental Impact Assessment of the regional sanitary landfill "Utrine" in Prokuplje, The Institute "Kirilo Savić", a.d, Beograd, November 2006. It is approved by the Municipal Assembly of Prokuplje on June 1, 2007;
- Detailed urban plan of the regional sanitary landfill "Utrine" in Prokuplje, The Institute "Kirilo Savić", a.d, Beograd, November 2006. It is approved by the Municipal Assembly of Prokuplje on June 1, 2007;
- Cadastre – topographical review and plan of the "Utrine" site, "Geonis", Kuršumlija, 2006;
- Design on sanitation and extension of the closed existing landfill in Blace, The Institute "Kirilo Savić", a.d., Beograd, 2006;
- Main designs of the regional sanitary landfill "Utrine" in Prokuplje, The Institute "Kirilo Savić", a.d., Beograd, June 2007; The technical control of the technical

- documentation was performed by the "Urbanprojekt", a company for consulting, urban planning, designing and engineering, Čačak, June 2007;
- Environmental Impact Assessment for regional sanitary landfill, performed by the Institute "Kirilo Savić, Beograd, in June 2007. It was approved by the Municipal Administration of Prokuplje-Department for Environmental Protection, on September 21, 2007;
 - Design on sanitation and extension of the existing landfill in Prokuplje, The Institute "Kirilo Savić", a.d., Beograd, June 2007;
 - Questionnaires issued by consultant and filled in by the PUC "Čistoća", Prokuplje, the PUC "Toplica", Kuršumljija, the PUC "Blace", Blace and the PUC "Žitorađa", Žitorađa, July, 2007;
 - All documentation on the conditions for designing the regional landfill, issued by relevant Republic, Provincial and/or municipal authorities.

A list of available and relevant project documents related to the regional sanitary landfill (prepared in the period 2003-present day) is given in Annex 3.1.

The total surface area foreseen to be the landfill site is more than 12 ha. Owner is the municipality of Prokuplje. The municipal Department for Construction, Urban Planning and Housing Affairs bear the responsibility for the site. They also issued the permits etc. for the site.

The site is located at the slopes and in a valley depression of Drenjak hill, 3.5 km (by air) to the north-east of the city centre that is not ideal for the purpose of a sanitary landfill. No buildings are located close to the site and no residents live nearby.

A poor and hilly access road for trucks from the main Niš - Prokuplje – Kuršumljija road (M-25), to the landfill of approx. 3 km is present.

Geotechnical analysis of the site

The site of the new regional sanitary landfill ('Utrine' site), belong to the Toplica river basin which is surrounded by Veliki Jastrebac and Mali Jastrebac mountains on the north, Kopaonik mountain on the west, Sokolovica and Arbanaške mountains on the south and partially by Vidojevica and Pasjača mountains on the east. The designing company Institute "Kirilo Savić, Beograd, ordered and "Geoprojekt", d.o.o., Niš, undertook a geotechnical and hydrogeological researches in May 2006 for the purpose of the main design preparing.

They drilled 14 research holes with depth of 6.0 – 10.0 m below ground level and 5 research pits with depth of 0.5 – 1.5 m-ground level. Based on laboratory analysis of the samples, they concluded that the soil at the bottom of the valley consists of low plastic non-organic clay, loam, with different granulometric content (dusty, sandy, gruss). Dusty/sandy loam is at the surface of the terrain up to 1.0 – 1.3 m in depth. Below this cover layer there is sandy loam, up to 3.3 m below ground level, followed by sandy gruss up to 3.3 m and 4.7 m – ground level. Below 4.7 m there is schist. The slopes of the valley consist of sandy gruss, up to 0.8 m in depth. Below sandy gruss, there is schist.

The permeability coefficient of clay (loam) is in range of 1.01×10^{-3} to 9.65×10^{-5} cm/sec. Natural humidity of the clay is in range of 8.71 - 13.08 %. Ground water was found only in four (of 14) research holes, at depths of 0.22 m to 2.18 m below ground level. Those research holes were placed on the lowest point of the valley. In 5 research pits ground

water was not encountered. To prevent ground water pollution, the designer has foreseen a ground water collection channel that needs to be constructed at the bottom of the valley.

Permitting procedures

A description is given of the permitting procedures which have been or need to be carried out. An overview is given of the permissions received for the proposed site including the permissions or activities still required before construction and operating can start.

On the basis of the findings a plan has been prepared identifying remaining steps and timing for securing all legal and regulatory approvals.

Overview of permits

The following permits have been obtained:

- Site "Utrine" was selected and officially approved by the Assembly of Municipality of Prokuplje, on 27. June, 2005, No 06-32/2005-02;
- Detailed urban plan of the regional sanitary landfill "Utrine" in Prokuplje, done by The Institute "Kirilo Savić, a.d. Beograd, in November 2006, was accepted by Commission for planning of Municipality of Prokuplje, and officially approved by the Assembly of Municipality of Prokuplje, on 01. June, 2007, No 06-19/2007-02;
- Environmental Impact Assessment for regional sanitary landfill, performed by the Institute "Kirilo Savić, Beograd, in June 2007, was approved by the Municipal Administration of Prokuplje-Department for Environmental Protection, on September 21, 2007, No 501-58/2007-03.
- The permit for the construction of the regional sanitary landfill, issued by the Municipal Administration of Prokuplje – Department for Construction, Urban Planning and Housing Affairs, on November 14, 2007. It is according to the adopted amendments of the Law on Planning and Construction (Official Gazette RS, No. 47/2003 and 34/2006): permit for construction of regional sanitary landfill for less than 200,000 populations, which is in this case, has to be issued on the level of municipalities.

Table 3.2 (next page) gives an overview of the status of the necessary administrative actions to be taken (decisions, conditions, and permits) with the relevant authorities.

Table 3-2 Checklist of design conditions, approvals, permits and their status

Description	Available	Reviewed	Approved	Disclosed for MIASP (1)
MAIN PERMITS/APPROVALS				
Construction permit,	√	√	√	√
EIA "2007" approval	√	√	√	√
S-EIA and Detailed Urban plan, approval, 2007	√	√	√	√
Site selection approval, 2007	√	√	√	√
Main designs, revision, 2007	√	√	√	√
Water management design conditions/approval, 2007	√	√	-	√
Land acquisition	√	√	n.a.	√
OTHER APPROVALS/CONDITIONS				
Approval by the Institute for protection of monuments and cultural heritage, 2006	√	√	-	√
Conditions for environmental protection	√	√	-	√
Fire-protection conditions/approval	-	-	n.a.	-
Conditions of the Institute of Seismology, 2006	√	√	n.a.	√
Geotechnical survey, 2006	√	√	√	√
Maximum rainfall analysis	√	√	n.a.	√
National defence requirements	√	√	√	√
Opinion by the Republican Hydro-meteorological institute, 2006, 2007	√	√	√	√
Power supply requirements, 2006	√	√	-	√
Telecommunication requirements, 2006	√	√	n.a.	√
Report on work safety,	-	-	n.a.	-
Requirements for connection to the road network	√	√	√	√
Railways of Serbia, conditions, 2006	√	√	√	√
Sanitary conditions, 2006	√	√	-	√
Topographical survey, 2006	√	√	-	-

√ = OK/done,

- = not established yet,

n.a. = not applicable/relevant

(1): For documentation not made available to MIASP, the status is based on the information provided by the municipality Prokuplje.

Conclusions

The consultant concludes that all relevant permitting requirements are fulfilled.

Land acquisition

The land required for the landfill complex is proved by Detailed Urban Plan. It consists of the land (partially) with the cadastre numbers 29, 131, 132, 28/1, KO Donja Stražava, part of road 961, part of road 962 and the whole land with cadastre numbers 28/2, 30, KO Donja Stražava. The owner is the municipality Prokuplje.

According to the information provided by the Municipal Management of Prokuplje all land required for the landfill complex is acquainted, except of two pieces of land for extension of the existing access road and making a shortcut of 500 m.

3.1.4 Waste generation and composition

The main categories of waste are described and an estimate of the current and future quantities is given. A description of the existing experience with waste separation at source (household and business/industries) in the four municipalities is given as well as the market for extracted materials.

All available relevant project documents have been studied (see Annex 3.1).

Reviewing the available documents we conclude the following (main findings):

- The collected waste is not weighed. Only the collection truck capacity in cubic meters is counted. As different types of trucks are used, a/o collection compactor trucks, this results in different specific weights of the collected wastes;
- The used waste composition is based on the assumed, experienced and calculated data from the designer company The Institute "Kirilo Savić", a.d., Beograd, expressed in above mentioned documents, studies and designs, 2003 - 2007, as well as on data reporting from the municipality of Prokuplje. It is not based on waste analysis carried out in the municipalities;
- No scenarios for population growths, economic growth, increase in collection coverage, separate collection schemes, etc. are taken into account.

As the amount and composition of waste affect the designs of the technical installations/equipments and the life-time of a landfill cell, and therefore determine the financial/economical impact of the project, it is of importance to work with as accurate data as possible. Therefore a/o questionnaires were issued by the consultant and filled in by the PUCs.

By developing scenarios the waste amount and composition for the project period are forecasted (chapter 3.1.8).

The waste amount and composition

2006 waste amount data

All four municipalities have been requested to provide their 2006 data on waste collection (filled-in Questionnaires, July, 2007).

Collected waste amounts, as provided by the municipalities, for the year 2006 are presented in table 3.3.

Table 3-3 2006 waste data (collected waste), as provided by the municipalities

Municipality	ton 2006												
	Paper	Glass	Plastic	Rubber	Public areas	Textile	Metal	Organics	Demolition	Ash *)	Other	Total	kg/person/day
Prokuplje	310	676	574	62	558	52	1,793	4,375	1,775	-	1,825	12,000	1.49
Žitораđe	4	9	8	1	8	1	25	61	25	-	25	167	0.91
Kuršumlija	205	448	380	41	370	34	1,188	2,899	1,176	-	1,209	7,950	1.75
Blace	77	169	143	16	139	13	447	1,090	442	-	455	2,991	1.58
Total	596	1,302	1,105	120	1,074	99	3,453	8,425	3,418	-	3,514	23,107	1.57

*) Ash included in "Others"

The obtained figures were not complete and are NOT in line with what can be expected. Since the collected waste is not weighted, only the cubic meters are (more or less) known (volume of collection truck).

The table 3.3 figures are more or less also applied in the new sanitary landfill design study of Institute "Kirilo Savić. Obviously the municipalities supplied them with the same data.

The obtained figures were compared with previous designs and study (see above), other Feasibility Studies for regional sanitary landfills in Serbia done by the Consultant and national waste figures.

Typical waste production figures in Serbia per person per day are:

Table 3-4 Typical waste productions in Serbia per person per day

Waste quantity per person/day (kg)			
Description	Qty waste per person per day		
	1991	1995	2001
Republic of Serbia	0.60	0.62	0.72
Belgrade	0.76	0.82	0.85

/1 source: para 4.2, table 2, page 19 FS Ekoindustrija april 2006

Comparing the waste productions per person per day we conclude that with the exception of Žitorađa the daily waste production per person is a factor 2 higher than expected.

By inquiring at Kuršumljia we were learned that they had calculated the amount of waste collected by multiplying the total number of inhabitants by 1 kg/person/day. The other municipalities could not explain the high waste production per person.

As we have the opinion that the waste amounts collected are a factor 2 too high (except of Žitorađa, but they hardly collect any waste) we have adjusted the waste amounts by 50%. This give the following assumed collected waste amounts in 2006.

Table 3-5 2006 waste data (collected waste), corrected

Municipality	ton 2006												
	Paper	Glass	Plastic	Rubber	Public areas	Textile	Metal	Organics	Demolition	Ash *)	Other	Total	kg/person/day
Prokuplje	155	338	287	31	279	26	897	2,188	888	-	912	6,000	0.74
Žitorađa	4	9	8	1	8	1	25	81	25	-	25	167	0.91
Kuršumljia	103	224	190	21	185	17	594	1,449	588	-	604	3,975	0.87
Blace	39	84	72	8	70	6	223	545	221	-	227	1,495	0.79
Total	300	656	557	60	541	50	1,739	4,243	1,721	-	1,770	11,637	0.79

*) Ash included in "Others"

The table 3.5 data is used in this feasibility study and used in all further calculations.

Waste composition

The municipalities do not have a good indication of the composition of their collected waste. In the technological design documents of July 2007 and the EIA of July 2007 (3rd column), composition of the wastes of the four municipalities is given. Based on these figures the weighted average composition for "Utrine" is calculated (table 3.6).

Table 3-6 Composition data of waste

Fraction	% volume 2006	Average density t/m ³	% weight 2006
Paper and cardboard	10.3%	0.068	2.6%
Glass	4.4%	0.345	5.6%
Plastic (incl. PET)	14.6%	0.089	4.8%
Rubber	1.0%	0.140	0.5%
Public areas	9.3%	0.135	4.6%
Textile	1.3%	0.086	0.4%
Metals	6.0%	0.679	14.9%
Organic waste / green	30.3%	0.327	36.5%
Demolition	5.9%	0.684	14.8%
Ash	0%	-	-
Other	16.85%	0.245	15.2%
Total	100%	0.271	100%

All data are from Main Design, IKS, June 2007

It is noted that the metal content is high, especially when taking into account that Roma ethnic individuals take out most of the ferro metals before collection by the PUC.

It is also noted here that the category 'Plastic' is not split-up in PET and other plastics. From composition analysis executed in other towns in Serbia a PET fraction of around 1.4 %-weight can be expected.

The calculated average weight of a 1 m³ of non-compacted collected waste differs from 241 to 390 kg/m³. The calculated weighted average of 0.271 t/m³ (non-compacted) is used.

A total of about 11,650 ton is estimated to be collected and dumped in 2006 by PUCs of Prokuplje, Kuršumljija, Žitorađa and Blace.

3.1.5 Waste collection and coverage and source separation

Waste collection

Waste collection and transport in terms of the available equipment differs much between Prokuplje, Kuršumljija, Žitorađa and Blace. Only Prokuplje, Kuršumljija and Blace have collection vehicles and containers. However, most of the vehicles are old and need replacement. There is also a lack of containers in all three municipalities. They identified the need for additional containers and waste collection vehicles. Žitorađa does not have containers and collection vehicles. Only 150 households (houses) in Žitorađa have bins of 120 ltr. The PUC Žitorađa collects the waste by means of a rented tractor. The waste collection system in Blace is much better equipped. The PUC Blace has a collection vehicle and containers of 5 m³ but in insufficient numbers (20 pcs.). The PUC Kuršumljija is a slightly better equipped than PUC Blace. PUC Prokuplje has the best collection system compared to the other three municipalities, but they still have low percentage of collection coverage, lacking a large number of containers and better collection vehicles.

There are no budgets to solve these shortcomings.

Table 3-7 Numbers of waste collection and transport equipment present in Toplica district (2006)

Municipality	Containers				Waste collection vehicles			
	5 m ³	1.1 m ³	Bins, 120 l	Bull-dozer	Compactor/ haulage truck	Truck-lifter	Tractor	Other
Prokuplje		320 (urban), owner PUC, For PET: 20 pcs. of 2 m ³ and 20 pcs of 1m ³ .		1	4 + 1	-	3	2
Kuršumljija		76 owned by PUC and ??? owned by business	??? Of 80 l		3 + 1	-	1	4
Žitorađa		NEW (donation) for PET: 65 pcs of 2 m ³ , 20 pcs of 1.5 m ³ , 15 pcs of 1 m ³	150 pcs, owned by PUC, for individual household				1 on rent	

Blace	20 pcs owned by PUC, for buildings, 6 owned by ind./comm.	NEW (donation for PET: 5 pcs of 2 m ³ , 30 pcs of 1.5 m ³ , 10 pcs of 1.0 m ³			1	1	1	2
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Table 3-8 Type of collection/transport/handling vehicles present in Toplica district (2006)

Municipality	Waste collection vehicles			Collection Frequency	
	Compactor/ haulage truck	Capacity	Year of purchase	New value x 1,000 Dinar	
Prokuplje	Compactor truck:				3-6 times/container/ week Working days: 6days/week, 312 days/year
	• Volvo	8 m ³	2001	-	
	• MAN	16 m ³	1992	236,050	
	• FAP 1616	16 m ³	1984	-	
	• FAP 1414	14 m ³	1989	-	
	Tractor:				
	• LTZ	3 m ³	2002	381,736	
	• VTZ	3 m ³	2003	314,103	
	• IMT 542	3 m ³	1984	-	
	Truck-:				
	• FAP 13k,	5 m ³	1978	19,352	
	Bulldozer	-			
Kuršumlija	• Bulldozer TG 80		1990	-	1 time/container/week Working days: 5 days/week, 265 days/year
	ICD Shovel		1991	-	
	Autocleaner of the streets		2003	1,943,547	
	Compactor truck:				
	• MAN	20 m ³	2001	1,045	
	• FAP 1212	9 m ³	1978	2,819	
Žitorađa	• VOLVO	8 m ³	1979	1,726	1 container/10 days. Working days: 3 days/week, 156 days/year
	Truck:				
	• FAP 13, tipper	5 m ³	1974	130	
	Tractor :				
Blace	• IMT 359	2 m ³	2001	182	Minimum 2 times per container or box per week. Working days: 5 days/week, 268 days/year
	Tractor			On rent	
	Compactor truck				
	• FAM 13-14	10 m ³	1983	2.534.754	
	Truck-lifter				
	• Volvo	5 m ³	2002		
	Tractor				
	• IMT 549	1 m ³	1987		
	Trencher				
	• FIAT-ITACHI	2 m ³	2003	1,527,559	
	Shovel				
	• ULTA		1989		

Waste collection in the surrounding rural areas does not exist. The PUC "Čistoća" Prokuplje reported that they are missing 80 pcs. of containers of 1.1 m³. The PUC Žitorađa even has no containers, some 150 containers are needed for whole municipality.

The collected waste is transported by the collection trucks or tractors to the local dumpsite where it is dumped without further treatment. No weighing and/or any registration happen.

Collection coverage

Total number of inhabitants in municipality Prokuplje is 48,501 (2002 statistics), out of which 27,673 is urban (city of Prokuplje) and 20,828 is rural. Only 80% of the urban inhabitants, i.e. about 22,000 urban inhabitants or about 8,500 households or are served by PUC "Čistoća". Surrounding villages are not covered.

Similar collection coverage is found in municipality Kuršumljija with total 21,608 inhabitants (census 2002). PUC "Toplica" serves 12,000 inhabitants of total urban 13,790 in cities Kuršumljija and Kuršumlijska Banja (87%). Rural inhabitants of 7,818 in number are not covered, except the villages Lukovo and Prolom, because those villages are Spa centres. The number of the population in these two villages is 472 (6 %).

The lowest coverage of waste collection is in the municipality of Žitorađa. The population of municipality Žitorađa is 18,207 (census 2002) of which 3,543 inhabitants are in the village of Žitorađa, out of which only 500 inhabitants (14.11 %) are served by PUC. The rest of inhabitants in Žitorađa village, as well as 14,664 inhabitants in the surrounding 29 settlements are not covered with PUC services.

In the municipality Blace, which is dominantly a rural area like Žitorađa, the collection coverage is much better. The total number of inhabitants in Blace municipality is 13,759 (2002 statistics), out of which 5,465 is urban (village of Blace) and 8,294 is rural. Only the urban inhabitants, about 98 %, i.e. about 5,355 of urban inhabitants are served by the PUC "Blace". Surrounding villages/settlements are not covered.

An overview of the waste collection coverage in Toplica district is given in **table 3.9**.

Table 3-9 Population (ext.2004) and waste collection coverage

Municipality	Inhabitants			Waste collection coverage		
	Total	Urban	Rural	Total	Urban	Rural
Prokuplje	47,995	27,646	20,324	22,117 (46%)	22,117 (80%)	-
Žitorađa,	17,887	3,543	14,344	500 (3%)	500 (14%)	-
Kuršumljija	21,606	14,200	7,606	12,426 (58%)	12,000 (85%)	462 (6%)
Blace	13,366	5,297	8,039	5,191 (39%)	5,191 (98%)	-
Total	100,824	50,686	50,338	40,270 (40%)	39,808 (79%)	462 (1%)

Waste separation and recycling initiatives

Prokuplje

The PUC "Čistoća" Prokuplje started with PET collection in September 2005.

Table 3-10 Collection initiative in Prokuplje (July 2007)

<p><u>PET:</u></p> <ul style="list-style-type: none"> • 40 collection containers placed on strategic locations, 20 pcs. of 2 m³, 20 pcs of 1 m³. • Started with collection in September 2005. • Once per 6 months one private person, who has a press machine, is coming, buying the collected PET and press PET • The collected quantities are 3-4 ton of pressed PET per 6 months. • The selling price of non pressed PET is 7 din/kg <p><u>Metal</u> (mainly ferro) is collected primary by Roma ethnic individuals, the PUC is not involved.</p> <p><u>Paper:</u> It was planned and it was also started two years ago, but the industries/commercial stopped with delivery of paper waste to PUC very soon after the start., without any explanation</p>
--

The municipality administration gives great support to recycling activities of the Society of Disabled People "URVIS" in Toplica district. A non-used industrial building was made available by the municipality for use as a recycling centre. 37 people work in the recycling centre. USAID / Mercy Corp. has donated a 25 ton press, a mill for PET granulating and a briquette machine to the Society of Disabled People.

The briquette machine will mainly process saw dust from 10 wood mills. The briquettes are used as bio fuel.

The Society intends to serve the whole region. The public, mostly Roma ethnic individuals, can bring PET, paper, cardboard, alu. cans, metals, etc. to the recycling yard and will be paid. However most of the recyclables will come through voluntary groups like schools etc.

Figure 3-5 & 3-6 The press and the mill in the recycling centre of the Society of Disabled People 'URVIS' (Prokuplje, July 2007)



The press of 25 ton



The mill for PET granulating

The Society "URVIS" has contracts with:

- NIVES-Niš for the recycling of PET;
- UMKA, Belgrade, for the recycling of the paper/cardboard;
- Foundry, Sevojno, for the recycling of Al. cans.

It has also the contract with Recycling Agency of Republic of Serbia and official permit for recycling activities and prices, issued by the Agency.

Reported prices paid to the society "URVIS":

- 7 dinar/kg for non-pressed PET;
- 13 dinar/kg for pressed white PET;
- 9 dinar/kg for pressed green or blue PET;
- 8 dinar/kg for pressed brown PET;
- 2-4 dinar/kg for pressed paper/cardboard;
- 80-120 dinar/kg for pressed alu. cans.

Kuršumlja

The PUC "Toplica" Kuršumlja has no separate collection of waste. It has only some plans for PET collection, Roma ethnic individuals do some metal collection and sell metal waste in Prokuplje.

Žitorađa

The PUC "Žitorađa" started recently with the separate collection of PET. A grant was obtained for buying 50 PET collection containers (of 1m³, 1.5 m³, and 2m³), that have been placed in Žitorađa city. Additional 50 pcs of containers of 2 m³ are ordered for other villages in the municipality. Also, USAID-Mercy Corp. has donated a press of 15 ton (approx. 5,000 Euro) and a mill of 150 kg/hour for PET (approx. 7,000 Euro). This equipment is placed out of the PUC, in some rented building in centre of the city Žitorađa. The rent is paid by free delivery of electricity to the owner of the building.

The contract for PET selling is not signed yet. There is a contact with the "Alexander" Company from Šabac. Expected selling price are as follows:

- 9,000 dinar/ton for pressed PET;
- 380 Euro/ton for granulated PET, separated by colours, without stoppers and labels.

Expected is the collection of 0.7 ton/day of PET when all villages would be covered with collection containers. Approximately 1 ton of PET is equal to some 15,000 PET bottles of 1.5 litter. Also, the PUC planning aims at about 100 Roma ethnic individuals to involve in collecting and bringing of PET bottles to the processing location in Žitorađa. They will be paid 0.2 dinar/bottle.

Metals collection: Roma ethnic individuals do collect the metals (mainly ferro).

Paper/cardboard: The PUC started recently to collect from shops. There are plans to expand this.

Blace

The PUC "Blace" started two months ago with PET collection. It received as donation 45 containers for PET collection, out of which 5 pcs. of 2 m³ and 30 pcs. of 1.5 m³ are placed in city Blace and 10 pcs of 1 m³ are placed in villages, Also USAID-Mercy Corp. has donated a 40-ton press. The press is placed inside of the PUC building. In June 2007 it was processed 1 ton of PET.

The PUC "Blace" received two offers for buying the pressed PET: from Green Tec (Novi Sad) and from Vlada Pak (Beloljin). Vlada Pak obtained a mill for PET and an extruder for plastic foil from USAID.

Offered prices for PET are as follows:

- 13 Dinar/kg for pressed, non separated;
- 18 Dinar/kg for pressed, separated by colour, without stoppers and labels.

Roma ethnic individuals do some recycling (metal).

The PUC Blace has plans for paper/cardboard collection, but they need new containers. Also there is need for education/awareness raising of the population.

Note: The International Finance Corporation (IFC), through its Advisory Services Southern Europe, is supporting economically sound and environmentally and socially responsible recycling businesses in Southeast Europe, focusing on a/o Southern Serbia. It is implementing an integrated program geared towards enhanced competitiveness of the industry players, upgraded environmental standards, and improved social welfare of the individual scrap collectors. It is focussing on the informal sector of Solid Waste. The initiative entitled “the Recycling Linkages Project” is a three-year \$3.3 million program jointly financed by IFC and Federal Republic of Austria, Ministry of Finance. The Project is managed by IFC and addresses the financial, training, consulting, and market needs of every segment of the scrap metal, paper, plastic and glass value-chains. The objective is to promote Small and Medium Enterprise (SME) development and, in the process, improve the lives of thousands of families who make their primary income by collecting scrap materials.

The (not yet published) draft assessment reporting¹⁾ (Oct. 2007) gives recommendations for a program that shall achieve the following goals:

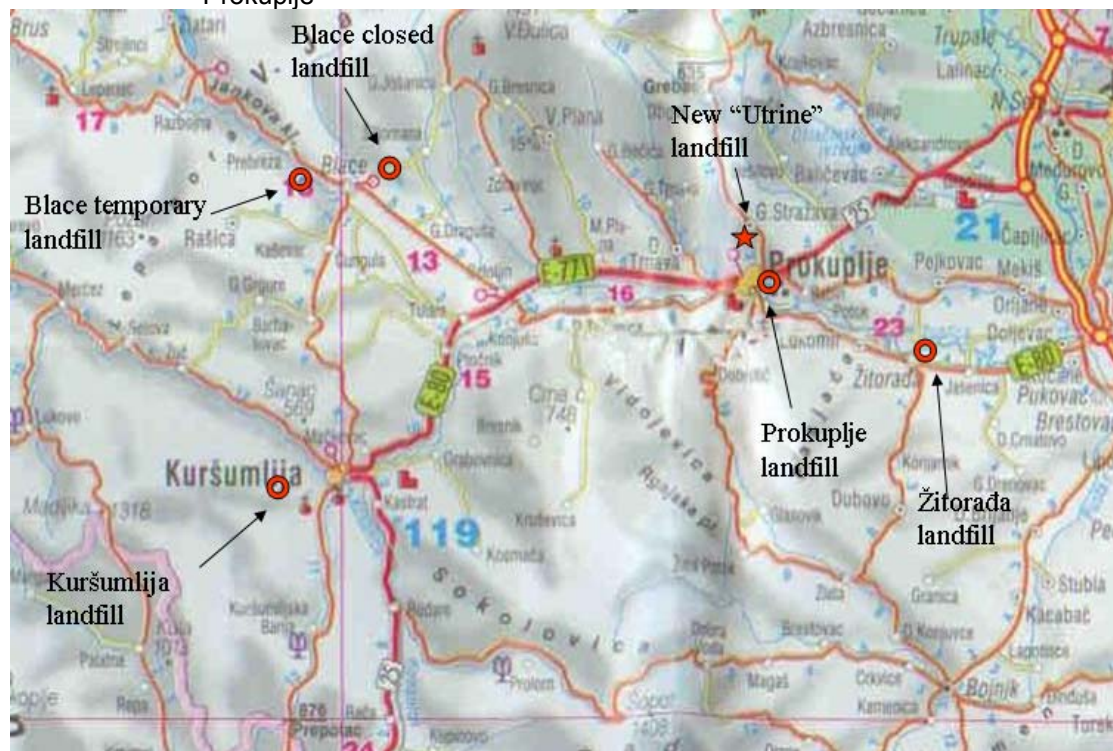
- Facilitate sustainable improvement in the livelihoods of (Roma) pickers, small junk shops, and other key actors;
- Support the Roma collectors and junk shop owners in their professional identities with different modes and types of training, capacity building, coaching, technical support, access to financing instruments, and related activities. testing strategies for supporting and encouraging collectors to enter new niches in a sustainable way;
- Facilitate changes in the enabling environment, including municipal policymaking and practice;
- Facilitate access to finance for the Roma informal sector.

This study is focussing on the formal sector of Solid Waste but is aware of and takes into account the existence of the informal sector in a/o Toplica district

1) *“Needs of Roma Collectors and Other Stakeholders in the PEP SE Region for Training, Technical Assistance and Financial Services for Programmatic Response”, Final Draft Report and Action Plan by WASTE, Gouda, the Netherlands and DURN, Belgrade, Serbia. October 2007*

3.1.6 Assessment of the present landfills and the inventory of the SWM system in Prokuplje, Žitorađa, Kuršumlija and Blace

Figure 3-7 Locations of the present landfills and routes to Utrine landfill site near Prokuplje



The characteristics of the landfill sites are given in the table on the next page.

Table 3-11 Characteristics of Prokuplje, Žitorađa, Kuršumljija and Blace landfills

Prokuplje,	Žitorađa	Kuršumljija	Blace
Located next to the city centre on an old Toplica river bend that is diverted. Houses of Gypsies next to landfill, some have been broken down (see photo underneath)	Near village/ near Toplica river (no flooding danger) There are many small illegal dump locations in the municipality.	The landfill is located 7 km from city to west in mountain area in a valley.	The in July 2005 closed site is approx 2 km from city (east of city), good access road. No permit. Closed by the Municipal Environmental Inspection in July 2005.
			
View along landfill towards city centre	Entrance of Žitorađa landfill	View to site	View from access road
Opened: 1994 (no license)	Opened: 1991 (no license)	Opened: 2001 (no license)	Opened: 1975 (no license)
Size: Approx. 16.5 ha, height: approx. 5 - 6 m	Size: 2,000 m ² (length: 150 -200 m, width: 4- 12 m, height: 2 m)	Size: 21,000 m ² , length: approx. 160m Width: approx. 130m, capacity (volume): approx 125,000 m ³	Size: 0.8 ha (20 x 400 m)
General site remarks: No fence, gate present, guard during daytime, located between present and old river bed (natural barrier), good access road exists, no drainage, no degassing wells, daily covering	General site remarks: No fence, no gate, no security. Relatively good access road exist, no drainage, no degassing wells, No covering with inert material	General site remarks: Fence, gate, security (daytime) and access road exist, no drainage, no degassing wells, no daily covering with inert material	General site remarks: No fence, no gate, good access road exist, no drainage, no degassing wells, no covering with inert material. Site closed since July 2005
Type of waste: Household waste + some industrial waste. Recently the dumping of slaughter waste ceased.	Type of waste: Municipal waste only.	Type of waste: Municipal waste only. Some industrial and limited (non harz.) medical waste. No slaughter waste /	Type of waste: Household waste, very limited medical waste. No industrial nor slaughter waste

The local hospital dumps their waste (in containers) on the landfill. It is supposed not to contain hazardous waste.		dead animals.	
Equipment on site: 1 bulldozer, 1 shovel	Equipment on site: None	Equipment on site: Municipal bulldozer is out of order, a bulldozer is rented	Equipment on site: only shovel, trencher
<ul style="list-style-type: none"> Leach No drainage. River short distance. Leachate will flow to this river. Groundwater of old Toplica river bend is connected with the new river bend. 	<ul style="list-style-type: none"> Leachate Will infiltrate the sand bottom / flows to river. No data available. 	<ul style="list-style-type: none"> Leachate Reported not to be a problem, will infiltrate the bottom (no river nearby). No drinking water wells nearby. 	<ul style="list-style-type: none"> Leachate Infiltrates into bottom. No groundwater data available. Recently 2 piezometers installed
<ul style="list-style-type: none"> Fires No. 	<ul style="list-style-type: none"> Fires Often, reported to be lit by people. No gas ventilation wells present. 	<ul style="list-style-type: none"> Fires Yes, occasionally (in winter month due to ash) No gas ventilation wells present 	<ul style="list-style-type: none"> Fires Occasionally, recently there was a large fire (see photos)
<ul style="list-style-type: none"> Smell Yes, complaints, depending on wind direction 	<ul style="list-style-type: none"> Smell Yes 	<ul style="list-style-type: none"> Smell Yes, esp. complaints when there is a fire. 	<ul style="list-style-type: none"> Smell No, closest residents at 200 m (covering applied)
Closure plan: Yes; plan has been worked out. Covering with 50 cm soil and re-cultivation/water drainage to river, gas ventilation New part will be develop using a bottom liner (costs: estimated 92 million Dinar)	Closure plan: No.	Closure plan: No. The ECO fund has been approached for a sanitation design. 60% (700,000 Dinar) of required budget was allocated, however the municipality is not able to finance the remainder 40% (500,000 Dinar+ VAT).	Closure plan: Yes, sanitation design prepared ((levelling, covering with clay, gravel/drainage layer, channel for leachate →evaporation & re-injection, fence/gate etc.). Estimated closure costs: 8.3 million Dinars). Trying to get ECO funding. Hope to be able to proceed with land filling after the sanitation till opening of the new regional sanitary landfill in Prokuplje.

Conclusions

Summarising the main findings:

- All landfill sites are in fact uncontrolled dump sites without any basic environmental protection facility;
- Non of the sites are legal / have permissions;
- Problems do exist regarding fires and smell. The fires were reported to be lit by people living nearby. Leachate problems were not reported due to lack of any measurements or whatsoever. However it can be expected that the groundwater is contaminated. Drinking water wells are not located near any of the dumpsites;
- Non-compliance with environmental legislation;
- Illegal dumping frequently occurs due to lack of permanent surveillance;
- Many small illegal dumping occurs in the rural areas Current situation with solid waste is that "waste is dumped on the roadside, in the forest, in rivers etc.";
- Blace has developed a plan for closure of its already closed dumpsite as well as Prokuplje for closure and extension of its existing dumpsite near the city centre. No plans are under development regarding the closure of the dump sites after the new regional sanitary landfill in Prokuplje is open;
- Separate collection of PET bottles started recently in all three municipalities (except Kuršumljia). USAID donated hydraulic presses and mills for PET compression/granulating. USAID also donated a briquette machine for saw mill waste in Prokuplje. Collection boxes for PET have been placed in the villages in Žitorađa and Blace. With the exception of Prokuplje no sale contracts have been signed yet.

According the Serbian landfill classification system the (official/public) disposal sites of Prokuplje, Žitorađa, Kuršumljia and Blace have to be classified as K4: "*Public deposit sites that do not fulfil any minimal protection measures*".

3.1.7 Closure of Prokuplje, Žitorađa, Kuršumljia and Blace landfills, monitoring and after-care

As the municipalities of Prokuplje, Žitorađa, Kuršumljia and Blace have agreed on erecting a regional sanitary landfill in Utrine, 3.5 km distance from the city of Prokuplje, their present landfills (dumps) will be put out of operation. Guidelines and conditions for the environmental sound closure of these landfills have been prepared for application by the municipalities.

The guidelines and conditions underlining the steps and related costs necessary to undertake the following tasks have been prepared in order to:

1. minimize the environmental risks related to the landfills;
2. recover as much as possible the areas for alternative utilizations;
3. rehabilitate and design the lay-out of the areas in such a way to prevent the illegal dumping of waste.

In the Toplica region (the project area) there are four (4) existing municipal landfills (see map in figure 3.1) in operation (Prokuplje, Žitorađa, Kuršumljia and Blace) and one closed landfill (in 2005, Blace). The operational (municipal) landfills serve part of the population for disposal of their waste. The waste is collected by the PUC's of the municipalities. Apart from the four municipals dumps, many illegal dumpsites are present in the region.



Our inventory of the landfills (see Annex 3.2: Site visit report) shows that none of the sites meet the national and international standards for sanitary landfills. The existing landfills are not equipped with environmental protection measures. At none of the sites, a weighbridge is installed. Monitoring of for instance leachate generation, groundwater and surface water quality, is not carried out. Only Prokuplje has a limited number of piezometers in place. Fires occur at several sites and the smell of waste from landfills causes nuisance depending on the direction of the wind. Rodents are in abundance present around the sites. No drinking water wells are close to the landfills.

In the following tables some characteristics of operating and closed landfills are summarized.

Table 3-12 Prokuplje landfill characteristics

The types of wastes	Household waste + some industrial waste. Recently the dumping of slaughter waste ceased
Period of usage and capacity for the next period	1 – 2 more years using new section that will be develop (using a/o. a bottom liner)
Size	Covered area: 16.5 ha
Quantity of waste disposed	Approx. 800,000 m ³
Description of the site (hydrogeology and geology)	No data, between old and new river bend, in former river bad, most likely over alluvial deposits.
Operation and control	Daily coverage by soil
Recordkeeping	No record keeping logbook
Mitigation measures	Fence: No, natural barrier (old and new river bend) Liners: No Groundwater protection: No, (2 piezometers installed) Leachate collection and removal: No Landfill gas collection and removal (venting): No Fire fighting system on site: No
Equipment	Bulldozer and shovel, always present on the site
Access road	Good access road
Expansion possibilities	None.
Others	Located directly near city centre between old and new river bend (see map figure 3.8)

Figure 3-8 Map with Prokuplje landfill location

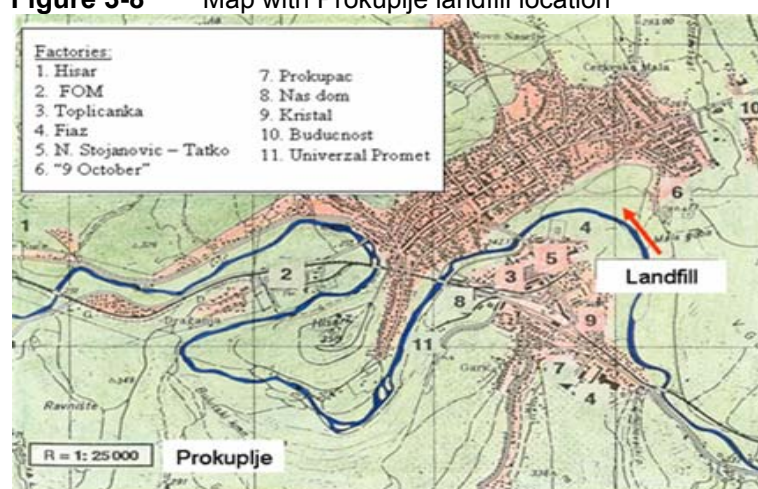


Table 3-13 Žitorađa landfill characteristics

The types of waste	Household waste
Period of usage and capacity for the next period	Used or over 10 years; limited expansion possibilities
Size	2,000 m ²
Quantity of waste disposed	4,000 to 5,000 m ³
Description of the site (hydrogeology and geology)	No data on geology & hydrology.
Operation and control	No specific measures taken
Recordkeeping	No.
Mitigation measures	Fence: No, sign nor a gate Guard house: No Liners: No Groundwater protection: No Leachate collection and removal: No Landfill gas collection and removal (venting): No Response system in case of the fire: No
Equipment	No full time bulldozer. No covering
Access road	Relatively good access road with steep grade. Located next to Toplica river, however no danger of flooding
Expansion possibilities	Unlikely
Others	Frequent fires

Table 3-14 Kuršumljija landfill characteristics

The types of waste	Municipal waste + some fruit waste
Period of usage and capacity for the next period	Since 2001, till opening of Utrine regional landfill
Size	Total: 21,000 m ²
Quantity of waste disposed	125,000 m ³ (total capacity)
Description of the site (hydrogeology and geology)	No data, no survey conducted (located in mountain area)
Operation and control	The waste is being covered by soil irregularly
Recordkeeping	None
Mitigation measures	Fence: Partly fenced, Guardhouse present: guard during daytime Liners No Groundwater protection: No Leachate collection and removal: No Landfill gas collection and removal: No Response system in case of the fire: No
Equipment	No bulldozer (out of order), for covering, it has to be rented
Access road	Access via mountain road
Expansion possibilities	Limited
Others	-

Table 3-15 Blace – (temporary) landfill characteristics

The types of waste	Household waste, very limited non-hazardous medical waste.
Period of usage and capacity for the next period	Since June 2005, full: end of 2007
Size	20 acres (now 80% filled), height: 1.5 m
Quantity of waste disposed	20,000 m ³ (till July 2007)
Description of the site (hydrogeology and geology)	Located on former sludge drying bed near river Botasnica
Operation and control	No specific measures taken; the waste is daily covered by soil
Recordkeeping	None
Mitigation measures	Fence and gate: Yes Liners No Groundwater protection No Leachate collection and removal No Landfill gas collection and removal No
Equipment	Shovel & trencher
Access road	Good access road
Expansion possibilities	No.
Others	-

Table 3-16 Blace landfill characteristics, closed in July 2005

The types of waste	Household waste, very limited non-hazardous medical waste.
Period of usage and capacity for the next period	1975 – July 2005
Size	0.8 ha (20 x 400 m)
Quantity of waste disposed	150,000 - 250,000 m ³
Description of the site (hydrogeology and geology)	No data, no survey conducted
Operation and control	No specific measures taken; the waste was covered by soil once a month
Recordkeeping	None
Mitigation measures	Fence: No, no clear sign and no gate Liners: No Groundwater protection: No Leachate collection and removal: No Landfill gas collection and removal: No Response system in case of the fire: No
Equipment	None
Access road	Along local road
Expansion possibilities	Yes, approx. 25,000 m ³
Others	Recently 2 piezometers installed Closure and expansion design made (levelling, covering with clay, gravel/drainage layer, channel for leachate → evaporation & re-injection, fence/gate etc.). Estimated closure costs: 8.3 million Dinars

The 2003 National Waste Management Strategy of Serbia, including the program of harmonization with the EU classifies four categories of deposit sites (table 3.17):

Table 3-17 Classification of deposit sites according the National Waste Management Strategy of Serbia

Classification	Characteristics
K1	Big sanitary deposit-sites with complete equipment (draining systems and bottom sealing, systems for filtrate and gas monitoring and control on a site)
K2	Official disposal sites which may be used during long periods, provided they are reclaimed and reorganized in compliance with EU standards (Sites of Beograd, Subotica, Zrenjanin, Trstenik, Kruševac, Sombor, Novi Sad). Some of the above disposal sites are characterized as some EU disposal sites (for ex. They have draining systems, are available, have gates and reception facilities, etc.)
K3	Official disposal sites - landfills which may still be used up to 5 years, provided renovation is done, with minimal prevention measures. In the <i>National Waste Management Strategy</i>
K4	Public deposit-sites – landfills not fulfilling minimal protection measures, completely full, which should be immediately restored, closed and re-cultivated

None of the four landfills complies with basic environment protection requirements of Serbia. Applying the classification to the landfills of Toplica region do all qualify in the category K4 “*Public deposit sites that do not fulfill any minimal protection measures*”.

However, the rating system is obsolete in terms of landfills in Prokuplje as the Prokuplje PUC improved its landfill (regular covering, expansion plan with bottom liner). In addition, all municipalities report significant problems in stemming illicit dumping as illicit dumps are present in all municipalities.

The lack of financial resources is one of the problems related to the management of the existing landfills. Generally spoken at the **dumps sites** there is a total absence of basic site management while at **landfills** some form of site management is practiced. Further, dumps have in most cases come to existence in a spontaneous manner while for the establishment of landfills a planning process has been followed and in several cases a landfill has been established according to some form of design. The terms dump and landfill are however not used very consistently. Therefore all four sites are considered as landfills, not all planned but with a specific level of site management.

The existing landfills need to be closed just after the Utrine regional landfill will start operations. This chapter describes the measures which need to be taken. Before measures will be taken, the sites need to be investigated in more detail in order to decide on the scope of measures, and assign the budget needed for these measures. Geo- and hydrogeotechnical research and leachate and groundwater analysis might be required

The period for implementation of the measures is expected to be 1 to 3 years after closure, including investigations, technical design, construction permits and implementation of the civil works. The “after-care period” starts after finalization of the civil works.

Based on the occupied area and the volume of waste, the existing landfills can be divided in three categories:

Table 3-18 Existing municipal landfills

Category	Municipality	Area (m ²)
Small landfill	Žitorađa	2,000
	Blace temporary site	2,000
	Blace closed site	8,000
Medium landfills	Kuršumlja	21,000
Large landfills	Prokuplje	165,000

The risk for the environment depends on

- waste characteristics;
- thickness of the waste layer/steepness of slopes;
- site management (a/o covering practices), and
- vulnerability of the environment.

At all sites the environmental risks are in particular related to groundwater contamination due to infiltration of leachate and the landfill gas emission (strong green house gas) together with the risk of fires with the consequent pollutants to the air.

Legislation

For the selection of landfill sites and the landfill operation guidelines were prepared in 1992: *Rulebook on criteria for determining a location and arranging landfills for waste material* (No. 110-00-000-10/92-04, Belgrade, Ministry for Environmental Protection, 26th June 1992), further called “Rulebook”.

The existing landfills have no legal status. None of the landfills do have an operation permit or a construction permit although they have a municipal permission to operate. There is no reporting of the involvement in legal disputes as e.g. the landfills are not selected nor operated on a legal basis.

The Rulebook prescribes criteria for locations and protective measures for municipal solid waste landfills. Hazardous waste is excluded. Protective measures consist of technical measures against instability, bottom liner (if no barrier available at site), fences, collection of storm water and leachate, landfill gas collection wells, daily cover, separation of solid industrial waste, groundwater monitoring wells and a final soil cover of 0.3 to 0.5 meter.

With regard to the current groundwater norms in Serbia related to remediation of the existing landfills and contamination prevention, the following can be applicable:

The mentioned Rulebook itself specifies that:

The Rulebook (1992)

Article 4:

A new landfill located on the terrain with greater permeability than 0.00001 cm/s will be secured in order to protect underground water with clay layer of 0.5 m or with plastic foil.

Furthermore the *Article 11:*

A of the same Rulebook states that a *landfill may not be located on:* On land within inner sanitary protection zone of potable water source and on land where the highest seasonal underground water table is 2 m from the bottom of a landfill and terrain with permeability higher than 0.00001 cm/s;

Based on the site reconnaissance and the existing information it appears very unlikely that the abovementioned prescribed protection measures were implemented in any of the concerned registered landfills.

Groundwater that is used for potable water supply without additional treatment, should comply with the Rulebook on potable water quality (Official Gazette of the FRY, No. 42/98), which further generally complies (except for a few water quality parameters) with the corresponding EU standards.

With regard to possible adverse effect that leachate or water infiltration through the existing landfill body and dumped waste may have on underground water quality in the landfill zone, the following general procedure is recommended to be followed:

1. Check compliance of a specific landfill with the abovementioned requirements and thereafter make preliminary assessment of likelihood of groundwater contamination;
2. Check the status of the concerned aquifer, i.e. whether it is used or intended for potable water supply or as a natural mineral water source;
3. Collect, systemize and analyze all relevant existing data on recorded groundwater quality and hydro-geological features;
4. Determine the original groundwater quality status – i.e. before the existing landfill started operation by using historical data, measurements, or using appropriate hydro-geological computer simulations and modeling;
5. Establish current state of the environment – underground water quality, pollution status, by monitoring of investigation wells, pollution transport modeling and carry out analysis of possible long-term effects on underground waters of the existing landfill, as it is now, and after being closed;
6. Prescribe rehabilitation and protection measures that would help to establish and maintain in a long run the original or required (for water supply and other) underground water quality.

With regard to possible pollution of groundwater, the effects of Natural Attenuation (NA) shall be taken into consideration. The main natural processes to be considered are:

- Microbiological decay and transformation of organic pollutants;
- Chemical precipitation of heavy metals;
- Sorption to organic matter and to silt particles.

Results from investigations in The Netherlands (The influence of Natural Attenuation (NA) on the risks and aftercare of abandoned landfills W.J. van Vossen, J. van der Ben, H. Slenders, J. van der Waarde, Sardinia Congress Proceedings 2001) show that in general the concentrations of contaminants are very low, even in the landfills itself. Only anaerobically difficult degradable compounds (benzene, naphthalene) are more than incidentally found in the landfill body itself. Outside the former landfills concentrations of both contaminants and nutrients are very low, e.g. concentrations of heavy metals in leachate and leachate plumes often are lower than background concentrations.

INVESTIGATION OF LANDFILLS

Introduction

Landfills in the current technical conditions represent a potential hazard for the pollution of surface water, ground water, soil and air. The landfills create an intrusive aesthetic effect in the natural environment. The landfills shall be investigated in order to obtain data for the decision-making process.

For the municipal landfills the following tasks need to be carried out:

- Evaluation of existing data;
- Topographic measurements and preparation of detailed digital topographic lay-out;
- Groundwater investigation;
- Measurement of leachate characteristics in case of leachate flow to the surface water;
- Geotechnical investigations (where needed).

A risk analysis shall be made to define the measures to be taken during the closure and aftercare period.

Evaluation of existing data

Existing data shall be evaluated. The existing data consist of waste characteristics, site investigation reports, operational plans and reports, aerial pictures and site pictures, and available monitoring data. The existing data shall be filed per separate landfill and a summary of the results shall be reported.

Topographic measurement

The topographic measurements shall be carried out at the landfill and the surrounding area, to prepare digital map of the landfill site. The map is to be used for preparation of the technical design of the landfill closure activities, and shall include melioration ditches and surface water in the vicinity of each landfill.



Groundwater investigation

For the landfills field investigations will be necessary. According to the Rulebook at least 3 piezometric bore-holes are to be constructed during the landfill operation period, one on each side, and one down-stream from a landfill where samples should be taken 2 times a year.

None of the existing sites uses the required monitoring system. To investigate the groundwater before closure of the landfill, 1 permanent monitoring well upstream of the landfill and an average of 3 permanent monitoring wells downstream shall be installed at each site.

Each well will contain a piezometer at least two meter below the minimum groundwater level, in which groundwater samples can be taken. Additional to the sampling of groundwater the following field measurements need to be executed: temperature, acidity (pH) and conductivity (Ec). The other analyses shall be executed in the laboratory and are focused on expected contamination: chloride, sulphate, ammonium, metals, barium, volatile aromatic hydrocarbons and halogenetic organic hydrocarbons, extractable organic halogens, phenol-index, nitrate, total organic carbon, sodium and bicarbonate.

The results of the groundwater investigation shall be assessed by using the national groundwater limit values, taken into account processes such as natural attenuation. Depending on the results of the investigation, further steps shall be taken where needed.

Leachate characteristics

If site visits and existing data show that leachate can be observed at the landfill site flowing into surface water, samples shall be taken in ditches/surface water downstream from the landfill, to determine the leachate characteristics and the effects to the surface water. Samples shall be analyzed on: chloride, sulphate, ammonium, COD, BOD, metals, barium, volatile aromatic hydrocarbons and halogenetic organic hydrocarbons, extractable organic halogens, nitrate, total organic carbon, sulphide, manganese, potassium, sodium and bicarbonate.

Geotechnical survey

In some cases a geotechnical survey is needed to assure that the design of the landfill will lead to a safe structure during construction and after closure. The Kuršumlja landfill is a site where a geotechnical survey and calculations shall be carried out as it is situated mountain area / valley.

MEASURES TO BE TAKEN

Introduction

Article 24 of the Rulebook prescribes the measures to be taken after operation is stopped. A landfill stops operation when it is no longer possible to deposit new waste or when it jeopardizes the environment. It is required to cover the waste with 3,000 - 5,000 m³ soil per hectare, depending on future use of the land and bearing in mind that the earth cover should be evenly distributed.

The thickness of the required soil layer will thus be approximately 0.3 to 0.5 meter. This soil layer does not prevent the infiltration of rain water into the landfill body, especially when no measures are being taken to drain rain water from the landfill top cover to the nearby surface water. If rain water is infiltrating into the landfill, leachate will produced. Therefore the European Directive 1999/31/EC on the land filling of waste prescribes the use of top covers for municipal solid waste landfills, consisting of a gas drainage layer, an impermeable mineral sealing, a drainage layer and a top cover. For hazardous waste landfills an artificial sealing liner (for example a PE liner) shall be added to the construction.

Besides the cover layer, other measures shall be considered depending on the landfill and waste characteristics, such as a leachate collection and disposal system, landfill gas extraction system, remediation of groundwater (if needed). A permanent groundwater monitoring system is needed in all cases, for which the monitoring wells of the investigation can be used.

The requirements of the Directive 1999/31/EC can be seen as best available technique. The use of best available techniques for all measures will lead to investments which are assumed not to be affordable in most cases. Therefore the need for measures shall be based on a risk analysis. The risk analysis needs to focus on the environmental and health risk, in relation to affordability of the measures to be taken.

The next table gives a summary of possible measures to be taken for each type of landfill. Measures which shall be decided on based on a risk analysis are indicated as 'optional'.

Table 3-19 Summary of possible measures

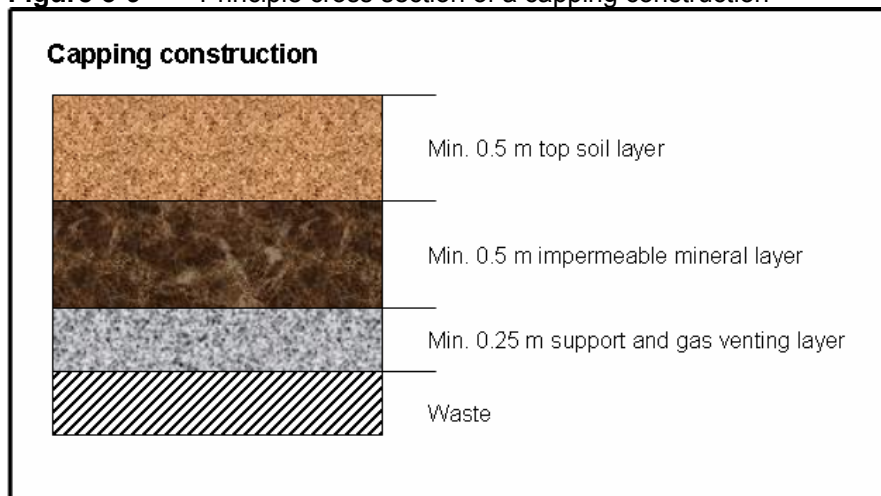
	Large landfill	Medium landfill	Small landfill
Groundwater monitoring	Yes	Yes	Yes
Top soil layer	Yes	Yes	Yes
Surface water run-off system	Yes	Yes	Yes
Drainage layer	Yes/Optional	Yes/Optional	Optional
Impermeable mineral liner	Yes/Optional	Yes/Optional	Optional
Gas drainage layer	Yes/Optional	Yes/Optional	Optional
Landfill gas extraction system	Yes	No	No
Passive landfill degassing	No	Yes	Optional
Leachate collection system	Optional	Optional	No/optional
Groundwater remediation	Optional	Optional	No/optional

Top cover

It is required that during exploitation of the landfill the waste shall be covered with 0.1 to 0.3 m granular material. After reshaping of the landfill to its final shape (with stable slopes on maximum inclination of 1:3) a support layer of approximately 0.25 m shall be constructed directly on the landfill. The primary function of this layer is to give adequate support to compact the mineral barrier.

Figure 3.9 shows a principle cross-section of a capping construction that can be used for large landfills and landfills which pose a risk to the environment.

Figure 3-9 Principle cross section of a capping construction



In order to reduce the production of leachate, a layer of mineral material shall be installed on top of the support layer. Precautions should be taken to avoid drying out of this mineral layer and contamination by the foundation layer. The artificial geo-hydrological barrier should be a 0.5 m thick clay barrier ($K \leq 1.0 \times 10^{-9}$ m/s) or equivalent.

Natural clay can be used as a geohydrological mineral barrier. An alternative for clay can be a mineral barrier of sand-bentonite or a geosynthetic liner, or Trisoplast (consisting of sand, bentonite and a polymer).

Where necessary, a sand drainage layer of 0.3 meters thickness will be installed to collect surface run-off. Drains shall be placed in this layer at the bottom of slopes. A drainage system will collect surface run-off water and discharge it. Synthetic drainage mats can be used as an alternative solution in stead of sand.

On top of the impermeable mineral barrier or drainage layer a top soil layer of at least 0.5 m thick will be constructed. This top soil layer prevents erosion of the mineral barrier and is appropriate for the growth of grass and plants. To avoid erosion of the top soil layer the whole covered surface shall be sowed with grass seed. The seed shall be any grass seed native to the area.

Other measures

Other measures consist of landfill gas extraction, leachate collection and groundwater remediation. All of these measures shall be based on the risk analysis, and are common techniques to be used at existing landfills to prevent contamination of air, soil, groundwater and surface water.

Landfill gas extraction is an active way of degassing, using an extraction system of vertical wells and a blower to transport the landfill gas to a flare. Additionally landfill gas can be used to produce electricity (see hereafter). If the amounts of landfill gas are relatively low, degassing may take place using passive methods such as controlled venting via 'chimneys' through the top cover with a biofilter to avoid odor emissions.

Leachate collection and groundwater remediation systems shall be site specific, and depend on expected amounts which will be reduced significantly after an impermeable top cover has been installed. Collected leachate and contaminated groundwater shall be discharged in controlled way towards a sewage system or, after treatment, towards surface water.

MONITORING AND AFTER-CARE

Groundwater monitoring

Four permanent monitoring wells should be installed around the landfill body:

- 1 monitoring well stream upwards from the landfill body;
- 3 monitoring wells stream downwards from the landfill body.

The groundwater flow direction should be checked by measurement of groundwater level. The quality of the groundwater should be monitored in the following years, since the waste at the site is partly reshuffled. The frequency of sampling and chemical analyses depends on the sensitivity of the area in which the landfill is located. At least three times in a period of five years groundwater should be sampled and analyzed.

If the results of the chemical analyses show that the groundwater is contaminated above Serbian standards, measures (such as a higher frequency for monitoring, install new well stream downwards of contaminated well) should be taken in consultation with the responsible Authorities.

Continuation of groundwater monitoring after five years should be discussed with the responsible Authorities for each individual landfill site.

The groundwater samples shall be analyzed according to Serbian standards. At least the following parameters shall be included: metals (8), volatile aromatic hydrocarbons (VAH), volatile organic hydrocarbons (VOH), TPH, phenol index and EOX.

Site inspection

During the first two years the site shall be expected once a year. After 2 years every five years a visual inspection of the landfill site should take place. During the site inspection the following issues should be verified:

- visual inspection of the cover layer and if required some control drillings to check the thickness of the cover layer;
- visual inspection of the condition of vegetation (damage by landfill gas) on the landfill. If vegetation damage is discovered additional measures (LFG-measurements with portable

equipment) should be taken;
visual inspection of the condition of nearby located surface water;
visual inspection of the use of the site (no confined spaces, no cattle, no vegetation with roots deeper than 0.3 meter, etc).

If a landfill gas extraction system is installed, or leachate collection is carried out, inspection and maintenance shall be specified during the design phase.

The findings of the site inspection should be reported to the responsible authority. The responsible authority will decide on the measures to be taken.

CLOSURE COSTS

The costs of the activities related to the closure and after care of existing landfills depend on the measures required. Cost figures in this project stage are indicative. Cost calculations have to be prepared on a site specific approach.

Activities consist of:

Investigations (Data collection and evaluation, Topographic (geodetic) measurements and digital drawings, Groundwater investigations and leachate sampling and a geotechnical survey);
Design and tendering;
Construction and construction supervision;
Monitoring and after care.

Investigations

Table 3-20 Cost estimate investigations

Activity	Input	Unit price (€)	Costs (€)
Desk top study existing data and reporting	10 days	100 per day	1,000
Geodetic survey and digital drawings scale 1:1,000 – may be affected by terrain characteristics, presence of woods and bushes -	19.8 hectare	500 per ha	9,900
Groundwater investigations (four permanent monitoring wells, analysis, report	5 sites	5,000 per site	25,000
Geotechnical survey, including calculations and report. May be influenced by required detail specification of investigations.	1 site	15,000	15,000
Total		Approx. 60,000	

Design and tendering

Table 3-21 Cost estimate design and tendering

Activity	Input	Unit price (€)	Costs (€)
3 small landfills	site	10,000	30,000
1 medium sized landfills	site	20,000	20,000
1 large landfill	site	30,000	30,000
Total		Approx. 80,000	

Construction

The construction costs of a top cover are mainly depending mainly on the availability of required minerals in the vicinity of a landfill. If these minerals are not available nearby, transport costs will affect the cost estimates.

The following assumptions have been made to indicate the costs of top covers at landfills:

Clay ($K \leq 1.0 \times 10^{-9}$ m/s) € 10 per m^3 (but may vary a lot depending on a borrow-pit distance, required compaction, etc.);
drainage sand (permeable sand) € 20 per m^3 ;
Soil (local available soil for cover) € 5 per m^3 .

For a top cover on small landfills the following breakdown can be given:

Table 3-22 Cost breakdown covering small dumpsites

Description	Quantity per m^2	Indicative costs per m^2
Site clearance, waste reshaping and compaction		€ 1.50
Support layer	0.25 m^3	€ 1.50
Clay layer	0.50 m^3	€ 5.00
Soil layer	0.80 m^3	€ 4.00
Vegetation, drainage channels, etc.		€ 1.00
Sub total		€ 13.00
Supervision, overhead and contingencies (approx. 20%)		€ 2.50
Unit price per m^2		€ 15.50

For a top cover on medium and large landfills the following breakdown can be given:

Table 3-23 Cost breakdown covering medium dumpsites

Description	Quantity per m^2	Indicative costs per m^2
Site clearance, waste reshaping and compaction		€ 1.50
Support layer	0.25 m^3	€ 1.50
Clay layer	0.50 m^3	€ 5.00
Drainage layer	0.30 m^3	€ 6.00
Soil layer	0.80 m^3	€ 4.00
Vegetation, drainage channels, etc.		€ 1.00
Sub total		€ 19.00
Supervision, overhead and contingencies (approx. 15%)		€ 3.00
Unit price per m^2		€ 22.00

Table 3-24 Cost breakdown covering for large (area) landfills

Description	Quantity per m^2	Indicative costs per m^2
Site clearance, (limited) waste reshaping and compaction		€ 0.50
Support layer	0.25 m^3	€ 1.50
Clay layer	0.50 m^3	€ 5.00
Drainage layer	0.30 m^3	€ 6.00
Soil layer	0.80 m^3	€ 4.00
Vegetation, drainage channels, etc.		€ 1.00
Sub total		€ 18.00
Supervision, overhead and contingencies (approx. 10%)		€ 2.00
Unit price per m^2		€ 20.00

Based on above mentioned assumptions, the costs for closure of the landfills based on a top cover lining are:

Table 3-25 Cost breakdown covering medium dumpsites (excl. investigations, design & tendering)

Category	Landfill	Area (m ²)	Unit price per m ²	Total €
Small landfills	Žitorađa	2,000	15.5	31,000
	Blace temporary site	2,000	15.5	31,000
	Blace closed site	8,000	15.5	124,000
Medium landfills	Kuršumlija	21,000	22	462,000
Large landfills	Prokuplje	165,000	20	3,300,000
Total			Approx.	3,948,000

The total costs for closure amount to approximately € 4 million. These costs do not contain investments for landfill gas extraction for utilization (this is not feasible due to its small size, see hereafter) and leachate collection and treatment.

Monitoring and after-care:

Table 3-26 Yearly cost estimate

Activity	Input	Unit price (€)	Costs (€)
Groundwater investigations (sampling, analysis, report)	5sites	3,000	15,000
Visual inspection	5 sites	2,000	10,000
Total			Approx. 25,000 per year

3.1.8 Waste generation, collection coverage and separation prognosis and calculation of the landfill lifetime

Scenarios

The following parameters have impact on the waste amount and composition scenario:

1. Population growth;
2. Increase in collection coverage;
3. Economic growth;
4. Waste reduction due to separate collection at source and composting at landfill.

1. Population growth

In the last few years there was a decline of the population Toplica district. Over the period 1999 – 2004 the decline was an average of 0.85% per year.

A zero (0%) scenario over the whole project period is applied in our calculations.

2. Increase in collection coverage

Based on our investigation the collection coverage is almost 80 to 90% in the urban areas except in Žitorađa (14%). The rural areas are not served. It can be expected a gradually increase in the urban coverage. We do not expect significant collection coverage of the rural settlements, due to reasons of:

- Remoteness;
- Low inhabitant densities, and
- Poor roads

Based on discussion with the PUCs it is expected that the urban areas will be served for 100% in 2010 (except Žitorađa: 100% coverage in 2012).

Table 3-27 Scenario for collection coverage in percentage

Scenario for the urban areas												
Municipality	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Prokuplje	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%
Žitorađa	14%	15%	25%	50%	75%	100%	100%	100%	100%	100%	100%	100%
Kursumlija	85%	88%	92%	96%	100%	100%	100%	100%	100%	100%	100%	100%
Blace	98%	98%	99%	99%	100%	100%	100%	100%	100%	100%	100%	100%
Scenario for the rural areas												
Municipality	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Prokuplje	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Žitorađa	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Kursumlija	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Blace	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

3. Economic growth (GDP)

The Best Case scenario of EBRD gives a real GDP growth of 3 – 5% (see table 3.28) per year. Based on historic data in Western Europe it is assumed that the waste production increases with the same growth.

Table 3-28 EBRD real economic growth scenario (base case)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Real GDP growth	4.2%	2.5%	8.4%	6.2%	5.7%	4.0%	4.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	3.0%	3.0%

Note: The above scenario is preferred above a growth rate of a 2% per year as mentioned in the Serbian Rulebook on criteria for determining landfill site and arrangement of landfills for waste materials (Official Gazette R Serbia, No 54/92) as this is considered to be too low (as historic data shows).

4. Waste separation at source

Reduction of the quantities of generated waste is a primary level of hierarchy and the basis of good practice in waste management. As no Regional Waste Management Strategy has been prepared any official programmes of promotion and recycling development, sorting and re-use are present.

One of basic principles applied in developing of the Regional Waste Management Strategy is the principle of proximity, which means that the treatment of waste should begin as close to the place of its origination as possible.

Special importance of application of primary separation of waste at the place of origination (at households, institutions and companies) is seen in the fact that quality ("non-contaminated") materials are recovered from waste which have a far higher price on the market of waste recoverable materials (e.g. from a separation line) and contribute to making a significant profit.

It is recommended that all municipalities draw a (Regional) Waste Management Strategy that sets targets for separate collection.

As mentioned with the help of USAID initiatives of separate PET collection is getting off. Based on the discussions with the PUCs / Society of Disabled People we expect that the separate collection of PET (plastic) will go up to 75% in 2011 in all four municipalities (see table 3.29).

Table 3-29 Scenario for PET separation at source, in percentage

Amounts of PET in waste				Assumed weight % of PET								
Municipality	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Prokuplje		10%	25%	50%	75%	75%	75%	75%	75%	75%	75%	75%
Žitораđa		10%	25%	50%	75%	75%	75%	75%	75%	75%	75%	75%
Kuršumlija		10%	25%	50%	75%	75%	75%	75%	75%	75%	75%	75%
Blace		10%	25%	50%	75%	75%	75%	75%	75%	75%	75%	75%

Waste amounts and composition prognosis

Based on the all above mentioned scenarios, the following waste amounts (table 3.30/figure 3.10) and composition is predicted (figure 3.11).

Table 3-30 Development of the total amount of collected waste

Municipality	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Prokuplje	6,000	6,659	7,281	7,930	8,690	9,124	9,580	10,059	10,462	10,880	11,315	11,655
Žitораđa	167	183	281	522	782	1,057	1,110	1,165	1,212	1,260	1,311	1,350
Kuršumlija	3,975	4,284	4,602	4,932	5,328	5,594	5,874	6,168	6,414	6,671	6,938	7,146
Blace	1,495	1,555	1,631	1,696	1,794	1,884	1,978	2,077	2,160	2,246	2,336	2,406
	11,637	12,682	13,794	15,080	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557

Figure 3-10 Development of the total amount of collected waste

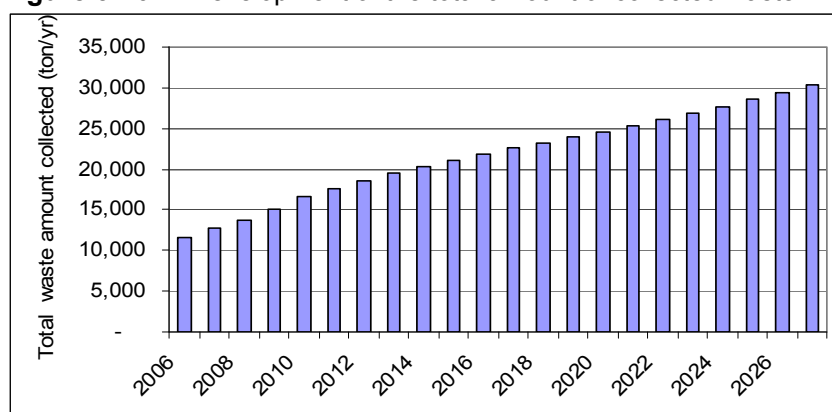
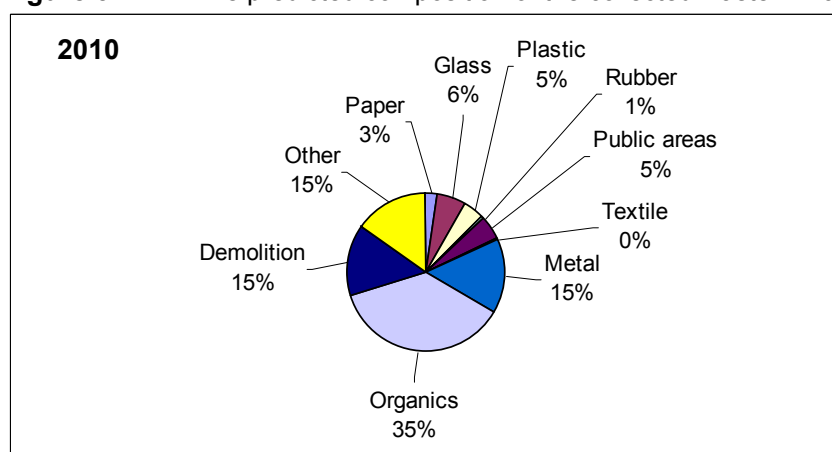


Figure 3-11 The predicted composition of the collected waste in 2010



Life-time of the new sanitary landfill

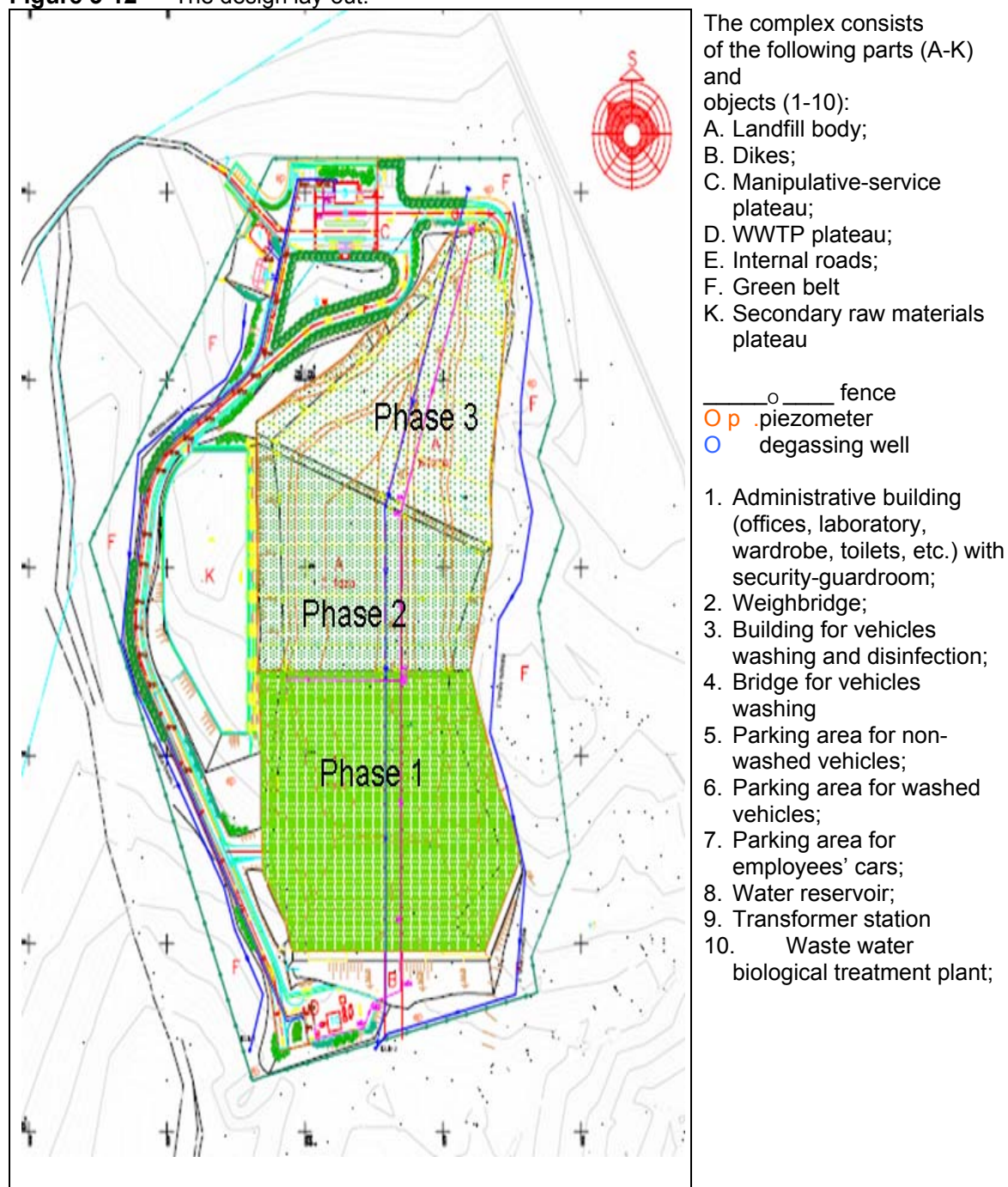
The landfill is filled up in three phases with a volume of 330,000 m³ each. Assumed density of the disposed waste after compacting is 850 kg/m³.

It is assumed that new sanitary landfill will start operation as regional landfill at the beginning of 2010. The Utrine landfill staging is given below. Its life-time is expected to be 11 years for the first phase, 8 year for phase 2 and some 7 years for phase 3, totalling some 26 years.

Table 3-31 Life-time of Utrine landfill (only 2 phases given)

Municipality	Total waste collected in tons				2010: Start of new sanitary landfilling																									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028							
Prokuplje	6,000	6,659	7,291	7,930	8,690	9,124	9,580	10,059	10,462	10,880	11,315	11,655	12,004	12,365	12,735	13,119	13,511	13,916	14,334	14,764	15,207	15,663	16,133							
Zborunje	167	183	201	222	262	1,057	1,110	1,165	1,212	1,260	1,311	1,350	1,381	1,432	1,475	1,520	1,565	1,612	1,661	1,710	1,762	1,815	1,869							
Kursumlija	3,975	4,204	4,602	4,932	5,328	5,594	5,874	6,169	6,414	6,671	6,938	7,146	7,360	7,581	7,808	8,043	8,284	8,533	8,789	9,052	9,324	9,590	9,863							
Blece	1,495	1,555	1,631	1,698	1,794	1,884	1,978	2,077	2,160	2,246	2,336	2,406	2,478	2,553	2,629	2,708	2,789	2,873	2,959	3,046	3,140	3,234	3,331							
Utrine	11,637	12,682	13,794	15,080	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	23,234	23,931	24,649	25,388	26,150	26,934	27,742	28,575	29,432	30,301	31,196							
Density after compacting	kg/m ³																													
m ³ /wasteyear	13,691	14,919	16,229	17,741	19,523	20,775	21,814	22,905	23,821	24,774	25,765	26,538	27,334	28,154	28,998	29,868	30,764	31,687	32,638	33,617	34,628	35,649	36,701	m ³ /year						
Inert material	3,423	3,730	4,057	4,435	4,881	5,194	5,454	5,726	5,955	6,193	6,441	6,634	6,833	7,038	7,250	7,467	7,691	7,922	8,159	8,404	8,656	8,912	9,175							
Cumm. volume	17,113	18,649	20,286	22,176	24,403	25,989	27,268	28,631	29,776	30,967	32,206	33,172	34,167	35,192	36,248	37,335	38,455	39,609	40,797	42,021	43,282	44,580	45,876							
Cumulative m ³ of waste					24,403	50,372	77,640	106,271	136,047	167,014	198,220	232,392	266,559	301,751	337,999															
																37,335	75,791	115,400	156,197	198,219	241,501	288,081	331,937							
						850 kg/m ³																								
capacity:				Cumm. m ³				ton																						
Phase I	330,000 m ³	330,000			280,500			280,500																						
Phase II	330,000 m ³	660,000			280,500			561,000																						
Phase III	330,000 m ³	990,000			280,500			841,500																						
				990,000 m ³	1,980,000			841,500																						
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Figure 3-12 The design lay-out.



Fence and gate

The terrain will be completely fenced, 3m height of the fence. It is designed gate to be installed which will be opened only by guardsman. Table with all necessary data will be placed in front of gate. It is designed detector of ionization radiation to be installed at the entrance. All vehicles filled with waste will pass by the detector.

DESCRIPTION OF THE OBJECTS:

1. Administrative building

In the administrative building with dimension of 13.12x9.52m, 125 m², will be placed Guardroom, offices, laboratory, kitchen, dinning room, dressing room, bathrooms, etc.

2. Weighbridge

All waste collection vehicles that arrive, passes over a weigh bridge near the entrance/ gate. Also all emptied vehicles will be weighed. The weighbridge is designed as an electronically weighbridge with dimensions of 12.70 x 3.44 m and suitable for loads up to a max. of 30 t. It has a pit underneath. Weigh house is designed with dimensions 3.16x4.56m

3. Building for vehicles washing and disinfection

After weighing, all vehicles, i.e. their wheels, will be washed (indoor) and disinfected. Designed building has dimensions of 15.9x10.0m. A small workshop is placed in this building also.

4. Bridge for vehicles washing and disinfection

This bridge is predicted for outdoor washing of vehicles. Dimensions are 30.0x2.5m

5. Parking area for non-washed vehicles

A parking area with 4 parking places of 4x10m is designed.

6. Parking area for washed vehicles

A parking area with 4 parking places of 4x10m is designed.

7. Parking area for employees' cars

A parking area with 5 parking places of 2.5x5m is designed.

8. Water reservoir

The location is not connected to Prokuplje water supply. Water supply of whole landfill complex is predicted to be from water reservoir. It is designed concrete water reservoir with volume of 110 m³ and with two chambers. The bigger chamber is predicted to supply fire protection system and technical water system, the smaller chamber is connected to sanitary water system. The reservoir is equipped with pump for water pressure increasing. It will be supplied with 50 m³ of water by auto tanks on daily base.

9. Transformer station

It is designed transformer station of 10/0.4 kV, with capacity of 250 kVA, and with transformer power of 160 kVA. Safety: All facilities are equipped with low voltage installations, lightning protection, fire and explosion, telecommunication protection.

10. Waste water treatment plant

This object is designed to be installed not on part C as all other objects, but on the part D: WWTP plateau. It consists of: waste water pump station, primary biological tank (lagoon) with, secondary sediment tank (lagoon), pump station for recirculation of water and for surplus of mud, manhole for water, manhole for mud, basin for storage of mud, manhole for the purpose of sampling, accumulation tank (lagoon) and manhole for pumping of treated water.

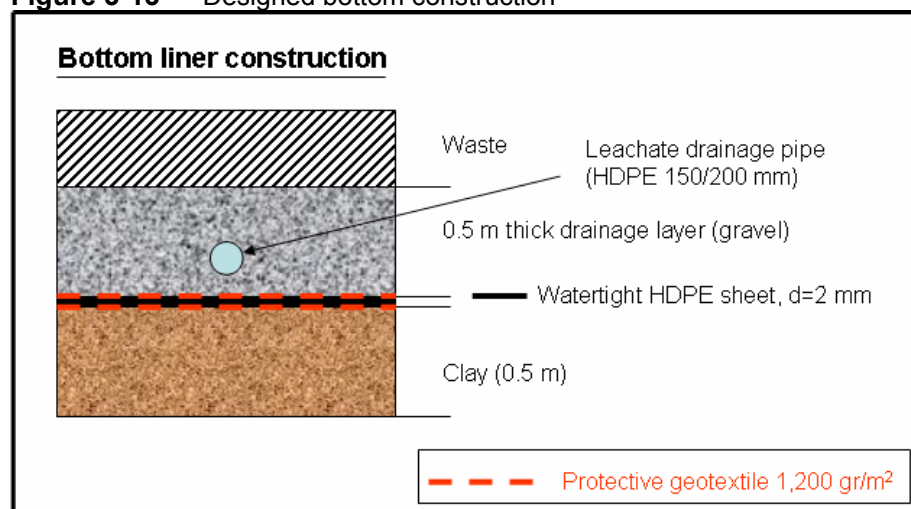
Landfill description

The plot area for land filling has a size of 5.4 ha. It is trapezium shaped (see the lay-out). The new sanitary landfill will be constructed in three phases, each phase of 330 m³, total 990,000 m³. If the land filling of I phase will start at the beginning of 2010, land filling of II phase will start in 2017, land filling of III phase will start in 2023 and will finish at the end of 2027. Life-time of new sanitary landfill is calculated to be 18 years.

Bottom liner

The landfill area consists completely of low plastic non-organic clay, loam, with different granulometric content (dusty, sandy, gruss). The permeability coefficient of clay (loam) is in range of 1.01×10^{-3} to 9.65×10^{-5} cm/sec. The proposed bottom sealing will consist of the new layer of compacted clay of 0.5 m and the permeability coefficient of 1×10^{-5} cm/sec. It is followed by a 7.5 mm protective geotextile with 1,200 gr/m², a 2.0 mm geomembrane (HDPE) and once again by a 7.5 mm protective geotextile with 1,200 gr/m². Above the membrane and geotextile sealing there will be a drainage gravel layer of 500 mm. This drainage layer will have 150/200 mm perforated HDPE pipes for leachate collection. Also it will have granulometric content of 18/24 except 24/32 around pipes. The pipes are covered with geotextile of 200 gr/m². The designed bottom construction can be visualized as follows (figure 3.13).

Figure 3-13 Designed bottom construction



Leachate treatment / WWTP

All waste water being sanitary water, technical water (from vehicles and equipment washing), laboratory, workshop, cleanings of operating and service surface, access road washing, etc, will be transported by a sewage system from the collection pits to a combined leachate / small waste water treatment plant (WWTP).

The collected leachate is drained towards a pit from where it is pumped into an aerated lagoon (10 x 10 m, height 3.1 m). The sediment is drained out and via thickener tank (2.7 x 2.7 m, height 3.75 m) and storage basin (4 x 4 m, height about 4.75 m) deposited on the landfill.

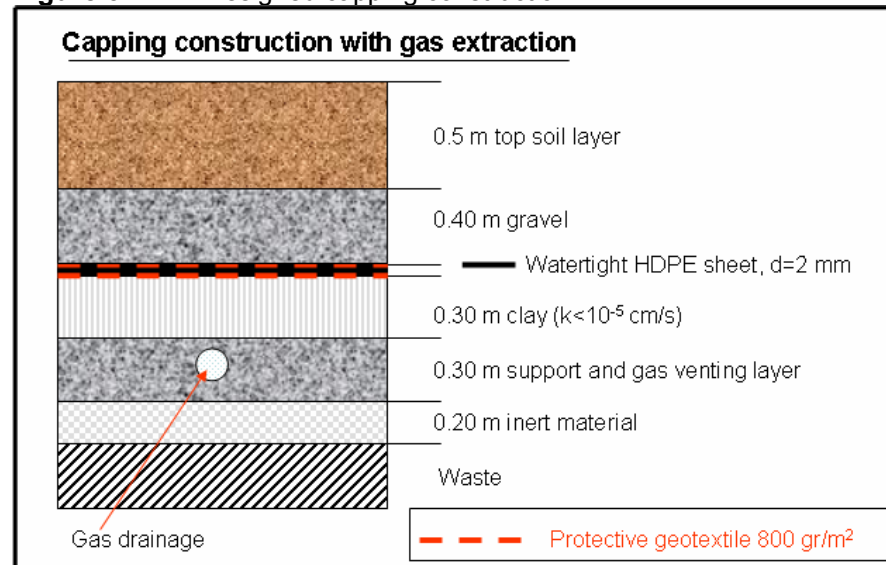
The treated water is drained out to an accumulation lagoon (4.5 x 2.7 m, height 3.2 m) from which is either collected by tank-truck for discharge into the sewage system of Prokuplje (that discharges untreated into the Toplica river) or sprayed over the landfill

body (from tank-truck or by pumps). By spraying it will partly evaporate.

Top sealing

The design top sealing will consist of a landfill gas drainage layer of 300 mm (granulometric content is 16/24) followed with layer of compacted clay of 300 mm and the permeability coefficient of $K \leq 1 \times 10^{-5}$ cm/sec. Over these two layers is layer of 4 mm geotextile (800 gr/m²) / geomembrane (d = 2 mm) / 4 mm geotextile (800 gr/m²) followed by a 400 mm water drainage layer and 500 mm recultivation soil. This covering recultivation soil consists of fertile soil and humus (enriched by mineral fertilizer). Grass will be planted on some part and lawn will be placed on other parts of landfill.

Figure 3-14 Designed capping construction



LFG venting

In designs it is foreseen a passive system for controlled extraction of biogas consisting of about 80 vertical extraction wells to be installed (total of all 3 phases). The extracted biogas will be ventilated (not flared). The distance between the degassing wells is 20 - 40 m (this is in the normal range of 20 – 60 m) and are set in corridor or chess arrangement. The depth of the natural vents goes to 90% of waste depth.

In the first phase area 38 venting wells are foreseen. The wells have a radius of 600 650 mm, with inside a perforated PVC pipe with radius of 200 mm. The well is filled with gravel (filter zone) with a granulation of > 32mm. In the phase II and III areas 21 resp. 22 degassing wells are present.

Technique of land filling

The waste that is brought to a landfill is spread in cells of 6.5. x 7.5 x 2.3 m and compacted. When the layer height of 2.3 m is reached it is covered with 0.2 – 0.3 m thick inert materials. Dimensions of cells with inert material are of 7.1 x 8.1 x 2.5 m. The optimal thickness of each layer is 2.5 m since in that way the optimal settlement of waste is provided along with the most appropriate height for the work of compactor. The total filling height varies from 15 to will be 35 m.

3.1.10 Technical solution proposed by consultants and justification

Hereafter the Consultant makes some comments on the 2007 design and some proposals for improvement.

Access road

The site has to be connected to the main road M-25 Nis – Prokuplje – Kuršumlja, but access road through the village of Đurevac is not designed. Existing access road is hilly, narrow, in poor condition and is not suitable for trucks.

Power supply

Electricity supply will be from a new transformer station (10/0.4 kV, 250 kVA) which has to be connected to main power line of 10 kV at a distance of approx. 700 m. This connection is not designed.

Landfill technique

Modern land filling technique of filling per cell, levelling, compacting and covering will be applied. The land filling technique is according modern practices.

Bottom liner construction

The EU Directive land filling of waste requires the following protective measures:

Protection of soil and water

A landfill must be situated and designed so as to meet the necessary conditions for preventing pollution of the soil, groundwater or surface water and ensuring efficient collection of leachate as and when required according to Section 3. Protection of soil, groundwater and surface water is to be achieved by the combination of a geological barrier and a bottom liner during the operational/active phase and by the combination of a geological barrier and a top liner during the passive phase/post closure.

The geological barrier is determined by geological and hydro geological conditions below and in the vicinity of a landfill site providing sufficient attenuation capacity to prevent a potential risk to soil and groundwater. The landfill base and sides shall consist of a mineral layer which satisfies permeability and thickness requirements with a combined effect in terms of protection of soil, groundwater and surface water at least equivalent to the one resulting from the following requirements:

- landfill for hazardous waste: $k \leq 1.0 \times 10^{-9}$ m/s; thickness ≥ 5 m,
- landfill for non-hazardous waste: $k \leq 1.0 \times 10^{-9}$ m/s; thickness ≥ 1 m,
- landfill for inert waste: $k \leq 1.0 \times 10^{-7}$ m/s; thickness ≥ 1 m.

Where the geological barrier does not naturally meet the above conditions it can be completed artificially and reinforced by other means giving equivalent protection. An artificially established geological barrier should be no less than 0.5 meters thick.

In addition to the geological barrier described above a leachate collection and sealing system must be added in accordance with the following principles so as to ensure that leachate accumulation at the base of the landfill is kept to a minimum: artificial sealing liner and drainage layer ≥ 0.5 meter

In the existing design reports it is written that the subsoil consist low plastic clay with a filtration coefficient of 1.0×10^{-3} to 9.6×10^{-5} cm/sec.

This means that the consistency of the 'natural' geological barrier is not proven. Therefore an additional artificial mineral bottom liner is in the design. The permeability of the geomembrane is $k \leq 1.0 \times 10^{-9}$ m/s; It is protected from both sides by a protective geotextile. It fulfils the EU requirement.

Comment:

- A clay layer of 0.5 m layer shall be laid underneath the HDPE sheet/geotextile. If the quality of the available clay is poor (or too expensive) a sand bentonite or a Trisoplast[®] can be applied as an alternative.

Leachate treatment / WWTP

In principle a good basic leachate / waste water treatment system is foreseen.

The treated leachate / waste water could be transported by truck to the municipal sewage system in Prokuplje that discharges without any treatment in Toplica River.

It is proposed spraying of the treated water over the landfill. The main part of the water will evaporate (> 50%). The remaining water will prevent dust problems and will infiltrate in the landfill body and enhance biodegradation and LFG production.

- The spraying/recirculation will increase the leachate flow slightly. The design capacities have to be recalculated.

Top sealing

Comments

An impermeable top liner (final covering) is applied. A drainage layer of around 400 mm is foreseen. This will not completely fulfil EU Directive 1999/31/EC on land filling of waste. We propose the following:

The EU Directive on land filling of waste requires the following top cover measures:

(..) If the competent authority after a consideration of the potential hazards to the environment finds that the prevention of leachate formation is necessary, a surface sealing may be prescribed. Recommendations for the surface sealing are as follows:

Landfill category	Non hazardous	Hazardous
Gas drainage layer	Required	Not required
Artificial sealing liner	Not required	Required
Impermeable mineral layer	Required	Required
Drainage layer > 0,5 m	Required	Required
Top soil cover > 1 m	Required	Required

If, on the basis of an assessment of environmental risks taking into account, in particular, Directive 80/68/EEC(1), the competent authority has decided (..) that collection and treatment of leachate is not necessary or it has been established that the landfill poses no potential hazard to soil, groundwater or surface water, the requirements in the above may be reduced accordingly. (..)



It is not known if such a risk assessment has been carried out. If not, a top cover shall be installed.

As Utrine landfill shall not receive hazardous waste an artificial sealing top liner is not required. It must be clear that NO HAZARDOUS WASTE is land filled in Utrine.

Common mineral liners, frequently used for similar purposes are:

1. Polymer bentonite enhanced sand (Trisoplast®) liner (permeability of $k = 5 \times 10^{-12}$ m/s);
2. Geosynthetic Clay Liner (GCL) (permeability of $k = 10^{-10}$ m/s, $k = 5 \times 10^{-11}$ m/s and $k = 3 \times 10^{-11}$ m/s);
3. Natural clay with permeabilities possible up to $k = 10^{-9}$ m/s.

The Serbian law ("Rulebook") gives in principle the following requirement: As the landfill has to settle, the final covering (capping) shall not be implemented earlier than one (preferred 2- 3) year after closure of the landfill.

According the EU Directive 1999/31/EC, the mineral sealing layer of the final covering must have a minimum thickness of 0.50 m and a permeability coefficient $k \leq 5 \times 10^{-10}$ m/s. This is equal to a maximum acceptable leakage of 32 mm/year (0.5 m hydraulic head above the mineral layer).

If designed liner has a permeability of $k \leq 5 \times 10^{-10}$ m/s that complies with the EU directive. The design top cover fulfils the requirement except for the drainage layer that shall be 500 mm instead of 400 mm. The recultivation layer is preferred to be 1 m thick.

Drainage layer

The drainage layer has to be made with a minimum thickness of 0.50 m. The value of the permeability must be $k \geq 1 \times 10^{-3}$ m/s. The content of calcium carbonate must not exceed 10% (mass). The size of the particles must be included between 4 mm and 32 mm. The percent of superior and inferior particles can't exceed 3% (mass). Woods, metals, plastic materials or other foreign components must not be contained in the drainage material. Drainage layers must have a tolerance in plane of maximum 2 cm/4.0 m.

Other general comments:

- It shall be avoided to mix municipal solid waste with other wastes. Household hazardous waste, hazardous industrial waste, slaughter waste and hospital waste should be banned from the landfill. A waste acceptance procedure must be drawn up for this purpose and shall be strictly applied.
- A maximum slope inclination of 1:3 (vertical : horizontal) shall be applied.
- A top soil layer for protection of the cover construction and grassing of the top surface of the closed and covered landfill is foreseen. The material is local available soil, but preferably a kind of soil, suitable to grow vegetation and with some resistance against erosion should be chosen. The thickness of the top soil layer shall be at least 0.5 m.

Waste separation facility

In the design for the regional sanitary landfill at Utrine site a plateau for a sorting/separation line is present. However in the design this is not worked out.

Recently initiatives have started for the separate collection of PET bottles and the processing of it (see chapter 3.1.5). USAID has donated equipment for this purpose. The PUC's are supporting these initiatives or are active participating in it.

In addition the International Finance Corporation (IFC) is supporting recycling businesses in Southeast Europe a/o Southern Serbia (Toplica district). It is implementing an integrated program geared towards enhanced competitiveness of the industry players, upgraded environmental standards and improved social welfare of the individual scrap collectors. It is focussing on the informal sector of Solid Waste. The initiative entitled "the Recycling Linkages Project" has a program budget of \$3.3 million. The objective is to promote Small and Medium Enterprise (SME) development and, in the process, improve the lives of thousands of families (mainly Roma) who make their primary income by collecting scrap materials.

A separation plant will conflict with these initiatives.

A separation line consists basically of a bag-opener, sieve, a handpicking line for PET bottles, plastic foil, paper/cardboard removal, a magnetic (ferro) separator, Eddy current for non-ferro metals and a press for the PET, plastics and paper/cardboard. As most of the PET bottles are already taken as well as ferro (by Roma ethnic individuals) the separation line will only take out the plastic foils, aluminium cans and paper/cardboard.

The separation plant in Novi Sad learns that due to the organic contamination only up to 50% of the foil and paper/cardboard can be taken out. Some glass is also taken out, but the market for recycled glass in Serbia is limited or even absent (Toplica region).

Supposing that 50% of the plastic foils and paper/cardboard is taken out the amount of waste to be land filled will reduce with less than 4 % (by weight).

The CAPEX required for a separation plant, designed for Toplica district, amounts some 2 million Euro. The income generated by the sale of plastic foils and paper/cardboard will not cover the operational costs. Over the 20-years life-time of the landfill some 10 months extra land filling is obtained. This has a NPV of less than 200,000 Euro.

From the above basic financial analysis a separation plant at Utrine landfill site cannot be justified.

It is recommended that the PUC's focus on primary separate collection of PET bottles by further supporting, or participating in, the on-going initiatives. Expanding the separate collection to paper/cardboard and aluminium cans shall be considered. On the longer term the separate collection of the organic waste fraction with the purpose of composting it, shall be considered.

The activities of the Roma ethnic individuals shall not be discouraged. On the contrary, their involvement in the primary separate collection scheme shall be stimulated. Reference is made to the IFC "The Recycling Linkage Project" presently undertaken in a/o Southern Serbia. Co-operation should be sought with this project

In order to increase the respond of the public education on the importance of separate collection shall be undertaken.

Composting facility

Reviewing the documents there is no composting facility foreseen.

In order to get a good quality of compost the bio-waste (green waste from households, gardens etc.) must be gathered through a separate collection system. Bio-waste from a separation line will be too contaminated for good quality compost. As no separate bio-waste collection is foreseen in near future a composting plant is not further considered here.

Landfill gas extraction & utilization

Reviewing the documents the main findings are:

- De-gassing piping is foreseen (some 80 wells);
- LFG amount calculation is present,
- The LFG is collected and not flared.

Comment and proposal

Land filled waste produces landfill gas (LFG). This gas has positive and negative properties. The main negative properties are the smell, the contribution to the global warming problem and the damage it causes to vegetation. Positive properties are its combustion features and energetic contents.

Extraction and utilization of the LFG combines the solving of the negative properties and taking the benefits of the positive properties. Therefore, the implementation of LFG extraction and utilization is worked out here for Utrine landfill.

Present LFG-extraction techniques make it possible to start LFG extraction already during the landfill activities.

Wells, headers and pipes

In the Utrine landfill case, the extraction of landfill gas is most effective by installing vertical extraction wells. It is foreseen to build up the extraction wells during the exploitation period of the new landfill cell (and future cells). This makes it possible to start landfill gas extraction from the earliest moment of production (approximately 3 years after land filling of the concerned waste).

In general, the landfill gas extraction (until the blower/flare units) system consists of:

- landfill gas extraction wells (extendable build-up wells);
- landfill gas collection headers;
- landfill gas collection and transport piping system;
- condense water siphons.

The operator of the landfill has to install the vertical extraction wells already during the start of the exploitation of the landfill. After approximately 2 m height of waste is dumped the wells can be installed directly at the sand drainage layer. During exploitation those wells shall be pulled up until the final level.

The bottom of the extraction pipe is placed at least 1 m above the bottom lining system. The extraction pipe consists of a slotted HDPE-pipe. The slotted part of the extraction pipe must be completely covered with filter gravel. The top of the extraction well is covered by a steel protection pipe/casing.

After reaching the final level of the landfill a telescopic connection is installed to absorb the settlement of the landfill at the upper-part of the slotted pipe. A blind HDPE pipe slides into this telescopic connection. Above the slotted part and the gravel column an impermeable plug of compacted clay/bentonite mineral of 60 cm thickness or geomembrane shall be installed.

The head of the extraction well connects the extraction well to the extraction piping system. The landfill gas extracted from several extraction wells (approximately 8 wells) is collected at one central point, the landfill gas collection header. From the header, a main piping network leads the gas to the blower, flare and utilization units. The collection and transport piping system shall be covered with soil. Condense water from the pipes will be discharged to the leachate collection system.

The amounts of LFG produced and captured have been recalculated based on the expected amounts of waste to be land filled over time and its composition over time.

Basic data:

- Design landfill, conform design with proposed adjustments
- Start of land filling: Jan, 2010;
- 3 phases;
- Waste amounts: see figure 3.10;
- Waste composition: see figure 3.11.



LFG calculation

The methodology used for calculation of the captured and destroyed landfill gas is based on multi-phase modelling. In the multi-phase First Order Decay Model, a number of fractions are distinguished, for which landfill gas generation is described separately. There are distinguished three phases: slow, moderate and fast degradable materials, but other subdivisions are possible, including the introduction of an inert fraction. The advantage of the multi-phase model is that the typical waste composition will be taken into account, since all types of waste contain typical fractions of slow, moderate and fast degradable.

In general, landfill gas formation models are not based on microbiological or biochemical principles, but mainly on a practical description of formation, as observed in laboratory experiments or in full-scale recovery projects.

The amount of landfill gas (LFG_{model}) that is generated is estimated with the following LFG generation model (multi-phase model):

$$LFG_{model} = \zeta \sum_{j=1}^3 1.87 * A_i * DOC_i * k_{1,i} * e^{-k_{1,i}t}$$

and

$$LFG_{model} * EE_{LFG} = LFG_{flare} + LFG_{electricity}$$

Where:

LFG_{model}	=	Formation of landfill gas in m ³ /y, 8,760 hours/year
1.87	=	A maximum amount of 1.87 m ³ biogas is produced out of one kilogram degraded organic carbon
ζ	=	Formation factor = $MCF * DOC_f$
DOC	=	Amount of (dry) organic carbon for each specific waste stream (kg/t).
DOC_f	=	Fraction of <i>dry organic carbon (DOC)</i> that dissimilates to landfill gas.
MCF	=	Methane Correction Factor (fraction) see table E.1 from New Baseline Methodology
A	=	Amount of waste (t/year).
K	=	Degradation velocity of each specific waste stream.
T	=	Time elapsed since (prevented) depositing in years.
I	=	Category of waste
EE_{LFG}	=	Extraction efficiency = fraction of the generated landfill gas that is extracted and thus available for combusting or electricity production

The methane generated in the landfill, extracted and used for energy-production is calculated using the following formula:

$$ME = LFG_{model} * W_{CH_4,y} * D_{CH_4} * EE_{LFG}$$

Where:

ME	=	methane (CH ₄) extracted (t/y) and to be combusted and/or used for electricity generation
$LFG_{model,y}$	=	is the amount of landfill gas/y as calculated by the multiphase model in Nm ³ LFG/y
$W_{CH_4,y}$	=	average methane fraction of the LFG (in m ³ CH ₄ /m ³ LFG);
D_{CH_4}	=	density (t/Nm ³) of methane (CH ₄)
EE_{LFG}	=	extraction-efficiency = fraction of the generated amount of landfill gas that is to be extracted

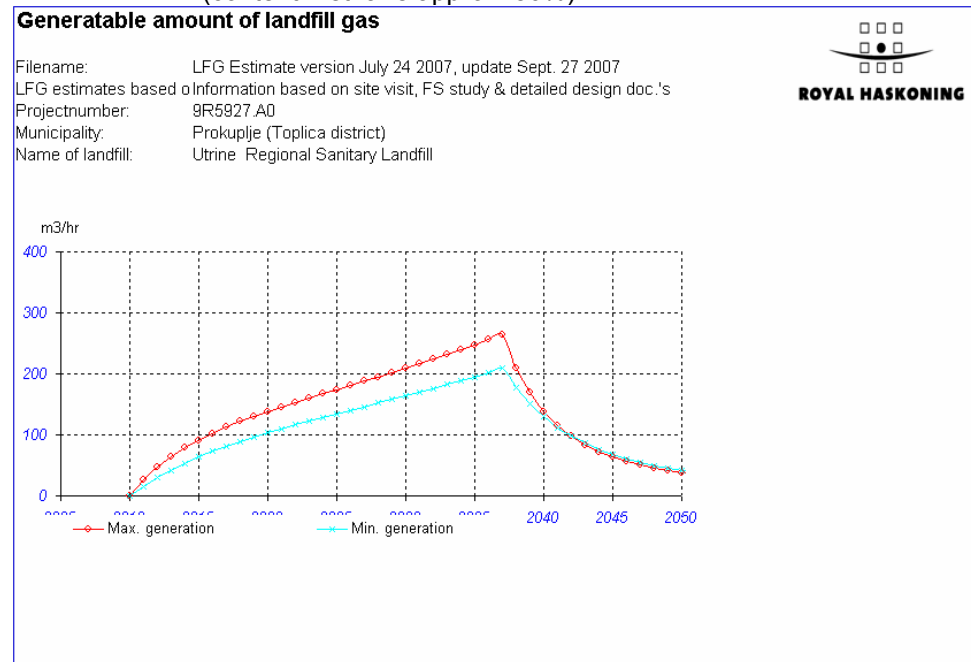
Royal Haskoning developed in the 1980's a First Order Decay multi-phase model that was used in numerous LFG projects world wide. It was found to predict the LFG productions pretty accurate. This LFG model is used here for the LFG calculation.



LFG generation

The generated amount of biogas (landfill gas - LFG) is given in **figure 3.15**. The two lines represent the range we normally see.

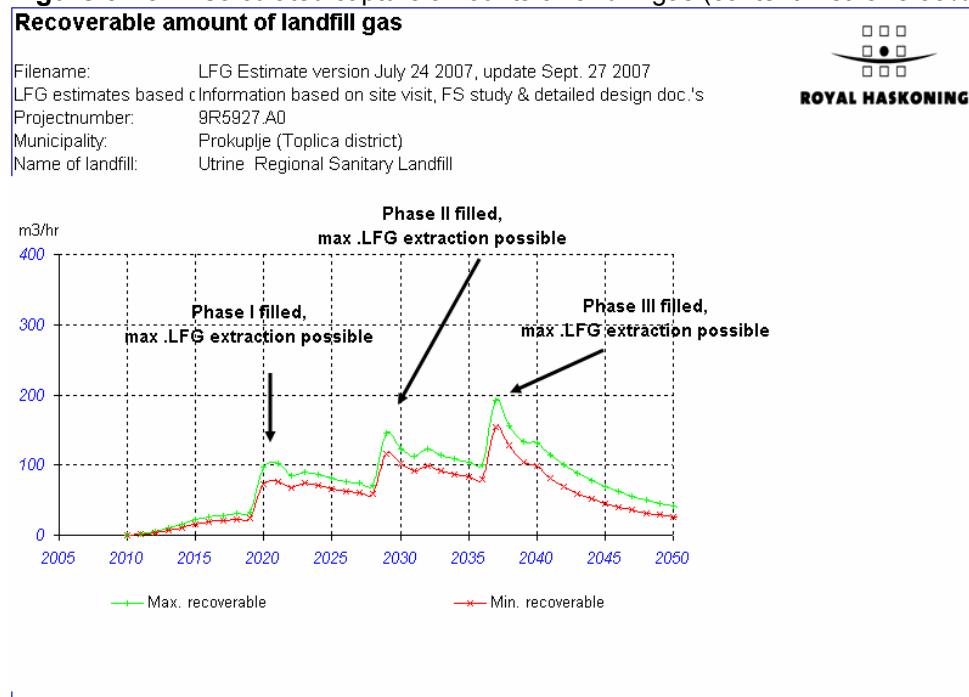
Figure 3-15 Calculated generation amount of landfill gas per hour
(content methane approx. 50%)



From 2010 onwards the first cell of the Utrine landfill is being filled up with waste. Temporary gas extraction wells are being installed from the start of filling. The vertical extraction wells will “grow” with the height of waste. As soon as the first phase volume is filled it is closed and covered with a (temporary) sand layer after which it is expected that some 70% of the gas produced will be captured. After settling (after some 2-3 years) a final cover shall be placed, increasing the recovery rate to at least 85%. During filling-up it is possible to capture some of the gas that is produced. In practice the gas is (will be) released to the atmosphere in a controlled way (using the wells for venting / controlled release). Therefore low capturing rates (10 – 25%) are used in the LFG modelling during the land filling activity.

Using these capture rates we get the following LFG capture amounts (figure 3.16).

Figure 3-16 Calculated capture amounts of landfill gas (content methane 50%)



The typical shape of the amount of LFG captured is explained as follows:

The fresh waste produces LFG however this can not (first year) or only partly (following years till closing) be captured as phase I volume is used and no covering is present (apart from a daily sand layer). As soon as the phase I volume is filled-up it is covered and the percentage of the produced LFG that is captured, increases. After the settling (2-3 years) of it the final cover can be put in place. This increases the recovery rate further far above 85%.

As soon as all phase I volume is filled up no fresh waste is deposited resulting in a decrease of LFG production. As LFG capturing from phase II volume is in the beginning low, we get the typical staggered shape of figure 3.16.

LFG utilisation

The technology proposed for the utilization of biogas can be regarded as standard technology. From the financial point of view LFG utilization becomes attractive after closure of the first phase foreseen in 2015.

The blower

A pressure gradient in the extraction system has to be realised to extract landfill gas. To create this pressure gradient a blower shall be installed. The capacity of the blower is based on the expected amount of biogas. According to our calculations (including the implementation of more new landfill cells) a compressor with a maximum capacity of ~250 Nm³/hr should be installed. This capacity shall be adjusted in the future, when more detailed information on quantity and quality of the LFG is obtained.

The flare

A flare is needed to burn excessive landfill gas. When the landfill gas is used for utilization purposes the flare needs to secure the gas extraction while doing maintenance on the utilization plant and during calamities. The maximum capacity of the flare shall be equivalent to the maximum capacity of the blower (~250 Nm³/hr).

The flare is foreseen to be a noiseless, closed flare. This means that the flame shall burn silently and only inside the flare (invisible).

Utilization of LFG

When the amounts of LFG become suitable to run gas engines, utilization of LFG can be implemented. In the case of the Utrine landfill, utilization (electricity production) of the landfill gas can start from 2016 after closure of the first section.

The electrical output of gas engines depends on the total energy content of the landfill gas and the gas engine efficiency. The main characteristics of landfill gas and electricity generation are given below.

Table 3-32 Engine electrical efficiency

Variable	Unit	Expected minimum methane content		Expected maximum methane content	
Methane content	%	45		55	
Total energy (based on lower burning value of methane)	kWh/m ³	4.5		5.5	
Gas engine efficiency	%	33	36	33	36
Electrical output	kWh/m ³	1.44	1.61	1.75	1.97

The engine efficiency depends upon the quality of gas, the amount of gas (between 60% and 100 % of the gas engine capacity), the burning conditions and the cooling equipment. Reciprocating gas engines for landfill gas applications range from stoichiometric combustion (naturally aspirated) to leaner combustion engines (lean-burn, turbo-charged). The expected electrical output of the gas engines is within the range of 1.44 to 1.97 kWh/m³. Combined with an average methane content of 50% the electrical output is expected to be not more than 1.75 kWh/m³.

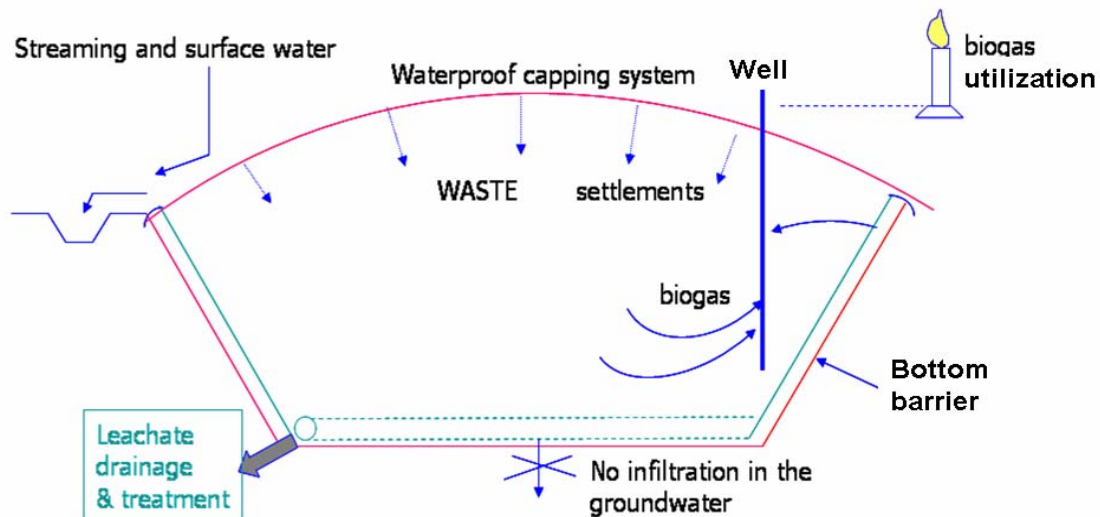
The emissions from the landfill consist mainly of CH₄ and CO₂. By utilizing landfill gas the available energy is used in a profitable way. The traces of pollutants may vary greatly in time and in place, since these levels are strongly dependent on the types of waste that have been land filled.

Table 3-33 Common properties of landfill gas

Component	Landfill gas	
Methane	50-60	%
Carbon dioxide	35-40	%
Nitrogen	0-10	%
Oxygen	0-2	%
Calorific value (LHV)	18 - 21.5	MJ/Nm ³
<i>Traces of pollutants</i>		
- Sulphur components	0-300	ppm
- Chlorine and fluorine	0-40	ppm

The basic scheme of a LFG extraction from (a) cell(s), with bottom) liner, is presented in the next figure.

Figure 3-17 Basic set-up of LFG extraction from new cell



The extraction technology applied will basically consist of:

- X No. of vertical wells (to be determined);
- connection PEHD piping (110 mm) of well to a collector header;
- collector headers (that serve 8 wells);
- a closed PEHD piping system (160 & 200 mm), connected to a compressor system;
- condensate separators;
- 1 compressor;
- simple leachate treatment installation with re-injection.

The landfill gas utilization equipment consists of:

- 1 flare (for burning any excess landfill gas that can not be utilized in the gas motors);
- 1 containerized reciprocating gas engines (landfill gas dedicated) connected to electric generators (proposed brand: Biogas dedicated engines from GE-Jenbacher or Caterpillar, rated output 1 x 175 kWe at peak LFG production);
- hook-up to grid devices (including transformer).

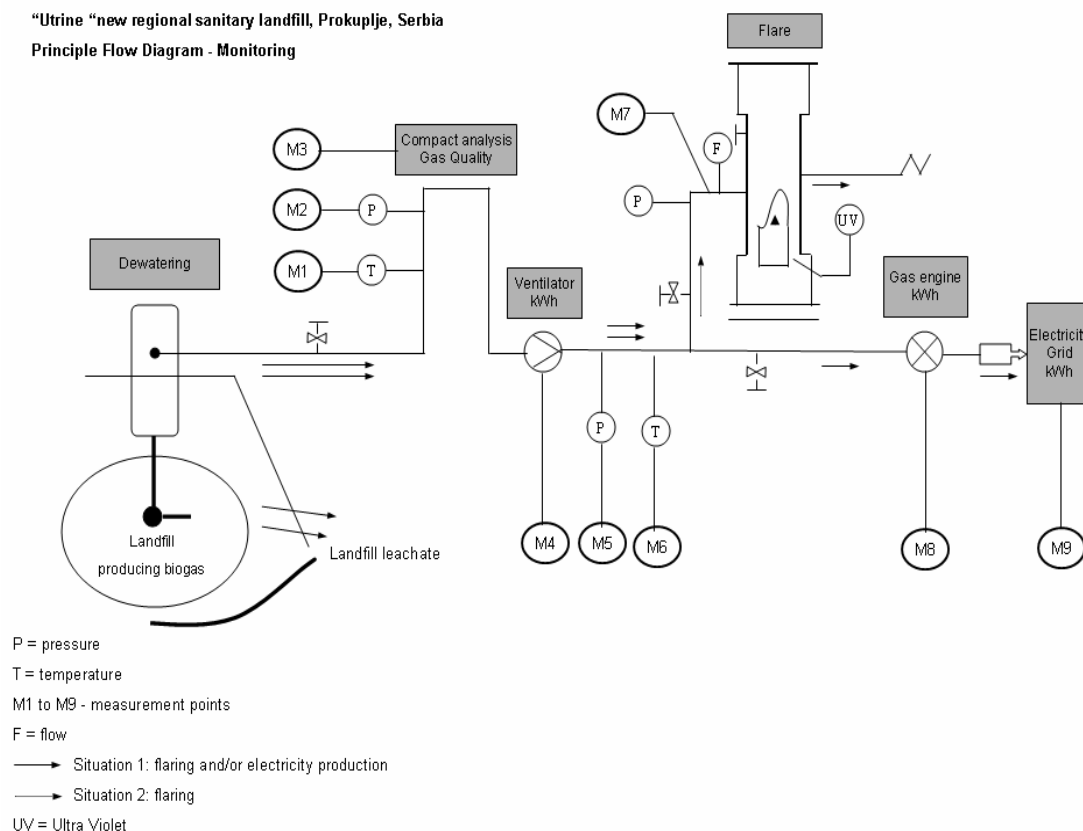
The simplified P&ID of the extraction and utilization system, the electrical connection to the grid of the system is given below.

Figure 3-18 Principle schematic set-up of a landfill gas extraction & utilization system

Landfill gas extraction and utilisation

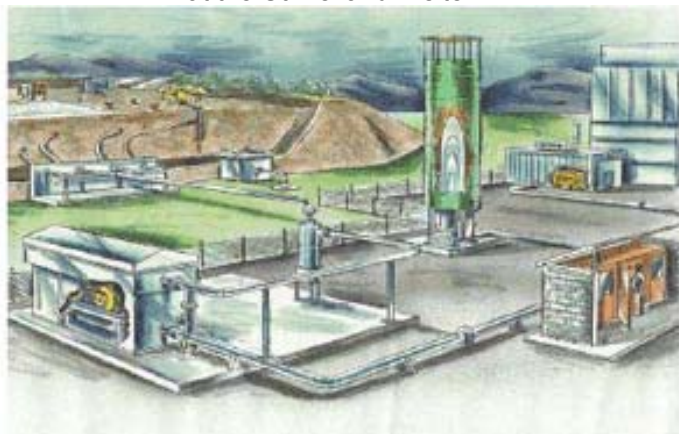
"Utrine "new regional sanitary landfill, Prokuplje, Serbia

Principle Flow Diagram - Monitoring



The visual set-up could be as indicated in the picture below. The compressors and containers can be placed in containers. This makes it possible to place extra unit(s) or remove unit(s) when the LFG amount is or becomes more respectively less.

Figure 3-19 Artist impression of possible landfill gas extraction & utilization configuration at the Utrine landfill site



Introduction into the Kyoto treaty

Due to the anaerobic condition in the landfill, landfill gas is produced. This gas migrates upwards and is released into the atmosphere. As LFG consists for some 55% of methane (CH₄) and for some 45 % of CO₂ of organic origin. As methane acts as a strong greenhouse gas (GHG) (21 x stronger than CO₂), thus contributing to the green house effect being the heating-up of the atmosphere.

The EU Directive Landfill on waste (1999/31/EC of 26 April 1999 + amendments) prescribes the capturing of LFG and the subsequent combustion of it. By doing so the contribution to the GHG-effect is prevented (Note: the produced CO₂ is considered of non-fossil origin, thus not contributing to the GHG effect).

All dumpsites of the municipalities will produce more or less LFG depending on factors as:

- Age of the waste;
- Composition of the waste;
- Water levels in the dumpsite;
- Dumping history, physical condition of dump, etc.

In recent years LFG capturing and flaring it (or using it for electricity production) has become very attractive thanks to the Kyoto-treaty. Countries that ratified the treaty (**Note: Serbia has ratified recently on Sept. 24 2007**) and that have no reduction obligation can develop projects in which Carbon Credits are generated that can be traded on so-called Carbon markets. Buyers are mainly Western countries that have an emission reduction obligation under the Kyoto reduction². Distinguished are the Clean Development Mechanism (CDM), for mostly developing countries, and the Joint Implementation (JI), concerning Central & Eastern European countries (except Serbia: → CDM). The treaty covers the period 2006 – 2012 for CDM and 2008 – 2012 for JI. JI will cease after 2012 while CDM will continue in some form however this is not yet clear (negotiation have started but are not yet successful).

An important criterion under CDM is the "Additionality criteria". A project activity shall be additional, in other words: It will not be implemented without CDM income as there are barriers (technically, financially, etc.). Legislation can prescribe LFG extraction as is the case in the EU Directive. As this Directive is not binding in Serbia a LFG project can qualify for CDM.³

The UNFCCC⁴ in Bonn registers JI/CDM projects and provide procedural and technical guidelines for a/o the baselines, calculations, monitoring etc.

The UNFCCC guidelines have been applied for the LFG and emission reduction calculations.

The amounts of electricity production and emission potentials up to 2018 are given in table 3.34.

² Within the EU there exists also an Emission Trade (ET) scheme between large companies. In future the ET market will merge with the market for JI carbon credits

³ The focal point for Carbon Credits (the Designated National Authority - DNA) in Serbia is the Ministry of Environment of Serbia Dr. Ivana Ribara 91, Novi Beograd [Ms. Branka Andric](mailto:Ms.Branka.Andric) (brana.andric@ecoserb.sr.gov.yu) Head of Department for International Cooperation, Phone: (381-11) 3611 6368, Fax: (381-11)158 793

⁴ United Nations Focal Climate Change Committee



Table 3-34 Electricity production and emission reduction potential (if forced extraction & flaring (combustion) is applied)

Year	Electricity production	CER's ¹⁾ from prevented fossil fuel in power generating facilities due to replacement ²⁾	CER's from LFG recovery (and subsequent full combustion) from Utrine sanitary landfill	Total CER's from LFG recovery and prevented fossil fuel in power stations
	MWh/yr	ton (1,000 kg)/yr	ton (1,000 kg)/yr	ton (1,000 kg)/yr
2009	-	-	-	-
2010	-	-	-	-
2011	-	-	137	137
2012	-	-	253	253
Total 2008 – 2012				
First credit period under Kyoto	-	-	390	390
2013	- 1	- 1	526	525
2014	- 1	- 1	872	871
2015	- 1	- 1	1,278	1,277
2016	- 1	- 1	1,446	1,445
2017	- 2	- 1	1,600	1,598
2018	- 2	- 1	1,740	1,738
2013 - 2018	- 8	- 6	7,462	7,456

1) Sept. 2007 CER price: 9 -11 Euro

2) Used grid emission factor: 0.545 ton CO₂/MWh

The 175 kWe gas engine can be put in operation after phase I is filled-up (2019) and can operate at full capacity in 2038. However the gas production is decreasing rapidly as no fresh waste is land filled after 2038.

Electricity production before phase I is filled-up (foreseen in 2019) makes little sense. There is not enough gas that can be captured.

A CDM Carbon Credit (CC) or Certified Emission Unit (CER) is presently (Sept. 2007) traded (forward market) between 9 -11 Euro/CER. The EU ETS (spot) market prices (phase II covering 2008 -2012) for Carbon Credits are between 22 - 28 Euro/CC.

Note: the amounts of CERs generated are less than 10,000. units per year at max. This would be a small project in CDM terms.

The proposed design is such that it fulfils the requirements regarding the Kyoto protocol, especially measuring monitoring, etc.

Table 3-35 Investment estimation extraction & utilization Utrine

Description	CAPEX (€)	Comments
Wells + piping/collector	90,000	> 6 wells required
Piping (main)	25,000	
Capping/covering	Not included	Included in capping budget
Compressor	35,000	
Flare	35,000	
Gas engine/generator unit (175 kWe)	100,000	Rest value present, not taken into account
Connection to grid	20,000	
Design, engineering, project management	35,000	
PDD & Validation (CDM)	n.a.	The Kyoto treaty ends ultimo 2012
Unforeseen, risk etc.	30,000	Minimum estimate
Total	Approx. 370,000	

The preliminary financial feasibility is negative for the LFG extraction & utilization (electricity production) project without Carbon Credit income due to its relatively small size. With additional Carbon Credits income (after Kyoto period) the LFG project can be made feasible provided that the project activity of LFG extraction & utilization is approved by the DNA of Serbia (at that time).

As the gas utilization system by means of a gas motor with electricity production cannot be put in operation before 2015 (as there is not sufficient gas before that time) the utilization system shall not be part of the project. The extraction system improved with the flare shall be put in place from the beginning of land filling. The gas has to be flared.

Mobile equipment means on landfill

A compactor and a tractor crawler with equipment for shovelling and ploughing are foreseen in designs for use on the landfill and landfill complex. For operation on the landfill complex the consultant proposes purchasing of the following mobile equipments:

1. one shovel / tractor crawler;
2. one compactor for waste compacting on landfill.

No new vehicles for waste collection are included.
The investment estimation is given in the following table.

Table 3-36 Investment cost estimation for shoveling means / compacting on the landfill site

Item	Description of works	Unit	Quantity	Unit cost (€)*	Total cost(€)
1	Shovel (tractor crawler)	pcs.	1	150,000	150,000
2	Compactor (type: CAT 826H)	pcs.	1	390,000	390,000
	Mobile equipment means, total				540,000

* incl. transport

Comment

New collection vehicles and containers are in the scope of this study, see chapter 3.1.11. All four municipalities need some number of the new collection vehicles and containers (see chapter 3.1.5.), particularly the municipality of Žitorađa, because the PUC Žitorađa has not any collection vehicle neither container (it only has very small number of containers for primary selection).

Transfer Station (TS)

The Consultant has considered and financially analysed the introduction of one or more transfer stations. The required investment for small TS amounts some 300.000 Euro each, tractor/shovel/trucks not included.

The condition and capacity of the proposed routes is such that large trucks with a > 40" container (some 50 m³ net capacity) are the maximum sized truck-container combination possible without damaging the roads and endangering the other traffic.

By applying a financial/economical Transfer Station model, developed by Royal Haskoning, in which the operational cost for the year 2010 for the two scenario's (with/without TS, scenario 1 resp. scenario 2) have been calculated, it is demonstrated that transfer stations in neither Blace, Kuršumljia and Žitorađa are cost efficient (table 3.37). The reason is that they produce only small amounts of waste and the distances are relatively short. It is more cost effective to transport the collected waste in the collection trucks (type: compactor) to Utrine.

Table 3-37 Operational cost for the year 2013 for two scenarios

	Waste quant. (2013)	Scenario 1		Scenario 2		Total cost TS+ hauling	Hauling vehicles required	Qualifies for TS? Yes/No
		Cost transport (No TS)	Compactor collection vehicles required	Cost transfer station	Cost hauling			
	ton/y	€/year	No.	€/year	€/year	€/year	No.	
Žitorađa	1,165	10,292	0	84,755	2,362	87,117	0	No
Kuršumljia	6,168	104,395	2	98,922	22,361	121,282	1	No
Blace	2,077	32,229	1	87,113	6,952	94,065	0	No

However in the case of Kuršumljia the difference is limited. A transfer station in Kuršumljia can therefore be considered. As it is a strong wish of Kuršumljia to have a transfer station, it is proposed to erect a TS and to equip it with a hydraulic press (for pressing and bailing of primary selected waste, because only the municipality of Kuršumljia has no the press machine) and with 3 reinforced containers. One (1) long-haul truck is required.

Žitorađa and Blace shall use their (new proposed → chapter 3.1.11) collection trucks for transporting to Utrine. No additional trucks are required.

A combined transfer station for Kuršumljia and Blace can be considered at the road junction in Beloljin, some 20 km from Prokuplje. The financial/economical analysis shows however that this is far from viable as both municipalities have first to transport their waste with collection vehicles to Beloljin where it is transferred into the long haul truck that transports it the remainder 20 km to Utrine (see table 3.38).

Table 3-38 Operational cost for the year 2013 for two scenarios in the case of a combined TS in Beloljin

		Scenario 1 Transportation with collection trucks to Utrine		Scenario 2 A TS in Beloljin for Kuršumlja + Blace together					
	Waste quant. (2013)	Cost transport (No TS)	Compactor collection vehicles required	Cost transfer station	Cost hauling	Cost Transport to Beloljin (both vill.)	Total cost	Hauling vehicles required	Qualifies for TS? Yes/No
	ton/y	€/year	No.	€/year	€/year	€/year	€/year	No.	
Kuršumlja + Blace	8,244	136,624	3	104,295	20,148	110,871	235,314	1	No

Bulk materials

For the time being, citizens delivering bulk waste originating from households (old furniture, home appliances, etc.) to their local landfill site. The Žitorađa, Kuršumlja and Blace landfills are to be closed. Without a collection alternative for the bulk waste a non-wanted environmental situation can develop. It is proposed that the bulk waste is collected by the PUC's on a regular interval (e.g. quarterly). Bulk waste can be placed along the roads or brought at certain collection points. A truck with an open 20 – 25 m³ container shall collect this waste and transports it to Utrine landfill where it is going through the recycle line (if required after manual dismantling) or land filled directly depending on the nature of the bulk waste. This truck shall be under control of the new joint PUC.

The investment cost estimation of transfer station in Kuršumlja is specified in table 3.39.

Table 3-39 Investments costs estimation for the transfer station in Kuršumlja

	Description	Unit	Quantity	Price (€)	Budget Summary (€)
1	Transfer station				
1.1	Terrain	m ²	10,000	3	30,000
1.2	Civil / mech. Constructions		1	250,000	250,000
2	Vehicles (intercity transport fleet)				
2.1	Long-haul trucks	pcs.	1	100,000	100,000
2.2	Press containers	pcs.	3	18,000	54,000
2.3	Hydraulic press	pcs.	1	80,000	80,000
2.4	Open truck for bulky material	pcs.	1	80,000	80,000
2.5	Shovel	pcs	1	90,000	90,000
	Total				684,000

Proposed set-up of a Transfer Station (TS)

A transfer station is proposed consisting mainly of:

- a terrain (land plot) of approx. 1 ha with gate/fence;
- a weighbridge;
- an approach ramp;
- an unloading platform;
- a steel roof construction;
- several reinforced containers suitable for compacting the waste;
- a hydraulic press and
- auxiliary equipment like fire extinguishing net, water supply, sewerage, administrative office, electric grid connection etc.

In addition press containers and a haulage truck(s) are required.

The unloading platform must be large enough in order to let the truck to manoeuvre and, when required, makes it possible to let a wheel loader to operate (pre-selection, take out large pieces etc). The unloading platform shall be fully covered.

The TS area shall be spacious in order to allow trucks to manoeuvre and must be completely fenced. The TS area shall have a container storage area, a small administrative office, etc.

A conceptual lay-out is presented in the next figure.

Figure 3-20 Conceptual lay-out of the TS area

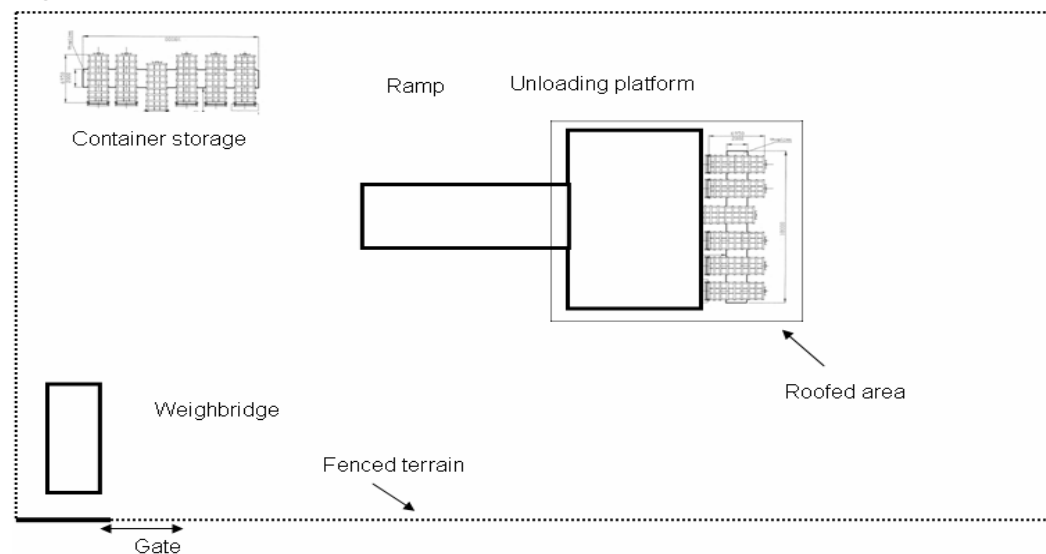


Figure 3.21 and figure 3.22 give a possible side and top view of the unloading platform.

Figure 3-21 Side view unloading platform TS

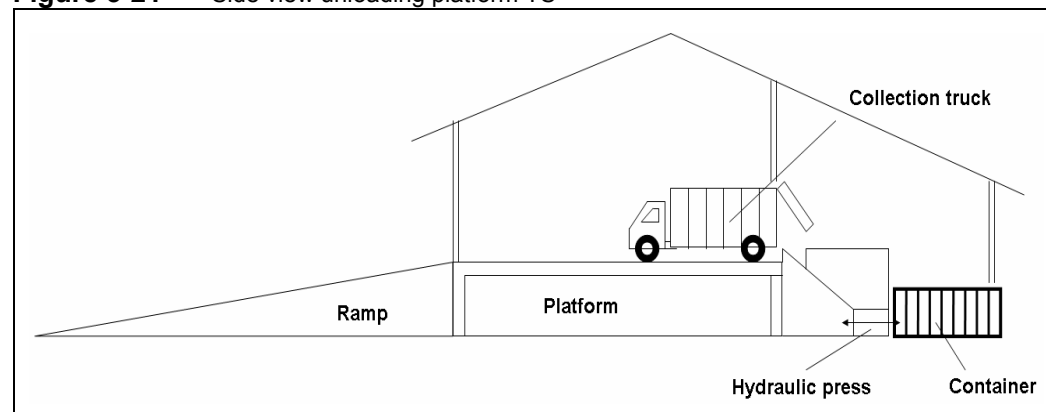
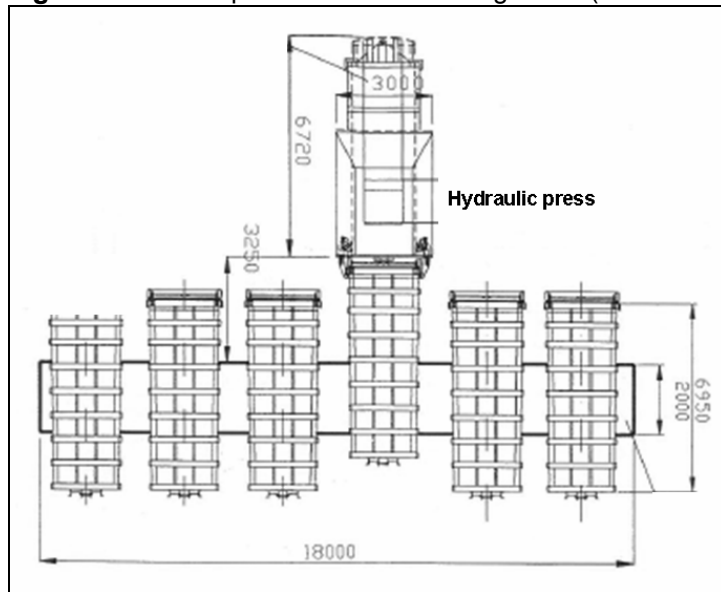


Figure 3-22 Top view container arrangement (Note: measurements are indicative)



The height of the roof shall be sufficient, as dump trucks might have different unloading principles too. See photo of the PCF project Liepaja (Latvia) transfer station that has been designed by Haskoning.

Figure 3-23 Truck on unloading platform



Location of the Transfer Station

The macro (general) location of a transfer station should fulfil the following requirements:

- More than 0.5 km away from the nearest residential houses (out of settlements);
- Landfill location should not be in a sanitary protection zone of potable water supply sources;
- Should be at a distance of more than 0.5 km from rivers, lakes and reservoirs;
- Should be more than 0.5 km away from a cultural heritage monument or protected environmental zone;
- At least 0.5 km from the closest railway or bus station, storage of flammable

- materials or military structures;
- At least 2.0 km from a medical institution with stationary patients, spas or food processing industries;
- At least 0.1 km from gas, oil and power supply lines;
- Must not be above installations for irrigation, underground structures such as tunnels and shelters;
- Elevation of terrain at the transfer station should be above the flood with 100-year re-occurrence interval.

Mobile equipment means in municipal PUCs

It is proposed that all four municipalities, i.e. all four PUCs should be supplied with new collection vehicles and containers, to overcome present shortcomings and anticipating the increase in collection coverage. The proposed number of collection containers and collection vehicles, based on our investigations and the information given by all four PUCs, is listed below.

Table 3-40 Investment cost estimation for collection vehicles and containers in PUCs

Description of works	Unit	Quantity	Unit cost (€)	Total €)
Prokuplje				
Collection vehicles	pcs	2	80,000	160,000
Containers of 1.1 m ³	pcs	200	290	58,000
Subtotal Prokuplje				218,000
Blace				
Collection vehicles	pcs	1	80,000	80,000
Containers of 5 m ³	pcs	50	630	31,500
Containers of 2 m ³	pcs	20	380	7,600
Subtotal Blace				119,100
Žitorađa				
Collection vehicles	pcs	1	80,000	80,000
Containers of 2 m ³	pcs	120	380	45,600
Subtotal Žitorađa				125,600
Kuršumlja				
Collection vehicles	pcs	2	80,000	160,000
Containers of 1.1 m ³	pcs	100	290	29,000
Containers of 2 m ³	pcs	50	380	19,000
Hydraulic press for PET/paper/cardboard	pcs	1	7,000	7,000
Subtotal Kuršumlja				215,000
Total collection vehicles and containers				677,700

3.2 Technical options

In this section a cost estimate of the proposed technical solution along with a summary of designs required for the proposed solution as well as the justification of the proposal are presented.

3.2.1 Additional design works

Other Main Designs will be developed for the following:

- Closure of existing non sanitary landfills in Kuršumljija, Žitorađa, Blace (1). The Main Designs for closure of existing landfills in Prokuplje and Blace (1) are already done by designer company the Institute "Kirilo Savic", Belgrade, but have to be reviewed and compared with EU regulation/Directives and relevant Serbian legislation in force.
- Transfer station with equipment, for either Kuršumljija or for Kuršumljija and Blace. For obtaining a construction permit, the following documents are required to be prepared before the Main Design elaboration:
 - a Study on locations evaluation and selection along with a Detailed Urban Plan,
 - as well as a Preliminary Design and an EIA including public consultation.

The municipality of Prokuplje will coordinate all activities about preparing of the above mentioned documents. Estimated date for finalization of the documentation is June 2008.

3.2.2 Cost estimates and phasing of the proposed investments

The costs of the proposed adjustments have been analysed. The results of the analysis for phase I are presented in the table below. A detailed cost estimate including phases I, II, III and IV is given in Annex 3.4.

Phase I is subdivided into two components (lots).

- Component (lot) 1 shall comprise the construction of phase I of the landfill body (out of three phases) with complete infrastructure and access road. This lot would be co-financed by the municipalities, Eco-fund and Development Fund. The value of this component is € 4.7 million;
- Component (lot) 2 shall comprise the construction of the transfer station, closure of the existing dumpsites, purchase of laboratory equipment, waste compacting and transport means on landfill site and waste collection vehicles, long-haul trucks and containers. This project component is expected to be financed by EU-IPA funds, or other international grants. The value of this component is € 6.3 million.

The project implementation plan is given in chapter 8.

Table 3-41 Investment cost estimates Phase I, lots 1 and 2

Description	Proposed LOT 1 of phase I 2008	Proposed LOT 2 of phase I 2009	Total Phase I
Landfill phase I	3,304	559	3,862
Access road & connection power grid	688		688
Upgrade waste collection equipment	-	678	678
Closure existing dumpsites	-	3,525	3,525
Transfer station Kursumlija	-	654	654
Land acquisition transfer station	-	30	30
Subtotal investments	3,991	5,445	9,436
Engineering, supervision, commissioning	200	402	601
Contingencies	299	406	705
VAT	203	-	203
Gross total	4,693	6,253	10,946

3.2.3 Justification of the proposed preferred option for the investments

The Consultant proposed the following technical options and phasing:

- **Phase I-lot 1** comprising construction of phase I of the landfill body (out of three phases) with complete infrastructure where the construction would start in 2008;
- **Phase I-lot 2** comprising construction of a transfer station with equipment, closure of the existing dumpsites, purchasing of the laboratory equipment, waste compacting and transport means on landfill site and waste collection vehicles, long-haul trucks and containers, where the construction and purchasing would start in August of 2009;
- **Phase II** comprising of construction of phase II of the landfill body and top capping and recultivation works of phase I.
- **Phase III** comprising of construction of phase III of the landfill body and top capping and recultivation works of phase II.
- **Phase IV** comprising of top capping and re-cultivation works of phase III.

Phase I is defined as the priority project. Lot 1 would be financed by the municipalities and the Eco-fund, while lot 2 would be targeted for EU-IPA assistance.

Justification for this phasing is that proposed regional landfill site is too large to be constructed in one phase and because of the need for a rapid solution for huge health problem in Prokuplje due to the existing dumpsite. It is therefore required to start with construction of LOT 1 as soon as possible.

With regard to financing the scheme, the Eco-fund in its Management Board meeting of August 23, 2007 approved of RSD 154 million (€ 1.9 million), which comprises 40% of LOT 1 of phase I. The Development Fund of Serbia has committed cca € 1.5 million. The municipalities are obliged to provide the remaining funds for LOT 1 of that phase (cca € 1.4 million).

Phase I lot 2 is subject to availability of EU-IPA funds which are not expected before 2009.

A transfer station is not economically justified but can be erected near Kuršumlija.

4 ENVIRONMENTAL AND SOCIAL ANALYSIS

4.1 Introduction and scope of EIA

The review of the environmental and social aspects of this project is set against the following requirements, to be found in the following documents:

- Environmental Integration Handbook for EC Development Co-operation, EuropeAid, December 2006
- Local legislation, Law on Environmental Impact Assessment (2004);
- Regulation on Criteria for the site selection and establishment of solid waste landfill "Official Gazette RS" No. 54/92);

4.2 EIA Procedure

4.2.1 Serbian requirements

According to Serbian legislation, an Environmental Impact Assessment has to be conducted and approved in order to obtain a construction permit. The Law on Environmental Impact Assessment (Official Gazette of the Republic of Serbia 135/2004) gives requirements for such an EIA. This law on EIA has been developed to be compatible with EU Directives.

EIA scope and contents

According to article 12 – 15 of the Serbian Law on EIA, the Competent Authority decides on the required scope and contents of an EIA study. Article 17 of the Law lists the following items.

- The data on project developer;
- The description of the location intended for project implementation;
- The description of the project;
- The outline of the main alternatives studied by the project developer
- The outline of the environmental status at the site and its close vicinity (micro location and macro-location);
- The description of likely significant impacts of the project on the environment;
- The environmental impact assessment in cases of accidents;
- The description of measures envisaged to prevent, reduce and, if possible eliminate any significant adverse impacts on the environment;
- The monitoring programme for impact on the environment;
- The short non-technical summary of data listed in points 2) to 9);
- The data on technical shortcomings, absence of the appropriate expertise and skills or, impossibility of obtaining the appropriate data.

Public consultation

Article 14 of the Law on EIA requires public announcement of the decision by the Competent Authority on the scope. Article 20 and 21 describe the public consultation procedures to be followed on the results of the EIA.



4.2.2 Requirements set by EAR

According to the Environmental Integration Handbook, Annex 7, an EIA is necessary if the waste disposal site is of a large scale (ie >150.000 population equivalent) or if it effects a particular vulnerability of the recipient environment or an existing SEIA report advises it. This project does is not a large scale (approximately 103.000 population equivalent) and the location is not on a vulnerable location. Furthermore, an EIA is not advised in a SEIA report.

4.3 Quick scan of main environmental impacts

In order to assess the construction of a regional landfill, it is important to understand the scope of the environmental impacts on various aspects. Therefore, a description of the main impacts is given in tables 4.5 and 4.5 (paragraph 4.7) based on a description below. Another aspect dealt with in the tables is the closing of the landfills in Toplica district. Closure will have a positive impact on the environmental and social impacts of the inhabitants in the area. Therefore, in this quick scan, the new landfill as well as the existing landfills is considered. Special attention is given to the existing landfill near the centre of Prokuplje, since that is the most critical one as to health, safety and environment.

The assessment of environmental impacts is based upon relevant document and on information gathered during fieldtrips in May, July and September 2007. On these occasions talks took place with representatives of the municipality, sites were visited and photos were taken.

4.3.1 Current situation

Landfill current status and use

The landfill at Prokuplje is in full use at the moment. It is estimated that the capacity lasts for another half a year. The other three landfills at Toplica district (Žitorađa, Blace and Kuršumlija) are still active.

Surface water existing landfills

The active landfill of Prokuplje is located very close to the city center, between sub rural settlements Babin Potok and Berilje, and on alluvial sediments of the Toplica River. At the site of the landfill the river bend was diverted to the east (man-made diversion). The sewage from the adjacent houses is flowing into the old river bend, as well as spring water from an old Turkish fountain. These streams, together with leachate from the dumpsite affect the surface water quality of the diverted part of the Toplica river, which is adjacent to the landfill.

Like other municipalities in the broader region the water supply plant of Prokuplje city uses water from river Toplica. The water intake point is upstream from the landfill. The contamination of the landfill induces serious public health risks, especially downstream.

Residents of Prokuplje complain over infections. It is reported that every one year they have some kind of epidemic of jaundice and pig plaque.

Figure 4-1 Existing landfill in Prokuplje



The other existing landfills are not situated near water supply sources. Nevertheless, downstream surface water quality will be affected by these landfills.

Groundwater existing landfills

As to the existing landfill near the centre of Prokuplje, groundwater contamination is evident (although not proven by laboratory analysis), and, as mentioned earlier, a threat to the surface water quality.

On all the other landfills the ground water quality will be affected by leachate, eventually leading to contamination of downstream surface water.

Ecological quality existing landfills

The ecological quality of the area surrounding the existing landfills has been deprived. It is not known if those areas inhabited critical plant or animal species.

Figure 4-2 Existing landfill in Blace



Air quality existing landfills

The air on the present landfill areas is polluted due to the uncontrolled release of gases formed in the process of decomposition of waste disposed in a non-sanitary way, as well as due to non-controlled fires on the landfill. Depending on the wind direction and the distance to settlement or houses, there are complaints of neighbors about the smell of the landfill.

Figure 4-3 Existing landfill in Kuršumlja



Soil quality existing landfills

The soil every sites is polluted by waste disposed in a non-controlled manner, as well as leachate.

4.3.2 Future situation

Surface water new regional landfill

At a distance of around 1 km from the lower part of the projected landfill, the Straževa river is situated. Since the new landfill will be constructed according to the requirements set forth, the surface water quality will not be influenced by the landfill.

Groundwater new landfill

In the vicinity of the landfill, there are no water supply sources. Since the new landfill will be constructed according to the requirements set forth, the ground water quality will not be influenced by the landfill. During measurements (hydro geological survey) ground water was only encountered at the lower part of the valley.

Ecological quality new landfill

The area is not a critical habitat of any plant or animal species. On the site there are no protected natural goods, endangered plant or animal species and vegetation. The natural environmental is not part of a protected area.

Air quality new landfill

The appliance of new landfill practices (as set forth by requirements) will prevent deterioration of air quality. Inhabitants of the area live at a minimum distance of 0.6 km.

Soil quality new landfill

The appliance of new landfill practices (as set forth by requirements) will prevent deterioration of soil quality.

Remaining issues

Not far from the projected landfill site electrical power supply lines and posts are present. The minimum distance of activities, such as a landfill, needs to be 100 meters (based upon Official Serbian rulebook on criteria for landfill site selection and construction, number 54/92). The projected landfill site is situated at minimum distance of approximately 110 meters as geodetically measured by Geonis, Kuršumlija, 2006).

Figure 4-4 Power lines near new landfill site



The transport of waste from the municipalities of Blace, Žitorađa and Kuršumlija will take place through the town centre of Prokuplje. It is estimated that an additional number of 2 trucks will cross the town centre daily.

The municipality of Prokuplje is raising funds for constructing a bypass road, thereby avoiding the town centre. It is by now not known if and when such a bypass road will be constructed.

Procedure of waste disposal on active landfill

In order to ensure health protection through environmental protection (water, air and soil) specific procedures will be implemented as to:

- Waste disposal starts at the lowest peak elevation of the landfill;
- Forming a (disposal)cell so that the daily working area is of the smallest possible dimensions;
- Filling the cell, if possible, straight to the final height;
- Always covering the cell, at the end of the working day, with inert material, even if the final height wasn't reached;
- Spreading each pile of waste delivered to the landfill body and compressing it well;
- Never leaving an unfinished cell for the following day;
- Working area slope must not exceed 1:4 and not be lower than 1:1.5;
- Strict compliance with the landfill fill-up plan;

- Using only adequate planned equipment, within the ranges of its performance;
- Location of the equipment in the active area, except for weekends, when the equipment is washed and disinfected, driven to the parking for clean vehicles, until the beginning of the new working cycle;
- Avoiding spreading of waste from the upper side of the working surface;
- Ensuring the movement of compactor (bulldozer) strictly along the working area;
- The building of an internal traffic road prior to the next section being filled up, to ensure undisturbed waste transport, without delays.

Monitoring environmental impacts during exploitation phase

A monitoring program has been drawn up in the EIA to ensure by measurements that the landfill during its operational existence does not affect the environment (i.e. especially air, ground water and surface water). The monitoring points are defined in the EIA.

Adaption to surroundings

By the establishment of protective green belts the landfill will be aesthetically adjusted to the surrounding environment.

Aftercare

A monitoring program should be drawn up to ensure by measurements that the landfill after closure will not affect the environment (i.e. especially soil, ground water and surface water). Monitoring points have to be defined.

4.4 Procedures undertaken

EIA

In line with requirements by Serbian Law, an EIA was carried out for the Regional solid waste landfill for Toplica district in Prokuplje by Institute 'Kirilo Savić', reported in 2007. This EIA has been approved by the Serbian competent authority (i.e. the assembly of the municipality of Prokuplje) on 21 September 2007 (see Annex 4.1).

The public of Prokuplje was informed by announcement that they could comment on the requirements for the EIA from 14 through 28 of June 2007. Since no comments were received, on 4 July 2007 it was made public by announcement that the requirements were finally determined.

Prior to the approval, the requirements for the EIA were received, whereupon on 2 July 2007 it was decided by the local municipality that an EIA should be carried out. A technical commission of Prokuplje reviewed the EIA and on 14 September 2007 passed a judgement to the assembly of the municipality that they agreed.

Urban planning

The Commission for Planning of the municipality of Prokuplje discussed on 28 May 2007 about the detailed urban plan for the new landfill and about the strategic EIA (SEIA, reported on 12 February 2007). The commission advised the assembly of the municipality of Prokuplje to approve the detailed urban plan for the new landfill and the SEIA.



Prior, a public hearing was announced for 26 April 2007 with respect to the urban plan for the new landfill and the SEIA. No comments or remarks were made at the public hearing, as it is stated in the Report of the Commission for Planning, dated on May 28, 2007.

The people of the settlements of Đurevac and Donja Stražava were involved in the process of planning the new landfill and drafting the urban plan. The new landfill was projected relatively close to their houses, and access to the landfill site could only be take place via the settlements.

The people of Donja Stražava objected to the suggested access road through their settlement, whereas the inhabitants of Đurevac supported the (alternative) route through their settlement.

4.5 Construction of the new landfill

The future landfill complex will be designed to enable unimpeded municipal solid waste disposal. The design takes into account the required environmental protection measures, measures of protection at work, and placing of protective green belt for creating a favourable aesthetic effect.

The future land use of the various sections of the landfill area is described in chapter 3.

4.6 Gap Analysis

In the table below a review is given of which parts are dealt with in the EIA (drafted by Institute 'Kirilo Savić', and approved of in September 2007). It does not give a judgement on whether it is sufficiently described.

Table 4-1 Summary of Serbian legislation

	Requirement	EIA 2007
1	The data on project developer;	√
2	The description of the location intended for project implementation;	√
3	The description of the project;	√
4	The outline of the main alternatives studied by the project developer	√
5	The outline of the environmental status at the site and its close vicinity (micro location and macro-location);	√
6	The description of likely significant impacts of the project on the environment;	√
7	The environmental impact assessment in cases of accidents;	√
8	The description of measures envisaged to prevent, reduce and, if possible eliminate any significant adverse impacts on the environment;	√
9	The programme of monitoring of impact on the environment;	√
10	The short non-technical summary of data listed in points 2) to 9);	√
11	The data on technical shortcomings, absence of the appropriate expertise and skills or, impossibility of obtaining the appropriate data.	-

Although the EIA by Institute 'Kirilo Savić' is not carried according to the specific EAR requirements, the EIA is reviewed accordingly in the table below.

Table 4-2 Summary review of EAR requirements

	Requirement	EIA 2007
1	Executive summary	✓
2	Background	✓
2a	Project justification and purpose	✓
2b	Project location	✓
2c	Project description and associated activities	✓
2d	Alternatives	✓
2e	Environmental policy, legislation and institutional framework	✓
3	Approach and Methodology	✓
3a	General approach	✓
3b	Geographical or mapping units	✓
3c	Environmental quality indicators	✓
3d	Assumptions, uncertainties and constraints	✓
4	Environmental baseline study	✓
5	Impact identification and evaluation	✓
6	Mitigation/optimization measures and residual impacts	✓
7	Recommendations	✓
8	Conclusions	✓
9	Technical appendices	✓
10	Other appendices	✓

4.7 Gap analysis on content of EIA (impact & mitigation measures)

In the tables below an overview is given on the content of the EIA. It focuses on the possible impacts and mitigation measures proposed. Within the column 'evaluation' it is indicated whether the item is dealt with sufficiently or whether additional information is needed.

Table 4.4 describes the issues relevant during construction phase, and table 4.5 for the operational phase of the project.

In the tables below an overview is given of the main environmental and social issues related to this project. An estimation of the impact is made based on expert judgment and assisted with the criteria below. Further down a comparison is made of no-action (no investments – leaving for the current situation to continue) and investment made.

Table 4-3 Criteria for minor and major impact setting

Criteria	Evaluation – Minor impact	Evaluation – Major impact
Intensity	Small	Large
Scale	Local or on-site scale only	Regional or National scale
Duration	Weeks or months	Years

Table 4-4 Main environmental issues and mitigation measures for construction phase

Type	Description of impact related to activity	Evaluation	Mitigation measures during construction phase
Physical environment			
Air pollution	Caused by <ul style="list-style-type: none"> Trucks in order to prepare landfill for use Dust during dry spells 	MINOR	<ul style="list-style-type: none"> Use good quality fuel/petrol, well maintained trucks To prevent additional dust, drive slowly and sensibly Drive slowly to reduce dust pollution to a minimum (no need to spray water)
Noise pollution	Caused by <ul style="list-style-type: none"> Trucks in order to prepare landfill for use 	MINOR	<ul style="list-style-type: none"> Good maintenance and check up on vehicles and equipment. Periodic engine control should take place. Prevent any unnecessary noise production, leaving equipment and vehicles running whilst they are not being used. Provide ear protection if limits exceed safety standards
Soil pollution	Caused by <ul style="list-style-type: none"> Spillage of fuel or hazardous fluids during construction phase 	MINOR	<ul style="list-style-type: none"> Good maintenance and check up on vehicles and equipment. Periodic control should take place. Allow for cleaning and rinsing of equipment only at a certain place with the right protection to prevent soil pollution. Regular site inspection to carry out visual checks on oil and chemical spillage during construction.
Water pollution	Groundwater caused by: <ul style="list-style-type: none"> Potential pollution through spillage during construction phase Surface water caused by: <ul style="list-style-type: none"> Indirect through groundwater 	MINOR	<ul style="list-style-type: none"> All measures need to be taken in order to reduce any spillage of pollutants during construction phase.
Waste	Caused by <ul style="list-style-type: none"> Contractors, waste from construction in general 	MINOR	<ul style="list-style-type: none"> Waste can be dumped at the site, unless hazardous waste is produced. It should always be dealt with in accordance with the local legislation.

Type	Description of impact related to activity	Evaluation	Mitigation measures during construction phase
Natural environment			
terrestrial flora & fauna	Negative impact on flora and fauna: <ul style="list-style-type: none"> Removal of bushes and small trees growing at present on the site. 	MINOR	Compensation should be made by planting the same amount of forest in other place or in protective belt.
Aquatic flora & fauna	Possible negative effect on flora and fauna due to pollution during construction phase which could contaminate the groundwater and eventually the downstream river.	NO Impact	If measures above are taken then no impact will occur
Human environment			
General HSE	<p>During the construction phase, workers are inevitably exposed to health, safety and security risks. Following activities (mainly safety) should have special attention;</p> <ul style="list-style-type: none"> Excavation work, Working with heavy machinery, Working with chemicals, Working in very noisy environments (noisy machines), Lifting and or loading of heavy loads. <p>Receptors of this impact are the construction workers. The impact can be classed as minor or major, depending on what will happen in practice. If the correct measures are taken and the correct working atmosphere allows for safe working conditions then the impact will be minor as it will be as low as reasonably practical (ALARP).</p>	MINOR	<p>Also for construction phase an extensive HSE management plan should be made. It should include all relevant aspects (as mentioned in the chapter on HSE management) but for labour protection the following is essential</p> <ul style="list-style-type: none"> Provision of PPE (Personal Protection Equipment), specific for each task, Permit to work system, regular checks in the field if regulations and standards are respected, Proven qualifications for the work needed, Provide medical assistance to all workers, Education of all workers on their risks and what to do (also hygiene and illnesses).

Type	Description of impact related to activity	Evaluation	Mitigation measures during construction phase
Resettlement	Not applicable	NO Impact	No measures needed
People	<ul style="list-style-type: none"> Based on the site visit it is clear that inhabitants of Đurevac live along the route to the landfill site. During the construction it is envisaged that the transport of material through Đurevac could cause accidents. 	MINOR	<ul style="list-style-type: none"> The people of Đurevac should be well informed about the construction works and the impact on the road traffic.



Table 4-5 Main environmental issues and mitigation measures for operational phase

Type	Description of impact related to activity	Evaluation	Mitigation measures during construction phase
Physical environment			
Air pollution	Caused by <ul style="list-style-type: none"> Trucks arriving with waste and leaving the landfill Additional air pollution of gasses due to compacting of waste Dust during dry spells 	MINOR	<ul style="list-style-type: none"> Use good quality fuel/petrol, well maintained trucks Take precautions during replacement of waste, included in the HSE management plan. To prevent additional dust, drive slowly and sensibly Drive slowly to reduce dust pollution to a minimum (no need to spray water)
Noise pollution	Caused by <ul style="list-style-type: none"> Trucks arriving with waste and leaving the landfill Compactors or shovels for replacement of waste 	MINOR	<ul style="list-style-type: none"> Good maintenance and check up on vehicles and equipment. Periodic control should take place. Prevent any unnecessary noise production, leaving equipment and vehicles running whilst they are not being used. Provide ear protection if limits exceed safety standards
Soil pollution	Caused by <ul style="list-style-type: none"> Dirty trucks driving in and out during operational phase Possible damage to protection layer (at the bottom of the landfill). Can be discovered by monitoring of drainage system and ground water monitoring. 	MINOR	<ul style="list-style-type: none"> Good maintenance and check up on vehicles and equipment. Periodic control should take place. Allow for cleaning and rinsing of equipment only at a certain place with the right protection to prevent soil pollution. Regular site inspection to carry out visual checks on oil and chemical spillage during construction. Strict inspection procedures as to protective layer in order to identify problems as soon as possible.

Type	Description of impact related to activity	Evaluation	Mitigation measures during construction phase
Water pollution	<p>Groundwater caused by:</p> <ul style="list-style-type: none"> Possible damage to protection layer (at the bottom of the landfill). Can be discovered by monitoring of drainage system and ground water monitoring. <p>Surface water caused by:</p> <ul style="list-style-type: none"> Indirect through groundwater 	MINOR	<ul style="list-style-type: none"> Damage to protective layer: Strict inspection procedures as to protective layer in order to identify problems as soon as possible.
Waste	Not relevant for operational phase	NO Impact	

Natural environment			
terrestrial flora & fauna	Not relevant for operational phase	NO Impact	
Aquatic flora & fauna	<ul style="list-style-type: none"> Possible negative effect on flora and fauna due to pollution to soil and groundwater (detected through monitoring of drainage system and ground water monitoring. 	MINOR	<ul style="list-style-type: none"> If pollution is detected in ground water then this water must be collected and prevented from streaming downhill to the surface water.
Human environment			
General HSE	<p>During the operational phase, workers are inevitably exposed to health, safety and security risks. The following activities (mainly safety) should have special attention;</p> <ul style="list-style-type: none"> Excavation work, Working with heavy machinery, Working with chemicals, Working in very noisy environments (noisy machines), Lifting and or loading of heavy loads. <p>Receptors of this impact are the construction workers. The impact can be classed as minor or major, depending on what will happen in practice. If the correct measures are taken and the correct working atmosphere allows for safe working conditions then the impact will be minor as it will be as low as reasonably practical (ALARP).</p>	MINOR	<p>Also for operational phase an extensive HSE management plan should be made. It should include all relevant aspects (as mentioned in the chapter on HSE management) but for labour protection the following is essential</p> <ul style="list-style-type: none"> Provision of PPE (Personal Protection Equipment), specific for each task, Permit to work system, regular checks in the field if regulations and standards are respected, Proven qualifications for the work needed, Provide medical assistance to all workers, Education of all workers on their risks and what to do (also hygiene and illnesses).

Resettlement	Not applicable	NO Impact	No measures needed
People	<ul style="list-style-type: none"> After reconstruction of the transport route (also through Đurevac) drivers of the trucks and inhabitants need to be aware of the changed situation that allows vehicles to drive at higher speeds. 	MINOR	<ul style="list-style-type: none"> During the reconstruction of the road special attention must be given to road safety especially at Đurevac.



4.8 Main Environmental consideration still needed to be finalised

The following issues still need to be finalized and agreed upon.

Table 4-6 Tentative monitoring plan

Environmental compartment	Location within compartment	Type of monitoring	Monitoring frequency
Physical environment			
Air quality			
Groundwater quality			
Human environment			
HSE			

There needs to be a clear monitoring plan for the construction and operational phase and for the period after closure (aftercare). The EIA needs to be elaborated on this. Monitoring points need to be defined for both phases, and it needs to be stated which parameter will be analyzed at which sampling points and with which frequency. It must be clear what levels are acceptable and which levels are unacceptable and what corrective measures are related to the analytical outcome. This should be incorporated in the contingency plan and it must clear who takes the responsibility for action.

4.8.1 Health and safety measures and contingency planning

Include HSE plans in construction protection measures. Based on interviews with experienced workers in Serbia this is a new way of working which is not so common. This project will therefore be an opportunity to learn and implement this way of working.

4.8.2 Regulatory compliance

Regulations that apply to the EIA

The project plans and design have to be in accordance with the following regulations:

- Law on Environmental Protection; OGRS 135/04
- Rulebook on Criteria for Location Selection for Solid Waste Landfills; OGRS 54/92

The following legislation regulates the contents and procedures of Environmental Impact Assessment in Serbia:

- Law on Environmental Protection; OGRS 135/04
- Law on Strategic Environmental Impact Assessment; OGRS 135/04
- Law on Environmental Impact Assessment; OGRS 135/04
- Regulation on the EIA Study (EIA Report) Contents Review; OGRS 69/05
- Regulations on the Contents of an Environmental Impact Assessment Study; OGRS 135/04
- Regulation on the Contents of the Screening Request and the Scoping Request; OGRS 69/05
- Regulation on Procedure of Public Insight, Presentation and Public Debate on Environmental Impact Assessment; OGRS 69/04
- Regulation on the Work of the Technical Commission for EIA Review; OGRS 69/05
- Regulation on the Public Register of the EIA Process and Decisions; OGRS 69/05

- Decree on the Project List subject to mandatory EIA and the Project List for which EIA can be requested; OGRS 84/05

In the future, new legislation related to Environment and Waste Management can be expected. Currently the following regulations are under preparation:

- Law on waste management; status: adopted by the Government and now in the procedure for adoption in the Parliament.
- The Draft Ratification Law on the Kyoto Protocol to the United Nations Framework Convention on Climate Changes, adopted by the Serbian Government on November 3, 2006, now in parliamentary procedure
- The Draft Ratification Law on the Convention on Environmental Impact Assessment in a Trans-boundary Context⁵, adopted by the Serbian Government on November 8, 2006, now in parliamentary procedure

Brief description of key applicable legislation in Environmental sector is given in chapter 6 and full list of legislation applicable to solid waste sector is presented in Annex 6.1

4.8.3 Assessment of socio-economic impact of the project

The construction and operation of the landfill will create job opportunities. For staffing proposal see chapter 7. People that are scavenging the landfills for recyclable items will lose their source of income.

The tariffs for waste collection services will increase, since the operation costs of the landfill will be much higher than they are now. More information on this can be found in chapter 5 of the feasibility study.

4.8.4 Impact on public health and HSE issues

The impact of public health will greatly be reduced for the people in Prokuplje as the present landfill will be closed.

Occupational health

Workers involved in the disposal of waste are exposed to health risks as skin and blood infections resulting from direct contact with waste, eye and respiratory infections resulting from exposure to infected dust and intestinal infections transmitted by flies and other insects feeding on the waste.

At the new landfill, protection measures need to be respected, including the use of protective clothing (PPE – Personal Protective Equipment), and basic sanitary facilities (a/o workers shed with water) are foreseen.

⁵ Signed in 1991 under the auspices of the United Nations Economic Commission for Europe (UNECE), this so called ESPOO Convention seeks to minimize significant adverse trans-boundary environmental impacts of certain projects that are likely to cause adverse trans-boundary impacts to ensure that an environmental assessment is undertaken for those projects to provide to the government and public of an affected country an opportunity to participate in the environmental assessment and to ensure that the results of the environmental assessment are taken into account in the final decision about the project. The Action required by the parties to the Convention is to identify and monitor projects likely to cause adverse trans-boundary impacts.



The introduction of better landfill management practices (e.g. daily covering of the waste) and waste separation will further reduce health risks compared to existing landfills.

Occupational safety

The main safety risks to workers at the existing landfills are: infecting wounds resulting from contact with sharp objects, infections caused by contact with medical waste, poisoning and chemical burns resulting from contact with small amounts of hazardous chemical waste mixed with general waste.

Safety practices (e.g. the use of protective clothing and better landfill management practices), will eliminate the risk of burning and methane explosions and reduces the risks related to hazardous wastes.

Possible fires and other accidents can have potential safety issues for the workers. Contingency plans are therefore essential and as well as proper training.

Contingencies

Possible accidents and incidents include:

- Fire, caused by spontaneous combustion, careless operation or by intentional setting;
- Explosions of a landfill gas – air mixture;
- Damage to the impermeable liner or its protection;
- Instability of the landfill structure;
- Instability of waste in the landfill;
- Accident to equipment on the landfill;
- Accident to equipment/vehicle in the operations area;
- Accident with vehicle during waste transport;
- Spillage of leachate or waste water from the treatment plant;
- Blockage of leachate pipe work;
- Introduction of hazardous waste;
- Blockage of gas system;
- Fire in operations area

4.9 Conclusion

Landfill location: the selected site is suitable for land filling. The new landfill takes away the unhealthy and unsafe existing landfill in Prokuplje as well as the other three existing landfills (Žitorađa, Blace and Kuršumljia) and one closed landfill in Blace. The investments needed for the new landfill prevent further deterioration of the surface water quality of the Toplica river, force back health risks and offer the necessary means to a protective way of land filling.

4.10 Recommendations

The following issues need to be described or clarified.

Monitoring plan

A monitoring plan for the construction and operational phase as well as for the period after closure should be elaborated.

HSE management plan

A general HSE management plan must be put in place. It should elaborate on all the HSE issues, including necessary training of employees.



5 FINANCIAL AND ECONOMIC ANALYSIS

5.1 Financial assessment Public Utility Companies

There are four public utility companies (PUCs) dealing with solid waste in the four municipalities of Toplica district:

- JKP Čistoća – Prokuplje
- JKP Blace – Blace
- JKP Žitoradja – Žitoradja
- JKP Toplica – Kuršumlija

This paragraph sets out the analysis of the PUC Čistoća operating in the Municipality of Prokuplje and gives a general overview on financial operations of the PUCs in Blace, Žitoradja and Kuršumlija. These public utility companies provide a variety of services and the analysis will deal with the PUCs as a whole, but where required, will zoom in on specifically solid waste related activities. This is done with a view to provide proper data for the financial modeling of the future solid waste activities, but also in view of the anticipated establishment of regional public utility company, which would be responsible for operations of the regional sanitary landfill and transfer station.

5.1.1 Profit and Loss statements

The Municipalities of Toplica district have founded several PUCs for the purpose of performing activities dealing with solid waste, water supply, waste water management, district heating and all other communal services defined within their scope of activities.

This analysis will analyse operations of the PUCs in Toplica district that within their activities include solid waste management.

In financial reporting, the PUCs record and disclose data on operating activities of all their departments in single financial reports, not showing separate business activities for each of their departments. This is the case with almost all of the PUCs operating in Serbia, and creates problems of extracting accurate data when their operating results are asked to be divided by different operational units.

The analysis is based on official data that were submitted by the PUCs to the Central Bank in accordance with the current Law on Accounting.

Table 5-1 Profit & Loss statement PUC Čistoča – Prokuplje (RSD '000)

No	Description	2004 actual		2005 actual		2006 actual		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
1.	Total revenues	-	-	24,328	100%	40,376	100%	53,838	100%
1.1.	Revenues from the business	-	-	24,223	100%	40,052	99%	52,438	97%
1.2.	Other revenues	-	-	105	0%	324	1%	1,400	3%
2.	Expenditures	-	-	20,505	84%	39,348	97%	53,716	100%
2.1.1	Material costs	-	-	2,383	10%	4,675	12%	2,020	4%
2.1.2	Salaries	-	-	14,636	60%	30,757	76%	37,439	70%
2.1.3	Depreciation	-	-	1,527	6%	1,560	4%	2,198	4%
2.1.4	Other	-	-	1,959	8%	2,356	6%	12,059	22%
3.	GROSS PROFIT	-	-	3,823	16%	1,028	3%	122	0%
3.1.	Net Interest payment	-	-	(3)	0%	(224)	-1%	-	0%
3.2.	Net extraordinary items	-	-	(3,325)	-14%	(655)	-2%	-	0%
3.3.	Taxes and contributions	-	-	88	0%	53	0%	-	0%
4.	NET PROFIT	-	-	407	1.7%	96	0.2%	122	0%

Remark: this company is the legal successor of the old PUC "Gradska Cistoca", Prokuplje and was constituted as a new PUC "Cistoca" Prokuplje in the middle of 2005. The company had decided to submit financial results as of this date, and financial report is complete only for the year 2006.

Table 5-2 Profit & Loss statement PUC Blace – Blace (RSD '000)

No	Description	2004 actual		2005 actual		2006 actual		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
1.	Total revenues	35,664	100%	36,812	100%	41,550	100%	53,000	100%
1.1.	Revenues from the business	35,664	100%	36,812	100%	41,550	100%	53,000	100%
1.2.	Other revenues	-	0%	-	0%	-	0%	-	0%
2.	Expenditures	33,276	93%	35,760	97%	39,876	96%	51,635	97%
2.1.1	Material costs	11,045	31%	10,400	28%	10,678	26%	14,600	28%
2.1.2	Salaries	13,420	38%	20,444	56%	22,720	55%	28,926	55%
2.1.3	Depreciation	2,458	7%	2,527	7%	2,408	6%	2,700	5%
2.1.4	Other	6,353	18%	2,389	6%	4,070	10%	5,409	10%
3.	GROSS PROFIT	2,388	7%	1,052	3%	1,674	4%	1,365	3%
3.1.	Net Interest payment	9	0%	288	1%	660	2%	770	1%
3.2.	Net extraordinary items	421	1%	(76)	0%	114	0%	(220)	0%
3.3.	Taxes and contributions	-	0%	-	0%	-	0%	-	0%
4.	NET PROFIT	2,818	8%	1,264	3.4%	2,448	5.9%	1,915	4%

Table 5-3 Profit & Loss statement PUC Žitoradja – Žitoradja (RSD '000)

No	Description	2004 actual		2005 actual		2006 actual		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
1.	Total revenues	-	-	5,601	100%	7,008	100%	7,746	100%
1.1.	Revenues from the business	-	-	1,753	31%	1,867	27%	7,746	100%
1.2.	Other revenues	-	-	3,848	69%	5,141	73%	-	0%
2.	Expenditures	-	-	5,601	100%	7,012	100%	7,745	100%
2.1.1	Material costs	-	-	334	6%	276	4%	1,000	13%
2.1.2	Salaries	-	-	4,440	79%	5,342	76%	6,134	79%
2.1.3	Depreciation	-	-	-	0%	369	5%	368	5%
2.1.4	Other	-	-	827	15%	1,025	15%	243	3%
3.	GROSS PROFIT	-	-	-	0%	(4)	0%	1	0%
3.1.	Net Interest payment	-	-	-	0%	-	0%	-	0%
3.2.	Net extraordinary items	-	-	-	0%	-	0%	-	0%
3.3.	Taxes and contributions	-	-	-	0%	-	0%	-	0%
4.	NET PROFIT	-	-	-	0%	(4)	-0%	1	0%

Remark: This company is the legal successor of the old PUC Cistoca, Zitoradja and the same as the above PUC Cistoca, Prokuplje, was constituted as the new PUC in the middle of 2005. The company had also decided to submit financial results as of this date, and financial report is complete only for the year 2006.

Table 5-4 Profit & Loss statement PUC Toplica – Kuršumljija (RSD '000)

No	Description	2004 actual		2005 actual		2006 actual		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
1.	Total revenues	27,748	100%	26,672	100%	35,809	100%	-	-
1.1.	Revenues from the business	25,870	93%	25,407	95%	28,732	80%	-	-
1.2.	Other revenues	1,878	7%	1,265	5%	7,077	20%	-	-
2.	Expenditures	28,643	103%	35,456	133%	36,164	101%	-	-
2.1.1	Material costs	8,871	32%	8,926	33%	7,739	22%	-	-
2.1.2	Salaries	11,456	41%	21,489	81%	22,572	63%	-	-
2.1.3	Depreciation	1,819	7%	1,569	6%	1,736	5%	-	-
2.1.4	Other	6,497	23%	3,472	13%	4,117	11%	-	-
3.	GROSS PROFIT	(895)	(3%)	(8,784)	(33%)	(355)	(1%)	-	-
3.1.	Net Interest payment	(260)	(1%)	(17)	0%	(262)	(1%)	-	-
3.2.	Net extraordinary items	1,175	4%	(39)	0%	(50)	0%	-	-
3.3.	Taxes and contributions	2	0%	-	0%	-	0%	-	-
4.	NET PROFIT	18	0%	(8,840)	(33%)	(667)	(2%)	-	-

Below are some of the most important findings of the financial performance analysis of the Toplica district PUCs:

Profitability and revenues

- Total 2006 revenues of the PUCs range from RSD 7 million (Žitorađa) to RSD 41.5 million (Blace). Total revenues of Prokuplje PUC amounted to RSD 40 million in 2006;
- The PUC in Kuršumljija recorded an operational loss during the analysed years, ranging from -1% to -33% of total revenues. On the other hand PUC Blace – Blace had a consistent operational gain from 3% to 7% of total revenues in the observing years;
- Net profit of the observed PUCs, in 2006, was positive and ranged from 0.2% in Prokuplje PUC to 5.9% in Blace PUC as a share of the total revenues. On the other hand, PUC Toplica – Kuršumljija recorded a negative net profit;
- Although the financial performance at or slightly below 0% profit is more or less general practice of Serbian PUCs, this rule does not apply to the PUCs in Blace and Prokuplje which operate with profit from their operating activities. The PUC Blace, however, is one of the rare public utility companies generating a significant profit., mainly because of commercial construction activities. This company is well managed, and their operating activities spread over many services that the company is registered to perform. However, although the net result is positive, it is still insufficient to finance larger capital investments. The PUCs in Žitorađa and Kuršumljija follow the general non-profit generating pattern;
- Out of the observed PUCs in Toplica district, only the Municipality of Prokuplje, as the leading municipality, has several PUCs on its territory that render their services separately. One of these is the PUC “Čistoča”, registered for solid waste removal and city cleaning. The other three PUCs perform combined communal services related to water/waste water, solid waste, district heating, management of graveyards and green markets. In total in 2006, the revenues from the the PUCs business activities have increased by 6.5% in Žitorađa and up to 65% in Prokuplje PUC as a result of the broken year in 2005. In all the observed PUCs revenues from business activities are dominant

throughout the observed period. This situation is typical for PUCs in Serbia.

- The operating plan for the year 2007 exists for the PUCs of Prokuplje, Blace and Žitorađa. For these PUCs, 2007 annual operating plans show further increase of total revenues. However, the PUC in Kuršumljia did not produce a plan for the year 2007. This PUC is facing substantial operating problems, which will be elaborated on further on in this chapter, together with the recommendations on improving their functioning. The company is on the edge of bankruptcy.
- Generally, the PUCs in Serbia are obliged to respect legally prescribed directions which relate to officially allowed tariff and salary increases. The limits for the current year (2007) for the tariff increase is 7.5%, and for the salaries 9.5%. The tariff increase is also very much subject to decisions of the political party that won the elections in the Municipality in question. This increase is not applied automatically, and the decision is within the discretion of the Municipal Assembly. Very often the Municipal policy is directed towards securing social peace, by not increasing these legally allowed tariff increases, at the expense of the PUCs.
- The financial departments of the PUCs make their annual activity plans based on the operational plans from the previous year. The 2007 year plans were made prior to finally presenting financial reports to the National Bank of Serbia. The PUCs cannot entirely plan their operating activities due to the fact that the PUCs are owned by the municipalities, and have to rely partly on the funding from the municipal budget. The municipal budget, on the other hand, has to be approved by the Municipal Assembly, and upon approval the share apportioned to the PUCs can be incorporated in the operational plan of the PUC. Municipalities usually have their end of the year session and approve the budget for the next year in March of that current year.

Expenditures

Total expenditures of Prokuplje district PUCs in 2006 ranged from RSD 7 million in PUC Žitorađa to RSD 40 million in PUC Blace. In all PUCs, total revenues exceeded total expenditures by approximately 3% except in Žitorađa PUC and Kuršumljia PUC for 2006 when total expenditures exceeded total revenues. Table 5-5 to 5-8 contain a break down by PUC of the most relevant expenditure categories.

Table 5-5 Total Expenditures PUC Čistoća – Prokuplje (RSD 000)

No	Description	2004		2005		2006		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
2.	Expenditures	-	-	20,505	100%	39,348	100%	53,716	100%
2.1	Material costs	-	-	2,383	12%	4,675	12%	2,020	4%
2.2	Salaries	-	-	14,636	71%	30,757	78%	37,439	70%
2.3	Depreciation	-	-	1,527	7%	1,560	4%	2,198	4%
2.4	Other	-	-	1,959	10%	2,356	6%	12,059	22%

Table 5-6 Total Expenditures PUC Blace – Blace (RSD 000)

No	Description	2004		2005		2006		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
2.	Expenditures	33,276	100%	35,760	100%	39,876	100%	51,635	100%
2.1	Material costs	11,045	33%	10,400	29%	10,678	27%	14,600	28%
2.2	Salaries	13,420	40%	20,444	57%	22,720	57%	28,926	56%
2.3	Depreciation	2,458	7%	2,527	7%	2,408	6%	2,700	5%
2.4	Other	6,353	19%	2,389	7%	4,070	10%	5,409	10%

Table 5-7 Total Expenditures PUC Žitoradja – Žitoradja (RSD 000)

No	Description	2004		2005		2006		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
2.	Expenditures	-	-	5,601	100%	7,012	100%	7,745	100%
2.1	Material costs	-	-	334	6%	276	4%	1,000	13%
2.2	Salaries	-	-	4,440	79%	5,342	76%	6,134	79%
2.3	Depreciation	-	-	-	0%	369	5%	368	5%
2.4	Other	-	-	827	15%	1,025	15%	243	3%

Table 5-8 Total Expenditures PUC Toplica – Kuršumljia (RSD 000)

No	Description	2004		2005		2006		2007 plan	
		RSD	%	RSD	%	RSD	%	RSD	%
2.	Expenditures	28,643	100%	35,456	100%	36,164	100%	-	-
2.1	Material costs	8,871	31%	8,926	25%	7,739	21%	-	-
2.2	Salaries	11,456	40%	21,489	61%	22,572	62%	-	-
2.3	Depreciation	1,819	6%	1,569	4%	1,736	5%	-	-
2.4	Other	6,497	23%	3,472	10%	4,117	11%	-	-

- Most significant items on the expenditure side of the PUCs are salaries. In Prokuplje district, salaries in the PUCs in 2006, ranged from 62% in Kuršumljia PUC to 78% in Prokuplje PUC. This reflects the typical situation of state owned companies, in which labor costs overtime become almost fixed costs. Increase in salaries is strictly prescribed by the Government, through the Ministry of Finance. Another large share of total expenditure can be attributed to material costs; they were at in the range of 4% in Žitoradja PUC to 27% Blace PUC in 2006. Large expenditures on fuel, electricity and maintenance, are typical for this type of companies.
- In the year 2006, depreciation costs in the PUCs of the Prokuplje district, as a share of total costs, were generally very limited at only 4% to 6%. This reflects the fact that the equipment and other assets are almost completely depreciated.
- Net extraordinary items are insignificant and range from -2% in Prokuplje PUC to 0% in 2006 in other PUCs.
- Net interest payment ranged from -1% in Prokuplje PUC to 2% in Blace PUC in 2006 in other PUC net interest payment is insignificant

5.1.2 Cash flow statements

The PUCs of Toplica district are classified as small and medium sized companies and according to the Serbian Law on Accounting, are not obliged to present cash flow statements. Therefore, no cash flow statements are included in this paragraph.

As is common practice for PUCs in Serbia, most of the investment activities are financed directly by the Municipality.

The common situation for PUCs in Serbia is that they typically manage to cover their direct operational costs only, without building up a reserve for replacement and/or capital maintenance of their assets.

5.1.3 Balance sheet review

The table below summarizes the balance sheet of PUC's in Toplica district during the period 2004 to 2007:

Table 5-9 Balance Sheet PUC Čistoća – Prokuplje (RSD '000)

Description	2004		2005		2006	
	RSD	%	RSD	%	RSD	%
ASSETS	0	0	14,271	100%	15,799	100%
Fixed assets	0	0	6,902	48%	6,197	39%
Current assets	0	0	7,369	52%	9,602	61%
Inventories	0	0	1,925	13%	2,337	15%
Account receivables	0	0	5,360	38%	6,437	41%
Cash and cash equivalent	0	0	45	0%	751	5%
Accrued	0	0	39	0%	77	0%
LIABILITIES	0	0	14,271	100%	15,799	100%
Equity	0	0	9,667	68%	9,764	62%
Long term reserves	0	0	0	0%	0	0%
Liabilities	0	0	4,604	32%	6,035	38%
Long term liabilities	0	0	0	0%	0	0%
Long term loans	0	0	0	0%	0	0%
Short term liabilities & Accrual	0	0	4,604	32%	6,035	38%
Short term loans	0	0	0	0%	0	0%
Accounts payable	0	0	3,004	21%	3,466	22%
Accruals	0	0	1,600	11%	2,569	16%

Table 5-10 Balance Sheet PUC Blace – Blace (RSD '000)

Description	2004		2005		2006	
	RSD	%	RSD	%	RSD	%
ASSETS	45,383	100%	47,579	100%	51,775	100%
Fixed assets	26,823	59%	24,707	52%	23,506	45%
Current assets	18,560	41%	22,872	48%	28,269	55%
Inventories	1,622	4%	1,887	4%	2,823	5%
Account receivables	16,404	36%	20,501	43%	24,899	48%
Cash and cash equivalent	534	1%	484	1%	511	1%
Accrued	0	0%	0	0%	36	0%
LIABILITIES	45,383	100%	47,579	100%	51,775	100%
Equity	38,776	85%	40,040	84%	42,488	82%
Long term reserves	0	0%	0	0%	0	0%
Liabilities	6,607	15%	7,539	16%	9,287	18%
Long term liabilities	0	0%	0	0%	0	0%
Long term loans	0	0%	0	0%	0	0%
Short term liabilities & Accrual	6,607	15%	7,539	16%	9,287	18%
Short term loans	0	0%	1,108	2%	0	0%
Accounts payable	6,607	15%	6,431	14%	9,287	18%
Accruals	0	0%	0	0%	0	0%

Table 5-11 Balance Sheet PUC Žitoradja – Žitoradja (RSD 000)

Description	2004		2005		2006	
	RSD	%	RSD	%	RSD	%
ASSETS	0	0	592	100%	10,232	100%
Fixed assets	0	0	0	0%	8,929	87%
Current assets	0	0	592	100%	1,303	13%
Inventories	0	0	0	0%	0	0%
Account receivables	0	0	45	8%	1,162	11%
Cash and cash equivalent	0	0	547	92%	141	1%
Accrued	0	0	0	0%	0	0%
LIABILITIES	0	0	592	100%	10,232	100%
Equity	0	0	0	0%	9,298	91%
Long term reserves	0	0	0	0%	0	0%
Liabilities	0	0	592	100%	934	9%
Long term liabilities	0	0	0	0%	0	0%
Long term loans	0	0	0	0%	0	0%
Short term liabilities & Accrual	0	0	592	100%	934	9%
Short term loans	0	0	0	0%	0	0%
Accounts payable	0	0	407	69%	453	4%
Accruals	0	0	185	31%	481	5%

Table 5-12 Balance Sheet PUC Toplica – Kuršumljia (RSD 000)

Description	2004		2005		2006	
	RSD	%	RSD	%	RSD	%
ASSETS	94,528	100%	98,347	100%	81,260	100%
Fixed assets	75,112	79%	73,725	75%	55,698	69%
Current assets	19,416	21%	24,622	25%	25,562	31%
Inventories	857	1%	1,125	1%	2,022	2%
Account receivables	18,403	19%	23,203	24%	23,478	29%
Cash and cash equivalent	156	0%	235	0%	57	0%
Accrued	0	0%	59	0%	5	0%
LIABILITIES	94,528	100%	98,347	100%	81,260	100%
Equity	77,466	82%	68,624	70%	55,331	68%
Losses	0	0%	8,840	9%	667	1%
Long term reserves	0	0%	0	0%	0	0%
Liabilities	17,062	18%	29,723	30%	25,929	32%
Long term liabilities	0	0%	0	0%	0	0%
Long term loans	0	0%	0	0%	0	0%
Short term liabilities & Accrual	17,062	18%	29,723	30%	25,929	32%
Short term loans	0	0%	0	0%	0	0%
Accounts payable	13,821	15%	16,341	17%	10,037	12%
Accruals	3,241	3%	13,382	14%	15,892	20%



In 2006, **fixed assets of the PUCs** have decreased by 20% in Kuršumlja PUC to 11% in Prokuplje.

Current assets in 2006 have doubled in the PUC Žitorađa. The increase was 4% in the PUC Kuršumlja, and 30% in the PUC "Čistoća", Prokuplje. Within current assets, **accounts receivable** were dominant. In 2006 account receivables increased by 1% in PUC Kuršumlja, to 22% in the PUC Blace.

Equity of the companies remained over the past several years almost at the same level, with the exception of PUC Toplica – Kuršumlja, which in 2006 wrote off a large part of their fixed assets at the expense of equity. Public utility companies in Toplica district did not take any long term loans during the analyzed period.

Accounts payable for the year 2006 show that the companies did not succeed in lowering their debts. The share of accounts payable in total liabilities ranges from 4% in the PUC Žitorađa to 22% in the PUC "Čistoća", Prokuplje. Every PUC in this district is actively working on settling its past due obligations.

For the purposes of analyzing the balance sheets of the PUCs and specifically the level of indebtedness and liquidity, the following indicators are used:

- **Net Current Fund (NCF):** the relation between long term assets (fixed assets plus long term financial investments) and long term funds (own capital plus long term debts/financial obligations). A positive value of NCF is a simple and relatively reliable indicator of soundness of the financial situation of the company;
- **Relation between NCF and stocks:** this is an additional test of company's financial position of liquidity and general indebtedness. Again, a positive value of this indicator reflects a good financial position;
- **Relation between total revenues and net debt:** calculated as the share of fixed assets, other long term investments and stocks, which are financed with borrowed funds. This includes loans, but also receivables and other non-paid financial liabilities. A common benchmark is that borrowed funds expressed as a share of total revenues should not exceed 10% of total revenues.

Table 5-13 Balance sheet indicators PUC Čistoća – Prokuplje (RSD 000)

No.	Indicator	2004	2005	2006	2007 p
1.	Long term sources (own capital and other long term sources)	-	9,667	9,764	-
2.	Long term assets (fixed assets and long-term investments)	-	6,902	6,197	-
3.	Net current fund - NCF (1-2)	-	2,765	3,567	-
4.	NCF minus Stocks	-	840	1,230	-
5.	Borrowed sources/Total revenues (general indebtedness)	-	11.2%	8.4%	-
	LIQUIDITY RATIO I, II and III	-	-	-	-
6.	Rigorous Liquidity Ratio (Cash/Short term liabilities)	-	0.01	0.12	-
7.	Current Liquidity Ratio (Short term receivables and cash/Short Term Liabilities)	-	1.17	1.19	-
8.	General Liquidity Ratio (Short term receivables and cash and stocks/Short Term Liabilities)	-	1.60	1.59	-

Table 5-14 Balance sheet indicators PUC Blace – Blace (RSD 000)

No.	Indicator	2004	2005	2006	2007 p
1.	Long term sources (own capital and other long term sources)	38,776	40,040	42,488	-
2.	Long term assets (fixed assets and long-term investments)	26,823	24,707	23,506	-
3.	Net current fund - NCF (1-2)	11,953	15,333	18,982	-
4.	NCF minus Stocks	10,331	13,446	16,159	-
5.	Borrowed sources/Total revenues (general indebtedness)	16.2%	19.7%	22.0%	-
	LIQUIDITY RATIO I, II and III				-
6.	Rigorous Liquidity Ratio (Cash/Short term liabilities)	0.08	0.06	0.06	-
7.	Current Liquidity Ratio (Short term receivables and cash/Short Term Liabilities)	2.56	2.78	2.74	-
8.	General Liquidity Ratio (Short term receivables and cash and stocks/Short Term Liabilities)	2.81	3.03	3.04	-

Table 5-15 Balance sheet indicators PUC Žitoradja – Žitoradja (RSD 000)

No.	Indicator	2004	2005	2006	2007 p
1.	Long term sources (own capital and other long term sources)	-	-	9,298	-
2.	Long term assets (fixed assets and long-term investments)	-	-	8,929	-
3.	Net current fund - NCF (1-2)	-	-	369	-
4.	NCF minus Stocks	-	-	369	-
5.	Borrowed sources/Total revenues (general indebtedness)	-	4.3%	4.4%	-
	LIQUIDITY RATIO I, II and III	-			-
6.	Rigorous Liquidity Ratio (Cash/Short term liabilities)	-	0.92	0.15	-
7.	Current Liquidity Ratio (Short term receivables and cash/Short Term Liabilities)	-	1.00	1.40	-
8.	General Liquidity Ratio (Short term receivables and cash and stocks/Short Term Liabilities)	-	1.00	1.40	-

Table 5-16 Balance sheet indicators PUC Toplica – Kuršumlija (RSD 000)

No.	Indicator	2004	2005	2006	2007 p
1.	Long term sources (own capital and other long term sources)	77,466	68,624	55,331	-
2.	Long term assets (fixed assets and long-term investments)	75,112	73,725	55,698	-
3.	Net current fund - NCF (1-2)	2,354	(5,101)	(367)	-
4.	NCF minus Stocks	1,497	(6,226)	(2,389)	-
5.	Borrowed sources/Total revenues (general indebtedness)	44.3%	56.9%	24.2%	-
	LIQUIDITY RATIO I, II and III				-
6.	Rigorous Liquidity Ratio (Cash/Short term liabilities)	0.01	0.01	0.00	-
7.	Current Liquidity Ratio (Short term receivables and cash/Short Term Liabilities)	1.09	0.79	0.91	-
8.	General Liquidity Ratio (Short term receivables and cash and stocks/Short Term Liabilities)	1.14	0.83	0.99	-

The main findings regarding the balance sheet review of Toplica region PUCs are:

- A common benchmark is that General Liquidity ratio should be 2, and Current liquidity ratio and Rigorous liquidity ratio should be 1;
- General liquidity ratio. The PUC's were unable to meet a common benchmark ratio during the period 2004 to 2006, except for PUC Blace. During the analyzed years, this ratio shows that short term liabilities were not covered well by working capital. Current liquidity ratio shows also poor performance of the PUCs except for PUC Blace and PUC "Čistoća", Prokuplje. However, the rigorous liquidity ratio shows actually that the PUCs had problems in covering short term liabilities, since in three out of four companies it is

dramatically less than 1. The only exception is the PUC in Žitorađa during the year 2005, when the rigorous liquidity ratio was very close to 1, at 0.92. However this should be taken cautiously, since the company started operating only in the middle of 2005. The conclusion may be drawn that there is a lack of cash for current operating activities;

- In the PUCs of Toplica district, the net current fund in 2006 had positive values in the PUCs Blace, Prokuplje and Žitorađa, showing a stable financial situation in these companies. Net current fund had a negative figure in the PUC Kuršumljia in 2005 and 2006;
- The 2006 indicators of indebtedness for the PUCs in Toplica district are relatively high and range from 4.4% in PUC Žitorađa to 24% in PUC Kuršumljia;
- However, a common benchmark is that borrowed funds expressed as a share of total revenues should not exceed 10% of total revenues. It is clear that in 2006, the PUCs Kuršumljia and Blace exceed these criteria at respectively 24% and 22%. The companies in Žitorađa and Prokuplje were not borrowing extensively, therefore their index was recorded at 4% and 8% respectively;
- Indebtedness in case of Kuršumljia shows the large liabilities of the PUC to many of its creditors. Among these are salaries owed to their employees for the period May-December 2006 at RSD 15 million (€188 thousand), which leaves this company on the edge of bankruptcy. This situation is also the result of poor cooperation with the Municipality, very old fixed assets, and finally low tariffs, and there can be no doubt that the population in this Municipality has been extensively and progressively impoverished over the years, so that they are unable to pay even the basic utility bills.

In general, the PUC's we have analyzed did not incur any long term interest bearing debt. Commercial bank loans are not used as a source to finance investments or operations. Although the PUCs in Blace and Prokuplje operate with profit and this is rather unusual for this type of company, as we have elaborated above. Negative profitability was recorded in the PUCs in Kuršumljia and Žitorađa. The overall analysis outlines that, irrespective of the fact that the two PUCs are generating considerable profit; it would be difficult for the PUCs to draw loans at the capital market. This is a common feature of the PUCs in Serbia and in most cases PUCs are tapping capital markets only with the support of their local governments. In these cases, PUCs get the proceeds of a loan, but the local government carries the liability and only sometimes on-lends this to their PUCs. Based on the results of this analysis, it is safe to conclude that if the PUCs from Toplica district want to attract finance from the capital market to fund part of the investment in the solid waste management system, it will need to be done through the local government.

5.1.4 Tariffs, revenues and collection rates by customer groups

The focus of this study is on the solid waste management of the PUCs of the Toplica district. This paragraph will give a detailed picture of the estimated solid waste revenues billed for each PUC, as well as the actual cash collected. It should be taken into account that this is only an estimate. The current financial systems in these companies are not capable of either dividing revenues or costs amongst different services they perform.

Tariffs for utility companies are regulated and capped by the Ministry of Finance since the year 2006. The current general policy is that tariffs are not allowed to be increased beyond the year's estimated inflation. For the year 2007, the maximum tariff increase has been set at 7.5%. For this reason, PUC's are currently severely constrained in applying a full cost based tariff setting approach.

Table 5-17 Solid waste revenue PUC Čistoća, Prokuplje (2006 in RSD '000)

No.	Consumers/ categories	RSD/m ² /mnth w/o VAT	Surface m ²	Revenue/ annually RSD '000	Average collection rate %	Revenue collected RSD '000
1	2	3	4	5 (3x4)	6	7 (5x6)
1	Housing surfaces	2.34	549,114	15,419,121	59	9,164,000
2	Industry/business					
2.1	Hospitals, Bankrupt companies	5.47	109,012	7,155,548	46	3,256,084
2.2	SME/textile, pharmacies/boutiques	8.20	52,874	5,202,802	79	4,110,213
2.3	Business premises/Agencies	8.20	1,180	116,112	66	76,410
3	Public sector					
3.1	Schools/kinder gardens	2.34	13,345	374,728	58	219,040
3.2	Judicial institutions(Jail, Courts,Police)	13.66	3,720	609,782	87	532,420
3.3	Utility co's (Post, Electricity)	13.66	3,440	563,885	90	506,990
	Total		732,685	29,441,977	61	17,865,157

Table 5-18 Solid waste revenue PUC Blace (2006 in RSD '000)

No.	Consumers/ categories	RSD/m ² /mnth w/o VAT	Surface m ²	Revenue/ annually RSD '000	Average collection rate %	Revenue collected RSD '000
1	2	3	4	5 (3x4)	6	7 (5x6)
1	Housing surfaces	2.04	96,455	2,361,218	58	1,378,000
2	Industry/business					
2.1	Chemical & food	8.33	7,213	721,011	64	461,000
2.2	SME & textile	5.56	16,487	1,100,013	71	781,000
3	Public sector					
3.1	Schools & Other institutions	3.70	20,518	910,999	60	550,000
	Total		140,673	5,093,242	62	3,170,000

Table 5-19 Solid waste revenue PUC Žitorađa (2006 in RSD '000)

No.	Consumers/ categories	RSD/m ² /mnth w/o VAT	Surface m ²	Revenue/ annually RSD '000	Average collection rate %	Revenue collected RSD '000
1	2	3	4	5 (3x4)	6	7 (5x6)
1	Housing surfaces	2.20	12,721	335,834	14	46,000
2	Industry/business	8.00	400	38,400	70	27,000
	Total		13,121	374,234	20	73,000

Table 5-20 Solid waste revenue PUC Kursumlija (2006 in RSD '000)

No.	Consumers/ categories	RSD/m ² /mnth w/o VAT	Surface m ²	Revenue/ annually RSD '000	Average collection rate %	Revenue collected RSD '000
1	2	3	4	5 (3x4)	6	7 (5x6)
1	Housing surfaces	2.50	126,492	3,794,760	40	1,518,000
2	Industry/business	10.00	21,262	2,551,440	40	1,020,000
	Total		147,754	6,346,200	40	2,538,000

Table 5-21 Solid waste revenues – summary (2006 in RSD '000)

No.	Consumers/ categories	RSD/m ² /mnth w/o VAT	Surface m ²	Revenue/ annually RSD '000	Average collection rate %	Revenue collected RSD '000
1	2	3	4	5 (3x4)	6	7 (5x6)
1	Housing surfaces	2.33	784,782	21,910,934	55	12,106,000
2	Institutions/other	6.46	249,451	19,344,719	60	11,540,157
3	Total	3.32	1,034,233	41,255,653	57	23,646,157

Before we begin analyzing the above findings, it should be mentioned that for all the PUCs, it was not possible to entirely separate revenues collected for different services, and some of the data supplied by the PUCs are their own estimates relying on their operational practice. These PUCs are conducting combined services, and are neither technologically equipped, nor professionally skilled to clearly separate their costs and revenues. Therefore, the below findings are only related to the invoiced and collected revenues for solid waste, while revenues for other services are not included.

For instance, the Municipality of Prokuplje apportions a total of RSD 11 million (€ 138 thousand) to the Urban Directorate as current subsidies for the purpose of street washing and cleaning, maintenance of storm water drainage and maintenance of green areas. At the Directorate, the registry (book) is opened, so that every week, or month, on the date when certain services are completed, this is entered into the registry (book), and the PUC receives a refund for these services. They receive a lump sum, and they themselves do not keep record on how much have they actually collected for each service. These records are kept in the Directorate.

Tariffs

The tariff structure for solid waste collection services differs according to various consumers categories. Following this basic principle, the PUCs of Toplica District divide consumers into three basic categories: citizens/households, industry/business and public sector. In this study, we have obtained the exact data from the PUC in Blace. However, as we have mentioned earlier, due to the issue of data recording combined for all the services, from the other three PUCs we have only used data that these two PUCs were able to submit.

The PUCs in Prokuplje and Blace further differentiate these groups into sub-groups: Industry and business consumers are grouped in respect to the size of the companies and/or the industry to which they belong. PUC Blace differentiates between Chemical and food industry and small- and medium sized companies and textile, which are charged different tariffs.

Tariffs charged to citizens are typically much lower than those for legal entities, although this does not necessarily mean that the tariffs are cross subsidized. The level of cross subsidy can be estimated if the amounts of waste produced for each client category are known. This will be further elaborated upon in paragraph 5.3 – financial analysis.

The difference between the solid waste tariff for households and for businesses is considerable. Within Serbia, tariffs for businesses are usually 2 to 2.5 times higher than for households. However, the pattern in this area is different, with some tariffs for businesses up to 4 times higher than tariffs for households.

Within Toplica district 2006 tariffs for households do not differ substantially and range between RSD 2.04/m²/month to 2.50/m²/month.

The findings of the above table show that in the PUC Čistoća, Prokuplje, the uniform, lowest tariff of RSD 2.34/m²/month, is charged to the households and the schools (in the Public sector).

The tariff charged for hospitals is 5.47/m²/month, and this tariff is also applied on the large Companies in the Industry sector that are bankrupt or in the process of privatization, with very poor operational performance.

However, the highest tariff of 13.66/m²/month is set for the Public sector clients, judicial institutions (courts, jails, police), and Utility companies (Electricity supply, Post office).

The small and medium size companies are charged RSD 8.20/m²/month, and other consumers within the Public sector pay 5.88/m²/month.

The PUC in Blace has somewhat similar tariff ranges for the same categories as in the PUC in Prokuplje. The lowest tariff is set for households at RSD 2.04/m²/month. The highest tariffs are set for the consumers within the Chemical and food industry at RSD 8.33/m²/month, and SMEs and textile companies are charged RSD 5.56/m²/month. Schools and other institutions pay 3.70/m²/month.

Collection rates & revenues

The average 2006 collection rate in Toplica district is unsustainably low at 57%. The domestic category pays 55% on average, while the other sectors combined realize 60%. There are large differences between municipalities: Prokuplje and Blace show an average collection rate of slightly above 60%, while Kursumlija realizes 40%. Zitoradja had a dismal 20% collection rate, though it should be remarked that this municipality only has few customers and a low service level (no compactor truck available). In order to enable financially sustainable operations at affordable tariffs, an increase in collection rates is an absolute necessity. For this reason, consultants recommend to support the local PUCs to improve their billing and collection systems and procedures as part of the proposed financial and operational performance improvement support.

On average, Toplica district 2006 billed revenues amount to RSD 41 million (or € 520 thousand), out of which 24 million was actually paid (€ 300 thousand). A little over 50% was invoiced to households, with the other half being invoiced to the combined commercial/institutional customer groups.

Billing system and procedures

As of July 2006 the PUC in Prokuplje started issuing a separate invoice for solid waste on a monthly basis for both industry and citizens. Prior to this, the invoice was issued bi-monthly. A group of 300 consumers was sent to court in May 2007 for unpaid debts. On the invoice itself, the PUC gives a calculation of the old debt, the new debt and the current amount invoiced for the month.

Until recently, payment reminders sent by all PUCs were delivered by company officials. However, as of September 2007, the PUCs have to send all their invoices and reminders to the citizens and industry by mail. The PUC has to deposit in advance a certain amount of dinars with the Post office, in order to cover mailing expenses of the invoices and reminders.

PUC Žitorađa also in principle sends out invoices on a monthly basis, and reminders are delivered bi monthly. However, this municipality has a very inconsistent invoicing and collection policy. Instead of sending or delivering invoices on a regular bases, the employees of the department in charge of this service mainly keep the records of non paying clients, and when and if the clients can pay their bills, this is recorded as collected revenue.

PUC Kuršumljia invoices are issued bi monthly to the citizens and on a monthly basis to the Industry. Invoices are delivered by the department employees, and they keep record of non paying citizens. Reminders are sent irregularly, when the management and the legal department agree upon.

PUC Blace issues invoices to the citizens every two months, and to the industry on a monthly basis. In this PUC, invoices are delivered by the invoice department officials.

The policy of this PUC in respect to non paying clients is that reminders are delivered approximately every two months, depending on the level of outstanding debt. In the month of August 2007, the PUC sent to court over 100 non paying clients. They are also giving a 10% discount to the regular paying and they charge 33% annual interest on outstanding payments, the National Bank of Serbia official interest rate for delayed payments. The latter measure is rarely used by any PUC, although they are legally entitled to it.

PUC Blace is the only PUC that has a defined and developed billing and collection policy, from which other municipalities within the District (and beyond) could learn. Still, the realized collection rate of 62% still leaves room for improvement, although it is the highest ratio in the District. In relation to this, it should be emphasized that the courts in Serbia are rather slow in addressing payment arrears. It may take up to several years before any court decision actually emerges. However, further procedure is that, upon reaching court decision, the PUC has the legal right to write off their outstanding debts, which otherwise can remain on the companies' accounts for extended periods, without the chance of ever being collected.

5.1.5 Capital structure

Like the majority of public utility companies in Serbia, the four PUCs are organized as 100% state owned companies. Their municipalities, Prokuplje, Blace, Kuršumljia, and Žitorađa, have a majority right of management. Ever since their founding, neither of the PUCs has undergone any changes in their capital structure. The table below summarizes the capital structure of the public utility companies of the analyzed project area. PUC Prokuplje has a relatively low capital base, since it does not have capital intensive water & waste water in its portfolio.

Table 5-22 Capital Structure of the PUCs (31.12.2006 in RSD '000)

No	Capital	Prokuplje	Blace	Žitorađa	Kursumlija	Structure (%)
1.	Legal reserves					
2.	Shareholders capital					
3.	Public capital	9,764	42,488	9,298	55,331	100%
4.	Other capital					
	Total Capital	9,764	42,488	9,298	55,331	100%

5.1.6 Assets

Except for land, capital assets are depreciated each year and the total accumulated depreciation is deducted from the original cost. With the exception of land, capital assets wear out in time or otherwise lose their economic usefulness. Between the time when a given asset is acquired and when it is no longer economically useful, a decrease in its value takes place. This loss in value over a period of years is known as depreciation. Depletion is a term applied to tangible fixed assets, whereas amortization is a term sometimes used to describe the writing off of intangible assets such as patents and trademarks.

All the purchases during the observed years 2004 to 2006 are valued at historical cost. Depreciation is calculated based on the historical value of the assets, installations and equipment, applying the linear method.

The PUCs do not regularly revalue their fixed assets. In an inflationary environment, this leads to the understatement of the real value of the fixed assets if this is valued at historical cost.

As we have seen earlier through the analysis of the Profit and Loss statement, depreciation costs are generally very limited at only 4%-6% of total costs during the period 2004-2007. This proves the fact that the equipment and other assets are almost entirely depreciated.

All the assets of the PUCs in Serbia are owned by their founders, the Municipalities, i.e. by the State of Serbia. The awaited transformation of the public companies will bring substantial changes in the ownership structure, and will change the picture of the property of local communities.

5.1.7 Extraordinary revenues and expenditures

Apart from substantial operational subsidies the analyzed PUCs receive from their municipalities, no other significant extraordinary revenues and expenditure are incurred.

5.1.8 Financial self sufficiency and the current use of profits

In our analysis of the four PUCs of Toplica district and through the practice in analyzing other PUC's in Serbia, it is evident that none of these companies is capable of functioning on its own. At best, tariffs are sufficient to cover the direct operating costs. Investments usually are funded directly by the municipality, since these cannot be funded by the PUC from internally generated cash flow. As a result of near zero profits and a low capital base/low depreciation charge, the generated cash flow is usually only slightly positive.

The PUC is limited in setting its own tariffs. Any tariff adjustments need to be approved by the municipal council, and since 2006 are regulated by the Ministry of Finance.

As has been pointed out earlier, current collection rates are unsustainable. On average, collection rate for the PUC in Prokuplje was 61%, Blace 62%, Zitoradja 20% and Kursumlija 40%. These figures are low. In order to improve the level of collected revenue, the PUCs will have to consider implementing measures. It is clear that especially in Zitoradja and Kursumlija, substantial measures will have to be taken.

5.1.9 Financial management and budgeting practices and systems.

Budgeting system & investment planning

Once per year, a consolidated annual plan and budget is submitted to the Municipal Council for approval. This budget contains:

- A review of last year's operations, including financial overview (budget/realized);
- A descriptive part setting out the plan for the next year;
- A cost/spending budget for the next year;
- An investment plan for the next year, including financing plan;
- A proposed tariff structure for the next year;
- A proposal for operational subsidies from the Municipality.

If approved, this annual plan forms the basis of the operations for the PUC. Problems with this system are:

- The PUCs are not obliged to prepare investment and financial plans in forms that are prescribed for other companies. Some provisional one year planning is prepared and these plans are usually underestimated. Classified as SME's, these PUCs have no obligation to submit cash flow statements. The PUCs rely on funding from their owner, the municipality for any capital investment. With the ongoing transformation of this sector, long term planning and financing will have to be introduced;
- Management of the budget is centralized. Monthly management reports compare (cumulative) actual expenditure against the approved budget at the level of the PUC only. No budgets are made available by service line, managed by department heads, nor are costs reordered by service line. Such a hierarchical management system prevents flexibility of operations and actually might lead to higher cost.
- Limited information is available on the actual costs by service; setting of cost based tariffs is therefore next to impossible (rather extensive time for any information delivery).

Short and long term financing

In order to maintain uninterrupted functioning of its company, the PUCs in Serbia have two ways of providing necessary financial means. It is either through borrowing from commercial banks, or through municipal subventions. In respect to subventions from their municipalities, the PUCs have to follow a rather strict procedure in order to obtain any funding. There is a necessary list of documents to be provided, that is often more extensive than the list of documents required by a bank for a commercial loan. However, most PUCs rather request subventions, since this is interest free. There is also a third way, and this is that the PUC "acts" as any other company on the market, by participating in tenders, performing other than core

activities they are registered for and earning additional revenue. This is widely used by the PUC in Blace.

We have noted inconsistencies between the annual operating report of the PUC Cistoca, Prokuplje and the actual data from the Balance sheet on the short term liabilities. The report states that: "in order to fund their daily operating activities, this PUC is taking short term commercial bank loans". However in the financial report, there is no record on these loans.

The PUC did not take any long term loans from commercial banks.

5.1.10 Accounts receivable and bad debts

Accounts receivable

The table below shows a list of major debtors for the year 2006 of PUC Čistoća, Prokuplje. Total accounts receivable amounted to RSD 6 million, or € 75 thousand. Out of that amount, the eight largest debtors owed RSD 3.9 million or 61%.

The largest debtor is comprised of the Citizens of Prokuplje, owing to the PUC for their services a total of over RSD 2 million, or 33% of total account receivables. It was already mentioned earlier that outstanding payments, especially from citizens, are very slowly settled, due to slow operations of the Serbian courts.

Other debtors are various companies like asbestos production factory, civil engineering Company, City's sports centre, but also the Municipality of Prokuplje and the PUC Green Market. It should be taken into consideration that the PUC Čistoća, Prokuplje operates rendering combined services, and the structure of their debtors concerns all company's departments.

Table 5-23 Largest debtors 2006 - PUC Čistoća, Prokuplje

No	Name	Place	RSD'000	%
1	Households	Prokuplje	2,125	33%
2	Asbestos factory FIAZ	Prokuplje	736	11%
3	PUC Green Markets	Prokuplje	344	5%
4	Non-ferrous metal Co.	Prokuplje	293	5%
5	The Municipality of Prokuplje	Prokuplje	153	2%
6	Civil engineering co.	Prokuplje	126	2%
7	Metal production factory	Prokuplje	108	2%
8	City sports Centre	Prokuplje	46	1%
	TOTAL		3,931	61%
	Accounts receivable		6,437	100%

Bad debts

The problem of bad debts, as discussed earlier in this chapter on the issue of billing and collection, arises due to various facts. After the PUC finally presents to the court non-paying clients, and when and if the decision is made in favor of the PUC, this judgment can often prove impossible to enforce. It is often found that the debtor has no property that could be



impounded lawfully or it is found that debtors are insolvent entities.

Despite high uncollectible debt, no bad debt policy is applied to make provisions for debt, or to write off debt after a certain event, or time in a structured way. This situation can lead to a high accumulated accounts receivable position in the balance sheet. If no charge or provision for bad debt is recognized, the profit and loss statement can be considerably overstated and the company's balance sheet overvalued.

General recommendation for the present situation is that companies have to create, apply and disclose a bad debt accounting policy. In addition, the low collection rates themselves should be targeted, for example by shortening the period of sending reminders, as well as charging interest on past due payments.

5.1.11 Accounts payable

Table 5-24 Largest Creditors 2006 – PUC Čistoća, Prokuplje

No	Creditor	place	RSD '000	%
1	Urban Directorate	Prokuplje	419	12%
2	Arkus	Novi Sad	421	12%
3	DDOR (Insurance Co.)	Novi Sad	195	6%
4	Zastava promet	Nis	134	4%
5	Dunav insurance Co.	Prokuplje	67	2%
6	Autooprema (Vehicle essentials)	Prokuplje	30	1%
7	Asbestos factory FIAZ	Novi Sad	25	1%
8	Metaloprerađa (Metal process.)	Prokuplje	25	1%
	TOTAL		1,316	38%
	Accounts payable		3,466	100%

For the year 2006 PUC Cistoca, Prokuplje, owed to their creditors RSD 3.4 million or € 43 thousand. Out of this, the eight largest creditors had claims totaling RSD 1.3 million (38%).

Until now, the creditors have not imposed any legal measures against PUC Cistoca, Prokuplje. The existing debts toward creditors are settled by means of negotiations and good business practice. Creditors are ready to wait for the PUC and the only measure imposed is usually an interest and/or penalty fee. The PUC has not experienced any disruptions of their ordinary activities because of the delay in payments.

5.1.12 Non cash settlements

None of the observed PUCs have any operating activities that are covered through non cash settlements.

5.1.13 Tax settlements

Main taxes payable by the PUC are value added tax (VAT) and payroll related taxes and statutory contributions. Corporate tax is also applicable; however in the absence of profits this is usually negligible.

The PUCs in Serbia are legally obliged to follow the regulations prescribed by the Law on Value Added Tax which states that VAT has to be paid on the 10th of the current month for the previous month. Regulations for taxes on salaries and all other taxes payable to the tax authorities are also prescribed by law for settling each category of taxes.

All of these taxes are paid in cash. There was no evidence of any tax settlements in kind.

5.1.14 Summary and conclusions

Main findings:

- The PUCs in Zitoradja and Kursumlija operate below 0% net profit, while the PUCs Cistoca, Prokuplje and PUC Blace generate profit from their operating activities;
- Substantial operational subsidies are received from all the municipalities to fund non revenue generating activities, such as street cleaning and green park management;
- Labour costs form the largest share of total costs, reaching 78% in Prokuplje, 57% in Blace, 76% in Zitoradja, and 62% in Kursumlija during the year 2006. The share of labour costs in total costs is increasing over time;
- Depreciation costs are relatively low and range between 4% to 6% of total costs;
- None of these companies has obligation to produce cash flow statements since they are operating as SMEs. However generated cash flow is insufficient to finance investments; most investments are funded directly by the Municipality or are provided for with capital subsidies;
- In general, solid waste service collection rates are unsustainably low at 57% average for all PUCs combined. The collection rates are marginally above this average in PUC Prokuplje (61%) and PUC Blace (62%). The situation is much worse in the PUCs in Zitoradja and Kursumlija, which recorded collection rates of respectively 20% and 40%;
- For all the PUCs, current tariffs just cover operating costs, although the level of operational subsidies and the costs which they are supposed to cover is difficult to assess in the absence of a cost centre based financial management system
- Fixed assets are not revaluated regularly. In an inflationary environment, as has been the case in Serbia, this leads to the understatement of the asset base in the balance sheet, but also to the understatement of the depreciation charge and might lead to tariffs being set at below cost recovery levels;
- None of the observed PUC's makes provisions for doubtful debts;
- The PUC's prepare annual plans and budgets, in conformity with guidelines provided by the Ministry of Finance. There is no multi year planning, integrated with this annual planning & budgeting cycle;
- Management of the budget is centralized at director level;
- There is no tariff setting formula or procedure, since it is currently national policy to cap tariff increase with the estimated inflation for the next year;

- The top 10 of large debtors of the PUC in Prokuplje account for 61% of total accounts receivable during the year 2006. Concentration of debtors is rather high, although the largest debtors are comprised of the citizens of the municipality of Prokuplje;
- The top 10 of largest creditors account for 38% of total accounts payable, which is not a very high concentration. Main creditor is the Urban Directorate of Prokuplje municipality itself. The PUC in Prokuplje owes to the Directorate 12% of its total accounts payable.

Main recommendations:

- Dramatically improve collection rates of all PUCs in Toplica district by i.a. establishing a bad debt policy, introducing interest payment for delays in payments, introduction of performance related/ pay for cash collectors, improving the billing department by introducing better working methods and procedures (computer software/hardware, educate the employees).
- Get the full support of the municipality to resolve outstanding debt issues;
- Clean up debtors database and introduce provisioning of uncollectible debt in accounts;
- Introduce a multi year planning, based on better projection methods. Cooperate closely with the financial departments of the Municipalities and their projected budget planning and integrate it with annual plans;
- Cost centre/cost accounting management system. The existing financial management systems have to be improved for the purpose of better cost management. This implies also a more precise definition on segregation of duties/departments. A more decentralized budgeting would also be needed;
- Through the improved financial management start considering full cost based tariffs;
- Apply adequate policy on depreciation by comparing physical database of the fixed assets and their financial register. Regular revaluation and writing off of fixed assets should be respected.

5.2 Creditworthiness assessment of the municipalities in the Toplica District

5.2.1 Introduction

The PUCs of Prokuplje, Blace, Kuršumlija and Žitoradja geographically belong to the Toplica district and are founded and owned by local government. Their functioning is under the direct influence of the local governments. This is reflected in all segments of their operations, especially in relation to financial matters. The managing boards of the PUCs are established in such a way that local government representatives are forming the majority. These managing boards are entitled to propose tariffs for the services that PUCs are delivering to the citizens. The proposals become effective after municipal assembly approval.

In order to support low income households, tariffs are usually set at a minimum level, that is, at a level at which the PUCs can cover their operating costs only without making any profit. As for depreciation costs, which are supposed to recover investments made for long term assets, the PUCs are including this item in their costing schemes in accordance with the accounting and other laws and regulations. However, the problem is that the assets of Serbian PUCs were worn out during the 1990-ties with hardly any re-investment or capital replacements taking place. Thus, the PUCs were effectively financing their operations - and very often some other social needs - on the expense of their capital asset base. As a result of this policy, most of

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today's PUCs have a low capital base with corresponding low tariffs. Consequently, they are in a bad position to finance any larger investment from consumer tariffs through internally generated cash flow.

The current situation is that most investments made in Serbian PUCs are financed from the municipal budget. Municipal budgets are the source of direct investments and/or provider of guarantees to the banks for commercial loans. After completion of the investment, the acquired assets are transferred to the PUCs and become part of their balance sheet. The PUCs usually do not have any financial obligation against municipal budgets for these assets. To the contrary, if PUCs can not service their debts, the local government is legally obliged to assume all liabilities and cover the financial obligations.

Therefore, when considering investment in the PUCs, it is thus important to identify the financial position and development of the municipal budget, as well as the financial position of the PUCs. The analysis of the budgets of Toplica district municipalities presented below is based on data from official reports submitted by municipal budget offices to the Ministry of Finance at the end of every budget year, in accordance with the current budget law.

5.2.2 Analysis of the national and local context

The current legal basis for local budget revenues is governed by the Law on Local Self-Government from 2002. Financing of local governments, went through some changes:

- In 2004, local governments' share of revenues based on salary fund tax was discontinued. In order to compensate this decrease in revenues to local budgets, the share of local government in income taxes was increased from 5% to 30%, In addition, the share of sales tax was increased in favour of selected poorer municipalities;
- From January 2005 onwards, sales tax has been replaced with value added tax (VAT). This change affects the way of providing local government budgets with revenues. Instead of sharing the sales tax with central government, the VAT is now going directly to the central funds, from which local governments are getting current transfers.
- In 2006, a new Law on local government finance has been adopted. The Law became effective on June 23rd, 2007. The main novelty is the decentralization of property tax. Property tax used to be collected by local offices of the National Government and then distributed to local government. By the provisions of the new Law, property tax is directly collected by local government, enabling them to broaden their own tax base/original revenues. Consequently, a unit for collecting property tax is established at the local level and related expenditure is to be borne by local government.

According to the new Law, the local government budgets obtain revenues from three main sources:

- Through local level, where local government can set taxes and collect its own revenues. These are called original revenues, according to the law terminology;
- Through central level, by allocating or sharing the revenues with the central government. These are called shared revenues; and
- Through transfers from central government. This source is defined separately, but since it is coming from central funds it might be considered as a specific type of shared revenue.

Original (own) revenues

The original revenues of local government budgets comprise:

- **Local fees** – administrative, communal and tourist fees;
- **Charges on construction land** – charges for utilization and for development of the city construction land;
- **Other revenues** – include a dozen different revenues (charges for natural resources, charges on sales of assets, interest on deposited budget funds, etc). Generally, revenues generated from this group are small compared to the above two sources. In particular cases these can however provide substantial revenues
- **Self-contribution** – this revenue can be introduced by the decision of citizens made through local referendum. By definition, it is used for development of local capital infrastructure;
- **Donations** – donations could come from different sources such as central level, international organization and other. In this case, they are going directly to the local government;
- **Property taxes** – according to the new Law on local government financing, taxes on property of the private and legal entities are becoming original revenues. This change is important as such, but equally important is the change related to the way how it is collected. After the introduction of this Law (June 23rd, 2007), local governments have taken over part of the central tax administration in order to fully control collection of this revenue. However during the initial phase, the Republic will for a certain period control the spending of money from property taxes.
- **The tax on passing the absolute rights** – from (June 23rd, 2007), is reduced from 5% to 2.5%.

Shared (allocated) revenues

The second large group of local budget revenues consists of revenues that are allocated by national level to the local level. According to the legal terminology, these are called allocated revenues. These revenues consist of:

- **Income taxes** – include a number of taxes on different personal incomes generated from different sources: agriculture and forestry, private business activities, immovable property, leased movable property; prizes in games of chance, personal insurance, part of the salary tax and others; This tax was lowered from 18% to 12% by the Law on income tax in 2006.
- **Property related taxes** – include taxes on inheritance and gift tax, on transfer of absolute rights and on goods and services;
- **Different charges on assets of public interest** – include charges for the utilization of different assets of public interest like mineral raw materials; river material; forest land; agricultural land, public roads, environmental protection and environment; investments;
- **Privatization revenues** – include part of the funds (5%) collected through the sale of capital in the privatization process that is taking place within the municipal territory;
- **Transfers** – include transfers from central government. Transfers as a specific type of local budget revenues were introduced in 2005 when the sales tax was replaced by VAT. The new Law on local government finance introduces a wide array of transfers: categorical and non-categorical transfers (which include equalization transfers), compensation, transitional, general and block transfers.

The investment capacity and creditworthiness of local budgets depends on the efficiency of the overall local financial management, which includes the capacity for generating revenues as well as the way in which these revenues are spent. Certain revenues are especially important for funding capital expenditure. These are:

- **Land use development charge.** This revenue is directly related to local investments. It is paid by investors who are planning to invest in construction on land within municipal boundaries. The investor is obliged to pay this charge in cases when he is the owner of the specific construction site, but also when he has the right for using it or the right to erect objects on it. The charge is set in accordance with the costs of developing the site, the purpose of the object and the city zone. Setting the base and rate of this charge is under the jurisdiction of local government.
- **Land use charge.** This charge is used to cover the costs of maintenance of local infrastructure and it is set in accordance with the costs of maintenance. This charge is also under the jurisdiction of local government.
- **Revenue from renting the City assets.** Revenues from renting immobile and mobile assets of the local governments are original revenues. They are supposed to be used exclusively for capital investments. But, since this is not strictly prescribed by law, in certain cases they are used for covering costs of current operations.
- **Self-contribution.** Self-contribution is a traditional revenue source of local government that is to be used for capital investment of special local communities needs such as water supply, roads etc. The contribution is raised and set by local referendum.
- **Privatization revenues.** According to the Law on Privatization, 5% of the proceeds received from selling state or socially owned companies on the territory of the municipality is going to the local government budget.
- **National Investment Plan (NIP) funds** The Government of Serbia had by end of the year 2006 for the first time adopted the NIP for the Serbian economy, covering the period 2006 to 2011. The NIP covers all vital economic sectors, employing and allocating on a national level the surplus of the funds from the process of privatization. Due to the increase in citizens' savings and the implementation of a number of economic reforms, the budget of the State of Serbia showed a significant surplus, thus making favourable conditions for development of a concise plan on financing public investments. Municipalities were invited to apply for investment funding.
- **Donations.** From the year 2000 donations, especially from international funds, became an important source of funding capital investments at local government level. In the near future, local government is still planning certain financial inflow from this source, but in mid, and especially in longer period, it is expected that this will decrease. It is expected that accession towards the EU will enable further funding through the EU's new Instrument for Pre-Accession (IPA).
- **Transfers.** Transfers are a relatively new type of revenues for Serbian local government. Until 2005 these transfers were relatively small. It is expected that after the introduction of the new Law on local government finance there will be a considerable increase in transfers. It is expected that this source will become very important for local governments.
- **Property tax.** From June 23rd, 2007 local government has taken over the control of property tax from the Republican level.
- **Tax on passing the absolute rights,** effective from the same date, the taxation rate for tax on passing the absolute rights is reduced from 5% to 2.5%. However, lowering of the

tax rate on passing the absolute rights does not mean that the local government will be less motivated to collect this revenue. Establishment of the local tax administration is considered to be a big change as such and it is expected that this might generally increase fiscal capacity of local government in Serbia.

5.2.3 Municipalities financial operations

Municipal Budget Revenues

As elaborated upon above, the revenues of the Serbian municipalities consist of two main groups of revenues: own or so called original revenues, being the revenues that local governments control, both in defining its level as well as in collecting it and the allocated or so called shared revenues that are collected by and then distributed from the central level. The new law on local government finance introduces new types of revenues like transfers which in general could be treated as allocated revenues.

One time transfers for capital investments are apportioned through the National Investment Plan, i.e. if the Municipality presents a well grounded plan to the relevant Ministry, for the investment they wish to be financed.

The budget of municipalities is prepared on the basis of an unified budget classification system, that is functional, economic and organizational classification in accordance with the Budget System Law. All the revenues are planned based on the budget realization from previous years, and the plan for current year which is in accordance with the Memorandum on the budget for that relevant year.

The data in the tables set out the revenues of each of the four municipalities of Toplica district. First, Prokuplje municipality will be analysed, followed by the other three municipalities.

Table 5-25 Budget revenues of Prokuplje municipality

No	Type of revenues	2004 a		2005 a		2006 a		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Original revenues	21	8	24	8	49	12	110	22
1.1	Fees (administrative, communal, tourist)	11	4	11	4	14	3	18	4
1.2	Land development charge	2	1	3	1	8	2	22	4
1.3	Property tax				0			25	5
1.4	Other	8	3	10	3	27	7	45	9
II	Allocated revenues	226	86	263	86	296	73	382	77
2.1	Sales tax	85	32		0		0		0
2.2	Income tax	79	30	150	49	188	46	177	36
2.3	Property tax	13	5	15	5	12	3		0
2.4	Property tax and tax on passing the absolute rights	10	4	8	3	13	3	18	4
2.5	Transfers	2	1	81	26	75	18	180	36
2.6	Other	37	14	9	3	8	2	7	1
III	Privatization revenues		0	2	1	1	0	2	0
IV	Credits	15	6	10	3	61	15	-	0
V	Revenue from previous year		0	7	2		0		0
VI	International Donations		0		0		0	1	0
	TOTAL REVENUES	262	100	306	100	407	100	495	100

Original revenues

The most important sources of own revenue are different fees that local governments are entitled to introduce and collect. The share of own (original) revenues in total revenues in the Prokuplje municipal budget ranged between 8% and 12% in the period 2004 to 2006. The plan for 2007 is to increase the share of original revenues to 22%, mainly as a result of the inclusion of property tax from allocated to original revenues and introducing a new way of revenues like different taxes and fees.

Allocated revenues

The share of allocated revenues changed from 86% in 2004 to 73% in 2006. This change was due to sales tax being replaced by VAT and the introduction of transfers from the Republican level. However, the share of transfers was not as high as the revenue collected through the sales tax. In the following year, 2006, transfers were still relatively low. It was only at the start of 2007 and as a result of the new Law on public financing that this picture changed for the municipalities, and the transfers apportioned for the Municipality of Prokuplje were set at RSD 180 million, a 140% increase compared to 2006. This, of course, should not necessarily represent the final amount, due to the fact that additional revenues can also be approved by the Budget rebalance.

With transfers and revenues from property tax, the Municipality will have a significant increase in both own and allocated revenues. The share of Income tax in 2007 is however lower compared to 2006, because of lowering of this tax from 18% to 12% by the Law on income tax. This decrease is more than compensated by the increase in transfers.

Allocated revenues for 2007 will record a 29% increase compared to 2006. Revenues will be generated through transfers and income tax. It is estimated that the switch of property tax from allocated to original revenues will cause the original revenues of the Prokuplje municipality to rise with an additional 5%.

For allocated revenues, the most significant source is still income tax which accounted for 30% in 2004 and 46% in 2006 of total revenues. Sales tax participated with 32% in 2004. Fiscal revenues obtained through sales tax were used for equalization of the local government budgets. The sales tax was replaced in 2005 with value added tax (VAT), which also took over its role regarding equalization. This revenue is disbursed to local government by means of transfers.

Privatization revenues

Revenues from privatization varied from RSD 2 million in 2005 to RSD 1 million in 2006. Although many companies in the municipality are already privatized, the Municipality of Prokuplje plans to generate an additional RSD 2 million during the year 2007.

Credits

In respect to loans, the Municipality of Prokuplje borrowed funds from commercial banks to finance part of their capital expenditures. Loans were taken in 2004, 2005 and 2006, and their share in total revenues was 6% in 2004 or RSD 15 million, 3% in 2005 or RSD 10 million and finally 15% in 2006 or RSD 61 million. In 2007 the municipality does not plan to take any new loans.

Revenues from previous years

Any surplus of budget revenues over expenditures in the previous year is brought forward in the next budget year as budget revenue. For 2007 the municipality does not plan any surplus of budget revenues over expenditures.

International donations

During the last few years, Prokuplje municipality did not have any international donations. The budget for 2007 plans for an international donation of RSD 1 million, or approximately € 13 thousand.

Original revenues of other Toplica district municipalities

The share of own (original) revenues in the Blace municipal budget has varied between 18% in 2004 to 20% in 2006. In Zitoradja, the share of original revenues was on average 15% in 2004 to 2006. In Kursumlija, the share of original revenues was at the average of 11% in 2004 to 2006.

Table 5-26 Budget revenues of Blace municipality

No	Type of revenues	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Original revenues	11	18	16	18	22	20	26	17
1.1.	Fees (administrative, communal, tourist)	3	5	6	6	7	7	7	5
1.2.	Land development charge	1	2	1	1	2	2	3	2
1.3.	Property tax				0			4	2
1.4.	Other	7	11	9	10	12	11	12	8
II	Allocated revenues	51	80	71	81	85	79	125	82
2.1.	Sales tax	22	34		0		0		0
2.2.	Income tax	13	21	27	31	35	33	29	19
2.3.	Property tax	3	5	2	3	3	3		0
2.4.	Property tax and tax on passing the absolute rights	2	4	4	4	5	5	5	3
2.5.	Transfers	2	3	37	42	41	38	90	59
2.6.	Other	8	13	1	1	1	1	1	1
III	Privatization revenues	1	2	0	0	0	0	0	0
IV	Credits		0		0		0		0
V	Revenue from previous year		0	1	1	0	0	1	1
VI	International Donations		0		0		0		0
	TOTAL REVENUES	63	100	88	100	108	100	152	100

Table 5-27 Budget revenues Žitoradja municipality

No	Type of revenues	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Original revenues	8	15	11	14	14	15	16	7
1.1.	Fees (administrative, communal, tourist)	4	6	4	5	6	6	7	3
1.2.	Land development charge	-	0		0	1	1	5	2
1.3.	Property tax				0			2	1
1.3.	Other	5	8	7	9	7	8	2	1
II	Allocated revenues	48	85	67	86	75	81	225	93
2.1.	Sales tax	21	37		0		0		0
2.2.	Income tax	18	32	33	43	43	46	48	20
2.3.	Property tax	1	2	1	1		0		0
2.4.	Property tax and tax on passing the absolute rights	1	2	1	1	2	2	2	1
2.5.	Transfers	1	2	31	40	27	29	69	28

No	Type of revenues	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
2.6.	Other	6	11	1	1	3	3	106	44
III	Privatization revenues		0		0		0		0
IV	Credits		0		0		0		0
V	Revenue from previous year		0		0	4	4		0
VI	International Donations		0		0		0		0
	TOTAL REVENUES	56	100	78	100	93	100	241	100

Allocated revenues

The share of allocated revenues changed from 80% in 2004 to 79% in 2006 in Municipality of Blace and 85% in 2004 to 81% in 2006 in the Municipality of Zitoradja. For the municipality of Kursumlija thus share was 85% in 2004 and decreased to 72% in 2006. This decline in share in allocated revenues, as mentioned earlier, was due to sales tax being replaced by the VAT and the introduction of transfers from the Republican level. At the start of 2006 the transfers apportioned for the Municipality of Blace were set at RSD 41 million. The plan for 2007 recorded further increase of transfers to RSD 90 million or 120% compared to 2006. The final amount would depend on the fact that additional revenues can also be approved by the Budget rebalance. The transfers apportioned for the Municipality of Zitoradja were set at RSD 27 million in 2006 and the plan for 2007 is RSD 69 million. In the Municipality of Kursumlija the transfers allocated in 2006 amounted to RSD 62 million and the plan for 2007 shows an increase of 65% or RSD 102 million.

Another important source of local budget revenues is income tax. The share of Income tax in 2007 is lower compared to 2006, because of lowering of this tax from 18% to 12% by the Law on income tax.

The municipalities of Toplica district region did not record any significant revenues from privatization. The reason for this are the low numbers of socially owned entities in these three municipalities. There are only 4 companies per 100 inhabitants. The number of companies to be privatised will not have any major impact on the revenues of this district.

Only the municipality of Prokuplje and Kursumlija had any credits during the analysed period. The municipality of Kursumlija took a long term loan in 2006 to finance the construction of sports centre worth RSD 29 million.

International donations

During the past several years, the municipalities of Blace and Zitoradja did not receive any international donations. The Municipality of Kursumlija, however received, international donations of respectively RSD 8 million or € 100 thousand in 2005 and RSD 6 million or € 76 thousand in 2006. This municipality plans to receive an international donation of RSD 10 million or approximately € 125 thousand during the year 2007.

Table 5-28 Budget revenues of the Municipality of Kuršumlja

No	Type of revenues	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Original revenues	11	9	17	11	26	12	36	15
1.1.	Fees (administrative, communal, tourist)	5	4	6	4	4	2	7	3
1.2.	Land development charge		0	6	4	4	2	14	6
1.3.	Property tax				0			8	3
1.4.	Other	6	5	5	3	18	8	7	3
II	Allocated revenues	109	85	125	84	154	72	194	81
2.1.	Sales tax	49	38		0		0		0
2.2.	Income tax	29	23	59	40	75	35	84	35
2.3.	Property tax	7	5	6	4	7	3		0
2.4.	Property tax and tax on passing the absolute rights	8	6	5	3	7	3	7	3
2.5.	Transfers	1	1	54	36	62	29	102	43
2.6.	Other	15	12	1	1	3	1	1	0
III	Privatization revenues		0	1	1		0		0
IV	Credits		0		0	29	13		0
V	Revenue from previous year		0		0		0		0
VI	International Donations	8	6	6	4	6	3	10	4
	TOTAL REVENUES	128	100	149	100	215	100	240	100

Before 2002, municipalities in Serbia did not have legal possibilities to make use of capital markets as a funding source for capital investments. After adoption of the new budget law in 2002, municipalities could start to make use of this source. Reforms of public finance, especially at the local level, are increasing the general autonomy of local government, including financing and ability to borrow funds for investments.

Municipal Budget Expenditures

All Serbian municipalities are spending their budget predominantly within the following three areas:

- Financing work of local government administration and governmental bodies, i.e. the municipal council, Mayor office;
- Financing social functions that are under local government competency like education, sport and culture. These institutes are financed by means of transfer of funds; and
- Investments, mostly in local infrastructure.

According to Serbian budget laws, there are no legal restrictions to the use of allocated revenues. These revenues have a general nature. However, Serbian municipalities are obliged to fund certain social functions like communal services, funding material costs of educational institutions, provision of cultural and sport activities etc. The level of funding of these services and functions is to be decided by the municipality. So, formally local budget expenditures are discretionary, i.e. local governments can independently decide the level of funding for each function.

Having this in mind, it is understandable that the relative share of certain expenditures vary between different Serbian municipalities. Still, a general standard is that municipalities are spending around 1/3 of the total budget to each of the three group of expenditures listed above.

Table 5-29 Budget expenditure Prokuplje municipality

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Municipal bodies and administration	59	23	80	26	91	22	108	22
II	Social functions (education, sport, culture, welfare)	72	28	84	27	96	24	269	54
III	Reserves	25	10	-	0	-	0	4	1
IV	Funds-residential & others	-	0	-	0	-	0	-	0
V	Agency for urbanism and development	-	0	-	0	-	0	-	0
VI	Subsidies	99	39	82	27	178	44	7	1
1	Current subsidies	84	33	25	8	50	12	2	0
2	Capital subsidies	15	6	58	19	128	31	5	1
VII	Self-contribution	-	0	-	0	-	0	-	0
VIII	Other budget expenditure	0	0	64	21	42	10	107	22
	TOTAL EXPENDITURE	256	100	310	100	407	100	495	100

The municipalities of Toplica district follow this 1/3 budget spending pattern. Spending on municipal bodies in the leading municipality of the district, Prokuplje, amounts to an average 23% during the period 2004 – 2007. Social functions amount to an average of 33% during the same period. The funds for capital investments are allocated through a separate body, called the Directorate. In 2004 capital and operational subsidies amounted to 39%, which increased to 44% in 2006. The plans for 2007 shows a significant decrease of this type of subsidy to only 1% of total expenditure, due to the municipal decision to decrease the allocation of funds to Directorate in 2007 and to make a direct allocation of funds to budget beneficiaries. The tendency in the Municipality of Prokuplje is to increase the capital expenditure and to decrease the expenses of municipal bodies and the administration.

Table 5-30 Budget expenditure Municipality of Blace

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Municipal bodies and administration	21	34	25	29	31	29	34	22
II	Social functions (education, sport, culture, welfare)	22	35	24	28	31	29	33	22
III	Reserves	-	0	-	0	-	0	25	16
IV	Funds-residential & others	-	0	-	0	-	0	-	0
V	Agency for urbanism and development	-	0	-	0	-	0	-	0
VI	Subsidies	10	17	20	23	23	22	32	21
1	Current subsidies	8	13	6	7	9	8	14	9
2	Capital subsidies	2	3	14	16	15	14	18	12
VII	Self-contribution	-	0	-	0	-	0	-	0
VIII	Other budget expenditure	9	14	17	19	22	20	28	19
	TOTAL EXPENDITURE	62	100	86	100	107	100	152	100

Table 5-31 Budget expenditure of the Municipality of Zitoradja

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Municipal bodies and administration	17	34	23	29	31	34	36	15
II	Social functions (education, sport, culture, welfare)	14	27	15	19	23	26	28	12
III	Reserves	-	0	-	0	-	0	31	13
IV	Funds-residential & others	-	0	-	0	-	0	-	0
V	Directorate for urbanism and development	13	26	30	38	22	24	118	49
VI	Subsidies	-	0	3	4	7	7	11	5
1	Current subsidies	-	0	-	0	-	0	-	0
2	Capital subsidies	-	0	3	4	7	7	11	5



No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
VII	Self-contribution	3	6	3	4	4	4	2	1
VIII	Other budget expenditure	4	7	5	6	4	5	14	6
	TOTAL EXPENDITURE	51	100	79	100	91	100	241	100

Spending on municipal bodies in Blace and Zitoradja amounted to an average 28%. Social functions accounted for 25%. The operational and capital subsidies were 21% in the Municipality of Blace and only 5% in the Municipality of Zitoradja.

These three municipalities recorded negligible investments activities. The funds for capital investments are allocated through the separate body, the Directorate, in Zitoradja and separate funds in the Municipality of Kursumlija.

Table 5-32 Budget expenditure of the Municipality of Kursumlija

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Municipal bodies and administration	43	34	54	37	64	30	62	26
II	Social functions (education, sport, culture, welfare)	16	13	18	12	23	11	28	12
III	Reserves	-	0	-	0	-	0	-	0
IV	Funds-residential & others	49	39	40	27	79	37	81	34
V	Agency for urbanism and development	-	0	-	0	-	0	-	0
VI	Subsidies	-	0	13	9	20	9	13	5
1	Current subsidies	-	0	-	0	-	0	-	0
2	Capital subsidies	-	0	13	9	20	9	13	5
VII	Self-contribution	-	0%	-	0	-	0	-	0
VIII	Other budget expenditure	18	14	22	15	26	12	55	23
	TOTAL EXPENDITURE	126	100	147	100	212	100	240	100

Spending on municipal bodies in the Municipality of Kursumlija was recorded at the average of 1/3 during the analysed period. Social functions realized an average share of 12%. The share of Funds, residential & other, recorded an average of 34%. Subsidies accounted for 9% in 2005 and 2006, and the plan for 2007 is 5% of total expenditure.

Municipal Investment Expenditures

The above presented data specify at a rather general level budget revenues and spending in relation to different purposes and/or budget beneficiaries. This paragraph provides more details of the capital investment expenditure budget of the municipalities located in Toplica district.

In Serbian municipalities, four main mechanisms of financing investments can be distinguished. These are:

- Capital subventions to the municipal entity specifically established to deal with municipal investments and development. Most Serbian municipalities have this kind of entity, usually called the Agency for Construction and/or Development. This entity used to be a separate public company, but after the local public finance reform from 2002 was introduced, quite a few were transformed into a budget beneficiary. The scope of work of these departments usually includes spatial planning and development and designing and implementation or monitoring of different municipal investment projects;
- Capital transfers to budget beneficiaries/institutions. Local governments are in

accordance with the Law on Local Self Government legally obliged to provide their citizens with certain services like children welfare, culture, sport, covering the material costs of primary and secondary education institutions, etc. Local government is financing the entities that are providing these services. Both operational as well as capital costs are financed;

- Capital subventions to the public companies, includes direct transfers of operational and/or capital funds to public companies;
- Direct investments. In this case, municipalities are investing directly into certain projects, so that officially the investor is the municipal administration as a whole. De facto, the investor is usually some of the specific municipal administration departments.

The first two mechanisms are strictly speaking the same: the transfers are made to entities or institutions founded by local government and they have the status of budget beneficiaries, since their legal framework is defined by the Law of Budget System. The practical consequence of this is that all of these institutions are from the financial point of view part of the local public finance system, meaning that all of them financially are operating within the local treasury system. The only difference is that in the first case municipalities are transferring capital funds to one specialized entity which is then dealing with different investments, while in the second case, each of the entities is supposed to carry out its own investments.

On the other hand, the third mechanism, subventions to public utility companies, is basically different because the transfers are made to the public companies that do not have a status of budget beneficiaries, although they are users of budget funds. Their legal framework is defined by the Law on Companies/Enterprises, which means that they are not operating within the system of public finance. After the transfer of subventions, the further financial flow to and from the public utility companies is out of the local treasury. In other words, their actual expenditure is not reflected in the local government accounts.

The municipalities of Toplica district disburse funds from the local budget to finance capital investments through different channels and institutions:

Table 5-33 Budget capital expenditure – Prokuplje municipality

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Capital subventions	48	95%	58	87%	155	95%	5	3%
1	Directorate	28	56%	53	80%	65	40%	-	0%
2	PUC	2	5%	-	0%	2	1%	1	1%
3	Water System	2	4%	4	6%	61	37%	-	0%
4	Public objects	-	0%	0	0%	2	1%	1	0%
5	Subvention from city adm	0	0%	1	1%	0	0%	-	0%
6	Intervention in public infra	-	0%	-	0%	26	16%	3	2%
7	Sports center	15	30%	-	0%	-	0%	-	0%
II	Capital expenditure of budget beneficiaries	2	5%	9	13%	9	5%	149	97%
1	Municipal administration	0	1%	5	7%	4	3%	8	5%
2	Culture	0	1%	0	0%	0	0%	1	0%
3	Sport	0	0%	0	0%	0	0%	3	2%
4	Local communities	2	3%	2	3%	3	2%	121	79%
5	Public objects	0	0%	0	0%	0	0%	16	10%
6	Other capital expenditures	0	0%	0	0%	0	0%	1	0%
	TOTAL (I+II)	50	100%	66	100%	164	100%	154	100%



The Municipality of Prokuplje established the Public Company Directorate, which has a status of budget beneficiary. During the period 2004 to 2006, the funds from the local budget were transferred directly to the Directorate. During 2006, RSD 65 million or 40% of total capital expenditure was invested through the Public Company Urban Directorate; 37% of total capital expenditures were direct investments in the water supply system and 16% was spent on interventions in public infrastructure. The plan for 2007 is to switch from capital subventions to capital expenditure of budget beneficiaries. In the structure of budgetary beneficiaries, the plan for 2007 is to support local communities with 79%, public objects with 10% and municipal administration with 5% of total capital expenditures.

These expenditures have been financed from budget revenues and long term loans. The large increase during 2007 is planned to be funded by introducing new original revenues like: current donations from international organizations, fees for building sites arrangement, proceeds from sales of movable assets and others.

Another source of finance is the National Investment Plan. The Municipality of Prokuplje has applied for funding from the NIP, and a total of € 1.7 million was apportioned to finance investments for reconstruction of the water supply network (€ 363 thousand in 2006 and € 1.2 million in 2007). In addition development of entrepreneurship was supported with € 114 thousand.

It should be noted that these funds are directly paid by the organisation managing the fund at national level and thus, are not included in the Prokuplje municipal budget.

Table 5-34 Budget capital expenditure – Blace municipality

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Capital subventions	2	23%	14	52%	15	49%	18	54%
II	Capital expenditure of budget beneficiaries	5	77%	13	48%	15	51%	15	46%
	TOTAL (I+II)	7	100%	27	100%	29	100%	33	100%

From 2004 to 2006, the Municipality of Blace recorded an increase in capital subventions of RSD 2 million in 2004 to RSD 15 million in 2006. The plan for year 2007 is to increase this with an additional 20%. The overall investment levels remained stable throughout the last three year at about RSD 30 million/annum.

The Municipality of Blace has applied for funding from the NIP to finance investments for the replacement of water pipes in the water system of the municipality and the road construction. It was granted € 162 thousand in 2006 and € 543 thousand in 2007. It should be noted that these funds are not included in the Blace municipal budget.

Table 5-35 Budget capital expenditure – Zitoradja municipality

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Capital subventions	0	0%	0	0%	0	0%	0	0%
II	Capital expenditure of budget beneficiaries	0	0%	3	100%	7	100%	11	100%
	TOTAL (I+II)			3	100%	7	100%	11	100%



The Municipality of Zitoradja established the Public Company Directorate which has a status of budget beneficiary. From 2004 to 2006, funds from the local budget were transferred directly to the Directorate. In 2006 RSD 21 million was transferred to the Directorate. The plan for 2007 is to increase this to RSD 118 million out of which RSD 50 million or 43% should be spent on communal infrastructure and RSD 50 million or 43% on donation support programs.

It should be noted that, according to the Budget of the Municipality of Zitoradja, the transfer to the Directorate is accounted for as a *current* subvention. Thus, it understates the actual capital investment budget as stated in the table above, since out of this current subvention, capital projects are financed.

The Municipality of Zitoradja has applied for funding from the NIP to finance investments for construction and development of local sewage network and was granted € 53 thousand in 2006 and € 298 thousand in 2007. These funds were, however, not included in the municipal budget of Zitoradja.

Table 5-36 Budget capital expenditure – Kursumlija municipality

No	Type of expenditure	2004 a		2005 a		2006 est		2007 plan	
		RSD m	%	RSD m	%	RSD m	%	RSD m	%
1	2	3	4	5	6	7	8	9	10
I	Capital subventions	-	0%	13	24%	20	20%	13	14%
II	Capital expenditure of budget beneficiaries	49	100%	40	76%	79	80%	81	86%
	TOTAL (I+II)	49	100%	53	100%	99	100%	94	100%

The Municipality of Kursumlija has established a Fund, with the status of budget beneficiary. The funds from the local budget are transferred directly to this Fund. During 2006, a total of RSD 79 million was spent on capital investment via budget beneficiaries. The municipality plans to spend a total of RSD 81 million on capital investments in 2007. Out of the planned amount, RSD 10 million or 11% of total expenditures are expected to be spent on the water system and RSD 30 million or 32% on sports objects in the municipality.

The Municipality of Kursumlija has applied for funding from the NIP to finance investments of constructing a water reservoir and reconstruction of the city water network and was granted € 60 thousand in 2006 and € 340 thousand in 2007. These funds were, however, not included in the municipal budget of Kursumlija.

During 2006, the municipalities of the Toplica district incurred capital expenditures amounting to RSD 319 million, equivalent to € 4 million. The planned capital expenditure budget for the year 2007 increased to RSD 396 million or € 5 million.

Table 5-37 Summary capital expenditures Toplica region municipalities

No	Municipality	2004 RSD m	2005 RSD m	2006 RSD m	2007 RSD m plan
1	Prokuplje	50	66	164	153
2	Kursumlija	49	53	99	94
3	Zitoradja		3	7	11
4	Blace	7	27	29	33
	Total	106	149	299	291

Summing up, it can be concluded that the municipalities in Toplica district have considerable investment capacity. The total investment capacity of Toplica district municipalities could be increased by attracting external finance from international donors and international banks through loans.

According to the current Budget System Law, municipalities could borrow up to 50% of current revenues from the previous year's realized budget revenues. The Ministry of Finance is regularly publishing these limits and they are applied very strictly. According to the last official release from the Ministry of Finance, valid for the year 2007, the municipalities can borrow up to the following limits:

Table 5-38 Borrowing limits for Toplica region municipalities (2007 /€ 1 = RSD 79)

No	Municipality	Realized revenues 2006		Borrowing limit 2007	
		RSD m	€ th	RSD m	€ th
1	Prokuplje	343	4,340	115	1,435
2	Kursumlija	172	2,183	57	725
3	Zitoradja	86	1,091	43	546
4	Blace	105	1,331	53	666
	Total	706	8,945	268	3,372

Source: Ministry of Finance Serbia

Because of loans already taken during previous years, the borrowing limit of the Municipality of Prokuplje as of 2007 is limited to RSD 115 million or € 1.4 million and Municipality of Kursumlija to RSD 57 million or € 0.7 million. The municipalities of Zitoradja and Blace did not take any loans in 2006. The total remaining 2007 borrowing limit for the municipalities of the district combined amounts to € 3.4 million.

Municipal balance sheets

The balance sheets of Serbian municipalities are burdened with a number of limitations and deficiencies. One of the biggest deficiencies is the fact that during 90-ties, the Republic government took over most of the local government property. This has made a tremendous impact on Local Government balance sheets. Some of the Local governments continued to keep record of the assets in their balance sheets. Others stopped doing that, only to restart recording these assets again around the year 2000. And another group transferred the bookkeeping of their assets to some of their entities, like the Agency for development. Because of this, balance sheets of Serbian local government cannot be compared in a meaningful way.

Having the above in mind, the analysis of local governments' balance sheets and the possible conclusions should be taken into account more as an illustration of the present situation than as a solid fact.

The municipalities of Toplica district did not continue to keep their balance sheets, but recorded all their operations through the municipal budget, like many other Serbian municipalities. The municipalities are, however, not legally obliged to keep their records in the typical financial reports, as required by the International Financial Reporting Standards. They submit their Budget plans, Revaluations and Budget Realization to the Municipal Assembly for approval.

Breakdown of the municipalities' main fixed assets as at the end of 2006 are given in the table below:

Table 5-39 Main assets of Toplica region municipalities (as at 31.12.1006)

Offices	RSD	€ th
Municipality building Prokuplje	865,445	11
Municipality building Kursumlija	137,437	2
Municipality building Blace	2,217,171	28
Municipality building Zitoradja	n/a	n/a
Total	3,220,053	41

When analyzing main assets of the municipalities in Serbia, it should be taken into consideration that they are the property of the State of Serbia. Consequently, also the main assets of the PUCs are owned by the municipalities. This is an important issue when municipalities enter into loan agreements with commercial banks, since this property cannot be placed under mortgage.

Credit history and financial management capacity

In general, Serbian municipalities do not have a long credit history. Major changes were initiated starting from 2002 with the new Budget System Law which introduced the possibility for Serbian municipalities to make use of capital markets, draw loans and issue municipal bonds. However, the practice of taking long term credits to finance large investment projects did not become significant until the year 2003.

Municipalities in Serbia are now changing the practice of applying conservative financial policies of avoiding loans and keeping a relatively high surplus of cash in order to avoid liquidity problems. They are more interested in improving the functioning of their regions, and are assisted in this by a number of international grants being awarded to improve communal services.

Being given legal rights to borrow money from commercial banks, municipalities are entering into these agreements respecting various conditions under which banks are ready to lend money to local communities. Municipalities have equal borrowing rights as any other company in the trade market. The difference lies in providing collateral. Each municipality has an account with the State Treasury, through which all the transfers from the State budget to the Municipality are directed. In case of borrowing, the bank usually requires signing a letter of authorisation with the municipality to debit their account with the Treasury for any outstanding loan repayment. This proves to be rather firm collateral, since the municipalities have regular transfers from the State and loans practically bear very little risk of not being repaid.

Long term loans

In May 2006, the Municipality of Prokuplje signed a contract with Raiffeisen bank AD Beograd, for € 735 thousand, repayable in RSD, interest rate EURIBOR + 3.35%, a front end fee of 0.20%, and 0.20% commission, for investing in the water production and distribution.

The tenor of the loan is 180 months; repayment of the principal is scheduled in 21 equal semi annual instalments, the first falling due 60 months after the first disbursement date. As collateral the Municipality had placed 10 promissory notes and 20 Agreements on Authorisation by which the Bank can claim any outstanding debt with the local Treasury department, where the Municipality has its business account. Under the provisions of this contract, the beneficiary is obliged to enable the Bank insight into allocation of the borrowed money. The bank shall decide on the time and monitoring method.

This municipality also signed 3 lease contracts for the purchase of vehicles for the total amount of € 97 thousand, on 7 and 5 years leases respectively.

In 2006, the Municipality of Kursumlija, took a RSD 29 million or € 367 thousand long term commercial loan, for the purpose of financing construction of the sports centre.

5.2.4 Creditworthiness assessment Toplica district municipalities

Creditworthiness during the period 2004 – 2007

The Municipality of Prokuplje is the lead municipality for this project, because of the size of its population, but also because the sanitary landfill is located within its boundaries. Therefore, the creditworthiness analyse concentrates the financial position of the Municipality of Prokuplje, with only a general overview provided for the other municipalities of the district.

Table 5-40 Municipality of Prokuplje actual 2004 – 2006 and plan 2007 (RSD million)

No	Item	2004	2005	2006 estim	2007 plan
I	Current Revenues (1+2+3+4)	245	283	337	471
1	Own Current Revenues	19	20	41	88
2	Share of State Taxes	224	182	221	202
3	Other state Transfers	2	81	75	180
4	Donations	-	-	-	1
II	Current Expenditures	168	226	232	331
A	Current Surplus/Deficit (I-II)	77	57	105	140
5	Capital Revenues	2	6	9	24
6	Capital Expenditures	50	66	164	153
B	Capital Surplus/Deficit (5-6)	(48)	(60)	(155)	(129)
C	Net Surplus/Deficit Before Financing (A+B)	29	(4)	(50)	11
7	Borrowing	15	10	61	-
8	Cash brought from previous year	-	7	-	-
9	Debt Service	13	17	11	7
10	Reserves	25	-	-	4
D	Net Debt Increase/decrease (7+8-9-10)	(23)	(0)	50	(11)
E	Net Surplus/Deficit (C+D)	6	(4)	0	0

- Municipal current revenues have increased during the period 2004 to 2006. During this period, current revenues grew from RSD 245 million in 2004 to RSD 337 million in 2006, or by 38%. In 2007, the Municipality of Prokuplje plans to increase its current revenues to RSD 471 million, a 40% increase compared to 2006;
- During the same period, current expenditures grew at the same rate as current revenues, at 38%. The plan for year 2007 is to increase current expenditures by 43%, from RSD 232 million to RSD 331 million;
- Capital expenditures during the period 2004 to 2006 has increased from RSD 50 million in 2004 to RSD 164 million in 2006. The plan for 2007 is to decrease



- capital investments to RSD 153 million, or by -7%;
- Capital revenues for the period grew, from RSD 2 million in 2004 to RSD 9 million in 2006. The plan for the year 2007 is a large increase to RSD 24 million;
 - The current surplus of the Municipality of Prokuplje, increased from RSD 77 million in 2004 to RSD 105 million in 2006. The plan for 2007 is to increase the current surplus to RSD 140 million, an increase of 33% compared to 2006. The current surplus was sufficient to fund the capital deficit only in 2004, while it is planned in 2007 to cover the capital deficit as well;
 - On the other hand, the capital cash flow (capital revenues minus capital expenditures) during these years was consistently negative: capital revenues can only finance a small part of the investment expenditures. The reason for this is the intensive investment program that has been initiated from the year 2000, but also the characteristic of the local public finance system in Serbia, which does not differentiate strictly between current/operational and capital revenues. However, although not legally prescribed, some taxes and fees are levied with the purpose to improve infrastructure in a municipality. For example, the land development charge is usually defined as revenue of the local agency for development, which in turn uses it to upgrade or fund new infrastructure. Revenues from renting municipal assets are used as a general source to fund the municipalities' capital investment program.
 - The findings of the budget analysis of the Municipality of Prokuplje, shows that the net surplus before financing, for every observed year, was insufficient to fund the capital deficit. In order to finance its ambitious investment program, this municipality has to reach for additional funds, borrowing from commercial banks or other financing means.

Regular planning of the municipal budget for the Municipality of Prokuplje and the municipalities in Serbia in general, was influenced by the fact that none of the 2006 municipal budgets could be approved by their municipal Assemblies due to the fact that the General Assembly was unable to meet for several months (due to political reasons). This created the situation that the municipalities were on temporary budgeting, and majority of the municipalities had underestimated planning of their 2007 budgets.

If we compare investment data of other municipalities we have analysed for the same period, the Municipality of Prokuplje recorded an active investment history. High growth of investment expenditure and revenues could also be explained by inflow of funds from commercial loans, internal revenue instruments such as local self contribution and funding through international and national grants. More recently and supported by public finance reforms, municipal budgets started increasing significantly, which enabled them to initiate and fund additional investments.

Table 5-41 Blace municipality actual 2004 – 2006 and plan 2007 (RSD '000)

No	Item	2004	2005	2006 estim	2007 plan
I	Current Revenues	56	81	98	142
II	Current Expenditures	55	60	77	94
A	Current Surplus/Deficit (I-II)	1	21	21	47
B	Capital Surplus/Deficit	0	(20)	(21)	(23)
C	Net Surplus/Deficit Before Financing (A+B)	1	0	0	24
D	Net Debt Increase/decrease	-	1	0	(24)
E	Net Surplus/Deficit (C+D)	1	1	1	0

Table 5-42 Zitoradja municipality actual 2004 – 2006 and plan 2007 (RSD '000)

No	Item	2004	2005	2006 estim	2007 plan
I	Current Revenues	53	74	84	234
II	Current Expenditures	51	76	84	198
A	Current Surplus/Deficit (I-II)	2	(1)	0	36
B	Capital Surplus/Deficit	3	0	(2)	(4)
C	Net Surplus/Deficit Before Financing (A+B)	5	(1)	(2)	31
D	Net Debt Increase/decrease)	-	-	4	(31)
E	Net Surplus/Deficit (C+D)	5	(1)	2	-

Table 5-43 Kursumlija municipality actual 2004 – 2006 and plan 2007 (RSD '000)

No	Item	2004	2005	2006 estim	2007 plan
I	Current Revenues	128	142	182	226
II	Current Expenditures	77	94	113	129
A	Current Surplus/Deficit (I-II)	51	48	69	97
B	Capital Surplus/Deficit)	(49)	(46)	(95)	(80)
C	Net Surplus/Deficit Before Financing (A+B)	2	2	(26)	17
D	Net Debt Increase/decrease	-	-	29	(17)
E	Net Surplus/Deficit (C+D)	2	2	3	(0)

The analysis of the municipal budgets of Blace, Zitoradja and Kursumlija illustrated in the above tables shows the following:

- Municipal current revenues in the period 2004 to 2006 increased at an average of 75% in Blace, 58% in Zitoradja and 42% in Kursumlija. Every municipality plans to follow this trend in 2007;
- Current expenditures in the same period increased by 40% in Blace, 65% in Zitoradja and 47% in Kursumlija. The plan for 2007 is to continue this trend;
- Capital expenditures during 2004 to 2006 have increased four times in Blace, three times in Zitoradja and two times in Kursumlija. The plan for 2007 is a further increase of capital expenditures;
- Capital revenues in 2006 increased by 50% compared to 2005 in Blace, 54% in Zitoradja and recorded a 42% decrease in the Municipality of Kursumlija;
- Current Surplus in 2006 remained at the same level compared to the previous year in the Municipality of Blace, the Municipality of Zitoradja recorded zero growth in 2006, and the Municipality of Kursumlija recorded an increase at 44%. Current Surplus in the Municipality of Blace was sufficient to fund the capital deficit during the entire period. In the Municipality of Zitoradja current surplus was sufficient only in 2004, and with the planned surplus in 2007, it is expected that the municipality can fund its capital deficit. In the Municipality of Kursumlija current surplus was sufficient to cover the capital deficit in each, with the exception of 2006;
- The Capital Surplus (capital revenues minus capital expenditures) during these years was consistently negative in the municipalities of Toplica district;
- Net surplus (Net Surplus before financing + Net Debt increase) in during the analysed period was zero or positive. An increase was recorded only in the Municipality of Zitoradja and Kursumlija during the year 2006.

The Table below provides some selected financial indicators which confirm the above trend. The indicators given in the table refer to the Municipality of Prokuplje.

Table 5-20 Municipal financial indicators – Municipality of Prokuplje

Item	Benchmark	2004	2005	2006 est.	2007 plan
Indicators of revenues					
Current revenues / Total revenues		99%	98%	97%	95%
Shared revenues / Total revenues		91%	63%	64%	41%
Original (local) revenues / Total revenues		9%	8%	14%	22%
Revenues from sale of property / Total revenues	2 – 5%	0%	0%	0%	0%
Capital revenues / Total revenues		1%	2%	3%	5%
Operating result / Current revenues		32%	20%	31%	30%
Indicators of expenditures					
Current expenditures / Total expenditures		77%	77%	59%	68%
Operating result / Current expenditures		46%	25%	45%	42%
Capital revenues / Capital expenditures		4%	9%	6%	16%
Capital investments / Total expenditures		20%	23%	47%	31%
Indicators of financial state					
Total expenditures / Total revenues	95% - 100%	88%	101%	114%	98%
Total expenditures / Current revenues		89%	103%	117%	103%
Indicators of indebtedness					
Debt / Total revenues from previous year		0%	0%	18%	14%
Debt service / Total revenues from previous year		0%	7%	4%	2%

Revenue indicators:

- The share of current in total revenues is stable throughout the years; the plan for the year 2007 is to keep up with this level;
- The share of allocated revenues (shared revenues) in total revenues decreased from 91% in 2004 to 64% in 2006, and according to 2007 plan revenues will be further decreased to 41%, due to the switch of the property tax and the decrease of the income tax rate;
- Original revenues show oscillations from 8% to 14%. The plan for 2007 is to increase these revenues to 22%, again being the result of reclassified property tax collection;
- The ratio between operating result and current revenues is consistently around 30%, with a drop to 20% in the year 2005.

Expenditure indicators:

- The share of current in total expenditures during the period 2004 to 2006 varied from 59% to 77%; the plan for the year 2007 is to increase current spending;
- Capital revenues coverage of capital expenditures throughout the years ranged from 4% to 9%. The plan for 2007 is to increase capital revenues coverage to 16%.
- Capital investments as a percentage of total expenditures showed an increase from 20% to 47% from 2004 to 2006. However, in 2007, capital investments to total expenditures are planned at a share of 31%;

Indicators of financial state:

- Total expenditures were lower than total revenues in 2004, while in the 2005 to 2006 total expenditures exceeded total revenues by 1% to 14% respectively. The plan for 2007 shows that the expenditures will be 2% lower than the revenues. The gap is mainly financed by commercial bank loans.

Indicators of Indebtedness:

- During the observed period Debt to Total revenues from previous year was zero in 2004 and 2005 and 9% in 2006, this indicator is declining in 2007 and it is negative at -4%.

Financial indicators for the municipalities of Blace, Zitoradja and Kursumlija, are included in Annex 5-1. Their overall performance reflects a picture almost identical to that of the Municipality of Prokuplje.

With the planned borrowing in 2007, municipalities of the Toplica district can fund only parts of their capital investment plans. In 2007, neither of the municipalities had used their entire legally prescribed borrowing limit, which gives them space to take further loans. All municipalities combined have a remaining legal; borrowing capacity of € 3.4 million.

Municipalities in Serbia are generally pro forma owners of their property, given to them by the Republic of Serbia. This means that the municipalities are legally limited as to the issue of disposing of their property. They can only use them as “tenants”, occupying their premises indefinitely without paying any “rents”. However, it is the State of Serbia that makes decisions in respect to any change in property ownership of the municipalities, and therefore also of the PUCs, on Serbian territory. Hence, municipalities cannot place “their” property as collateral if commercial banks granting loans require them to do so, but as we have elaborated above there are other equally firm means which municipalities are using as security for bank loans.

In order to pool more funds, the municipalities could improve collection of the land development and use charge, in order to finance their capital investments. Municipal budgets will grow with the new revenue collected from property tax charges, which became effective as of June 2007. The municipalities have a discretionary right to set the property tax charge within the legally prescribed limits. The Government is also apportioning more funds to the municipalities through budget transfers.

The municipalities are legally obliged to present to the municipal assembly the annual budget plan for the year following their approved budgets from the previous year. There are no obstacles for the municipalities to introduce multiyear planning, using economic forecasts, at least in those sections controlled by them (within the original revenues).

Funding of municipal investment plans by issuance of municipal bonds could be an appealing alternative compared to commercial bank loans. So far, however, this has not been initiated yet in Serbia. Neighbouring countries, including former FRY republics, are preparing (Republic of Srpska), or started (Croatia) projects on municipal bonds issuance. However, many organizational changes will have to be made in Serbia, prior to addressing the bond issuance, such as instituting a body that will be in charge of controlling the municipal

bond market, but also the issue of ownership of assets.

Creditworthiness forecast during the period 2008-2017

The projection of the Prokuplje municipal creditworthiness is based on data supplied by the budget department of the municipality. In order to assess the sensitivity of the projections to changes in the macro-economic environment, three different scenarios are presented: a base case, an optimistic and a pessimistic macro-economic scenario. Details of these macro-economic scenarios are presented in paragraph 5.3 financial and economic analysis. The projections are based on the municipal plan for 2007, with corrections for changes related to the new Law on local government financing.

The projection of budget revenues is based on the following assumptions:

- Current division of local budget revenues in accordance with the new law on local government finance;
- According to the same law, as from 2007, the tax on property is going to change its status from allocated to own revenues. The administration of this tax will be decentralized, so that the local government will be directly in charge of collecting this tax. For this reason it is assumed that this tax will have an autonomous increase in the future

The specific revenue growth parameters that have been used for the projection are presented in the table below:

Table 5-44 Municipal projection – revenue growth assumptions

I	Own revenues	
1.	Fees (administrative, communal, tourist)	- RSD Inflation - Real GDP growth
2.	Charge for land use and development	- RSD Inflation - Real GDP growth - Autonomous growth of revenues 1.5% (base), 3% (optimistic), 0% pessimistic
1.3.	Property tax	- RSD Inflation - Real GDP growth - Autonomous growth of this revenues from 0 (1-5 year), 3%/5%/0% (5-10 year), 6%/10%/0% (11-15 year)
4.	Other	- RSD Inflation
II	Allocated revenues	
2.1.	Income tax	- RSD Inflation - Real Wage Increase
2.2.	Heredity tax and tax on passing the absolute rights	- RSD Inflation - Real GDP growth
2.3.	Property tax	- RSD Inflation - Real GDP growth
2.4.	Transfers	- RSD Inflation - Real GDP growth
2.5.	Other	- RSD Inflation

The projection of Prokuplje municipality budget expenditures is based on different growth patterns for the following three main groups of expenditure:

- Expenditure related to the administration and governmental bodies;
- Expenditures related to social functions; and
- Expenditures related to operational expenditures of local development and utility operational subsidies.

The projection of budget expenditures is based on the following assumptions:

Table 5-45 Municipal projection – expenditure growth assumptions

No	Type of expenditures	Parameters of the projections
1.	Administration and municipal bodies	- RSD Inflation
2.	Social functions	- RSD Inflation - Real GDP growth
3.	Current subsidies	- RSD Inflation - Real GDP growth
4	Other current expenses	- RSD Inflation

After projecting revenues and expenditures, the net surplus before financing and before capital expenditure is estimated for each of the three macro economic scenarios. Next, debt service commitments arising from the existing loans are deducted from this amount. The remaining balance is in principle available for the funding of capital projects.

Prokuplje has taken one loan in 2006. No other loans are planned to be drawn during the year 2007. The 2006 loan has the following conditions:

- Loan amount € 735 thousand, equivalent to RSD 61 million at the time of signing the contract (May 2006);
- Loan is Euro denominated, but repayable in RSD;
- 15 year loan period;
- 5 year grace period;
- Interest rate margin 3.35% above EURIBOR, interest during grace period is not capitalized;
- EURIBOR at 4.75% (November 2007 Euribor ranges from 4.6% to 4.7%)
- Front-end fee 0.2%;
- Commission 0.2%;
- No commitment fee.

Based on this, the model will assess the capability of Prokuplje municipality during the period 2008 to 2009 to assume any further debt and/or capital financing directly from the municipal budget.

Of course this does not mean that this study proposes the Municipality of Prokuplje to finance 100% of the investment. The projection just assesses the possibility for the municipality to assume the *maximum* amount of the liabilities. In the end it is up to the municipality to decide on an appropriate key or mechanism to finance the municipal part of the project, or to attract funding from other sources to close the financing plan.

The final result of the projection is presented in the tables below. The results are presented both in RSD as well as Euro.

Table 5-46 Prokuplje Municipality budget forecast – base case

	Unit	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total budget revenues	RSD m	534	582	637	697	767	839	919	1,007	1,089	1,180
Total current expenditures	RSD m	353	377	404	433	464	495	529	566	602	641
Operating result	RSD m	181	204	233	264	303	344	390	441	487	539
Budget capital financing	RSD m	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	RSD m	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	RSD m	5	5	5	11	11	11	10	10	10	9
Available for capital spending	RSD m	176	199	228	253	292	333	379	431	477	530
Outstanding principal amount (at beginn	RSD m	60	61	62	63	58	52	46	40	34	28
Total budget revenues	€ th	6,531	6,984	7,499	8,085	8,764	9,453	10,201	11,013	11,734	12,530
Total current expenditures	€ th	4,316	4,531	4,760	5,022	5,302	5,580	5,875	6,190	6,490	6,807
Operating result	€ th	2,215	2,454	2,740	3,063	3,461	3,873	4,326	4,823	5,244	5,723
Budget capital financing	€ th	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	€ th	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	€ th	60	60	60	133	127	121	115	109	103	97
Available for capital spending	€ th	2,155	2,394	2,680	2,930	3,334	3,752	4,211	4,713	5,141	5,626
Outstanding principal amount (at beginn	€ th	735	735	735	735	662	588	515	441	368	294
Max borrowing capacity	€ th	3,088	3,265	3,492	3,750	4,042	4,382	4,726	5,100	5,506	5,867
Max additional borrowing capacity (50%)	€ th	2,353	2,530	2,757	3,015	3,381	3,794	4,212	4,659	5,139	5,573

Table 5-47 Prokuplje Municipality budget forecast – optimistic case

	Unit	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total budget revenues	RSD m	537	584	637	695	763	838	921	1,013	1,107	1,216
Total current expenditures	RSD m	353	376	400	427	455	486	520	556	595	637
Operating result	RSD m	184	208	236	268	308	352	402	457	512	578
Budget capital financing	RSD m	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	RSD m	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	RSD m	5	5	5	11	10	10	9	9	8	8
Available for capital spending	RSD m	179	203	232	257	297	342	392	448	504	570
Outstanding principal amount	RSD m	59	59	59	59	53	48	42	36	30	24
Total budget revenues	€ th	6,714	7,295	7,958	8,683	9,487	10,371	11,344	12,413	13,504	14,753
Total current expenditures	€ th	4,413	4,697	5,003	5,333	5,662	6,016	6,398	6,811	7,256	7,736
Operating result	€ th	2,301	2,599	2,955	3,350	3,825	4,355	4,945	5,603	6,249	7,017
Budget capital financing	€ th	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	€ th	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	€ th	60	60	60	133	127	121	115	109	103	97
Available for capital spending	€ th	2,241	2,539	2,895	3,217	3,698	4,234	4,830	5,493	6,146	6,920
Outstanding principal amount	€ th	735	735	735	735	662	588	515	441	368	294
Max borrowing capacity	€ th	3,088	3,357	3,648	3,979	4,342	4,744	5,186	5,672	6,207	6,752
Max additional borrowing capacity (50%)	€ th	2,353	2,622	2,913	3,244	3,680	4,156	4,671	5,231	5,839	6,458

Table 5-48 Prokuplje Municipality budget forecast – pessimistic case

	Unit	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total budget revenues	RSD m	566	628	688	747	803	855	919	988	1,062	1,141
Total current expenditures	RSD m	380	420	457	493	526	557	592	629	668	711
Operating result	RSD m	185	208	231	254	276	298	327	359	393	431
Budget capital financing	RSD m	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	RSD m	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	RSD m	5	6	6	14	14	14	13	13	12	12
Available for capital spending	RSD m	180	202	225	239	262	284	314	346	381	419
Outstanding principal amount	RSD m	44	44	44	98	84	71	59	48	38	29
Total budget revenues	€ th	6,259	6,434	6,646	6,868	7,174	7,494	7,977	8,492	9,042	9,621
Total current expenditures	€ th	4,208	4,303	4,416	4,533	4,704	4,881	5,137	5,407	5,693	5,991
Operating result	€ th	2,051	2,130	2,230	2,335	2,470	2,613	2,840	3,085	3,349	3,630
Budget capital financing	€ th	-	-	-	-	-	-	-	-	-	-
Loan financing - drawdown	€ th	-	-	-	-	-	-	-	-	-	-
<i>Debt service</i>											
Loan 1 (2006)	€ th	60	60	60	133	127	121	115	109	103	97
Available for capital spending	€ th	1,991	2,071	2,171	2,202	2,343	2,492	2,725	2,976	3,246	3,533
Outstanding principal amount	€ th	735	735	735	735	662	588	515	441	368	294
Max borrowing capacity	€ th	3,088	3,129	3,217	3,323	3,434	3,587	3,747	3,988	4,246	4,521
Max additional borrowing capacity (50%)	€ th	2,353	2,394	2,482	2,588	2,773	2,999	3,233	3,547	3,879	4,227



The main findings of the above projections are:

- The current loan obligations do not severely restrict the municipalities ability to fund capital expenditures directly from the budget: less than 10% of the operational surplus needs to be spent on debt service;
- Cumulative *total* available budget for capital projects during the period 2008 to 2009 under macro-economic base case scenario amounts to € 4.5 million, with a pessimistic scenario resulting in € 4.1 million and an optimistic scenario totaling € 4.8 million;
- Assuming that around 50% of this balance is allocated to solid waste infrastructure, the municipality could commit an additional € 2.25 million during the period 2008 to 2009, assuming a base case scenario.
- There is some scope for additional borrowing during the period 2008 to 2009, as a result of growing municipal revenues and principal repayment of existing loans. This is estimated at € 3.2 million cumulative (base case scenario);
- Assuming that the grace period for this loan would be set at a minimum of 3 years, the total available municipal capital budget for the period 2008 to 2009 would amount to € 7.7 million (base case scenario);
- If 50% of this would be used to fund the solid waste project, the total municipal financing of the project could amount to approximately € 3.8 million;
- As elaborated upon in paragraph 5.3, the envisaged contribution by Prokuplje is far below this amount. It is even less than the total municipal contribution required by all four municipalities;
- Therefore, based on this analysis, the municipality has sufficient financial sources to co-fund the project.

Finally, the table below summarizes some key indicators of Prokuplje. These indicators confirm that the municipality can sustain the financial burden under all macro-economic scenarios. Obviously, this is also a result of the strict borrowing constraints imposed by the Ministry of Finance.

Table 5-49 Prokuplje Municipality - budget forecast indicators

	Unit	Rate	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Indicators - base case												
Prokuplje												
Operating result / total revenues	%	MIN=	34%	35%	37%	38%	39%	41%	42%	44%	45%	46%
Operating result / Total debt service	multiple	MIN=	37.2	41.2	46.0	23.0	27.2	32.0	37.6	44.2	50.8	58.8
Outstanding Debt / operating result	multiple	MAX=	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Outstanding Debt / revenues previous yr	%	MAX=	12%	11%	11%	10%	8%	7%	5%	4%	3%	3%
Debt service / revenues previous yr	%	MAX=	1%	1%	1%	2%	2%	1%	1%	1%	1%	1%
Indicators - optimistic case												
Prokuplje												
Operating result / total revenues	%	MIN=	34%	36%	37%	39%	40%	42%	44%	45%	46%	48%
Operating result / Total debt service	multiple	MIN=	38.6	43.6	49.6	25.2	30.1	36.0	42.9	51.3	60.5	72.1
Outstanding Debt / operating result	multiple	MAX=	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0
Outstanding Debt / revenues previous yr	%	MAX=	12%	11%	10%	9%	8%	6%	5%	4%	3%	2%
Debt service / revenues previous yr	%	MAX=	1%	1%	1%	2%	1%	1%	1%	1%	1%	1%
Indicators - pessimistic case												
Prokuplje												
Operating result / total revenues	%	MIN=	33%	33%	34%	34%	34%	35%	36%	36%	37%	38%
Operating result / Total debt service	multiple	MIN=	34.4	35.8	37.5	17.6	19.4	21.6	24.7	28.2	32.4	37.3
Outstanding Debt / operating result	multiple	MAX=	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1
Outstanding Debt / revenues previous yr	%	MAX=	12%	12%	11%	11%	10%	8%	7%	6%	4%	3%
Debt service / revenues previous yr	%	MAX=	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%



5.2.5 Risks & Weaknesses

The risk of default on credits and other financial obligations of municipalities in Serbia is generally not very high, because of the strict application of the law on public finance by the Central Government/Ministry of Finance. This law regulates the municipal debt market by setting the limit to accumulated municipal debt to maximum 50% of the previous' year realized budget revenues. In addition, debt service is not to exceed 15% of the previous' year realized budget revenues. Municipalities have to apply for a permit to the Ministry of Finance for any debt they wish to take. The Ministry of Finance controls whether the municipalities adhere to the stipulations of the law on public finance and especially these debt limits, before issuing the permit.

The other factor that is decreasing risk in servicing debts of local governments is the still relatively slow procedure in creating debts. According to the new law on public procurement and new treasury procedures, the process of initiating project implementation is very slow. It could be said that Serbian municipalities still did not develop management capacity to spend efficiently funds available on viable projects.

This is one of the reasons for not having spent funds as planned during the budget year.

Within Toplica District, only the municipalities of Prokuplje and Kursumlija have in the recent past actively used the instrument of borrowing from commercial banks. Although both municipalities will be exposed to debt service liabilities, its financial position is not considered to be very risky.

Certain risks could be related to the coming reform of the local governmental system which includes considerable changes in the financial operational system:

- The new law on local governments financing envisages the establishment of a tax administration at the local level and take over much bigger responsibility for collecting larger original (own) revenues;
- Introduction of the new elaborated treasury system that will integrate the system of public finance in Serbia;
- Introduction of public procurement law;
- Starting with the accounts of the 2006 financial year, municipalities and public companies are obliged to have their accounts audited and certified by an external auditor.

The risk is related to the reforms not being implemented successfully or creating excessive bureaucracy. On the other hand, a successful implementation will enhance the local government financial management system and increase the creditworthiness of the municipalities.

There is a political risk. Change of either the mayor or the constitution of the assembly can change political priorities. Frequently, (senior) managers in both the city administration as well as related public companies are changed as a result of a newly elected mayor from a different political party or a change of the assembly.

Although municipal accounts do separate between capital and current accounts, little attention is paid to a strict separation of the two types of expenditure. Frequently, current and investment expenditures are mixed up. Actual expenditures of subventions given to public utility companies are not reflected in the municipal accounts. The accounts of Zitoradja municipality are a clear example of this: subventions to the Directorate are accounted for as current expenditure, although the bulk of the funds provided are spent on capital projects. This all makes it difficult to track planned investment versus actual expenditure.

Conclusion is that many local government reforms are recently introduced which, if implemented successfully, will contribute to enhance the creditworthiness of municipalities. A potential item for a creditworthiness enhancement program could be strengthening the municipalities' capacity to plan and track long term capital investment.

5.3 Financial and affordability analysis

5.3.1 Introduction

Based on several assumptions as outlined below, this chapter analyses the financial feasibility of both the project and its effect on the finances of the planned regional Public Utility Company. The analysis and projections for the profit & loss account, balance sheet, cash flow statement of the company as well as the financial cost-benefit analysis will be carried out for 28 years in total (2 year construction and 26 operational years), which coincides with the estimated lifetime of the landfill. Therefore, the analysis will cover the years 2008 to 2035.

The model uses as an input the waste quantities projections elaborated upon in chapter 3. Furthermore, it builds upon the estimated staffing numbers required to operate the scheme as set out in chapter 7 and the priority investment plan detailed in chapter 3.

The financial analysis takes the following components into consideration as part of the investment costs:

- Phase I of Utrine regional landfill;
- Transfer station at Kursumlija;
- Long haul transport equipment;
- Upgrade of collection equipment in all four municipalities;
- Closure of 5 existing dumpsites.

In addition, extension and closure of the Utrine landfill, as well as re-investments in connection to the initial investments are part of the analysis.

Tariffs are proposed for all individual parts of the solid waste collection system. However, the financial statement projection will only be related to the Regional PUC, which is currently being established. The regional PUC is responsible for the following activities:

- Operation and maintenance of the Utrine regional landfill;
- Operation and maintenance of the Kursumlija transfer station;
- Operation and maintenance of the long haul transport between transfer station Kursumlija and the Utrine regional landfill.

The four municipal public utility companies are responsible for:

- Operation and maintenance of the upgraded collection equipment in their territory;
- Transport of collected waste either directly to the Utrine regional landfill (Prokuplje and Zitoradja) or to transfer station Kursumlija (Kursumlija and Blace);
- Monitoring of the closed dumpsites within their territory.

All revenues and expenditures are presented in nominal values.

The appendices contain the full set of outputs of the financial model.

Option analysis

This chapter does not contain a further option analysis, since this has been summarized already in chapter three – technical analysis, as far as this has been possible. The selected technical alternative will be used as a starting point for this chapter. The selected alternative is:

- Staged construction of a sanitary landfill, at the Utrine site in the municipality Prokuplje;
- Construction of one transfer station for Kursumlija and Blace together, including long haul transport equipment;
- Upgrade of the solid waste collection system for all four municipalities Prokuplje, Zitoradja, Kursumlija and Blace;
- Closure of existing five dumpsites.

5.3.2 Assumptions

Macroeconomic scenarios

Underlying macro-economic assumptions of the model build upon data used by the EBRD, with some changes to reflect recent actual exchange rates. A base case scenario, with a probability of 50% will be used throughout this chapter. Pessimistic and optimistic scenarios are used to assess the sensitivity of the financial model to changes in these assumptions.

The table below summarizes the three macro economic scenarios:

Table 5-50 Base case scenario

Financial year ending	Units	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
RSD Inflation	%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
EUR Inflation	%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RSD/EUR Nominal Exchange Rate	RSD	81.70	83.30	84.90	86.20	87.50	88.80	90.10	91.40	92.80	94.20	109.10	122.70
Real Appreciation RSD vs EUR	%	0.9%	1.0%	1.0%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Real GDP Growth	%	4.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	3.0%	3.0%	3.0%	3.0%
Real labour wage increase	%	3.0%	3.0%	4.0%	4.0%	5.0%	5.0%	5.0%	5.0%	3.0%	3.0%	3.0%	3.0%

Table 5-51 Pessimistic scenario

Financial year ending	Units	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
RSD Inflation	%	15.0%	10.0%	8.0%	7.0%	6.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
EUR Inflation	%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RSD/EUR Nominal Exchange Rate	RSD	90.40	97.60	103.50	108.70	111.90	114.10	115.20	116.30	117.40	118.60	130.80	141.40
Real Appreciation RSD vs EUR	%	0.0%	0.0%	0.0%	0.0%	1.0%	1.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Real GDP Growth	%	0.0%	1.0%	2.0%	2.0%	2.0%	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Real labour wage increase	%	0.0%	1.0%	1.0%	1.0%	1.0%	1.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

Table 5-52 Optimistic scenario

Financial year ending	Units	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
RSD Inflation	%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
EUR Inflation	%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RSD/EUR Nominal Exchange Rate	RSD	80.00	80.00	80.00	80.00	80.40	80.80	81.20	81.60	82.00	82.40	86.40	89.60
Real Appreciation RSD vs EUR	%	2.0%	2.0%	2.0%	2.0%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Real GDP Growth	%	7.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Real labour wage increase	%	3.0%	3.0%	4.0%	4.0%	5.0%	5.0%	5.0%	5.0%	3.0%	3.0%	3.0%	3.0%

Investments

In chapter 3, a priority investment plan is elaborated upon. The financial model assumes that the first phase priority investment plan can be completed during the years 2008 to 2009.

Construction of stage II/extension of the landfill is required towards the 11th year of operational use of stage I of the landfill, i.e. during the year 2020. The construction of the third and final stage/extension of the landfill is planned after another 8 operational years, i.e. during the year 2028. Final capping of each of the three stages of landfill construction is timed at the end of each stage, i.e. in respectively year 13 (2020), year 21 (2028) and year 28 (2035).

Re-investments are required after seven operational years for mobile equipment, fifteen years for electrical/mechanical equipment and five years for solid waste collection containers.

The estimated investment amounts are summarized in the table below. Individual items include provisions for contingencies and VAT.

Table 5-53 Investments (current prices)

Financial year ending	Units	Total	2008	2009	2014	2016	2019	2020	2023	2024	2028	2029	2030	2034	2035
Priority investment plan															
Land acquisition	€ m	0.03	-	0.03											
Landfill and access road phase 1	€ m	5.09	4.48	0.60											
Engineering & supervision	€ m	0.61	0.21	0.40											
Transfer station	€ m	0.35	-	0.35											
Transportation TS to LF	€ m	0.35	-	0.35											
Collection equipment	€ m	0.73	-	0.73											
Closure dumpsites	€ m	3.79	-	3.79											
Subtotal PIP	€ m	10.95	4.69	6.25	-	-	-	-	-	-	-	-	-	-	-
Phase 2/closure phase 1	€ m	2.45						2.45							
Phase 3/closure phase 2	€ m	2.84									2.84				
Closure phase 3	€ m	2.03												2.03	
Re-investment WWTP landfill	€ m	0.17								0.17					
Re-investment mobiles	€ m	5.99			-	1.73	-	-	1.98	-	-	-	2.28	-	-
Re-investment equipment TS	€ m	0.12			-	-	-	-	-	0.12	-	-	-	-	-
Re-investment Containers	€ m	1.50			0.24	-	0.27	-	-	0.30	-	0.33	-	0.36	-
Subtotal	€ m	15.11	-	-	0.24	1.73	0.27	2.45	1.98	0.59	2.84	0.33	2.28	0.36	2.03
Total	€ m	26.05	4.69	6.25	0.24	1.73	0.27	2.45	1.98	0.59	2.84	0.33	2.28	0.36	2.03

Apart from the re-investment listed above, no other discretionary investments have been included for the new investments, since the investment program is assessed to capture all required investments for support of the operations of the landfill, transfer station and collection system. In addition, sizable allocations are made in the projections for maintenance and repair, which should be sufficient to keep the investments in a proper condition.

Financing

The first phase priority investment plan is planned to be financed by the municipalities, a grant from the Ecofund, a grant from the Development Fund and other grants (i.e. EU-IPA, other sources). The Development Fund is a fund managed by the Serbian Ministry of Economy and Regional Development. Its objective is to support economic development in all municipalities of Serbia, with preferential treatment to the 35 poorest ones. All municipalities in Toplica District belong to these 35 poorest municipalities.

The Ecofund has already committed in writing RSD 155 million (approximately € 1.9 million). The agreement is included in Annex 6-2. This grant is restricted to financing the landfill. 40% of eligible expenditure is financed from the grant, with the remaining 60% to be financed by the municipality.

The Development Fund has committed RSD 120 million (approximately € 1.5 million), however

at the time of writing this report (November 2007), no written statement to this effect has been received by the consultant.

The total municipal contribution is estimated at € 1.36 million. Out of this, the municipality of Prokuplje has committed itself to exclusively finance the access road to the Utrine regional landfill site as well as connection of the landfill site to the power grid, estimated at in total RSD 55 million (approximately € 0.67 million). The remaining amount of € 0.69 million is to be divided between the participating municipalities.

In principle, grant funds such as EU-IPA funds, are assumed to amount to up to 75% of eligible costs (excluding VAT, land acquisition). Since the municipalities have decided to start with the procurement of the landfill already in 2007-2008, using national procurement procedures and with financing from Ecofund, Development Fund and municipal contributions, actual funds required from international grants are lower than 75% of total eligible cost. In any case, actual grant size will depend on the appraisal of this feasibility study, availability of funds and the applicable grant determination mechanism. This is further discussed in paragraph 5.3.10 of this chapter.

Table 5-54 Source of financing phase I/Priority Investment Plan

Financial year ending	Units	Total	2008	2009
Municipal contribution	€ m	1.36	1.33	0.03
State budget (ecofund)	€ m	1.89	1.89	
Development fund (grant)	€ m	1.47	1.47	
International grants (EU-IPA, others)	€ m	6.22	-	6.22
Total	€ m	10.95	4.69	6.25

Other potential funding sources can be targeted by the municipalities from Toplica District, such as the National Investment Fund or other bilateral donors. Any additional funding can be used to lower the municipal contribution, or to lower funding from EU-IPA.

The municipal contribution is targeted to be included in the 2008 budget of the municipalities. A logical key for the distribution would be to base this on the estimated quantity of waste to be land filled. This would lead to the following percentage distribution:

Table 5-55 Percentage distribution municipal contribution based on waste quantities (tons)

	2006	2007	2008	2009	2010	2011	2012
Prokuplje	6,000	6,659	7,281	7,930	8,690	9,124	9,580
Žitorađa	167	183	281	522	782	1,057	1,110
Kuršumlja	3,975	4,284	4,602	4,932	5,328	5,594	5,874
Blace	1,495	1,555	1,631	1,696	1,794	1,884	1,978
Total	11,637	12,682	13,794	15,080	16,594	17,659	18,542
Prokuplje	52%	53%	53%	53%	52%	52%	52%
Žitorađa	1%	1%	2%	3%	5%	6%	6%
Kuršumlja	34%	34%	33%	33%	32%	32%	32%
Blace	13%	12%	12%	11%	11%	11%	11%
Total	100%	100%	100%	100%	100%	100%	100%

The distribution changes over the years, due to increasing collection coverage in Zitoradja.



An alternative calculation based on population served would yield approximately the same result, since solid waste production per person does not differ significantly between the municipalities.

A final alternative would be to base the distribution on the total population of each municipality, based on census 2002 data. This has as an advantage that accurate, impartial data are used. Disadvantage is that actual usage of the landfill depends on waste quantities land filled, or number of people actually served and does not necessarily depend directly on total population.

Table 5-56 Percentage distribution municipal contribution based on total population (2002 census data)

Municipality	2002 census	%
Prokuplje	48,501	48%
Zitoradja	18,207	18%
Kursumlija	21,608	21%
Blace	13,759	13%
Total	102,075	100%

A comparison between the tables learns that there are quite some differences. Especially the population of Zitoradja is much larger as a proportion of the total population of Toplica District, if compared to the actual collected solid waste quantities. This can be explained by the fact that Zitoradja municipality does not have a large, concentrated urban centre. Its residents are mainly rural and live in a large number of villages. Since solid waste collection services are concentrated in urban areas, the physical quantities of waste collected in Zitoradja are relatively lower than in neighbouring municipalities. Hence, it is suggested to base the distribution on the estimated quantities of waste collected during the year 2012, when the increase in coverage rate of all municipalities has settled.

Revenues

In the base case scenario, the following main revenue streams can be distinguished:

- Proceeds from land fill tipping fees payable by the waste collection companies of each of the four municipalities. The land fill tipping fee will be charged against actual delivered quantities of waste as measured at the either the Utrine landfill site or the Transfer Station serving Kursumlija and Blace;
- Proceeds from the transfer station tipping fee in Kursumlija. This revenue will only be charged to Kursumlija and Blace PUC and will cover the costs of operation of the transfer station and transport from transfer station to landfill;
- Proceeds from increased solid waste collection tariff in each of the four municipalities as a result of higher costs due to the upgrade of the collection system;
- Proceeds from increased solid waste collection tariff in each of the four municipalities as a result of higher costs due to the closure and monitoring of the existing landfills/dumpsites.

The setting of these tariffs will be elaborated upon in paragraph 5.3.6, but in principle is based on full cost recovery, using straight line historical depreciation.

For the optional Landfill Gas project, projections are based on the following assumed prices:

Table 5-57 Market prices LFG (2007)

Item	Unit	Unit price
Carbon credit	€/ton CO2	10.00
Electricity sale to grid from LFG	RSD/kwh	4.00

The carbon credit market price is the current price for long term contracts. In contrast, spot market prices are considerably higher. The assumed market price for carbon credits is therefore rather conservative. Market prices for electricity produced by landfill gas are assumed to be 80% of the consumer price of electricity.

A distinction will be made in revenue projections between the “with” and the “without” project situation. This is necessary in order to be able to:

- Estimate total future solid waste costs and to assess incremental impact on final consumer’s tariff and affordability to pay;
- Determine the costs and required tariffs for each component of the solid waste system;
- Estimate the project’s incremental revenue stream for the cost benefit analysis.

The “without” project is comprised of the following components:

- Solid waste collection & operation of local dumpsites

In addition to the above component, the “with” project is comprised of the following additional components:

- Operation of the Utrine landfill site;
- Transfer station operations in Kursumlija, including long haul transport to the Utrine landfill site;
- Operation of upgraded collection equipment;
- Monitoring of closed landfills/dumpsites;
- Landfill gas to electricity project (optional).

It is proposed in this study to have a separate public utility company exclusively dealing with the operations of the landfill, transfer station as well as the optional landfill gas to electricity component. The operation of upgraded collection equipment, as well as the monitoring of the closed landfills/dumpsites would be the responsibility of the individual local utilities in each of four municipalities.

For the purpose of this analysis, incremental revenues (and costs), i.e. the difference between “with” and “without” project are defined as revenues and costs associated with the above identified, new components. This is a simplification, because some current operations, such as dumpsite management, can be discontinued after the new sanitary landfill is opened. It is assessed, however, that this will not have a material impact on the overall analysis.

Furthermore, revenues of the current solid waste collection services are assumed to grow with inflation only, in line with current Government policy, and are estimated to cover the costs of the existing services. However, on top of the existing solid waste collection fee, an additional charge will be calculated to cover the *incremental* cost of the upgraded solid waste collection equipment, as well as costs related to the closure and monitoring of existing dumpsites. These additional, incremental costs will be elaborated in the next section.

Allowances for bad debt considerably reduce the revenue stream of the local PUC's of the four municipalities. As discussed in paragraph 5.1, the current collection rate is low at approximately 57%. Since the new PUC will not provide services directly to the final beneficiaries, but rather to the four existing PUC's, it is assumed that this low collection rate will not affect the payment of services provided by the Regional PUC. In effect, the regional PUC only has four clients: PUC Prokuplje, PUC, Zitoradja, PUC Kursumlija and PUC Blace, so this should in principle be manageable. However, in order to ensure 100% payment of services provided by the Regional PUC, it is recommended to require the local PUC's to issue payment guarantees before start of the landfill and transfer station operations.

Incremental tariffs for collection services and monitoring of closed dumpsites are set in such a way that costs related to uncollectible debt are fully covered.

Expenditures

Expenditures are distinguished in two categories:

- Variable costs (electricity, fuel, water and chemicals). These costs directly fluctuate with the amount of waste collected and/or land filled;
- Fixed costs (wages, maintenance, insurance, depreciation). These costs do not directly fluctuate with the amount of waste collected and/or land filled.

Also for expenditures a distinction will be made between the "without project" situation and the "with project situation"

The following 2007 base prices are assumed for the various expenditure categories:

Table 5-58 Variable operation and maintenance assumptions (2007 prices)

Financial year ending	Units	Rate
Electricity	RSD/kwh	5.00
Diesel	RSD/liter	75
Water (including transport)	RSD/m3	52

Table 5-59 Fixed operation and maintenance assumptions (2007 prices)

Financial year ending	Units	Rate
Employee costs (gross salaries)		
Unskilled Labour	RSD/year	240,000
Skilled Labour	RSD/year	300,000
Lower/ Mid level management	RSD/year	420,000
Higher Management	RSD/year	540,000
Employee benefits	%	20.0%
Maintenance rates % of investment		
Civil works	%	0.5%
Plant equipment	%	5.0%
Mobile equipment	%	7.5%
Compressors & gas engines LFG	€/hour	10.0
Compressors & gas engines LFG - operatic	hrs/year	8,000
Infra/distribution pipes LFG	%	3.0%
Monitoring closed dumpsites	years	10
Insurance costs % of investment		
Civil works	%	0.1%
Plant equipment	%	0.75%
Mobile equipment (incl. vehicle/road tax)	%	4.0%
Depreciation		
Landfill phase 1	years	11
Landfill phase 2	years	8
Landfill phase 3	years	7
Civil works	years	26
Installations/equipment	years	15
Mobile equipment	years	7
Containers collection service	years	5
Closed landfills	years	26
LFG equipment + infrastructure	years	25

Although civil works in nature, the depreciation rate for each stage of the land fill works is set at its useful technical lifetime, which for the Utrine landfill is estimated at respectively 11, 8 and 7 years for stages I, II and II.

Civil works and closed landfills are depreciated over 26 years, coinciding with the total operational lifetime of the landfill. Monitoring of the closed dumpsites is estimated at 10 years, in the absence of a legally prescribed period.

Starting from the first year of operations, input prices are adjusted for real and nominal price increases, using the following assumptions:

Wages and salaries: inflation + real wage increase
Employee benefits: inflation + real wage increase
Electricity: inflation + real GDP growth
Fuel: inflation + real GDP growth
Maintenance: inflation + 50% real wage increase
Other costs: inflation only

This results in the following nominal increases:

Table 5-60 Price escalation O&M costs

	Unit	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Nominal increase opex																
annual increase																
Wages and Salaries	%	8.2%	8.2%	9.2%	9.2%	10.3%	10.3%	10.3%	10.3%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Employee benefits	%	8.2%	8.2%	9.2%	9.2%	10.3%	10.3%	10.3%	10.3%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Electricity	%	9.2%	9.2%	10.3%	10.3%	10.3%	10.3%	9.2%	9.2%	9.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Fuel	%	9.2%	9.2%	10.3%	10.3%	10.3%	10.3%	9.2%	9.2%	9.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Maintenance	%	6.6%	6.6%	7.1%	7.1%	7.6%	7.6%	7.6%	7.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
Other costs	%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%

Apart from unit prices and unit price increases, expenditure patterns are estimated based on the following assessment (major items only):

- Staffing follows the schedules as elaborated upon in chapter 7. It is assumed that the new regional PUC starts operating as from the year 2009;
- Landfill
 - Start operations as of 2010;
 - Electricity 5 kwh/hour, 24 hours/day;
 - Diesel heavy equipment (bulldozer, compactor) 30 liter/hour for 4 hours per day, 300 days per year;
 - Water 25 m3 per day for 300 days/year;
- Transfer station
 - Start operations as of 2010;
 - Electricity 40,000 Kwh/year;
- Transportation transfer stations to landfill
 - Start operations as of 2010;
 - Solid waste transported 25 ton pay load/trip;
 - Diesel consumption 40 liter/100km;
- Upgrade collection equipment
 - Current solid waste collection tariffs are assessed to cover the costs of current services. This is based on the observation that on average all PUC's make a near to zero net profit;
 - Incremental costs of the upgrade of the collection equipment are based on:
 - Start operations as of 2010;
 - Solid waste payload 6.75 ton/compactor truck;
 - Diesel consumption 50 liter/100km;
 - Incremental diesel costs consist of transport from collection point to either Utrine landfill (Prokuplje, Zitoradja) or transfer station (Kursumlija, Blace). Other diesel costs are assumed not to be incremental, since these are incurred already with existing collection services;
 - Staff (drivers, co-drivers) are assumed not to be incremental costs, since these are incurred already with existing collection services and covered by the current tariff;
 - Maintenance, insurance and depreciation based on the investment value of collection equipment are assumed to be entirely incremental, since the current equipment is almost completely depreciated (newest compactor trucks are from the year 2001).
- Monitoring closed landfills/dumpsites
 - Start monitoring as of 2010 for 10 years only;
 - Monitoring costs amount to € 5,000/site/year.

Working capital will be calculated assuming:

- Average day of accounts receivable 45 days;
- Average day of accounts payable 30 days;

Waste quantities and source selection

In chapter 3, demand projections for solid waste collected have been elaborated upon. The main assumptions have been set out in this chapter as well. This analysis is used as an input in the financial model. The amount of waste to be presented at the Utrine landfill, for which tipping fees will have to be paid is shown in the table below.

Table 5-61 Waste amounts for tipping fee calculation

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Prokuplje	7,281	7,930	8,690	9,124	9,580	10,059	10,462	10,880	11,315	11,655	15,663	19,841
Žitorađa	281	522	782	1,057	1,110	1,165	1,212	1,260	1,311	1,350	1,815	2,299
Kuršumljia	4,602	4,932	5,328	5,594	5,874	6,168	6,414	6,671	6,938	7,146	9,590	12,130
Blace	1,631	1,696	1,794	1,884	1,978	2,077	2,160	2,246	2,336	2,406	3,234	4,096
Total	13,794	15,080	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367

The solid waste quantities shown in the table are the quantities presented at the either the Utrine landfill or the Kuršumljia transfer station. However, waste collected at source is excluded from the solid waste quantities for which tipping fees are due, since this waste stream does not end up at the landfill. It is assumed that only PET bottles will be separately collected at source, following the scenario described in chapter 3. Based on the assumptions of source selection, the relevant amounts of this waste stream are:

Table 5-62 Separate collection PET bottles

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Prokuplje	26	56	92	103	109	114	118	123	128	132	177	225
Žitorađa	1	4	8	12	13	13	14	14	15	15	21	26
Kuršumljia	16	35	57	63	67	70	73	76	79	81	109	137
Blace	6	12	19	21	22	24	24	25	26	27	37	46
Total	48	106	176	200	210	221	229	239	248	255	343	435

This is a relatively small waste stream of a maximum of 1.1% of the total waste collected and stored at the landfill.

It is assumed that the revenues of separate source selection will accrue directly to the organizations which collect these. Consequently, costs and revenues of separate source selection are left outside of the financial calculation of the project included in this chapter.

5.3.3 Expenditure forecast

“Without project” expenditures

The “without project” expenditures consist entirely of the costs associated with collection of solid waste by the four local public utility utilities, using current equipment. Current solid waste tariffs, escalated for inflation only, are assessed to continue covering the costs of these services.

On the other hand, the upgrade of the collection equipment and the monitoring of the closed landfills/dumpsites will increase the direct cost of the local utilities, as identified and elaborated upon in the previous paragraph. Apart from this effect, it is assumed that the new sanitary

landfill operations and transfer station will not have a major impact on the costs of waste collection services as such. The new regional PUC will have its own support services and management. This is admittedly a simplification, since management of dumpsites can be discontinued after the new landfill is operational. Some limited number of staff currently engaged with operation of the existing dumpsites could be transferred to the new regional PUC. In any case, it is assessed that these effects are not material and thus will not substantially impact on the results of the financial analysis.

"With project" expenditures

Expenditures related to the "with project" situation consist of the above expenditures plus new operations in relation to the sanitary landfill Utrine, transfer station, upgraded collection equipment and monitoring of closed landfills/dumpsites. Incremental costs attributable to the project consist entirely of operational costs associated with these new activities and components, using the methodology set out above.

The tables below provide a summary of each of the new activities. Full details are included in the Annexes. A distinction is made between costs related to the regional PUC and *incremental* costs incurred by the local utilities, as a result of the project intervention in upgrade of collection equipment and monitoring of closed landfills/dumpsites.

Table 5-63 Regional PUC - operational costs by cost category (in RSD '000)

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Total variable + fixed costs		69,466	71,826	74,533	77,491	80,618	84,025	87,338	94,436	162,356	264,850
Variable costs	RSD '000	6,222	6,919	7,694	8,559	9,416	10,362	11,406	12,412	29,132	58,345
Electricity	RSD '000	588	676	783	906	1,029	1,169	1,327	1,478	4,346	10,296
Diesel	RSD '000	5,182	5,738	6,355	7,040	7,718	8,462	9,280	10,070	22,897	44,514
Other	RSD '000	451	504	556	613	670	731	798	864	1,890	3,535
Fixed costs	RSD '000	63,243	64,908	66,839	68,932	71,201	73,663	75,932	82,024	133,224	206,505
Wages & salaries	RSD '000	6,667	7,281	8,027	8,850	9,757	10,757	11,633	12,582	27,542	51,548
Employee benefits	RSD '000	1,333	1,456	1,605	1,770	1,951	2,151	2,327	2,516	5,508	10,310
Maintenance	RSD '000	8,584	9,194	9,895	10,649	11,461	12,335	13,146	14,010	26,485	44,081
Insurance	RSD '000	3,607	3,787	3,977	4,176	4,384	4,604	4,834	5,075	8,267	12,215
Depreciation	RSD '000	40,285	40,285	40,285	40,285	40,285	40,285	40,285	43,948	59,079	78,982
Other costs	RSD '000	2,767	2,905	3,050	3,203	3,363	3,531	3,708	3,893	6,341	9,369
Variable costs	%	9%	10%	10%	11%	12%	12%	13%	13%	18%	22%
Electricity	%	1%	1%	1%	1%	1%	1%	2%	2%	3%	4%
Diesel	%	7%	8%	9%	9%	10%	10%	11%	11%	14%	17%
Other	%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Fixed costs	%	91%	90%	90%	89%	88%	88%	87%	87%	82%	78%
Wages & salaries	%	10%	10%	11%	11%	12%	13%	13%	13%	17%	19%
Employee benefits	%	2%	2%	2%	2%	2%	3%	3%	3%	3%	4%
Maintenance	%	12%	13%	13%	14%	14%	15%	15%	15%	16%	17%
Insurance	%	5%	5%	5%	5%	5%	5%	6%	5%	5%	5%
Depreciation	%	58%	56%	54%	52%	50%	48%	46%	47%	36%	30%
Other costs	%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

The largest cost category is depreciation which is more than 50% of total costs by the year 2010, declining to 30% by the year 2035, the final year of the analysis. The relative decline is a result of historical, straight line cost depreciation. Next largest item is payroll costs, comprised of salaries and employee benefits, with a share of 12% in 2010, which gradually grows to 23% during the year 2035. Maintenance costs show a strong growth from an initial 10% to 19% during the year 2035. These costs tend to grow strongly with ageing equipment. Finally, variable costs are relatively minor, ranging between 9% and 22% of total cost.

Table 5-64 Local PUCs – *incremental* operational costs by cost category (in RSD '000)

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Total variable + fixed costs		31,216	32,100	33,062	34,126	35,241	37,325	38,586	41,909	56,877	90,235
Variable costs	RSD '000	1,870	2,213	2,561	2,965	3,367	3,824	4,343	4,838	14,223	33,695
Electricity	RSD '000										
Diesel	RSD '000	1,870	2,213	2,561	2,965	3,367	3,824	4,343	4,838	14,223	33,695
Other	RSD '000										
Fixed costs	RSD '000	29,347	29,887	30,500	31,161	31,874	33,501	34,243	37,071	42,654	56,540
Wages & salaries	RSD '000	-	-	-	-	-	-	-	-	-	-
Employee benefits	RSD '000	-	-	-	-	-	-	-	-	-	-
Maintenance	RSD '000	5,806	6,260	6,783	7,349	7,963	8,627	9,259	9,937	9,946	16,554
Insurance	RSD '000	1,719	1,805	1,896	1,990	2,090	2,194	2,304	2,419	3,941	5,822
Depreciation	RSD '000	21,822	21,822	21,822	21,822	21,822	22,680	22,680	24,715	28,767	34,163
Other costs	RSD '000	-	-	-	-	-	-	-	-	-	-
Variable costs	%	6%	7%	8%	9%	10%	10%	11%	12%	25%	37%
Electricity	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Diesel	%	6%	7%	8%	9%	10%	10%	11%	12%	25%	37%
Other	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fixed costs	%	94%	93%	92%	91%	90%	90%	89%	88%	75%	63%
Wages & salaries	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Employee benefits	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Maintenance	%	19%	20%	21%	22%	23%	23%	24%	24%	17%	18%
Insurance	%	6%	6%	6%	6%	6%	6%	6%	6%	7%	6%
Depreciation	%	70%	68%	66%	64%	62%	61%	59%	59%	51%	38%
Other costs	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

The single largest item is depreciation, which accounts for more than 70% of incremental costs during the year 2010. Variable costs increase considerably towards the end of the analysis period, due to increased waste volumes.

Costs by component are presented in the tables below. Again, a distinction is made between costs related to operations of the Regional PUC and costs which are directly to be borne by the individual local utilities.

Landfill operation and maintenance account for the largest share of total costs of the Regional PUC, ranging from 70% to 80%, without a lot of fluctuations.

Table 5-65 Regional PUC - operational costs by component (in RSD '000)

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Landfill	RSD '000	53,937	55,476	57,183	59,041	60,997	63,121	65,190	69,585	115,415	183,128
Transfer stations	RSD '000	4,673	4,934	5,293	5,690	6,121	6,596	7,038	7,481	15,266	27,587
Transportation	RSD '000	10,855	11,416	12,057	12,760	13,500	14,308	15,111	17,370	31,676	54,135
Total	RSD '000	69,466	71,826	74,533	77,491	80,618	84,025	87,338	94,436	162,356	264,850
Landfill	%	78%	77%	77%	76%	76%	75%	75%	74%	71%	69%
Transfer stations	%	7%	7%	7%	7%	8%	8%	8%	8%	9%	10%
Transportation	%	16%	16%	16%	16%	17%	17%	17%	18%	20%	20%
Total	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Incremental costs related to the upgrade of the collection equipment grow relatively much faster than monitoring costs of closed landfills. Costs by municipality also vary considerably. The highest incremental cost for the upgrade of the collection system is to be borne by Kursumlija municipality, due to large travel distances. Costs of closure and monitoring cost of landfills/dumpsites ate by far the highest for Prokuplje municipality.

Table 5-66 Local PUCs - operational costs by component and location
(in RSD '000)

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Collection system	RSD '000	16,494	17,152	17,854	18,636	19,442	21,190	22,124	25,093	44,736	78,094
Closure dumpsites	RSD '000	14,723	14,948	15,208	15,491	15,799	16,135	16,463	16,816	12,141	12,141
Total	RSD '000	31,216	32,100	33,062	34,126	35,241	37,325	38,586	41,909	56,877	90,235
Collection system	%	53%	53%	54%	55%	55%	57%	57%	60%	79%	87%
Closure dumpsites	%	47%	47%	46%	45%	45%	43%	43%	40%	21%	13%
Total	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Collection system, by location											
Prokuplje	RSD '000	5,209	5,389	5,594	5,820	6,056	6,565	6,833	7,781	13,468	22,853
Žitorađa	RSD '000	2,810	2,933	3,027	3,129	3,236	3,551	3,671	4,132	6,879	11,271
Kuršumlija	RSD '000	5,672	5,933	6,232	6,568	6,911	7,532	7,939	9,021	17,207	31,785
Blace	RSD '000	2,803	2,896	3,001	3,118	3,239	3,542	3,681	4,159	7,182	12,184
Total	RSD '000	16,494	17,152	17,854	18,636	19,442	21,190	22,124	25,093	44,736	78,094
Closure dumpsites, by location											
Prokuplje	RSD '000	10,745	10,791	10,843	10,899	10,961	11,028	11,093	11,164	10,229	10,229
Žitorađa	RSD '000	606	651	703	760	821	888	954	1,025	90	90
Kuršumlija	RSD '000	1,891	1,936	1,988	2,044	2,106	2,173	2,239	2,309	1,374	1,374
Blace	RSD '000	1,481	1,571	1,675	1,788	1,911	2,045	2,177	2,318	448	448
Total	RSD '000	14,723	14,948	15,208	15,491	15,799	16,135	16,463	16,816	12,141	12,141

5.3.4 Unit cost prices

The unit cost price per ton of collected solid waste is calculated in such a way to cover at least the below mentioned costs. Full cost coverage is achieved if the tipping fee is set equal or more to the cost price as calculated below.

- Operation & maintenance costs;
- Depreciation;
- Interest payment;
- Working capital (regional PUC only);
- Profit margin (set at 0%);
- Collection rate of the tipping fee of the Regional PUC is assumed to be 100%: it is assumed that the 4 participating municipalities will ensure that their waste collection utilities will pay the tipping fee charges as agreed upon. To ensure this, it is recommended to include a requirement to this effect in an inter-municipal agreement. This guarantee should be backed by the issuance of irrevocable payment guarantees, issued by the PUC's and backed by the respective municipalities before the systems starts to operate;

Depreciation is calculated at historical cost and by using a straight line depreciation methodology. The profit level is set at 0%, in line with current practice in Serbia. Although this is not uncommon, it will constrain the possibility for the PUC to invest in service improvements or system extensions.

Furthermore, for the Regional PUC, a separation is made between a *landfill tipping fee*, a *transfer station fee*. The land fill tipping fee is a charge per ton of delivered waste at the land fill site Utrine. This landfill tipping fee is to be paid by all four utility companies who deliver waste at either the land fill site or transfer station.

The transfer station tipping fees is solely to be paid by Kursumlija and Blace PUCs, since

these will be the only municipalities using this transfer station. Waste from Prokuplje and Zitoradja is transported directly by the collection vehicles to the Utrine landfill site. The transfer station tipping fee is set in such a way to cover the costs of the transfer station in Kursumlija and transport from the transfer station to the Utrine land fill site.

The additional required solid waste collection tariff for the four local PUCs is separated between a charge for the upgraded collection equipment and a charge related to the closure and monitoring of existing landfills/dumpsites. For obvious reasons, these charges are differentiated by municipality, since costs and quantities collected differ between municipalities.

In order to be able to set tipping fees, first the cost price for each of these services needs to be calculated in accordance with the methodology elaborated upon above.

Landfill cost price

The average cost price per ton of land filled solid waste is € 40/ton in 2010. The cost price declines to € 32/ton in the year 2016, after which it increases again to ultimately € 39/ton during the year 2035. The unit cost price of landfill operations at the Utrine site is considerably more expensive if compared to other sanitary landfills in Serbia. This is mainly caused by the fact that only a small quantity of waste is dumped at the site. On the one hand, the lifetime of the individual cells of the landfill is extended, precisely because of these small quantities. On the other hand, relatively fixed costs, such as access and internal roads, buildings and the fixed part of operating costs contribute to this higher unit cost price.

Table 5-67 Cost price sanitary land fill

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Operating costs & depreciation	RSD m	54	55	57	59	61	63	65	70	115	183
Increase in working capital	RSD m	2	0	0	0	0	0	0	0	1	1
Bad debt	RSD m	-	-	-	-	-	-	-	-	-	-
Interest and fee payment	RSD m	-	-	-	-	-	-	-	-	-	-
Profit	RSD m	-	-	-	-	-	-	-	-	-	-
DSCR over depreciation	RSD m	-	-	-	-	-	-	-	-	-	-
Total	RSD m	56	56	57	59	61	63	66	70	116	184
Less revenues secondary materials	RSD m	-	-	-	-	-	-	-	-	-	-
Total costs to cover	RSD m	56	56	57	59	61	63	66	70	116	184
Tons of waste collected	tons	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367
Unit cost of waste	RSD/ton	3,366	3,158	3,098	3,048	3,026	3,012	2,993	3,099	3,832	4,806
	€/ton	40	37	35	34	34	33	32	33	35	39

Transfer station and long haul transport cost price

The transfer station in Kursumlija becomes operational as from the year 2010. It receives all waste from Kursumlija and Blace and transports this with long haul trucks to the Utrine landfill. The cost price of the transfer station starts at € 27/ton during the year 2010 and increases to € 41/ton in the final year of the analysis. The cost price is calculated based on the actual waste handled; i.e. only the waste originating from Kursumlija and Blace is included. This unit cost price is again substantially higher than in other solid waste management schemes, due to the relatively low quantities of waste handled.

Table 5-68 Cost price transfer station and transportation

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Operating costs & depreciation	RSD m	16	16	17	18	20	21	22	25	47	82
Increase in working capital	RSD m	1	0	0	0	0	0	0	0	0	1
Bad debt	RSD m	-	-	-	-	-	-	-	-	-	-
Interest and fee payment	RSD m	-	-	-	-	-	-	-	-	-	-
Profit	RSD m	-	-	-	-	-	-	-	-	-	-
DSCR over depreciation	RSD m	-	-	-	-	-	-	-	-	-	-
Total	RSD m	16	16	17	19	20	21	22	25	47	82
Less revenues secondary materials	RSD m	-	-	-	-	-	-	-	-	-	-
Total costs to cover	RSD m	16	16	17	19	20	21	22	25	47	82
Tons of waste collected - total	tons	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367
Unit cost of waste	RSD/ton	969	931	940	952	973	997	1,017	1,107	1,558	2,145
	€/ton	11	11	11	11	11	11	11	12	14	17
Tons of waste collected - Kursumlija and Blace	tons	7,122	7,478	7,852	8,244	8,574	8,917	9,274	9,552	12,823	16,227
Unit cost of waste	RSD/ton	2,258	2,198	2,220	2,249	2,298	2,355	2,401	2,614	3,682	5,071
	€/ton	27	26	25	25	26	26	26	28	34	41

Solid waste collection cost price

The upgraded collection equipment and the monitoring of the closed landfills/dumpsites become operational as from the year 2010. The unit cost price is differentiated by component and by municipality, since costs differ considerably. In addition, it should be noted that the unit cost price is calculated without taken into account costs related to provisions for or write off of bad debt. In setting the final incremental solid waste collection tariff, an adjustment will be made for this effect.

The incremental unit cost prices differ considerably between the various local utilities, mainly as a result of large differences in waste collected and travel distances to the Utrine landfill or transfer station.

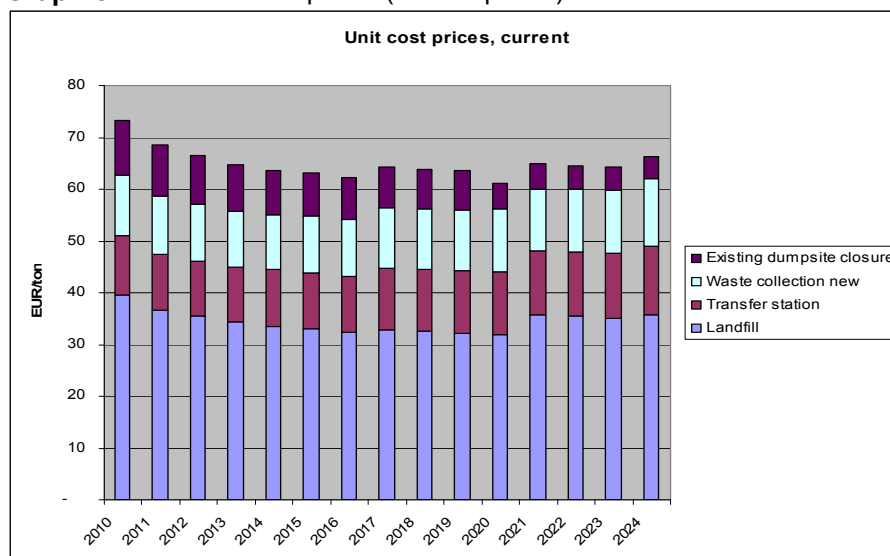
Table 5-69 Incremental cost price upgraded solid waste equipment

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Operating costs & depreciation											
Prokuplje	RSD m	5	5	6	6	6	7	7	8	13	23
Žitорада	RSD m	3	3	3	3	3	4	4	4	7	11
Kuršumljia	RSD m	6	6	6	7	7	8	8	9	17	32
Blace	RSD m	3	3	3	3	3	4	4	4	7	12
Subtotal	RSD m	16	17	18	19	19	21	22	25	45	78
Tons of waste collected											
Prokuplje	ton	8,690	9,124	9,580	10,059	10,462	10,880	11,315	11,655	15,663	19,841
Žitорада	ton	782	1,057	1,110	1,165	1,212	1,260	1,311	1,350	1,815	2,299
Kuršumljia	ton	5,328	5,594	5,874	6,168	6,414	6,671	6,938	7,146	9,590	12,130
Blace	ton	1,794	1,884	1,978	2,077	2,160	2,246	2,336	2,406	3,234	4,096
Subtotal	ton	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367
Additional unit cost price - average											
Prokuplje	RSD/ton	599	591	584	579	579	603	604	668	860	1,152
Žitорада	RSD/ton	3,592	2,775	2,727	2,685	2,670	2,817	2,800	3,060	3,791	4,904
Kuršumljia	RSD/ton	1,065	1,061	1,061	1,065	1,077	1,129	1,144	1,262	1,794	2,620
Blace	RSD/ton	1,562	1,537	1,517	1,501	1,500	1,577	1,576	1,729	2,221	2,974
Subtotal	RSD/ton	994	971	963	957	960	1,006	1,010	1,112	1,476	2,035
Additional unit cost price - average											
Prokuplje	€/ton	7	7	7	7	6	7	7	7	8	9
Žitорада	€/ton	42	32	31	30	30	31	30	32	35	40
Kuršumljia	€/ton	13	12	12	12	12	12	12	13	16	21
Blace	€/ton	18	18	17	17	17	17	17	17	20	24
Subtotal	€/ton	12	11	11	11	11	11	11	12	14	17

Table 5-70 Incremental cost price closure and monitoring local dumpsites

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Operating costs & depreciation											
Prokuplje	RSD m	10.7	10.8	10.8	10.9	11.0	11.0	11.1	11.2	10.2	10.2
Žitorađa	RSD m	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.0	0.1	0.1
Kuršumlija	RSD m	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	1.4	1.4
Blace	RSD m	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3	0.4	0.4
Subtotal	RSD m	14.7	14.9	15.2	15.5	15.8	16.1	16.5	16.8	12.1	12.1
Tons of waste collected											
Prokuplje	ton	8,690	9,124	9,580	10,059	10,462	10,880	11,315	11,655	15,663	19,841
Žitorađa	ton	782	1,057	1,110	1,165	1,212	1,260	1,311	1,350	1,815	2,299
Kuršumlija	ton	5,328	5,594	5,874	6,168	6,414	6,671	6,938	7,146	9,590	12,130
Blace	ton	1,794	1,884	1,978	2,077	2,160	2,246	2,336	2,406	3,234	4,096
Subtotal	ton	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367
Additional unit cost price - average											
Prokuplje	RSD/ton	1,237	1,183	1,132	1,083	1,048	1,014	980	958	653	516
Žitorađa	RSD/ton	775	616	633	652	678	705	728	759	49	39
Kuršumlija	RSD/ton	355	346	338	331	328	326	323	323	143	113
Blace	RSD/ton	825	834	847	861	885	911	932	963	138	109
Subtotal	RSD/ton	887	846	820	796	780	766	752	746	401	316
Additional unit cost price - average											
Prokuplje	€/ton	15	14	13	12	12	11	11	10	6	4
Žitorađa	€/ton	9	7	7	7	8	8	8	8	0	0
Kuršumlija	€/ton	4	4	4	4	4	4	3	3	1	1
Blace	€/ton	10	10	10	10	10	10	10	10	1	1
Subtotal	€/ton	10	10	9	9	9	8	8	8	4	3

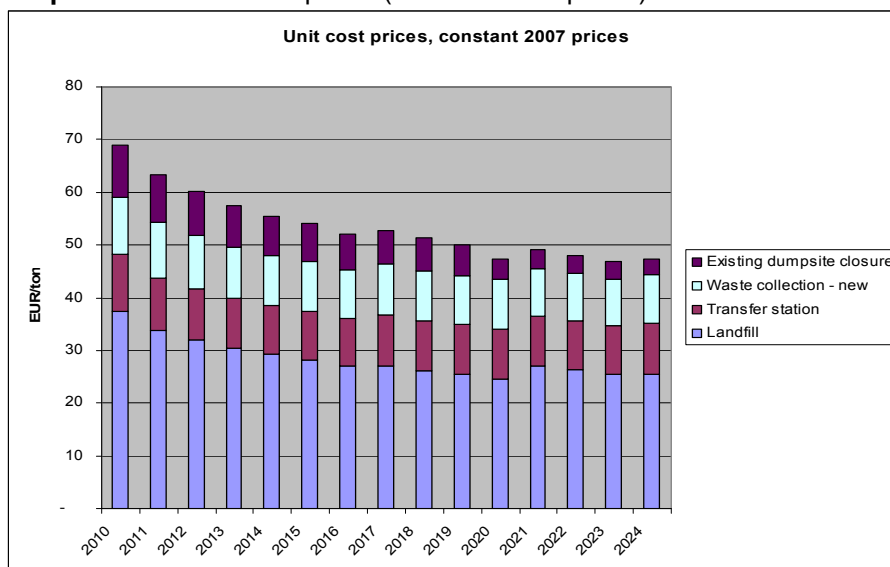
The graph below illustrates the development of the total cost price of all three components, expressed in Euro in current prices. It can be clearly seen from the graph that costs of the landfill make up the majority of the total cost price. In order to be able to make a meaningful comparison, the transfer station cost price is expressed as a function of total waste quantities delivered at the landfill, rather than waste quantities processed by the Kursumlija transfer station. In addition, only incremental solid waste collection unit cost prices are included, resulting from the project intervention.

Graph 5-1 Unit cost prices (current prices)


The graph below summarizes the unit cost prices, however expressed in constant 2007 prices. By doing so, real increases in prices can be easily analyzed.

The real unit cost price as a result of the project ranges between € 44 to € 69/ton of waste collected and delivered at the Utrine landfill. Initially, the unit cost prices are higher, but settle at a range of € 45/ton to € 50/ton as from the year 2016 to 2035.

Graph 5-2 Unit cost prices (constant 2007 prices)



5.3.5 Tipping fees

After having calculated the cost price for the different components of the solid waste management scheme, tipping fees and a tariff policy can be designed. It is proposed to have the following different tipping fees:

- Landfill tipping fee;
- Transfer station tipping fee;
- Incremental solid waste collection fee.

The landfill tipping fee is payable by all four PUC's to the Regional PUC. The transfer station tipping fee is only to be paid by PUC Kursumlija and Blace, since this station is only used to transport waste from these municipalities to the Utrine landfill.

The incremental solid waste collection fees are in addition to the existing solid waste collection charges and are to be introduced by the individual local utilities.

Landfill tipping fee

The tipping fee for the landfill is proposed to be set at RSD 2,150/ton (€ 25/ton) during the first year of operations (2010) and is adjusted thereafter with inflation only. In this way its is in line with the current national price control policy, which only allows tariff increases up to a maximum of the estimated inflation in any one year.

Initially, the landfill tipping fee will be below full cost recovery. However, during the year 2018,

the ninth year of operations, full cost recovery is achieved. The tipping fee will be paid against actual, weighted waste delivered at the gate of the landfill or transfer station. It covers the cost of landfill operations. By escalating the tipping fee with inflation only, sufficient funds will be built up to fund, from internal cash generation, the extension of the landfill and replacement of mobile equipment, as well as closure costs.

The table below summarizes the development of the landfill tipping fee as compared to the full unit cost price.

Table 5-71 Tipping fee landfill and waste separation line

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Unit cost of waste	RSD/ton	3,366	3,158	3,098	3,048	3,026	3,012	2,993	3,099	3,109	3,122	3,140
	€/ton	40	37	35	34	34	33	32	33	33	32	32
Proposed tipping fee	RSD/ton	2,150	2,258	2,370	2,489	2,613	2,744	2,881	3,025	3,177	3,335	3,502
	€/ton	25	26	27	28	29	30	31	32	33	34	36

Transfer station tipping fee

The transfer station fee is proposed to be set at RSD 1,500/ton during the year 2010, the first year of operations and is adjusted thereafter with inflation only. Full cost recovery will have been achieved towards the end of the project period (2035).

Table 5-72 Tipping fee transfer station

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2035
Unit cost of waste	RSD/ton	2,258	2,198	2,220	2,249	2,298	2,355	2,401	2,614	2,681	2,753	2,832	5,071
	€/ton	27	26	25	25	26	26	26	28	28	28	29	41
Proposed tipping fee	RSD/ton	1,500	1,575	1,654	1,736	1,823	1,914	2,010	2,111	2,216	2,327	2,443	5,080
	€/ton	18	18	19	20	20	21	22	22	23	24	25	41

Incremental solid waste collection fee

The incremental solid waste collection fee is proposed to be set at as follows:

- Additional cost of upgrade of solid waste equipment at full unit cost price;
- Additional cost of closure and monitoring of existing landfills only for the direct operational expenditure, exclusive of depreciation.

The reason of this is that solid waste equipment is depreciating rapidly (between five to seven years), so that a reserve needs to be build up to enable timely investment in the replacement of the equipment.

To the contrary, depreciation arising out of the investment in the closure is a one off historical cost. If included in the overall price, customers would pay both for these legacy costs, as well as costs related to the future closure of the new sanitary landfill, which are included in the regional tipping fee. It is therefore proposed only to include an additional charge in the solid waste collection fee to cover the costs of monitoring of these closed dumpsites for a period of ten years.

Table 5-73 Incremental solid waste collection fee – upgraded equipment

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Additional unit cost price - average											
Prokuplje	RSD/ton	599	591	584	579	579	603	604	668	860	1,152
Žitorađa	RSD/ton	3,592	2,775	2,727	2,685	2,670	2,817	2,800	3,060	3,791	4,904
Kuršumlija	RSD/ton	1,065	1,061	1,061	1,065	1,077	1,129	1,144	1,262	1,794	2,620
Blace	RSD/ton	1,562	1,537	1,517	1,501	1,500	1,577	1,576	1,729	2,221	2,974
Subtotal	RSD/ton	994	971	963	957	960	1,006	1,010	1,112	1,476	2,035
Additional unit cost price - average											
Prokuplje	€/ton	7	7	7	7	6	7	7	7	8	9
Žitorađa	€/ton	42	32	31	30	30	31	30	32	35	40
Kuršumlija	€/ton	13	12	12	12	12	12	12	13	16	21
Blace	€/ton	18	18	17	17	17	17	17	18	20	24
Subtotal	€/ton	12	11	11	11	11	11	11	12	14	17
Proposed collection fee - average											
Prokuplje	RSD/ton	599	591	584	579	579	603	604	668	860	1,152
Žitorađa	RSD/ton	3,592	2,775	2,727	2,685	2,670	2,817	2,800	3,060	3,791	4,904
Kuršumlija	RSD/ton	1,065	1,061	1,061	1,065	1,077	1,129	1,144	1,262	1,794	2,620
Blace	RSD/ton	1,562	1,537	1,517	1,501	1,500	1,577	1,576	1,729	2,221	2,974
Subtotal	RSD/ton	994	971	963	957	960	1,006	1,010	1,112	1,476	2,035
Proposed collection fee - average											
Prokuplje	€/ton	7	7	7	7	6	7	7	7	8	9
Žitorađa	€/ton	42	32	31	30	30	31	30	32	35	40
Kuršumlija	€/ton	13	12	12	12	12	12	12	13	16	21
Blace	€/ton	18	18	17	17	17	17	17	18	20	24
Subtotal	€/ton	12	11	11	11	11	11	11	12	14	17

Table 5-74 Incremental solid waste collection fee – closure dumpsites

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Additional unit cost price - average											
Prokuplje	RSD/ton	1,237	1,183	1,132	1,083	1,048	1,014	980	958	653	516
Žitorađa	RSD/ton	775	616	633	652	678	705	728	759	49	39
Kuršumlija	RSD/ton	355	346	338	331	328	326	323	323	143	113
Blace	RSD/ton	825	834	847	861	885	911	932	963	138	109
Subtotal	RSD/ton	887	846	820	796	780	766	752	746	401	316
Additional unit cost price - average											
Prokuplje	€/ton	15	14	13	12	12	11	11	10	6	4
Žitorađa	€/ton	9	7	7	7	8	8	8	8	0	0
Kuršumlija	€/ton	4	4	4	4	4	4	3	3	1	1
Blace	€/ton	10	10	10	10	10	10	10	10	1	1
Subtotal	€/ton	10	10	9	9	9	8	8	8	4	3
Proposed collection fee - average											
Prokuplje	RSD/ton	59	62	64	67	70	73	76	80	-	-
Žitorađa	RSD/ton	660	531	553	575	604	634	659	693	-	-
Kuršumlija	RSD/ton	97	100	104	109	114	120	125	131	-	-
Blace	RSD/ton	576	596	620	645	678	711	740	777	-	-
Subtotal	RSD/ton	156	159	165	172	181	190	197	207	-	-
Proposed collection fee - average											
Prokuplje	€/ton	1	1	1	1	1	1	1	1	-	-
Žitorađa	€/ton	8	6	6	6	7	7	7	7	-	-
Kuršumlija	€/ton	1	1	1	1	1	1	1	1	-	-
Blace	€/ton	7	7	7	7	8	8	8	8	-	-
Subtotal	€/ton	2	2	2	2	2	2	2	2	-	-

5.3.6 Affordability

Unfortunately, no complete or useful data were obtained from the PUCs regarding the quantities of waste collected by customer group. Consultants have therefore estimated that 75% of all collected waste originates from domestic sources, with the remainder coming from business/industries or institutions. This estimate is based on collection patterns in other Serbian districts for which regional solid waste management projects have been prepared.

Based on this assumption, waste quantities per customer group can be computed as follows:

Table 5-75 Waste quantities by customer group (in tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Domestic	8,728	9,511	10,346	11,310	12,446	13,244	13,906	14,602	15,186	15,793	16,425	16,918	22,726	28,775
Industry/public	2,909	3,170	3,449	3,770	4,149	4,415	4,635	4,867	5,062	5,264	5,475	5,639	7,575	9,592
Total	11,637	12,682	13,794	15,080	16,594	17,659	18,542	19,469	20,248	21,058	21,900	22,557	30,301	38,367

From the detailed information in chapter 5.1, actual 2006 invoiced amounts per customer group for all four utilities combined are known. From this, an average charge per ton of waste is calculated:

Table 5-76 Solid Waste Tariff by customer group (2006, excluding VAT)

Customer group	Invoiced RSD	Waste (tons)	Charge/ton	
			RSD	€
Domestic	21,910,000	8,728	2,510	32
Industry/Public	19,345,000	2,909	6,649	84
Total	41,255,000	11,637	3,545	45

It can thus be concluded that tariffs are cross subsidized between customer groups. The charged fee per ton for industrial/public consumers is on average 2.6 times higher than charges for domestic clients. This is in line with the actual tariffs charged, which are on average 2.8 times higher for industrial/public clients compared to domestic clients.

Although in general it is desirable to have a tariff system which reflects the actual cost of waste collection and which can provide appropriate pricing of services so as to stimulate economic, rational behavior, it is beyond the scope of this feasibility study to propose an alternative tariff setting mechanism for the waste collection system as such. The current tariff system is based on the surface of build property, which does not have a direct link with the amount of solid waste produced: the solid waste fee has to be paid regardless of how much waste is actually produced.

In calculating the impact of the regional system and the incremental cost of the upgrade of the collection equipment and closure & monitoring of the dumpsites on the domestic client group, consultants have used as a principle that the additional charge will be paid pro-rata the existing cross subsidy. Thus, also the additional charge is cross subsidized between customer groups. This is done for reasons of affordability, as will be discussed below. This boils down to:

- Domestic customers are charged 71% of the average proposed fee rate per ton collected waste;
- Industrial/institutional customers are charged 188% of the average proposed fee rate per ton collected waste.

Furthermore, consultants have assumed that the current tariff for collection is only adjusted with inflation over time, in line with current national policy. Next, it is assumed that the average household income will grow with inflation and real wage increase and that household size will decrease from 3.00 to 2.70 in 2035, in line with the trend during the period 1991 to 2002. Additional people served from both urban and rural areas, in accordance with the waste quantity forecast, is included as well. Finally, the base case assumes that the collection rate for domestic clients increases from 55% in 2006 to 95% in 2015. A low case scenario, assuming no change in collection rates, is presented as well. Tariffs are set in such a way that the revenue shortfall of uncollected debt is fully compensated with a higher tariff, so that net revenues are equivalent to the average fees per ton as proposed in paragraph 5.3.6.

The tables below summarize the impact of the introduction of the regional PUC tipping fee and incremental solid waste collection fee on the average monthly household solid waste charge:

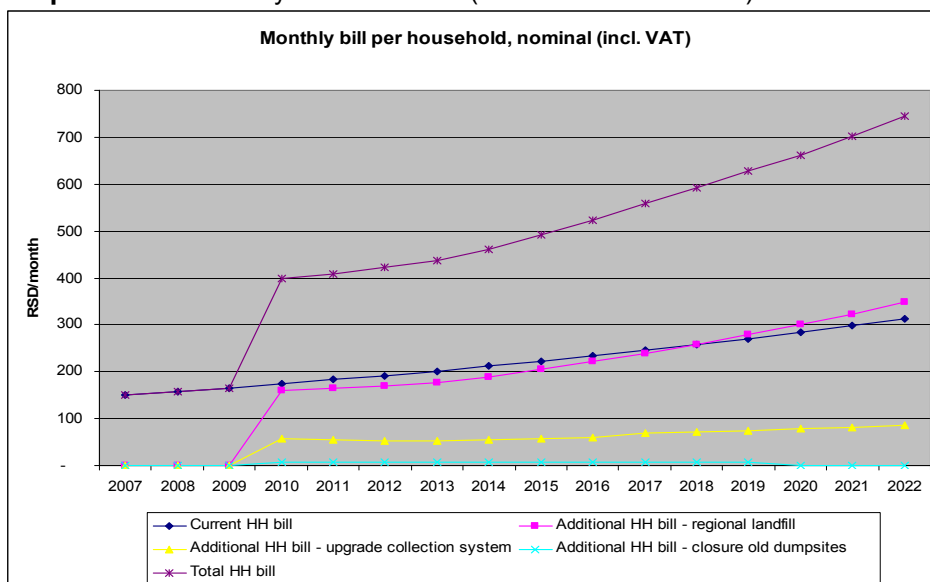
Table 5-77 Household tariff and affordability, base case

	Units	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Average collection rate households	%	55%	62%	68%	73%	78%	83%	88%	93%	94%	95%	95%	95%	95%	95%
Average collection rate public sector	%	59%	65%	71%	76%	81%	86%	90%	94%	95%	95%	95%	95%	95%	95%
Average collection rate businesses	%	62%	73%	79%	84%	86%	88%	91%	93%	94%	95%	95%	95%	95%	95%
Total															
Average household size	persons	2.95	2.94	2.93	2.92	2.91	2.90	2.88	2.87	2.86	2.85	2.84	2.83	2.72	2.70
Number of HH served - current	households	14,074	14,130	14,836	15,702	16,740	17,804	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
Additional people served	persons		1,904	2,358	2,836	2,889	886								
Additional HH served	households		647	805	972	994	306								
Total HH served	households	14,074	14,777	15,640	16,674	17,734	18,110	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
No. of paying HH	households	7,741	9,171	10,590	12,124	13,781	14,979	15,947	16,923	17,291	17,479	17,548	17,618	18,328	18,448
Total affordability															
Current average SW tariff (incl. 8% VAT)	RSD/mnth	140	151	158	166	174	183	192	202	212	222	233	245	399	590
Add. tariff per HH - regional PUC	RSD/mnth			-	-	161	165	171	177	189	205	223	240	504	937
Add. tariff per HH - collection system	RSD/mnth			-	-	57	55	54	53	54	58	60	68	117	202
Add. tariff per HH - closure existing landfi	RSD/mnth			-	-	9	9	9	9	10	11	12	13	-	-
Total SW tariff per HH	RSD/mnth	140	151	158	166	401	411	425	441	465	496	528	566	1,020	1,729
Nominal increase	%		7.5%	5.0%	5.0%	141.8%	2.6%	3.4%	3.7%	5.5%	6.6%	6.5%	7.1%	6.3%	7.1%
Real increase	%		0.0%	0.0%	0.0%	130.3%	-2.3%	-1.5%	-1.3%	0.4%	1.5%	1.4%	2.0%	1.2%	2.0%
Cumulative real increase	%			0.0%	0.0%	130.3%	124.9%	121.5%	118.7%	119.6%	123.0%	126.2%	130.8%	155.5%	193.1%
Nominal average household income	RSD/mnth	29,415	32,570	35,224	38,095	41,600	45,427	50,083	55,217	60,877	67,116	72,586	78,502	171,849	321,632
Nominal maximum affordable HH tariff	RSD/mnth	441	489	528	571	624	681	751	828	913	1,007	1,089	1,178	2,578	4,824
Affordability ratio		0.5%	0.5%	0.4%	0.4%	1.0%	0.9%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.6%	0.5%

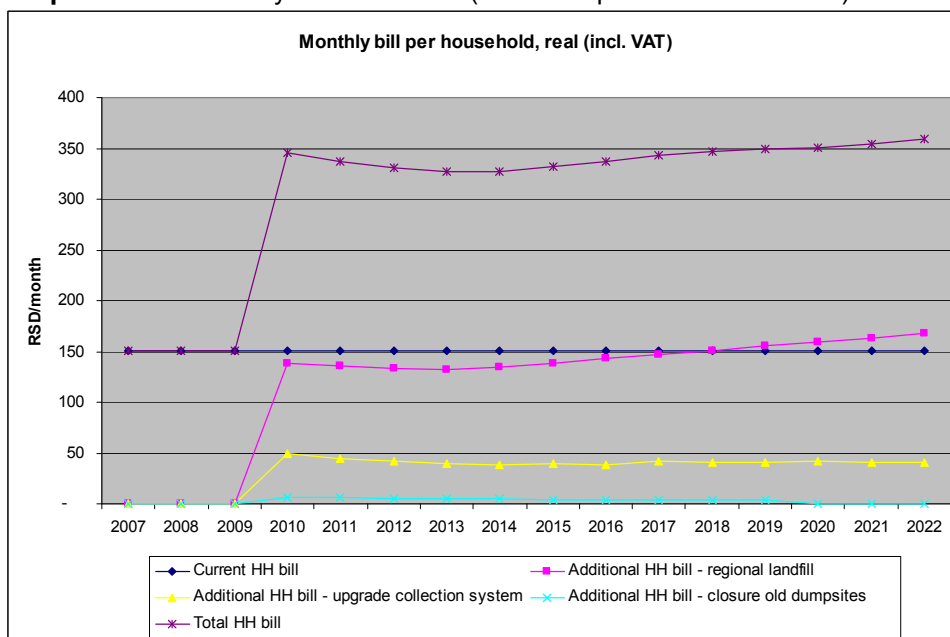
The proposed tipping fee would lead to an increase of 130% in real terms in the year 2010 of the average household bill. A cumulative increase of 193% in real terms would be required until the year 2035. This is within the affordability limit of 1.5% of disposable income. Maximum affordability ratio is reached during the year 2010 with 1.0%, declining to 0.5% in the year 2035. Still, the steep tariff increase during the year 2010 could be difficult to implement, although a clear improvement of services can be expected as well. For this reason, it is recommended to initiate a public awareness campaign before and during the start of the new solid waste operations both at local and district level. The purpose of this campaign is to elaborate and promote the benefits of the improved solid waste management system and to support introduction of the increased tariffs. A further alternative could be that municipalities subsidize the tariff increase, which for example could gradually be phased out during, say 4 years, although this would be difficult to implement if utility tariffs are still capped with inflation by the National government.

The graphs below illustrate both nominal and real tariffs and its development over time:

Graph 5-3 Monthly Household bill (nominal in RSD/month)



Graph 5-4 Monthly Household bill (2007 real prices in RSD/month)



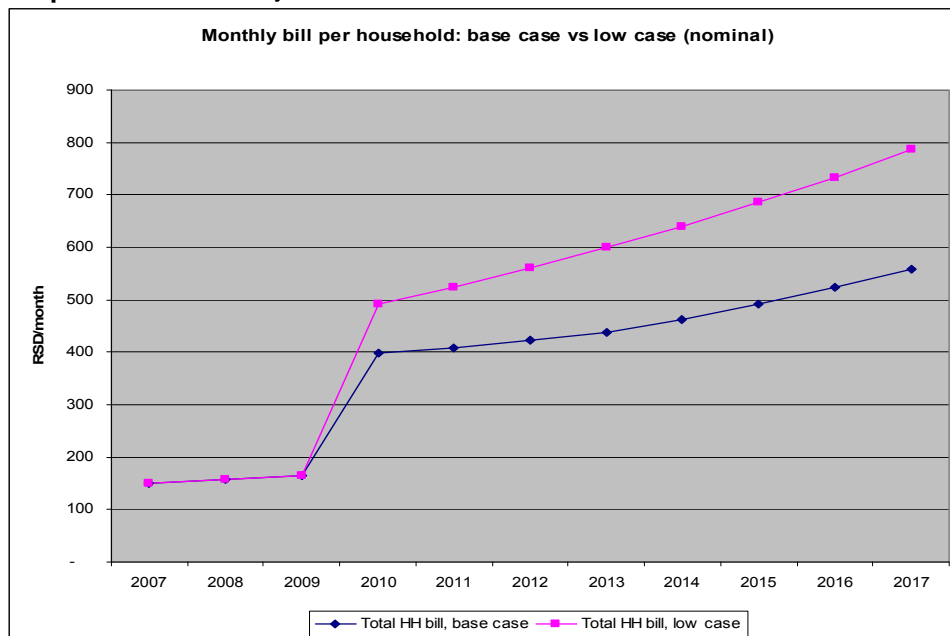
Assuming a low case collection rate scenario with the same starting tipping fee of RSD 2,150/ton, a real tariff increase of 69% cumulative would be required. This tariff is also within affordability constraints: maximum of 0.9% is achieved during the years 2009 to 2012, declining to 0.7% during the year 2022.

Table 5-78 Household tariff and affordability, low case

	Units	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Average collection rate households	%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Average collection rate public sector	%	59%	59%	59%	59%	59%	59%	59%	59%	59%	59%	59%	59%	59%	59%
Average collection rate businesses	%	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%
Total															
Average household size	persons	2.95	2.94	2.93	2.92	2.91	2.90	2.88	2.87	2.86	2.85	2.84	2.83	2.72	2.70
Number of HH served - current	households	14,074	14,130	14,836	15,702	16,740	17,804	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
Additional people served	persons		1,904	2,358	2,836	2,889	886								
Additional HH served	households		647	805	972	994	306								
Total HH served	households	14,074	14,777	15,640	16,674	17,734	18,110	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
No. of paying HH	households	7,741	8,127	8,602	9,171	9,754	9,961	10,000	10,040	10,079	10,119	10,159	10,200	10,611	10,681
Total affordability															
Current average SW tariff (incl. 8% VAT)	RSD/mnth	140	151	158	166	174	183	192	202	212	222	233	245	399	590
Add. tariff per HH - regional PUC	RSD/mnth			-	-	227	248	272	299	325	354	385	414	871	1,619
Add. tariff per HH - collection system	RSD/mnth			-	-	81	82	85	89	92	100	104	118	201	349
Add. tariff per HH - closure existing landfills	RSD/mnth			-	-	13	13	15	16	17	19	20	22	-	-
Total SW tariff per HH	RSD/mnth	140	151	158	166	495	526	564	605	646	695	742	799	1,472	2,558
Nominal increase	%		7.5%	5.0%	5.0%	198.2%	6.4%	7.2%	7.3%	6.8%	7.5%	6.8%	7.6%	6.5%	7.5%
Real increase	%		0.0%	0.0%	0.0%	184.0%	1.3%	2.1%	2.2%	1.7%	2.4%	1.8%	2.5%	1.5%	2.3%
Cumulative real increase	%			0.0%	0.0%	184.0%	187.8%	193.7%	200.1%	205.2%	212.5%	218.0%	225.9%	268.6%	333.6%
Nominal average household income	RSD/mnth	29,415	32,570	35,224	38,095	41,600	45,427	50,083	55,217	60,877	67,116	72,586	78,502	171,849	321,632
Nominal maximum affordable HH tariff	RSD/mnth	441	489	528	571	624	681	751	828	913	1,007	1,089	1,178	2,578	4,824
Affordability ratio		0.5%	0.5%	0.4%	0.4%	1.2%	1.2%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	0.9%	0.8%

The effect on the domestic consumer bill of the low collection rate versus increased collection rate can be seen from the graph below. A continuous low collection rate would result in a substantially higher burden on overage households. The cumulative real tariff increase required would be more than 300% towards the final year of the analysis. For this reason, a financial and operational performance improvement technical assistance project activity is recommended, which aims at improving the billing and collection system and procedures of the individual utilities.

Graph 5-5 Monthly household bill: base case versus low case



In order to assess the impact of the proposed tipping fees on the affordability of domestic customers per municipality, a differentiation of quantities of waste and tariffs needs to be made. The calculations take the following factors into consideration:

- Household income differentiated per municipality;
- Number of households is calculated based on 2002 census data about composition of household by municipality. An annual decrease in average size of household in accordance with the realized decline during the period 1991 – 2002 is assumed, up to a bottom average size of 2.7 people per household.
- Collection rate of debt differentiated by municipality, but improving up to the year 2015 in line with the overall average;
- Current solid waste tariffs for collection adjusted in line with inflation only and differentiated by municipality;
- Additional landfill tipping fee calculated individually per municipality, based on the reported quantity of waste collected and growth in serviced households;
- Additional charge for Kursumlija and Blace due to the transfer station tipping fee;
- Differentiated charges for the incremental cost of upgraded collection equipment and monitoring of closed dumpsites.

The results assuming a base case macro economic scenario are shown in the table below, with details to be found in the Annexes.

Table 5-79 Household tariff and affordability by municipality

	Units	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Current average SW tariff by municipality															
Prokuplje	RSD/mnth	185	199	209	219	230	242	254	267	280	294	309	324	528	780
Žitotada	RSD/mnth	213	229	240	252	265	278	292	307	322	338	355	373	607	897
Kursumlija	RSD/mnth	74	80	84	88	92	97	101	107	112	117	123	130	211	312
Blace	RSD/mnth	113	122	128	134	141	148	155	163	171	180	189	198	323	477
Additional tariff per HH/month by municipality - regional PUC															
Prokuplje	RSD/mnth					119	123	127	132	143	155	169	182	384	710
Žitotada	RSD/mnth					152	151	156	162	167	172	188	203	444	830
Kursumlija	RSD/mnth					245	252	260	270	278	288	314	340	743	1,389
Blace	RSD/mnth					205	212	221	230	246	269	293	317	694	1,300
Additional tariff per HH/month by municipality - collection system															
Prokuplje	RSD/mnth					33	32	31	31	32	34	35	40	67	112
Žitotada	RSD/mnth					254	185	179	174	170	177	183	206	342	559
Kursumlija	RSD/mnth					71	70	69	68	68	70	74	84	159	294
Blace	RSD/mnth					88	85	83	82	83	91	94	107	184	313
Additional tariff per HH/month by municipality - closure old landfills															
Prokuplje	RSD/mnth					3	3	3	4	4	4	4	5	-	-
Žitotada	RSD/mnth					47	35	36	37	38	40	43	47	-	-
Kursumlija	RSD/mnth					6	7	7	7	7	7	8	9	-	-
Blace	RSD/mnth					32	33	34	35	38	41	44	48	-	-
Total SW tariff per HH/month by municipality															
Prokuplje	RSD/mnth	185	199	209	219	386	400	416	434	458	488	517	551	979	1,603
Žitotada	RSD/mnth	213	229	240	252	717	650	663	690	697	727	769	829	1,393	2,286
Kursumlija	RSD/mnth	74	80	84	88	414	424	437	451	465	483	519	562	1,114	1,995
Blace	RSD/mnth	113	122	128	134	467	478	493	510	538	580	621	670	1,202	2,090
Nominal average HH income by municipality															
Prokuplje	RSD/mnth	30,219	33,460	36,187	39,137	42,737	46,669	51,453	56,726	62,541	68,951	74,571	80,648	176,547	330,425
Žitotada	RSD/mnth	33,538	37,134	40,161	43,434	47,430	51,793	57,102	62,955	69,408	76,523	82,759	89,504	195,933	366,708
Kursumlija	RSD/mnth	27,504	30,454	32,936	35,620	38,898	42,476	46,830	51,630	56,922	62,757	67,871	73,403	160,686	300,739
Blace	RSD/mnth	26,494	29,336	31,727	34,312	37,469	40,916	45,110	49,734	54,832	60,452	65,379	70,707	154,785	289,695
Affordability ratio by municipality															
Prokuplje	%	0.6%	0.6%	0.6%	0.6%	0.9%	0.9%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.5%
Žitotada	%	0.6%	0.6%	0.6%	0.6%	1.5%	1.3%	1.2%	1.1%	1.0%	1.0%	0.9%	0.9%	0.7%	0.6%
Kursumlija	%	0.3%	0.3%	0.3%	0.2%	1.1%	1.0%	0.9%	0.9%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%
Blace	%	0.4%	0.4%	0.4%	0.4%	1.2%	1.2%	1.1%	1.0%	1.0%	1.0%	1.0%	0.9%	0.8%	0.7%

The affordability ratio after inclusion of the project differs considerably per municipality, however does not exceed 1.5% of household income in any of the years. Thus, the ratio for none of the four municipalities exceeds the maximum affordability ratio of 1.5%. It should be mentioned however that Žitotada municipality would reach this maximum affordability ratio in the year 2010, after which it goes down to 1.2% and lower. This has mainly to do with the very low quantities of waste collected in Žitotada.

5.3.7 Revenue forecast

After setting the tariffs, the total revenues for the project can be calculated. A distinction is made between revenues accruing to the Regional PUC and incremental revenues accruing to local utilities. These revenues are comprised of:

- Regional PUC
 - Landfill tipping fees;
 - Transfer station tipping fees;
- Local utilities
 - Upgraded collection equipment fees;
 - Monitoring of closed dumpsite fees.

Table 5-80 Revenues forecast Regional PUC

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Landfill tipping fee	RSD m	36	40	44	48	53	58	63	68	149	279
Transfer station tipping fee	RSD m	11	12	13	14	16	17	19	20	44	82
Total revenues	RSD m	46	52	57	63	69	75	82	88	193	362

Due to the upgraded collection equipment, some limited additional demand is created. Hence, apart from incremental revenues as a result of the proposed tariff increase, additional revenues arising from incremental demand included in the revenue calculation as well.

Table 5-81 Incremental revenues forecast upgrade solid waste equipment and monitoring closed dumpsites

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Incremental revenues due to increased demand for collection services											
Existing demand	HH	16,740	17,804	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
New demand due to project	HH	994	306	-	-	-	-	-	-	-	-
Total demand	HH	17,734	18,110	18,182	18,254	18,326	18,399	18,472	18,545	19,293	19,419
Average tariff excluding VAT	RSD/HH/m	161	169	178	187	196	206	216	227	370	546
Incremental revenues	RSD m/yr	2	1	-	-	-	-	-	-	-	-
Incremental revenues due to increased tariff											
Collection system	RSD '000/y	16	17	18	19	19	21	22	25	45	78
Closure dumpsites	RSD '000/y	3	3	3	3	4	4	4	5	-	-
Uncollectable debt											
Collection system - incremental der	RSD '000/y	0	0	-	-	-	-	-	-	-	-
Net incremental revenues											
Collection system	RSD '000/y	18	18	18	19	19	21	22	25	45	78
Closure dumpsites	RSD '000/y	3	3	3	3	4	4	4	5	-	-
Total net incremental revenues	RSD '000/y	21	20	21	22	23	25	26	30	45	78

5.3.8 Profit & loss, balance sheet and cash flow statement Regional PUC

This paragraph presents one of the final outputs of the financial model: forecasted financial statements of the new regional solid waste management PUC. Full printouts of the model, both in RSD as well as Euro, are included in the Annexes.

Projections of financial statements of individual local utilities are not included in this chapter, since this is outside of the scope of the Terms of Reference. A separate analysis is made of all project components, in order to assess financial sustainability of the overall project in isolation of company financials.

The following statements are presented and briefly discussed:

- Profit & loss statement;
- Balance sheet;
- Cash flow statement.

These financial statements include the financial effects of the project on the regional PUC company. Thus, it helps to assess whether the project can be carried out in a financially sustainable way, i.e. without jeopardizing the financial viability of the company.

Profit & loss statement

With the proposed tariff policy, the company only breaks even starting from the year 2019. Thereafter, the company breaks even or makes a net profit. The net loss is a direct result of the tariff setting policy, which during the first years of the project effectively sets the tipping fee at below cost recovery for reasons of affordability.

Table 5-82 Profit and loss statement (RSD million)

	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Revenue										
Tipping fee	46	52	57	63	69	75	82	88	193	362
Proceeds secondary materials	0	0	0	0	0	0	0	0	0	0
Land fill gas	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Subsidies	0	0	0	0	0	0	0	0	0	0
Revenue	46	52	57	63	69	75	82	88	193	362
Expenditure										
Variable costs										
Electricity	6	7	8	9	9	10	11	12	29	58
Diesel	1	1	1	1	1	1	1	1	4	10
Other	5	6	6	7	8	8	9	10	23	45
Other	0	1	1	1	1	1	1	1	2	4
Fixed costs										
Wages & salaries	23	25	27	29	31	33	36	38	74	128
Employee benefits	7	7	8	9	10	11	12	13	28	52
Maintenance	1	1	2	2	2	2	2	3	6	10
Insurance	9	9	10	11	11	12	13	14	26	44
Other costs	4	4	4	4	4	5	5	5	8	12
Other costs	3	3	3	3	3	4	4	4	6	9
Operating costs	29	32	34	37	40	44	47	50	103	186
EBITDA	17	20	23	26	28	31	35	38	90	176
Depreciation	40	40	40	40	40	40	40	44	59	79
Bad debt	0	0	0	0	0	0	0	0	0	0
Total costs	69	72	75	77	81	84	87	94	162	265
Net Operating Income	-23	-20	-18	-15	-12	-9	-6	-6	31	97
Interest charges	0	0	0	0	0	0	0	0	0	0
FX loss (gain)	0	0	0	0	0	0	0	0	0	0
Net Income before Tax	-23	-20	-18	-15	-12	-9	-6	-6	31	97
Income tax	0	0	0	0	0	0	0	0	0	10
Net Income after Tax	-23	-20	-18	-15	-12	-9	-6	-6	31	87
EBITDA %	37%	39%	40%	41%	41%	42%	42%	43%	47%	49%
Net operating income %	-50%	-39%	-31%	-23%	-18%	-12%	-7%	-7%	16%	27%



Balance sheet

The balance sheet is healthy, with a very high share of equity out of the balance sheet total and a slow conversion of fixed assets into cash. By the end of the analyzed period, the company will have build up substantial cash reserves available for necessary re-investment in infrastructure. The quick ratio is well above minimum standards.

Table 5-83 Balance sheet (RSD million)

	2010	2011	2012	2013	2014	2015	2016	2017	2027	2035
Fixed assets	488	447	407	367	327	286	349	305	178	307
Current assets										
Inventories	0	0	0	0	0	1	1	1	1	2
Receivables	6	6	7	8	8	9	10	11	24	45
Cash	15	34	57	82	110	141	72	109	331	660
Total	21	41	64	90	119	150	82	121	356	706
Non-operating	0	0	0	0	0	0	0	0	5	13
Total assets	508	489	471	457	445	437	431	426	534	1,013
Equity bf	528	505	485	467	452	440	431	426	490	893
Retained earnings	-23	-20	-18	-15	-12	-9	-6	-6	31	97
Grants	0	0	0	0	0	0	0	0	0	0
Equity cf	505	485	467	452	440	431	426	419	521	990
Long term liabilities										
Equity	505	485	467	452	440	431	426	419	521	990
Long-term liabilities	0	0	0	0	0	0	0	0	0	0
Total	505	485	467	452	440	431	426	419	521	990
Current liabilities										
Payables	4	4	4	5	5	5	6	6	13	23
Overdraft	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Total	4	4	4	5	5	5	6	6	13	23
Non-operating	0	0	0	0	0	0	0	0	0	0
Total liabilities	508	489	471	457	445	437	431	426	534	1,013

Cash flow

Cash flow generation of the project is sufficient to finance all necessary (re)investments after the initial investment. This means that no further capital subsidy from either the municipalities or state level is required, so that the PUC finances are sustainable.

The most substantial follow on investments are required during the years 2020 and 2028 when the subsequent stages of the landfill are realized and olds cells are capped. Although this will cause the cash flow to become negative within the year of investment, accumulated cash flow from previous years is sufficient to finance this short fall. The final capping of the landfill will occur during the year 2035, which again is a substantial investment which can be financed from internally generated funds.

The cumulative cash flow is positive for each of the years during the analyzed period. Thus, at company level, the project is financially sustainable.

Table 5-84 Project cash flow statement (in RSD million)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2020	2023	2024	2028	2030	2035
Cash bf	-	(0)	(0)	15	34	57	82	110	141	72	195	114	46	331	218	734
Overdraft bf	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net cash bf	-	(0)	(0)	15	34	57	82	110	141	72	195	114	46	331	218	734
Revenue																
Tipping fee	-	-	46	52	57	63	69	75	82	88	112	141	153	209	245	362
Proceeds secondary materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land fill gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less bad debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	46	52	57	63	69	75	82	88	112	141	153	209	245	362
Costs																
Variable costs	-	-	6	7	8	9	9	10	11	12	16	21	23	32	38	58
Electricity	-	-	1	1	1	1	1	1	1	1	2	3	3	5	6	10
Diesel	-	-	5	6	6	7	8	8	9	10	13	16	18	25	29	45
Other	-	-	0	1	1	1	1	1	1	1	1	1	1	2	2	4
Fixed costs	-	-	23	25	27	29	31	33	36	38	46	57	61	79	91	128
Wages & salaries	-	-	7	7	8	9	10	11	12	13	16	20	22	30	35	52
Employee benefits	-	-	1	1	2	2	2	2	2	3	3	4	4	6	7	10
Maintenance	-	-	9	9	10	11	11	12	13	14	17	21	22	28	32	44
Insurance	-	-	4	4	4	4	4	5	5	5	6	7	7	9	10	12
Other costs	-	-	3	3	3	3	3	4	4	4	5	5	5	7	7	9
Total	-	-	29	32	34	37	40	44	47	50	62	77	83	111	129	186
Working capital required	-	-	2	0	0	0	0	0	0	0	1	1	1	1	1	2
Operating cash flow	-	-	15	20	22	25	28	31	34	37	49	63	69	97	115	174
Capex & start-up subsidy	383	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capex	383	145	-	-	-	-	-	-	103	-	241	131	31	315	167	249
Discretionary capex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment cash flow	-	142	-	-	-	-	-	-	103	-	241	131	31	315	167	249
Credit / overdraft interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grants	-	142	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Financing cash flow	-	142	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash for debt service	-	0	15	20	22	25	28	31	(69)	37	(193)	(68)	39	(218)	(52)	(75)
Capital repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest and fee payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total debt service	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net change in cash	-	0	15	20	22	25	28	31	(69)	37	(193)	(68)	39	(218)	(52)	(75)
Cash cf	-	-	15	34	57	82	110	141	72	109	2	46	84	113	166	660
Overdraft cf	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net cash cf	-	-	15	34	57	82	110	141	72	109	2	46	84	113	166	660

5.3.9 Financial cost benefit analysis

A financial cost-benefit analysis has been carried out based on the assumptions set out in previous paragraphs. The purpose of the financial cost benefit analysis is to assess the financial feasibility and viability of the project and to determine the maximum possible EU grant assistance. The analysis is carried out in accordance with the "Guide to cost-benefit analysis of investment projects" (EC DG Regio, 2002). The output of the analysis is:

- Calculation of the project financial net present value (FNPV/C) and internal rate of return (FIRR/C) of the total investment, in order to assess financial feasibility and need for (grant) assistance;
- Assessing the financial sustainability of the project by calculating the projects' financial and cumulative cash flow, including financing;
- Calculating the financial net present value of invested capital (FNPV/K) and internal rate of return of invested capital (FIRR/K). This analysis calculates financial feasibility from the viewpoint of the recipient and only takes into consideration the total invested public capital;
- Sensitivity and risk analysis. This analysis identifies and assesses the sensitivity of the project to key input variables;
- Economic cost benefit analysis. Assessment of the economic feasibility of the project from the viewpoint of society as a whole.

EU grant assistance

The EU grant assistance is calculated using the so called funding gap method calculated by means of the “modified formula”. The rationale behind this methodology is to identify the financial needs of a project (funding gap) and to provide grant assistance in order to make them financially feasible.

The formula used is defined as:

$$\text{Grant rate} = \text{DIC} / (\text{DIC} + \text{DNR})$$

Where DIC = discounted investment cost and DNR is discounted net revenues. Under the current ISPA regulation, this grant rate can be up to 75% and in exceptional cases 85%. This study assumes that the maximum grant rate under IPA is 75%.

Subsequently, the maximum EU grant can be calculated by multiplying the grant rate with the total eligible investment cost (excluding amongst others VAT and land acquisition costs).

It should be noted however, that the methodology to determine the level of grant assistance of ERDF and Cohesion fund assistance projects for the 2007 – 2013 programming period differs from the “modified formula” elaborated upon above. A special methodology is developed for revenue generating projects, such as projects in the water & waste water sector.⁶ This methodology leads to substantially lower grant amounts. For the sake of completeness, this different grant calculation methodology is also applied. The methodology is as follows:

Step 1: determination of funding gap rate (R):

$$R = \text{Max EE} / \text{DIC}$$

Where

Max EE is the maximum eligible expenditure = DIC-DNR

DIC is the discounted investment cost

DNR is the discounted net revenue = discounted revenues – discounted operating costs + discounted residual value

Step 2: calculating the “decision amount” (DA):

$$\text{DA} = \text{EC} * R$$

Where

EC is the eligible cost

Step 3: find the (maximum) EU grant:

⁶ Council regulation (EC) 1083/2006 dated 11 July 2006, article 55 “revenue generating projects”



EU grant = DA*Max CRpa

Where

Max CRpa is the maximum co-funding rate fixed

Discount rate

In the absence of a national Serbian discount rate, a discount rate as applied in EU-ISPA financed projects in neighboring countries is used, which is also recommended by the EU guide to Cost-Benefit Analysis of Investment Projects⁷. This discount rate amounts to 6% in real terms. Since the analysis is carried out in current prices, a nominal discount rate of 8% is applied, after adjusting the real rate for 2% inflation.

It is recognized that the most recent guidance from the EU concerning ERDF and Cohesion Fund financed projects during the programming period 2007 – 2013 recommends a lower real discount rate of 5%⁸. However, this is to be applied for countries which have acceded into the EU already and which have more advanced financial markets and a lower financial risk profile than Serbia. For this reason, a slightly higher discount rate is used which reflects this higher cost of capital.

Assumptions

As elaborated upon in the previous paragraphs, a distinction between the “without” and “with” project is made. Incremental costs and revenues are defined as the difference between “with” and “without” cost and revenue estimate. These incremental costs are a direct result of the project intervention.

In doing so, consultants have made the following assumptions:

- Incremental costs and revenues entirely consist of investments, cost and revenues associated with the new activities sanitary landfill, transfer station Kursumlija, closure and monitoring of existing dumpsites and incremental costs and revenues as a result upgraded collection equipment and of and waste separation line. Other changes in operation & maintenance of the existing four PUC's as a result of the project are estimated not to have a material effect on the overall analysis;
- Tipping fees are considered to accrue entirely to the project, although only a limited incremental waste is collected as a result of the project intervention. This is justified on the grounds that the project will result in the delivery of an entirely new service (sanitary land filling) and hence will add (environmental) value to the overall solid waste management system. Landfill, transfer station and closure & monitoring fees would not be levied in the “without” project situation.

⁷ EU guide to Cost-Benefit Analysis of Investment Projects (EU Commission 2002), available at http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide02_en.pdf

⁸ Working document 4: Guidance on the methodology for carrying out Cost-Benefit Analysis, available at http://ec.europa.eu/regional_policy/sources/docoffic/2007/working/wd4_cost_en.pdf



Further considerations are:

- Net present values and internal rate of return are calculated back to base year 2007, with the project period starting in 2008 up to the year 2035 (28 years);
- Phase I investments and related extensions, closure and re-investments are included in the financial cost benefit analysis, necessary for the proper operation of the sanitary landfill, transfer station, upgraded solid waste collection equipment and monitoring of closed dumpsites;
- Costs associated with the operation landfill gas to electricity project are excluded from the analysis, since this is an investment option which could be considered to be realized after the initial investment;
- Non-eligible costs for EU financing are included in the discounted cash flow analysis, since these present a real outflow for the company. Thus, non-reimbursable value added tax and land acquisition costs are included in the investment cost. However, in calculating the potential EU grant, these non-eligible costs are excluded;
- Residual investment value is included at the end of the project period. The residual value is calculated simply as the remaining book value at the end of the year 2035. The calculation ignores exchange rate losses;
- The final closure cost of the landfill is to be invested during the final year of the analysis, the year 2035. No residual value is taken into consideration, since these costs are related to the tipping fees earned during the exploitation period of the landfill and are thus to be fully charged against these revenues.

Full printouts of the financial cost-benefit analyses are included in the Annexes.

The results of the analysis are, assuming a base case macro – economic scenario:

Financial cost benefit analysis total invested capital

- During the 28 year analysis period, the nominal internal rate of return (FNPV/C) is 0.5%;
- The financial net present value (FNPV/K) is negative and amounts to € -6,897 thousand;
- Therefore, EU grant assistance is required to make the project financially feasible, which is calculated below.

Table 5-85 Financial cost benefit analysis total invested capital

Unit	Rate	NPV	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Cash inflow		13,748	-	-	789	837	890	954	1,017	1,095	1,166	1,254	1,403	1,434	1,701	1,825	2,315	2,458	2,619	3,382	6,831									
Regional PUC tipping fees		10,433	-	-	546	599	651	707	761	819	881	936	1,066	1,136	1,375	1,465	1,886	2,013	2,145	2,767	2,948									
Secondary materials		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Separate collected recyclable materials		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Waste collection fees		2,727	-	-	213	205	204	210	216	232	238	260	281	297	327	360	426	444	474	595	636									
Existing dumpsite closure fee		234	-	-	30	33	35	38	41	44	47	50	56	-	-	-	-	-	-	-	-									
LFG - carbon credit sale		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
LFG - electricity sale		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Residual value		353	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Cash outflow		20,645	4,693	6,253	432	459	491	524	563	597	632	667	745	728	858	908	1,136	1,203	1,273	1,602	1,697									
Investments		13,754	4,693	6,253	-	-	-	-	244	-	1,727	-	270	2,453	1,983	890	2,844	329	2,278	363	2,027									
Landfill phase 1		5,230	4,693	1,032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Transfer stations		304	-	355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Transportation		299	-	348	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Waste collection equipment		625	-	729	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Closure existing dumpsites		3,249	-	3,789	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Phase 2/closure phase 1		902	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Phase 3/closure phase 2		665	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Closure phase 3		235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Re-investment WWTP landfill		47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Re-investment mobile		1,831	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Re-investment Mechanical/electrical TS		33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Re-investment Containers		436	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Operation & maintenance		6,891	-	-	432	459	491	524	569	597	632	667	745	728	858	908	1,136	1,203	1,273	1,602	1,697									
Landfill		3,713	-	-	225	240	256	273	291	310	327	345	384	406	479	506	630	670	708	884	936									
Transfer stations		730	-	-	39	42	45	49	53	58	61	65	74	79	95	102	133	141	151	197	211									
Transportation		1,370	-	-	79	84	90	97	104	111	118	126	141	150	177	189	240	253	269	346	368									
Collection system		843	-	-	58	61	64	67	71	75	78	82	89	93	106	111	133	139	146	174	182									
Closure existing dumpsites		234	-	-	30	33	35	38	41	44	47	50	56	-	-	-	-	-	-	-	-									
Total cash flow before financing		(6,897)	(4,693)	(6,253)	357	377	399	430	214	498	(1,193)	587	388	(1,747)	(1,411)	327	(1,665)	926	(933)	1,397	2,907									
Cumulative cash flow		(6,897)	(4,693)	(10,946)	(10,589)	(10,212)	(9,813)	(9,383)	(8,169)	(6,671)	(9,864)	(9,276)	(8,267)	(10,014)	(9,613)	(9,286)	(7,814)	(6,888)	(7,821)	(1,762)	1,145									
Discount rate - nominal	%																													
Net present value FNPV/C	€ 000																													
Internal rate of return FIRR/C	%																													

The maximum EU grant, using the modified formula, is calculated to amount to € 8,035 thousand (current prices) as set out in the table below. The calculated grant rate is 77.6%, above the maximum of 75%.

Table 5-86 EU grant calculation, modified formula

NPV incremental revenues		
Tipping fees	€ 000	10,433
Waste collection fees	€ 000	2,727
Existing dumpsite closure fee	€ 000	234
Residual value	€ 000	353
Subtotal incremental revenues	€ 000	13,748
NPV incremental operational costs		
Landfill	€ 000	3,713
Transfer stations	€ 000	730
Transportation	€ 000	1,370
Waste collection equipment	€ 000	843
Closure existing dumpsites	€ 000	234
Extension, closure, reinvestment	€ 000	4,048
Subtotal incremental operational costs	€ 000	10,938
Discounted net revenues (DNR)	€ 000	2,810
NPV investment costs (DIC)		
Landfill phase 1	€ 000	5,230
Transfer stations	€ 000	304
Transportation	€ 000	299
Waste collection equipment	€ 000	625
Closure existing dumpsites	€ 000	3,249
Subtotal investment costs (DIC)	€ 000	9,706
Grant rate, calculated DIC/(DIC+DNR)	%	77.6%
Grant rate, applied (max 75%)	%	75.0%
Eligible investment cost (current price)	€ 000	10,713
EU grant (maximum)	€ 000	8,035

The funding gap methodology applicable to ERDF/CF financed project during the programming period 2007 – 2013 leads to a substantially lower maximum grant level of € 5,709 thousand, assuming a maximum co-financing rate of 75%. In case the discount rate would be set at 5% in real terms (7% current) as required for ERDF/CF financed projects during the programming period 2007 - 2013, the maximum EU grant would amount to € 5,377 thousand.

Table 5-87 EU grant calculation, ERDF/CF 2007-2013

Step 1: funding gap rate		
Discounted net revenues (DNR)	€ 000	2,810
Discounted investment costs (DIC)	€ 000	9,706
Eligible expenditure EE (DIC-DNR)	€ 000	6,897
Funding gap rate R (EE/DIC)	%	71.1%
Step 2: decision amount		
Eligible investment costs EC (current)	€ 000	10,713
Decision amount DA (R x EC)	€ 000	7,612
Step 3: maximum EU grant		
Maximum co-funding rate Crpa	%	75%
EU grant (maximum)	€ 000	5,709

Financial sustainability

The cash flow statement of the company as set out in paragraph 5.3.9 already showed that at regional PUC level no cash flow problems arise, assuming a base case scenario. Cumulative cash is positive in any single year. Large reinvestments in especially the closure of phases and construction of subsequent cells of the landfill can be completely financed from internally generated cash, i.e. from the tipping fees charged to the local PUC's of the four participating municipalities.

In order to assess financial sustainability of the project as such, including the effect of revenues, costs and investment in the upgraded collection equipment and closure and monitoring of existing dumpsites, a separate calculation is made which only includes incremental costs, revenues, investments as well as the all financing sources available.

The table below shows that the project is also financially sustainable, since in any one year cumulative cash flow is positive. Although cash flow during the years 2015, 2016 and 2022 is negative as a result of large investments, accumulated cash during previous years is sufficient to finance this.

Table 5-88 Project financial sustainability

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Total financial sources	9,706	4,693	6,253	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenues	13,395	-	-	789	837	890	954	1,017	1,095	1,166	1,254	1,403	1,434	1,701	1,825	2,315	2,458	2,619	3,362	3,585	-	-	-	-	-	-	-	-
Total inflows	23,101	4,693	6,253	789	837	890	954	1,017	1,095	1,166	1,254	1,403	1,434	1,701	1,825	2,315	2,458	2,619	3,362	3,585	-	-	-	-	-	-	-	-
Total operating costs	6,891	-	-	432	459	491	524	559	597	632	667	745	728	858	908	1,136	1,203	1,273	1,602	1,697	-	-	-	-	-	-	-	-
Total investment costs	13,754	4,693	6,253	-	-	-	-	244	-	1,727	-	270	2,453	1,983	590	2,844	329	2,278	363	2,027	-	-	-	-	-	-	-	-
Interest on loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retirement bonus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loan principal repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total outflows	20,645	4,693	6,253	432	459	491	524	803	597	2,358	667	1,015	3,181	2,842	1,498	3,980	1,532	3,551	1,964	3,725	-	-	-	-	-	-	-	-
Total cash flow	2,456	-	-	357	377	399	430	214	498	(1,193)	587	388	(1,747)	(1,411)	327	(1,665)	926	(833)	1,397	(140)	-	-	-	-	-	-	-	-
Cumulative cash flow	-	-	-	357	734	1,133	1,564	1,777	2,275	1,083	1,670	2,679	932	1,333	1,660	3,132	4,058	3,126	9,184	9,045	-	-	-	-	-	-	-	-

Financial cost benefit analysis invested capital

A third analysis is made to determine the net present value and rate of return of the public funds invested on the project. In this project, the national contribution consists of funds provided by:

- Municipalities of Toplica District;
- Ecofund;
- Development Fund

The analysis reveals that:

- Financial internal rate of return of invested capital (FIRR/K) is 5.0%, below the discount rate of 8%;
- Financial net present value (FNPV/K) is negative and equals € -1,562 thousand.

Therefore, it can be concluded that with the EU grant, the project is below the threshold of 8% and therefore the project is strictly speaking not financially feasible from the perspective of Serbia. Since Toplica District is one of the most underdeveloped regions in Serbia and considering the positive external benefits of the project, still it can be argued to continue with the project, in spite of not meeting this financial criterion.

Table 5-89 Financial cost benefit analysis invested national capital

Table 6.66 Financial cost-benefit analysis of invested national capital																						
	Unit	Rate	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2023	2024	2026	2029	2030	2034	2035
Revenues		13,395	-	-	789	837	890	954	1,017	1,095	1,166	1,254	1,403	1,434	1,701	1,825	2,315	2,458	2,619	3,362	3,585	
Residual value		353	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	#####	
Total revenues		13,748	-	-	789	837	890	954	1,017	1,095	1,166	1,254	1,403	1,434	1,701	1,825	2,315	2,458	2,619	3,362	6,631	
Total operating costs		6,891	-	-	432	459	491	524	559	597	632	667	745	728	858	908	1,136	1,203	1,273	1,602	1,699	
Re-investment financed from internal cash flow		4,048	-	-	-	-	-	-	244	-	1,727	-	270	2,453	1,983	590	2,844	329	2,278	363	2,027	
Interest on loans		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Retirement bonus		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Loan principal repayment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private equity		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total national public contribution		4,371	4,693	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total expenditures		15,310	4,693	30	432	459	491	524	803	597	2,358	667	1,015	3,181	2,842	1,498	3,980	1,532	3,551	1,964	3,725	
Net cash flow		(1,562)	(4,693)	(30)	357	377	399	430	214	498	(1,193)	587	388	(1,747)	(1,141)	327	(1,665)	926	(933)	1,397	2,907	
Cumulative cash flow		-	(4,693)	(4,723)	(4,366)	(3,989)	(3,590)	(3,159)	(2,945)	(2,448)	(3,640)	(3,053)	(2,044)	(3,791)	(3,390)	(3,063)	(1,591)	(665)	(1,597)	4,461	7,368	
Discount rate	%	8.0%																				
FNPV/C	€ 000	(1,562)																				
FIRR/C	%	5.0%																				

5.3.10 Sensitivity analysis

A sensitivity analysis is conducted to analyze the impact of:

- Variations in the macro-economic environment;
- Identify the sensitivity of the model to changes in some key input factors.

Macro-economic scenarios

The table below summarizes the results of the sensitivity analysis for changes in the macro-economic environment. Revenues have been fixed at the level as proposed for the base case scenario. The remarks on cash flow effects relate to project cash flow only and thus are not analyzed at Regional PUC company level.

Table 5-90 Sensitivity analysis macro-economic assumptions

Description	FIRR/C	FNPV/C (€ '000)	Remarks
Base case	0.5%	-6,897	Cashflow negative 2016, 2020, 2023, 2028, 2030, 2035, cumulative cashflow
Optimistic case	9.2%	1,931	Cashflow negative 2016, 2020, cumulative cashflow positive
Pessimistic case	-8.2%	-11,020	Cashflow negative 2014, 2016, 2019, 2020, 2022, 2023, 2024, 2028, 2030, 2035, cumulative cashflow negative 2016 to 2035

Conclusion is that the project is very sensitive to changes in the macro-economic environment: the internal rate of return varies between -8.2% and 9.2% for respectively the pessimistic and optimistic macro economic scenario. Project operations would be financially sustainable under an optimistic and base case macro economic scenario, since cumulative cash flow is positive in every single year of the analyzed period. This would, however, not be the case under a pessimistic macro economic scenario. A pessimistic macro economic scenario causes the cumulative cash flow at project level to become negative during the years 2016 to 2025. This means that the revenues generated by the project are not sufficient to fund re-investments, extension and closure of the landfill, necessitating alternative funding.

Key input variables

A number of key input variables are identified and varied with respectively +/- 1%, 2%, 3% and 5%, in order to assess the sensitivity of the project to such changes. If a change of 1% in an input leads to an increase of more than 5% of the net present value (FNPV/C), the variable is considered to be a key risk factor and a more in depth risk analysis is required.

The following key input variables are identified:

- Discount rate
- Demand: waste quantities
- Investment cost (total)
- Revenues: tipping and solid waste collection fee
- Operation & maintenance cost

The discount rate is changed with 1% percentage in *absolute* terms. For example, +1% would mean a discount rate of 8% + 1% = 9%.

The other variables are changed *relative* to the base value, while keeping the other input variables fixed. Variations are only added to the base value of a single year, so that changes are *not* cumulative. The tariff is also fixed at the base level, although underlying costs would change as a result of variations, which in turn would prompt a different level of tariffs, following the full cost price setting policy proposed in this study.

Variations will be carried out assuming a base case macro economic scenario.

Table 5-91 Sensitivity analysis key input variables

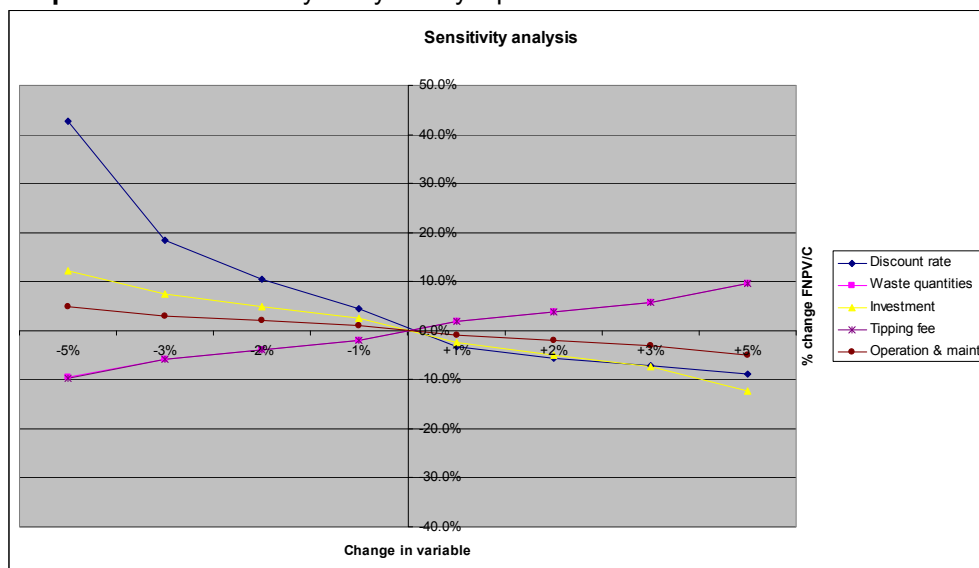
Description	Change in value FNPV/C					
	Change in variable	Discount rate	Waste quantities	Investment	Tipping fee	Operation & maint.
Change in variable of	+5%	-8.8%	9.6%	-12.3%	9.7%	-5.0%
Change in variable of	+3%	-7.2%	5.7%	-7.4%	5.8%	-3.0%
Change in variable of	+2%	-5.6%	3.8%	-4.9%	3.9%	-2.0%
Change in variable of	+1%	-3.2%	1.9%	-2.5%	1.9%	-1.0%
Change in variable of	-1%	4.4%	-1.9%	2.5%	-1.9%	1.0%
Change in variable of	-2%	10.4%	-3.8%	4.9%	-3.9%	2.0%
Change in variable of	-3%	18.4%	-5.7%	7.4%	-5.8%	3.0%
Change in variable of	-5%	42.8%	-9.6%	12.3%	-9.7%	5.0%

A change of +/- 1% of any of the identified key input variables does not cause the FNPV/C to change with more than 5%. Therefore, none of the key input variables are critical to the financial outcome, although of course they do impact the financial result. Hence, no further risk analysis of these variables will be carried out.

The FNPV/C value is clearly most sensitive to changes in the discount rate and in particular to lower discount rates. A lower discount rate would rapidly increase the financial net present value of the project. The level of the discount rate has been discussed and justified already in paragraph 5.3.10.

Secondly, results are sensitive to variations in investments, followed closely by solid waste quantities and tipping fee levels. Changes in operation and maintenance costs do not cause the net present value to vary as much as the other variables do.

Graph 5-6 Sensitivity analysis key input variables



5.3.11 Economic cost benefit analysis

In this paragraph, an economic analysis of the Toplica District solid waste management system is carried out. The analysis builds upon the financial analysis and model as elaborated upon in the previous paragraph. The analysis is conducted following the methodological guidelines as presented in the Guide to cost-benefit analysis of investment projects (European Commission - Evaluation Unit, DG Regional Policy, & European Commission, Brussels 2002)

Approach and methodology

The main objective of an economic analysis is to analyze the cost and benefits of the proposed project to society as a whole. It differs from a financial analysis, which only takes actual money flows into consideration, accruing to or to be paid by the investor of the project. However, the financial analysis and specifically the financial cost-benefit analysis, forms the basis on which the economic analysis is conducted.

An economic analysis consists of:

- A qualitative assessment of the external benefits and costs of a project to society as a whole;
- A quantitative economic analysis, in which first external effects are quantified and subsequently monetized. However, environmental, social, health and economic external benefits are often difficult to quantify, let alone monetize. Usually, only part of all identified benefits and costs can be quantified and monetized. For that reason, the qualitative assessment complements the quantitative analysis and improves the overall quality of the analysis. The main output of the quantitative economic analysis is an estimate of the economic internal rate of return (EIRR), the economic net present value (ENPV) and the Benefit-Cost ratio, all of which are to be judged against certain minimum thresholds. The minimum threshold of the Benefit-Cost ratio is 1, which means that the

overall benefits to society are higher than its costs.

The analysis is carried out in nominal terms during the 28 year project period, i.e. from 2008 to 2035, equivalent to the financial analysis referred to above.

In the absence of an official Serbian economic discount rate, a nominal rate of 7% is used, comprised of 5% real and 2% inflation. This social discount rate is commonly used to evaluate EU-ISPA co-financed projects and is also proposed to be used in the Guide to cost-benefit analysis of investment projects. It is recognized however, that this rate differs from the social discount rates to be used by ERDF/CF financed projects during the 2007-2013 programming period⁹. The latter proposes a social discount rate of 5.5% for cohesion countries (meaning most regions in Eastern European EU countries) and 3.5% for other countries within the EU.

For the quantitative analysis, the following steps are carried out:

- **Fiscal corrections.** All financial prices in the financial analysis should be net of all indirect taxes/subsidies and other transfers, like value added tax. Direct taxes (income taxes) however, are to be included in the analysis;
- **Corrections for externalities.** External costs and benefits which are not priced in the financial are to be quantified and valued. Integrated solid waste management projects usually have large external benefits, such as resource cost savings and health benefits;
- **Conversion of market prices to accounting prices.** Market prices are distorted because of imperfect markets. An example of market distortions, which is also valid for this study, is legally enforced minimum wages in countries with high unemployment figures. To convert market prices to accounting prices or economic prices, corrections are made by means of:
 - Standard conversion factors to estimate marginal cost. Standard conversion factors are calculated as follows:

$(M + X) / ((M + T_m) + (X - T_x))$, where:

M = total imports

X = total exports

T_m = import taxes

T_x = export taxes

- Shadow wages. The shadow wage is calculated to assess societies' true marginal cost of labor. This is especially relevant in Serbia, where high unemployment exists. The shadow wage is calculated as follows:

$$SW = FW \cdot (1-u) \cdot (1-t)$$

SW is the shadow wage

FW is the financial (market) wage

u is the regional unemployment rate

t is the rate of social security payments and relevant taxes

⁹ Working document 4: Guidance on the methodology for carrying out Cost-Benefit Analysis, available at http://ec.europa.eu/regional_policy/sources/docoffic/2007/working/wd4_cost_en.pdf



This shadow age will only be applied to unskilled labor, since this is in abundant supply. Skilled labor, however, is assumed to be properly priced, since the market for this is competitive.

Qualitative economic analysis

In summary, the project would generate the following economic benefits:

Water

The construction of a sanitary landfill with a highly impermeable bottom liner as well as a leachate collection and treatment system will minimize the risk of contamination of ground- and surface water. This is a large social benefit, especially if compared to the current situation in which the large Prokuplje dumpsite is located next to surface water, with leachate flowing directly into the Toplica river and ultimately the Southern Morava.

Air

Collection and flaring (or combustion to electricity) of land fill gas will prevent emission of damaging methane gas and thus contribute to reducing the green-house effect. Furthermore, the risk of explosions or fires will be reduced. Finally, concentration of land filled waste in one site and closure of existing dumpsites will expose less people to smell and respiratory problems especially in Prokuplje municipality where the dumpsite is located next to the urban centre.

Landscape

Closure of existing dumpsites and concentration of waste in one regional site will reduce the total contaminated area. Therefore, disamenity costs associated with the project are likely to be much lower, also taking into consideration that the current Prokuplje dumpsite is located at a very short distance from the city centre. To the contrary, there are no people living close to the Utrine site;

Health

The introduction of long haul containerized waste transport and proper management of a single regional sanitary landfill will reduce significantly the risk on human health by reducing the scavenging of animals, the potential for breeding of vermin and other disease vectors and minimizing direct contact with waste of the waste workers;

Efficiency

Higher density of land filled waste through the use of compactors reduces the overall landfill capacity required for Toplica District;

Resource cost

A regional landfill will reduce future construction costs of having separate landfills in each of the participating municipalities. An additional cost could be increased transportation costs, since waste is transported over longer distances in order to reach the Utrine regional landfill site.

Wider social and development benefits

The closure of existing dumpsites and establishment of a regional sanitary landfill will contribute to increased employment and associated multiplier effects as well as attracting investments. Especially increased employment will provide substantial benefits, given the high unemployment rate in the project area.

Quantitative economic analysis

Starting from the financial cost benefit analysis and using the economic analysis methodology elaborated upon above, the following corrections are made:

Fiscal corrections.

A correction is made for value added tax included in the investment cost estimate of the project.

External corrections

Although many external benefits have been identified in the qualitative assessment, proper quantification and monetization of these effects is difficult or very time consuming. Different techniques are available to estimate external benefits, such as:

- Willingness to pay studies (contingent valuation). A survey is conducted in which people are asked what they would want to pay in order to achieve certain results, for example reduced odor levels, better recreational/swimming/angling opportunities because of improved surface water quality etc. This method is time consuming and beyond the scope of this study;
- Direct estimation of reduced health costs as a result of the project. In order to be able to estimate these effects, detailed statistical information of the project area on incidence of illness and associated costs would be required. Furthermore, a precise dose-response relation would need to be researched, i.e. what is the relation between reduced leachate level on improved water quality and ultimately reduced illnesses and associated costs. The detailed statistical information is not available, nor is a primary study on dose-response relations within the scope of this project;
- A simpler approach is to use existing (primary) studies or approaches which resemble project circumstances: the benefits transfer method. This method is selected to estimate external benefits for this project.

A study on the overall benefits of compliance with the Environmental Acquis for candidate countries (Ecotec, 2001) provides useful data to quantify and monetize environmental benefits. The monetized external benefits of introduction of the waste directives for some neighboring countries are set out in the table below:

Table 5-92 Per capita external benefits of EU waste directive approximation: overall estimate (€ 1999 prices)

	low	high
Bulgaria	1.1	35.3
Hungary	11.4	188.7
Romania	3.8	117.9
Slovenia	10.7	120.6
Turkey	1.2	28.8

Calculated based on *benefits of compliance with the Environmental Acquis for candidate countries* (Ecotec, 2001)

It should be noted that the estimate above only monetizes part of the external benefits identified in the quantitative analysis. Thus, the overall benefits are likely to be in a much higher range.

The following benefits have been monetized:

- Methane Capture and carbon sequestration in landfills: reduction in global warming;
- Methane Capture: energy savings from power generation from captured methane;
- Avoided damage from leachate to ground and surface water and subsequently to human health;
- Reduced disamenity from landfills, given that landfills become sanitary, and fewer landfills needed with the targets inherent in the directive;
- Replacement of secondary/recycled materials with primary materials.

Furthermore, the low estimate refers to a scenario in which countries maximize incineration of waste as opposed to a scenario where recycling is maximized. Estimates for the scenario in which recycling is maximized is set out in the table below:

Table 5-93 Per capita external benefits of EU waste directive
approximation – maximum recycling scenario (€ 1999 prices)

	low	high
Bulgaria	3.2	35.3
Hungary	15.7	188.7
Romania	8.9	117.9
Slovenia	14.1	120.6
Turkey	5.3	28.8
total	8.7	73.1

Calculated based on *benefits of compliance with the Environmental Acquis for candidate countries* (Ecotec, 2001)

For this analysis we use Bulgaria as a proxy for Serbia, being the lowest in the table above. However, we use the estimated benefits of the maximum recycling scenario, since the project clearly does not follow an energy consuming incineration approach, but is more in line with a recycling approach. Adjusted for a 2007 price level, estimated external benefits for the project range between € 4 to € 41 per capita.

It should be noted however, that part of the benefits relates to achieving *maximum* recycling targets. Although some limited recycling of PET bottles is being carried out in Toplica District, this is admittedly not the direct result of the project intervention. Thus, part of the benefits captured in the per capita estimate above cannot be attributed to the project. Still, the use of the per capita estimates are justified on the grounds that a large range of other external benefits are not monetized and by using the low – high range in the final estimate of the EIRR, ENPV and cost-benefit ratio.

The served population in the project area is projected to increase from an estimated 51,500 in 2010 to 52,500 during the year 2035. Associated external benefits are thus estimated starting from € 0.2 to 2.1 million in 2010 to € 0.3 to 3.8 million in 2035 in nominal prices for respectively the low and high estimate.

Conversion of market to economic prices

Based on National Bank of Serbia statistics for the year 2006, the standard conversion factor for Serbia is 0.97, assuming an export tax rate half of the average import tax rate. Conversion of market prices to economic/accounting prices is summarized in the table below:

Description	SCF
(Re) Investment – domestic costs	0.97
(Re) Investment – foreign costs	1.00
Revenues	0.97
Operation & Maintenance	0.97
Residual value (mainly civil works)	0.97
Operation & Maintenance	0.97

Finally, a large benefit to society is the creation of additional jobs, assuming these would be recruited from the ranks of the unemployed. This is a likely assumption, especially in light of high unemployment in the project area of 22.0%.

During the construction phase, large civil works are carried out which are labor intensive. It is estimated that 30% of the value of civil works is spent on labor. Total incremental employment generated during operation of the sanitary landfill, transfer station and waste separation line is limited to 18 new jobs, out of which 9 positions are for unskilled labor. As elaborated above, only unskilled labor is valued against the shadow wage.

Economic net present value

The project will have substantial environmental, social and economic benefits. After correction for some of the external benefits, as well as fiscal adjustments and conversion of market to economic prices, the project shows the following result:

- Using the low estimate for assessing the external benefits, an economic internal rate of return (ERR) of 6.2%, an economic net present value of € -851 thousand and a benefit cost ratio of 0.94 is achieved;
- Using the high estimate, the economic internal rate of return (ERR) reaches 30.8%, an economic net present value of € 33,131 thousand and a benefit cost ratio of 2.64 is achieved;
- Using the average of the low and high external benefit estimate, the economic internal rate of return (ERR) equals 17.4% and an economic net present value of € 11,399 thousand and a benefit cost ratio of 1.55 is achieved;

The spread between the results of the low and high estimate is very high. Although the low estimate has a negative net present value and a benefit cost ratio below 1, both average and high estimates are well above the thresholds, so that it can be concluded that the project is feasible from the point of view of society as a whole, with a small down side risk. It should further be noted that the overall benefit to society will probably be higher, since not all external benefits have been monetized.



Details of the economic cost-benefit analysis are shown in the tables below.

Table 5-94 Economic cost benefit analysis – low case

Amounts in € '000	CF	NPV 7.0%	2008	2009	2010	2011	2012	2013	2014	2015	2016	2019	2020	2023	2024	2028	2029	2030	2034	2035
correction VAT on investment		190	203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fiscal corrections		190	203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net overall external benefits - low		3,335	-	-	215	227	236	246	256	266	277	312	325	366	380	446	464	482	565	588
External benefits		3,335	-	-	215	227	236	246	256	266	277	312	325	366	380	446	464	482	565	588
Revenues																				
Tipping fees	0.97	11,649	-	-	530	581	631	686	738	794	854	1,034	1,102	1,333	1,421	1,832	1,953	2,080	2,684	2,860
Secondary materials	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Separate collected recyclable material	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste collection fees	0.97	3,015	-	-	206	199	198	204	209	225	231	272	288	317	349	414	431	460	577	617
Existing dumpsite closure fee	0.97	244	-	-	29	32	34	37	39	42	45	55	-	-	-	-	-	-	-	-
LFG - carbon credit sale	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG - electricity sale	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residual value	0.97	444	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,955
Investments																				
Landfill phase 1																				
domestic	0.97	(3,257)	(2,891)	(636)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(1,930)	(1,713)	(377)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transfer stations																				
domestic	0.97	(228)	-	(261)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(75)	-	(86)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transportation																				
domestic	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(304)	-	(348)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste collection equipment																				
domestic	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(636)	-	(729)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Closure existing dumpsites																				
domestic	0.97	(1,605)	-	(1,838)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(1,655)	-	(1,895)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2/closure phase 1																				
domestic	0.97	(494)	-	-	-	-	-	-	-	-	-	-	(1,190)	-	-	-	-	-	-	-
foreign	1.00	(509)	-	-	-	-	-	-	-	-	-	-	(1,227)	-	-	-	-	-	-	-
Phase 3/closure phase 2																				
domestic	0.97	(333)	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,378)	-	-	-	-
foreign	1.00	(343)	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,422)	-	-	-	-
Closure phase 3																				
domestic	0.97	(148)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(983)
foreign	1.00	(152)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,014)
Re-investment WWTP landfill																				
domestic	0.97	(26)	-	-	-	-	-	-	-	-	-	-	-	-	(84)	-	-	-	-	-
foreign	1.00	(27)	-	-	-	-	-	-	-	-	-	-	-	-	(86)	-	-	-	-	-
Re-investment mobiles																				
domestic	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
foreign	1.00	(2,092)	-	-	-	-	-	-	-	-	(1,727)	-	-	(1,983)	-	-	-	(2,278)	-	-
Re-investment Mechanical/electrical TS																				
domestic	0.97	(18)	-	-	-	-	-	-	-	-	-	-	-	-	(58)	-	-	-	-	-
foreign	1.00	(19)	-	-	-	-	-	-	-	-	-	-	-	-	(60)	-	-	-	-	-
Re-investment Containers																				
domestic	0.97	(484)	-	-	-	-	-	-	(237)	-	-	(261)	-	-	(289)	-	(319)	-	(352)	-
foreign	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operation & maintenance																				
Landfill																				
domestic	0.97	(4,126)	-	-	(219)	(233)	(248)	(265)	(282)	(301)	(318)	(373)	(393)	(465)	(491)	(611)	(650)	(687)	(858)	(907)
foreign	0.97	(816)	-	-	(38)	(40)	(44)	(48)	(51)	(56)	(60)	(72)	(77)	(93)	(99)	(129)	(137)	(146)	(191)	(205)
Transfer stations	0.97	(1,526)	-	-	(77)	(82)	(86)	(94)	(101)	(108)	(115)	(137)	(145)	(172)	(183)	(233)	(245)	(261)	(335)	(357)
Collection system	0.97	(931)	-	-	(56)	(59)	(62)	(65)	(69)	(72)	(76)	(86)	(90)	(103)	(108)	(129)	(135)	(141)	(169)	(177)
Closure existing dumpsites	0.97	(244)	-	-	(29)	(32)	(34)	(37)	(39)	(42)	(45)	(55)	-	-	-	-	-	-	-	-
correction unskilled labour																				
unskilled labour during construction		1,797	803	778	-	-	-	-	-	-	-	-	449	-	-	521	-	-	-	371
unskilled labour during operations		452	-	-	21	22	24	26	29	31	33	40	43	52	55	71	76	81	104	111
Conversion from market to economic prices		(4,378)	(3,801)	(5,391)	367	388	411	444	236	514	(1,175)	417	(1,240)	(1,114)	368	(1,066)	974	(892)	1,460	3,272
Total cash flow before financing		(851)	(3,598)	(5,391)	582	616	648	690	492	780	(898)	729	(915)	(749)	748	(620)	1,438	(410)	2,025	3,860
Cumulative cash flow			(3,598)	(8,989)	(8,407)	(7,792)	(7,144)	(6,454)	(5,962)	(5,182)	(6,080)	(3,518)	(4,433)	(2,903)	(2,154)	1,692	3,130	2,720	11,110	14,969
Discount rate	%	7.0%																		
ENPV	%	6.2%																		
ENPV	€ '000	(851)																		
B/C ratio	factor	0.94																		

Table 5-95 Economic cost benefit analysis – high case

Amounts in € '000	CF	NPV 7.6%	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
correction VAT on investment		190	203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fiscal corrections		190	203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net overall external benefits - high		32,759	-	-	2,403	2,543	2,646	2,753	2,864	2,980	3,100	3,491	3,632	4,091	4,256	4,987	5,188	5,398	6,324	6,580										
External benefits		37,317	-	-	2,403	2,543	2,646	2,753	2,864	2,980	3,100	3,491	3,632	4,091	4,256	4,987	5,188	5,398	6,324	6,580										
Revenues																														
Tipping fees	0.97	11,649	-	-	530	581	631	686	738	794	854	1,034	1,102	1,333	1,421	1,832	1,953	2,080	2,684	2,860										
Waste collection fees	0.97	3,015	-	-	206	199	198	204	209	225	231	272	288	317	349	414	431	460	577	617										
Existing dumpsite closure fee	0.97	244	-	-	29	32	34	37	39	42	45	55	-	-	-	-	-	-	-	-										
Residual value	0.97	444	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Investments																														
Landfill phase 1																														
domestic	0.97	(3,257)	(2,891)	(636)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(1,930)	(1,713)	(377)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Transfer stations																														
domestic	0.97	(228)	-	(261)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(75)	-	(86)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Transportation																														
domestic	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(304)	-	(348)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Waste collection equipment																														
domestic	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(636)	-	(729)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Closure existing dumpsites																														
domestic	0.97	(1,605)	-	(1,838)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(1,655)	-	(1,895)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Phase 2/closure phase 1																														
domestic	0.97	(494)	-	-	-	-	-	-	-	-	-	-	-	(1,190)	-	-	-	-	-	-										
foreign	1.00	(509)	-	-	-	-	-	-	-	-	-	-	-	(1,227)	-	-	-	-	-	-										
Phase 3/closure phase 2																														
domestic	0.97	(333)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,379)										
foreign	1.00	(343)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,422)										
Closure phase 3																														
domestic	0.97	(148)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
foreign	1.00	(152)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Re-investment WWTP landfill																														
domestic	0.97	(26)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(84)										
foreign	1.00	(27)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(86)										
Reinvestment mobiles																										</				

5.3.12 Potential for additional revenues

In September 2007, the Serbian parliament ratified the Kyoto protocol. This enables the sale of carbon credits through the Clean Development Mechanism (CDM) in Serbia. For this reason, this paragraph explores the possibilities of initiating an optional landfill gas to electricity project, which would be partly financed by the sale of carbon credits.

Assumptions of the landfill gas to electricity project are elaborated upon in paragraph 5.3.3. In addition, two scenarios are calculated:

- Revenues generated by electricity sales only;
- Revenues generated by both electricity and carbon credit sales.

The second scenario assumes that carbon credit sale will be possible after 2012, when the current Clean Development Mechanism expires. Secondly, only the impact on the macro-economic base case scenario will be analyzed. The analysis further assumes that the investments will be financed from internally generated funds.

Revenues from electricity sales to the national grid can start from the year 2016. Carbon credit sales start as from the year 2011. Part of the generated electricity will be used by the landfill operations. This will fetch higher revenues than sale to the national grid, because these



avoided costs are valued at 100% of consumer prices, whereas electricity sale to the national grid is estimated to be 80% of consumer prices.

In order to generate electricity from landfill gas, a generator and auxiliary equipment will need to be invested in the year 2016, estimated to amount to € 465 thousand in 2010 prices.

The landfill gas to electricity project with electricity sales, but without carbon credit revenues yields the following result:

- During the project period 2008 to 2035, the internal rate of return is below 8% and the net present value € -292 thousand at 8% nominal discount rate;
- The investment in the electricity generation component can initially be financed from internal sources in the year 2016. However, due to the negative results, cumulative cash turns negative during the years 2020 and 2023, so that the Regional PUC would need to attract alternative financial sources.

The landfill gas to electricity project with revenues from carbon credit sales and carbon credit sales shows the following result:

- During the project period 2008 to 2035, the internal rate of return is positive at 13.9%, with a net present value amounting to € 97 thousand at 8% nominal discount rate;
- The investment in the electricity generation component can initially be financed from internal sources in the year 2016. However, due to the initial cash requirements, cumulative cash turns negative during the year 2020, so that the Regional PUC would need to attract alternative financial sources, or arrange for an overdraft facility.

Table 5-96 Financial cost benefit analysis LFG to electricity without carbon credits

	Unit	Rate	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2027	2035
Amounts in € '000																			
Cash inflow			-	-	-	-	-	-	89	85	125	129	141	161	188	243	260	282	226
LFG - carbon credit sale			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG - electricity sale			-	-	-	-	-	-	89	85	125	129	141	161	188	243	260	282	226
Cash outflow			-	-	-	-	-	-	608	149	157	165	174	182	191	201	211	246	366
Investments			-	-	-	-	-	-	465	-	-	-	-	-	-	-	-	-	-
Phase 1 - gas collection			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 1 - gas collection			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land fill gas to electricity			-	-	-	-	-	-	465	-	-	-	-	-	-	-	-	-	-
Operation & maintenance			-	-	-	-	-	-	142	149	157	165	174	182	191	201	211	246	366
Landfill gas - infrastructure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landfill gas - gas engine			-	-	-	-	-	-	142	149	157	165	174	182	191	201	211	246	366
Total cash flow before financing			-	-	-	-	-	-	(519)	(65)	(32)	(36)	(33)	(21)	(4)	42	48	36	(140)
Cumulative cash flow			-	-	-	-	-	-	(519)	(584)	(616)	(652)	(685)	(706)	(709)	(668)	(619)	(467)	(667)
Internal rate of return - nominal	%	#NUM!																	
Discount rate - nominal	€ 000	8.0%																	
Net present value	%	(292)																	

Table 5-97 Financial cost benefit analysis LFG to electricity with carbon credits

	Unit	Rate	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2027	2035
Amounts in € '000																			
Cash inflow			-	3	8	14	25	33	136	126	183	186	199	223	256	343	348	356	260
LFG - carbon credit sale			-	3	8	14	25	33	47	41	59	57	58	62	68	100	89	74	34
LFG - electricity sale			-	-	-	-	-	-	89	85	125	129	141	161	188	243	260	282	226
Cash outflow			-	-	-	-	-	-	608	149	157	165	174	182	191	201	211	246	366
Investments			-	-	-	-	-	-	465	-	-	-	-	-	-	-	-	-	-
Phase 1 - gas collection			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 1 - gas collection			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land fill gas to electricity			-	-	-	-	-	-	465	-	-	-	-	-	-	-	-	-	-
Operation & maintenance			-	-	-	-	-	-	142	149	157	165	174	182	191	201	211	246	366
Landfill gas - infrastructure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landfill gas - gas engine			-	-	-	-	-	-	142	149	157	165	174	182	191	201	211	246	366
Total cash flow before financing			-	3	8	14	25	33	(472)	(24)	26	20	25	41	65	142	137	110	(107)
Cumulative cash flow			-	3	12	26	51	84	(388)	(412)	(385)	(365)	(340)	(299)	(234)	(92)	45	440	703
Internal rate of return - nominal	%	13.9%																	
Discount rate - nominal	€ 000	8.0%																	
Net present value	%	97																	

The analysis shows that a landfill gas to electricity is financially not feasible without carbon credit sale. Based on this analysis, it is recommended to make a decision about a potential landfill gas to electricity project only if sufficient security about the possibility of carbon credit sale is obtained. Since substantial carbon credit revenues are only expected as from the year 2016, the Regional PUC can simply postpone the investment decision until the year 2015.



6 INSTITUTIONAL AND LEGAL ANALYSIS

6.1 Introduction

In this chapter, the following issues are outlined and addressed:

- presentation of the overall regulatory framework;
- policy documents and roles and responsibilities of main project stakeholders;
- supervision and enforcement in solid waste sector and in respective municipalities,;
- description of legal status of a new regional solid waste company; and
- proposed measures for improvement of relations between the founders and the regional solid waste company.

6.2 Regulatory Framework

6.2.1 Legislative framework

General background

In 2004, Serbia has launched an ambitious programme to modernise its environmental management and harmonise its environmental legislation with EU Directives.

The body of environmental legislation in Serbia consists of a large number of laws and regulations (over 100). Legislative, executive and judicial powers are mostly practiced through the legally prescribed scope of competences of the Authorities of the Republic.

Environmental legislation includes laws and regulations on planning and construction; mining; geological survey; water, soil and forest protection; flora and fauna; national parks; fishery and hunting; waste management; production and trade of chemicals; trade and transport of explosive and hazardous materials; protection of ionizing and non-ionizing radiation; nuclear safety etc. An overview of relevant legislation is included in Annex 6.1

Harmonised environmental legislation

The new legal framework for environmental protection was introduced in the Republic of Serbia, in 2004, by:

- The Law on Environmental Protection;
- The Law on Strategic Environmental Assessment;
- The Law on Environmental Impact Assessment, and
- The Law on Integrated Prevention and Pollution Control

The most significant issues addressed by the Law on Environmental Protection include:

- the main principles of environmental protection;
- management and protection of natural resources;
- measures and conditions of environmental protection;
- environmental programs and plans;
- industrial accidents;
- public participation;

- monitoring and information system;
- clearly identified competences of the Environmental Protection Agency;
- reporting on environmental issues
- financing of environmental protection;
- inspection services, and fines

This Law also foresaw the creation of Ecological Funds for environmental investments. The new laws are harmonised with the EU Directives on Environmental Impact Assessment (85/337/EEC), Strategic Impact Assessment (2001/42/EC), IPPC (96/61/EC) and Public Participation (2003/35/EC). A number of EU Directives has been prioritised for transposition into Serbian Law. Relevant for Waste Management are the EU Directives on Packaging (2005/20/EC) and the Landfill Directive (1999/31/EC).

Serbia and Montenegro is a signatory to the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal. Harmonization with this convention as well as with the EU legislation is of special significance.

In September 2007, the Kyoto protocol on the reduction of greenhouse gas emission was ratified (Law on Ratification of Kyoto Protocol with the United Nations Framework Convention on Climate Change, RS Official Gazette 88/07).

Draft Solid Waste Law

The framework for Solid Waste Management (SWM) is provided by the draft Law on Waste. A modern Law harmonised with the relevant EU Directives has been drafted by the Government and is currently in the latest stages of approval and adoption by the National Assembly of the Republic of Serbia. The specific objectives of this piece of legislation are:

- to ensure compliance with EU Directives;
- to promote efficient implementation of solid waste legislation;
- to define the responsibilities at the three governmental levels: viz. national, regional, and local level;
- to facilitate private sector involvement in this sector

Important features of this Law are:

- **Planning**
The Government is obliged to develop a National strategy in combination with an action plan. Regional Waste Management Plans shall be prepared by two or more Municipalities, while local Waste Management Plans shall be developed by a Municipality. The planning horizon of all these plans shall be 10 years with a mid-term review/update.
- **Actors**
The Law distinguishes between the Parties that are obliged to set the conditions for SWM and the implementing Parties involved in SWM. The first category includes the Republic, the Autonomous Province of Vojvodina, Municipality or City, the Agency for Environmental Protection and the authorised professional organisations for waste testing and other organisation in line with the law while the second category comprises Producers, Owners, Waste Transporters as well as the Waste Treatment Facility and

Landfill Operators.

- Permitting and public information

Waste management permits are required for the:

1. collection;
2. transportation;
3. storage;
4. treatment, and
5. final disposal of waste

Permits for activities in the territory of a group of municipalities are issued by the Ministry. The Operator submits requests for permits and the Ministry has to inform the public within 15 days of the receipt of the request.

- Reporting

Municipalities, which have adopted a Regional Waste Management Plan, shall report on its realisation every two years to the Ministry. The Ministry submits an annual environmental report to the Parliament.

Producers and owners of waste shall maintain daily records on waste quantity, quality, generated and disposed of and report every six months to the Agency for Environmental Protection on waste delivered to the solid waste management facility, recyclable materials and waste and other materials transported to the facility. The Agency reports on its turn to the Ministry. The Ministry shall maintain a database on SWM. This database shall contain data on the quality, quantity and types of waste, facilities, storage, treatment and disposal of waste, permits issued for facilities operations and permits for import, export and transit of waste.

- Supervision and inspection

The Ministry supervises the Agency and Directorate for Environmental Protection, Municipalities and authorised legal entities. Inspection is carried out by the environmental protection inspectors of the Ministry. The Municipalities are in charge of the inspection of collection, transport and temporary storage of non-hazardous waste. Inspectors are authorised to monitor implementation of solid waste plans, permits etcetera prescribed by this law. Inspectors can order rehabilitation of the dumpsite/landfill after its closure and supervision of it up to 30 years after its closure. Inspectors can forbid storing, treatment or disposal of waste for the waste management facility for which the permit was issued.

Communal services

Handling of solid waste is defined as a communal activity (Law on Local Government RS official Gazette 9/2002) which belongs to the realm of the Municipality. The Municipality may either create to this purpose a Public Utility Company (PUC) or entrust the activity to another enterprise. If the establishment of a PUC would not be rational considering the scope of activities and the number of users, the Municipality can delegate these activities to a third party. Delegation of public utility activities is set for a period of up to five years but in case this delegation is issued in combination with the obligation to provide capital, the duration may last as long as the repayment period but not longer than 25 years.



The exploitation and development of public utility activities is financed from the sales of products and services of the public utility. Other possibilities include compensations for the development and utilisation of construction land, voluntary local taxes, and other legally possible sources (grants and subsidies).

Public utility activities may be organised for two or more municipalities together. In this case, the municipalities will regulate their internal rights and commitments in a separate agreement.

Public Companies

The set-up of a PUC is regulated in the Law on Public Companies and Activities of Common Interest ("Official Gazette of the RS", no. 25/2000, 25/02, 107/05). The Law deals with the establishment, the internal organisation, and the operation of Public Companies. A Company shall be established by a Founding Act and duly registered with the Serbian Business Registers Agency. Company regulations shall be defined in the Articles of Association/ Company Statute and any other documents required by Law.

Management is assured by a Manager who reports to the Management Board, which is the highest decision making body in the Company. The Management Board is supervised by a Supervisory Board who monitors the functioning of the Company, in particular, the financial documents such as the annual report and proposals for the allocation of profits is monitored, and the Founders (the Municipality) are advised accordingly.

The Law contains a numbers of provisions to protect the general interest in a Public Utility Company. The Municipality, in practice the People's Assembly, must approve the statute (and eventual changes) and major policy issues, i.e. tariffs, disposal of company assets, capital investments, etc, and nominates the Management of the PUC, i.e. Supervisory Board, Management Board, and the Manager.

The Ministry of Finance may send instructions to limit the annual increase in salary mass and tariffs. The annual accounts are submitted to the National Bank of Serbia and audited by external auditors. The Ministry of Finance through its Treasury sector controls financial aspects of the work of Public Utility Companies, which are indirect budget users.

According to the Law on Public Companies and Performance of Operations of Public Interest (Official Gazette RS 107/05), Article 22b and 23, it is clearly stated that the PUCs set tariffs upon projection for the following year and subject to the approval of the Municipality. The waste collection fees are never set to provide full cost recovery, and only cover for operational expenditures while the investments are provided for from the municipalities. There is no tariff setting formulae and the increase of tariffs has been under Governmental control as of 2006. The maximum annual increase for these services is limited by the following acts: the Law on Public Companies and Performance of Operations of Public Interest, Article 22, and 22a and 22b; the Decree on Temporary Discontinuation of Proceedings regarding the Transfer of Budgetary Funds of the Republic of Serbia to Local Self-government Units, (Official Gazette 06 / 2006, from 23 January 2006); and the Decree on manner and control of calculation and payment of salaries in public companies (Official Gazette RS 5/06). According to the instruction no. 023-0263/2006, issued by the Ministry of Finance on 6th February 2006, the fees could be increased by 9.3% cumulatively for the whole year of 2006. In year 2007, the



limit is set at 7.5% for the tariffs and 9% for salaries. In the event of introducing new activities, the salaries for the newly recruited staff must not exceed the average salary levels for the Municipality.

6.2.2 Policy framework

The National Waste Management Strategy (NWMS), approved in 2003, provides a comprehensive policy framework for rational and sustainable waste management in the Republic of Serbia. It contains general and sector specific goals and objectives and determines principles of waste management implementation and planning.

Solid waste is generally classified as controlled and uncontrolled waste. Controlled waste includes domestic, commercial, and industrial waste and medical waste. All the mentioned types of waste may be inert, hazardous or not. Uncontrolled waste includes agricultural waste, and waste from mining and quarry industry.

An important element of the Strategy is the waste management policy analysis, which addresses the following issues:

- waste volume development in the Republic of Serbia;
- waste collection and the main problems in this area;
- waste treatment and the lacking capacities in this field;
- current uses of disposal sites and developments in the near future

The Strategy identified regional clusters of different types of environmental infrastructure mainly based on technical and economic criteria:

- a network of **regional landfills**: 29 regional clusters for 160 municipalities;
- a network of **transfer stations**: 44 regional clusters for 63 municipalities;
- a network of **recycling centres**: 17 regional clusters for 160 municipalities;
- a network of **composting centres**: 7 regional clusters for 146 municipalities;
- a network of **incinerators for communal waste**: 4 incinerators for 160 municipalities

The orientations of the National Waste Management Strategy is again confirmed in the draft National Environmental Strategy (NES) and the corresponding National Environmental Action Plan (NEAP).

The NES describes a coherent comprehensive strategy on Environmental Management and attaches a high priority to waste management. The most relevant elements of the NES which bear on the Toplica SWM comprise amongst others:

- **Legislative**: harmonisation of National waste legislation with the EU Environmental Acquis;
- **Regulatory**: environmental quality standards, a.o. revision of the technical requirements for sanitary landfill sites following the Landfill Directive 99/31/EC;
- **Economic instruments**: introduction of economic instruments, a.o. application of volumetric waste charges (Polluter Pays Principle), application of full cost recovery and the introduction of a landfill and methane tax;
- **Monitoring**: improvement of monitoring and information systems, a.o monitoring of

- waste volume, composition, and physical-chemical characteristics;
- **Financing:** earmark environmental revenues for environmental investments and channel by preference through the Environmental Protection Fund and harmonise them with other earmarked environmental funds;
- **Institutional:** strengthening of the Environmental Monitoring System, the Environmental Inspectorate, and Environmental Protection Fund. Establishment of Inter-municipal Waste Management Councils;
- **Infrastructure:** extend the existing infrastructure (vehicles and containers) for collection and transportation, build transfer stations to serve the regional landfills, building of regional landfills for at least 50% of the population.

The NEAP component dealing with Waste Management for the period 2005 – 2009 identifies 12 policy objectives and 58 actions. The policy objectives that are most relevant for the Toplica District Landfill Project comprise:

- To harmonise National waste legislation with the EU Environmental Acquis – i.e. packaging;
- To develop integrated waste management plans for all regions following the Waste Framework Directive 75/443/EEC by 2009;
- To extend municipal waste collection to cover 80% of the Serbian population by 2008;
- To establish sanitary landfills in each region by 2014 according to the technical and operational requirements of the Landfill Directive 99/31/EC (10 landfills the coming 5 years);
- To (safely close and) re-cultivate dumpsites that pose the greatest environmental risks;
- To increase recovery and recycling of packaging waste (glass, paper, cardboard, metal and plastics) to 25 % of their volume.

To align the project with the national solid waste management strategy the municipalities signed the Letter of Intent on Joint Solid Waste Management (see Annex 6.4) in which the following principles are outlined:

- Principle of sustainable development;
- Principle of closeness, and regional approach to waste management;
- Principle of precaution;
- Principle “the polluter pays”;
- Principle of waste management hierarchy;
- Principle of implementation of the most practical environmental options and
- Principle of producer’s liability.

The following goals are stipulated:

- Decrease of waste quantities;
- Re-use of waste (separation and recycling);
- Controlled communal waste disposal to a sanitary landfill and
- Special treatment of toxic waste, increase of solid waste coverage.

The Prokuplje project is in line with the NEAP components 3-5 above. Contents of the Letter of Intent indicate a set of integrated activities aimed at solid waste management, yet is not a legally binding document and further set of agreements is required in order to implement the intended solid waste management activities.

6.2.3 Institutional Framework

National Level

The Ministry of Science and Environmental Protection – **the Directorate for Environmental Protection** (DEP) - has the key responsibility in the field of environmental protection. The DEP has a wide range of responsibilities identified in the Law on Ministries (The Official Gazette R Serbia Nr 19/04 and 84/04). This Directorate is amongst others responsible for all Waste Management except for radioactive waste and environmental and sustainable development related inspection. The Sector for Inspection comprises three departments; the Inspectorate of Environmental Protection disposes of 45 inspectors and deals with the Inspectorates for Environmental Protection at municipal level. There is no clear separation of responsibilities between these two levels.

The Law on Environmental Protection (Official Gazette of the Republic of Serbia 135/04), created in accordance with the Basel Convention and EU legal framework, regulates general aspects of solid waste. The Law also provides for the establishment of the **Environmental Protection Fund**, and sets out the sources of financing for the Fund, the management of these funds and defines the supervisory bodies of the Fund (see box below). The Law provides for setting up environmental funds at the State, Provincial and local government levels. The revenues of the Fund include:

- part of the revenues from nature and resource use;
- pollution charges;
- a portion of funds resulting from privatization;
- funds from multilateral and bilateral international cooperation such as programmes, projects and other activities in the field of environmental protection and energy efficiency;
- re-invested income and revenues of the Fund;
- contributions, donations, grants and assistance, and other sources.

On August 23 2007, the Management Board of the Fund reached a Decision (No 060-00-08/2007-05/5.1) to allocate RSD 154,639,456, equivalent to € 1.9 million to the Utrine sanitary landfill site (Annex 6.2). This amount has a value of 40% of the investment required by the Municipalities for phase I of landfill construction, while the other 60% would have to be financed by the municipalities themselves.

Environmental Protection Fund

The Environmental Protection Fund was established in accordance with the Law on Environmental Protection in 2005. The Fund is designed to finance the preparation, the development and the implementation of environmental and energy efficiency projects but may also act as mediator in providing external financing for environmental projects.

The Fund is replenished by earmarked budgetary funds resulting from environmental charges, privatisation funds, and revenues realized from international cooperation, own funds and grants. 40% of the charges imposed on polluters go into the Republican budget while the balance is intended for the budget of the Local Self-Governance Units. These Units may also introduce environmental charges and establish Environmental Protection Funds at municipal or regional level.

The Fund may grant funds through loans, guarantees and other forms of collateral, subsidies, assistance and donations. The Annual Plan budgets 15 M€ investment of which 64% is planned for construction of regional sanitary landfills and 17% for the rehabilitation of existing dumpsites. Applicants will have to follow a public procurement procedure.

The Government passed a Decision (352-3744/2005-001 of 7 July 2005) that defined regional landfills and rehabilitation of existing dumpsites as the first priority. It is the intention to provide 70-80% of the total funds in form of grants at the beginning but to decrease to 50% with an increase of loan components to 30% by 2009.

The Development Fund was established by the Law on Development Fund of RS 20/92 and 107/05 and its objective is to support economic and regional development. It was announced that the Development Fund would provide RSD 120 million grant which is M€ 1,5 for the construction of the first phase of the regional landfill.

The Public Companies and State Aid Sector of the Treasury Department (Ministry of Finance) monitors the performance of the PUCs. The PUCs are monitored for salary levels and are given instructions on their annual plans.

Investments could be provided through the Ministry of Science of and Environmental Protection and its Environmental Protection Fund, while other Ministries may provide funds for the sectors in which they have line responsibility: the Ministry of Capital Investments for access roads, the Ministry of Agriculture, Forestry and Water Management with their Directorate for Waters for water and waste water. In 2006, the Ministry of Finance launched the National Investment Fund that is coordinated by the line Ministries and the Ministry of Local Governments with its Municipal Infrastructure Agency in the sector of municipal infrastructure.



The Standing Conference on Towns and Municipalities (SCTM) serves as a Professional Association for all municipalities in the country. The members pay an annual fee in accordance to their size and budget. The SCTM acts as a platform for exchange of best practices and advocacy. It has established a Working Group for Solid Waste Management and is currently promoting a manual for the development of Regional Waste Management Plans. Municipal Waste Operators are united in a professional organization KOMDEL.

Regional level

The role of the Government at Regional Level is mainly coordinative and very limited. The NWMS has defined regional clusters for 29 regional landfills and 44 regional transfer stations. Please note that these regions are not prescribed but only serve as a guideline for a possible division in suitable regions.

Local level

The Municipalities are responsible for local government. Municipalities are headed by elected Mayors and controlled by an elected Municipal Council. The Municipality is responsible for communal services and usually handles this by means of a Public Utility Company (PUC), regrouping all the various services concerned. Usually, the PUC is able to cover its expenses for O&M but has to refer to the Municipality for investments. The Council will need to ratify the major decisions of the PUC, most notably tariffs and salaries, operational plans and reports on operations.

6.2.4 The roles and responsibilities of Public Administration in Solid Waste Management

Solid Waste Management is a complex field which touches on every economic activity in the country. In the following section, we will try to characterise the division of tasks and responsibilities between the different Governmental levels. Public Administration in Serbia focuses on the National, Provincial and local level but allows certain activities at Regional level. The NWMS, however, recognises that solid waste management cannot be solved alone at local level and that regional and in some cases national solutions are required. This realisation will require more activities to be carried out at regional level.

Planning

Policy development by its very nature is the prerogative of the National Government. This applies for legislative and regulatory activities. Strategic planning for waste management on the other hand is foreseen at national, regional and local level. National Authorities play a dominant role in planning as most (environmental) investments are provided by them. Important players in this respect are the National Investment Plan (NIP, implemented by respective ministries and their agencies) and the Environmental Fund (Ecofund, implemented by the Directorate for Environmental Protection).

Operations

Solid waste management is the responsibility of the Municipalities which found PUCs for this purpose. Waste collection and separation of secondary raw materials still is typically a governmental activity and no private operators have been signalled in this field yet. Some initiatives of Private Sector Participation are developed but no real experience on the ground is available. Waste collection is mostly concentrated on urban areas and effective. This is not the case for rural areas.

Supervision and enforcement

Supervision of environmental issues and larger polluters is carried out either by the Ministry of Science and Environmental Protection (the Environmental Inspection comprises 45 inspectors) and provincial inspectors or by the environmental Inspectors of the Municipalities. The Republican and Provincial inspectors are in supervision of municipal inspectorates. The Inspectorates will issue the environmental license and monitor its application. In reality no waste disposal site complies with the environmental regulations but cannot be closed down in absence of viable alternatives. It is the intention of the Directorate of Environmental Protection to close down all irregular waste disposal sites once a sanitary landfill is available in the region. The inspectors perform regular controls and also react upon complaints or upon the observed irregularities.

While environmental inspectors are focused on large polluters, dumpsites and large companies, Municipalities also have at their disposal a communal inspection which supervises hygiene in the public areas and is focused on small commercial companies, public utility companies and the population itself. This inspectorate also monitors collection and transportation of solid waste.

In Prokuplje two communal inspectors are employed with the Municipality. The Republican environmental inspectors control the method of solid waste treatment (eg compliance with the regulations on type of waste, secondary materials) while communal inspectors are in charge with illegal dumping. Subject to the report of the inspectorates, the PUCs for solid waste collection undertake activities on closure of illegal dumpsites. Data on inspection in other municipalities was not available at the moment of preparation of this study.

The municipalities reported illegal dumping practice in particular in the areas with no coverage with solid waste collection. Illegal dumpsites emerge in areas where bulk waste is disposed of by the citizens as there is no willingness to pay for collection of bulk waste. In the areas where the containers are located, the municipalities also reported inappropriate waste disposal due to the insufficient number of containers and low level of public awareness. Therefore, increased coverage along with the increased number of containers and a public awareness campaign would contribute to overcoming this problem. Collection of bulk waste is foreseen by this project.



6.3 Regional Solid Waste Company

In the following section, existing inter-municipal agreements will be presented. In addition, agreements and required amendments to the existing municipal decisions that will affect the position of a new regional solid waste company will be recommended by the Consultant.

6.3.1 Relations between the RSW company and municipalities and its legal status

Communal services in Serbia are managed by Public Utility Companies (PUCs) in accordance with the Law on Communal Services (Official Gazette 16/97 and 42/98) and the Law on Public Utilities (Official Gazette RS 107/05). The Law on Communal Services envisages that an agreement signed between the municipalities is a legal document by which communal activities may be arranged in between two or more municipalities. Such Agreement shall include: definition of mutual rights and obligations in arranging communal activities in municipal respective territories, rights and obligations of PUCs operating the system and method of decision making in event of disagreement by one of the municipalities (eg. tariff setting, control).

The Agreement on Joint Solid Waste Management

On November 12 2006, the Mayors of Prokuplje, Zitoradja, Blace and Kursumlija signed the Agreement on Joint Solid Waste Management (No 400-1087/06-01) The Agreement was backed up by the Decision to enter the regional solid waste scheme by the Municipality of Blace (No I-352-205/06, April 2006), the Municipality of Kursumlija (No I-501-104/2006, November 2006), and the Municipality of Zitoradja (No 352-446/06, September 2006), see Annex 6.4.

The Agreement envisages the following scope of activities to be carried out by the signatories: preparation of preliminary design, provision of permits, preparation of main as built design, founding of a joint company to manage the scheme and concluding the contract on construction of the landfill and financing the construction, The Agreement further envisages that an Implementation Committee shall be formed which has not been done by the time of finalisation of this study

The Agreement constitutes solid grounds to start process of forming a regional solid waste management scheme, however it does not have a form of a legally binding document in which rights and responsibilities of parties involved are defined. Therefore, an additional Inter-municipal contract was proposed by the Consultant.

6.3.2 Recommendations and Conclusions

In the following section, the consultant will present a set of legally binding agreements that are required to found and strengthen the position of the regional Public Utility Company that will be managing the scheme.

Recommended Inter-municipal Contract

In the process of preparation of this study, the municipalities prepared a Draft Contract on Founding, Construction, and Use of the Regional Sanitary Landfill, (hereinafter: the contract) see Annex 6.4.

The Draft Contract specifies the following:

- Provision of funds for construction, use and maintenance of the Regional Sanitary Landfill;
- Provision of funds for founding and operations of a Joint Regional Public Utility Company and
- Manner of decision making in the event of disputes.

The contract specifies the value of landfill construction investment and participation in the founding as follows:

- Eco-fund 40% (RSD 154 million);
- Republican Development Fund 31% (RSD 120 million) and
- Municipalities 29% (RSD 110 million).

As a guarantee for participation of the municipalities, issuing draft bills of exchange is foreseen.

Preliminary discussions at inter-municipal level indicate that the municipal funding shall be set in line with the population data but also with the budget capacity of the municipalities, in RSD million: Prokuplje 50, Kursumlija 30, Blace 20 and Zitoradja 10. Participation of each of the municipalities in percentages and the value of guarantees has not been included in the Draft Contract yet.

Recommended contents of the PUC statutory documents

The Law on Public Utility Companies (Official Gazette of the RS, no. 25/2000, 25/2002 and 105/1005) envisages that the PUCs must have a Founding Act and the Statutes and defines its contents.

The **Founding Act** shall be the agreement between the two partners to establish and operate the RSWM scheme which shall define their mutual rights and obligations. The Founding Act shall define (i) the purpose of the Company, (ii) the resources (capital) put at the disposal of the Company, (iii) the rights and obligations of and to the Founders, (iv) decision making, and (v) eventual profit sharing (vi) measures for environmental protection

The **Statutes** are more detailed and determine roles and responsibilities of governing bodies of the PUC, lists general enactments of the Company such as rule books, books on procedures and role of labour unions.

In the Draft Contract referred to above, the following contents of the Founding Act are included:

- Definition of the property of the regional PUC as state owned capital and a possibility of a PUC to have its own capital;
- Participation in the founding capital in compliance with the participation in founding the construction of the landfill, expressed in percentages;
- Provision of funds for operations of the regional PUC as expressed in the PUC Annual Operational Plan (to be prepared);
- Foreseen method of operations so as to ensure continuity, quantity and quality, efficiency improvement, environmental protection, adherence to health regulations, set priorities in event of force majeure and assure functionality of facilities and equipment;
- Governing bodies of the PUC, namely: the Director, the Management Board, and the Supervisory Board;
- Composition of and majority of vote in the Management Board: one representative from each of the municipalities and one representative of employees, where the voting right is in line with the participation in funding expressed in percentages;
- Right to profit (foreseen use for improvement or extension of the system) and coverage of loss by the municipalities in line with the foreseen participation in funding expressed in percentages;
- Obligation of the Management Board to define the level of tipping fees
- time limit of 30 days for endorsement of all municipal decisions related to the PUC operations;
- Proposed alternatives in event of disputes related to decision making, endorsement of decisions by the Municipalities and breach of the contract, namely: a) loosing the right to the capital employed b) forming Arbitrary Committee whose decisions would be binding for all parties and c) majority voting system in line with the percentages of capital employed
- Obligation of the Founders to provide consent/endorsement of the following: the PUC Statutes, issuing guarantees, Decision on tariffs and tariff setting system, purchase and sales of property the value of which exceeds the limits stipulated in the Founding Act (to be specified), Decision of general conditions for delivery of products and services, capital investments, statutory changes, Decision on valuation of state-owned capital which will be expressed in shares and Program and Decision on property transformation

The Consultant recommends the following amendments/addendums to the Draft Contract:

- Delete items related to ownership of the secondary (recyclable) material as separation shall not make part of the PUC operations and insert ownership of the waste collected by local public utility companies in participating municipalities (Articles 2,9 and 21);
- Specify in percentages participation in the investment of each municipality;
- Specify the founding capital of the PUC and
- Insert obligation of local PUCs to issue draft bills of exchange to the Regional PUC as a guarantee for regular payments for waste disposed of at the regional landfill.

Founding of the Regional PUC is expected in January 2008.

Recommended Agreements on PUC operations

The set of aforementioned documents is prescribed by law. It however does not address operational efficiency and mutual responsibilities in that respect. Legal background that may enable introduction of additional agreements along with the proposal on a Service Level Agreement is given in section 7.3.5.

Recommended Regional Solid Waste Management Plan (RSWMP)

Responsibility for preparation of a Regional solid Waste Management Plan is with the local authorities and regional bodies established by the municipalities. The procedure is as follows:

No	Activity	Responsibilities	
		Local level	Regional level
1.	Draft Decision to prepare a Regional Solid Waste Management Plan (RSWMP)	-	Regional Committee
2.	Endorse the Decision	Municipal Parliaments	
3.	Preparation of a Plan	Consultants	
4.	Endorsement of RSWMP	Municipal Parliaments	
5.	Draft a Contract on RSWMP implementation	Regional committee	
6.	Endorse the Contract	Municipal Parliaments	
7.	Monitoring the implementation of the (RSWMP)	Regional Committee	

The recommended contents of the RSWMP are as follows:

- Legal framework: present and expected changes;
- Analysis of existing solid waste management practise in the region;
- Strategic plan and specification of goals;
- Institutional and organisational issues: roles and responsibilities at local and regional level;
- Environmental protection best options: scope of present separation at source, possible increase/improvements;
- Financial analysis with cost effectiveness;
- Socio-economic issues;
- List of recommendations; and
- Implementation and monitoring plan.

The following obligations resulting from the Regional Solid Waste Management Plan should be included in the Inter-municipal Contract:

- Activities required for implementation of the plan;
- Rights and liabilities of parties involved in the process of RSWMP implementation;
- Time frame for execution of liabilities;
- Provision of the funds required for the implementation of the RSWMP and
- The body responsible in the event of disputes.

The funding for the preparation of the RSWM plan has not been identified yet.

Recommended Amendments to Municipal Decisions on Communal Arrangements

The Decisions on Communal Arrangements (hereinafter: the Decisions) form legal grounds for implementation, supervision and inspection of all communal activities in the territory of municipalities in which they are enacted by municipal parliaments. In solid waste sector, the Decisions define authorities, method of performance, criteria for quality and frequency of services performed by PUCs as well as authorities of inspection and penalties imposed at PUCs, citizens and commercial enterprises.

In Prokuplje, two municipal Decisions related to solid waste collection are effective, namely the Decision of waste disposal and the Decision on taxes, none of which stipulates the location of the dumpsite or the authorities of inspectors.

It is recommended that the Decisions on Communal Arrangements be prepared and/or amended in line with the Inter-municipal contract and foreseen authorities of the existing local and the new regional PUC. In particular, the following amendments referring to the entire territories of the four municipalities should be included:

- Authority of the regional PUC in the process of solid waste management;
- Exclusivity of use of the regional landfill for solid waste disposal;
- Type of waste that can be disposed at the regional landfill;
- Enforced use of solid waste services in the territories;
- Revised authorities of the of the two existing public utility companies;
- Authorities of inspectors in all municipalities;
- Penalties that may be imposed at citizens, legal entities and the public utility companies and
- Frequency of waste collection.

The overview of existing and required documents and activities to be taken by the municipalities in setting legal and institutional framework is given in Annex 6.3.

All municipal Agreements and statutory documents referred to above have to be endorsed by the Parliaments of all four Municipalities.

The project implementation plan is given in chapter 8.

Conclusions

Prokuplje regional landfill project is in line with existing national legislation and policy. A set of Inter-municipal agreements and amendments to municipal Decisions will be required in order to define responsibilities and authorities of municipalities as well as to further strengthen the position of the envisaged regional solid waste management company. In the process of preparation of this study, the municipalities acted in line with the recommendations of the Consultant in preparation of the Inter-municipal Contract. Additional founding and consultancy services will be required for preparation the Regional Solid Waste Management Plan.

7 OPERATIONAL EFFICIENCY

7.1 Introduction

In this chapter an assessment of performance of local solid waste Public Utility Companies has been presented and a proposal on organisation and management of the new regional solid waste management company that will be established for the management of the regional solid waste management scheme. The consultant proposed a number of measures to be introduced in order to create an efficient solid waste management organisation.

7.2 Existing situation

Presently there are four municipal Public Utility Companies offering solid waste services in the project area of Kuršumlija, Prokuplje, Blace and Žitorađa. These are:

- PUC Toplica (Kuršumlija);
- PUC Žitorađa (Žitorađa);
- PUC Blace (Blace);
- PUC Cistoca (Prokuplje).

The PUC Cistoca (Prokuplje) offers services in solid waste, public hygiene and park maintenance. Other PUCs are, in addition to solid waste services, responsible for additional following activities:

- Potable water treatment and distribution;
- Public hygiene;
- Cemeteries;
- Green market maintenance;
- Waste water collection (Kuršumlija, Žitorađa)

The PUC Blace is also responsible for heating and construction works.

Solid waste services in all municipalities consist of collection and disposal at non-sanitary dumpsites. Separation of recyclable materials has been introduced to the limited extent in all local PUCs. Details on solid waste services provided by the PUCs are given in section 3.1.5.

7.2.1 Organisation and staffing

PUC Toplica (Kuršumlija) has 86 employees out of which 10 managers. Out of this, 23 staff and 2 managers are employed in solid waste services.

PUC Cistoca (Prokuplje) has 111 employees out of which 13 hold managerial positions. Total number of employees in solid waste sector is 25.

PUC Žitorađa has 14 employees of which 3 in managerial positions. Total number of employees in solid waste sector is 3.

PUC Blace has 69 employees of which 10 in management and staff. 13 employees are in solid waste services. An overview of staffing per qualification in solid waste services is presented in table 7.1.

Table 7-1 Overview of staffing per qualification in solid waste services

Qualification	Kuršumlja	Blace	Žitorađa	Prokuplje
University Degree	1	1		
College	1	-		
High School	-	1	1	
Vocational Qualification	5	-		
Qualified	-	2		
Semi-qualified	-	-		
Unschool	18	9	2	
Total	25	13	3	25

In all PUCs staffing qualification level is appropriate for solid waste sector. Staffing efficiency was evaluated by the Consultant in terms of number of employees served and quantity of waste annually collected per employee. A comparison of staffing efficiency indicators is given in table 7.2 below.

Table 7-2 Staffing efficiency indicators

Municipality	No of employees in solid waste services ¹⁰	Employees per 1,000 people served	Ton waste collected per employee/year
Užice	63	0.90	204
Čačak	76	0.89	207
Šabac	74	1.13	288
Sremska Mitrovica	40	0.93	332
Prokuplje	25	1.13	240
Kuršumlja	25	2.01	159
Blace	13	2.50	115
Žitorađa	3	6	56

The efficiency in providing solid waste service varies widely per utility company. The table above indicates that all PUCs have low staffing efficiency. Compared to the international standards, where up to 600 tons of collected waste per employee per year is reported, the utilities have quite some potential to improve. However, the number of routes and kilometers per route were not provided by the utilities, which would be required for a more accurate efficiency assessment. As the project foresees extension of collection services, it is recommended that no new employees are recruited to the existing PUCs and also to transfer a certain number of employees to the new regional PUC, as presented in table 7.6. .

¹⁰ Excluding overhead staff

7.2.2 Planning systems

Annual operational programs and their contents are prescribed by the Ministry of Finance as of 2006 and must include the following:

- Source of revenues (own, subsidies, other);
- Breakdown of planned expenditures;
- Method of profit allocation;
- Elements included in tariff setting policy;
- Elements included in employment and salaries policy;
- Criteria for use of aid funds, sports activities, marketing;
- Criteria for defining fees of the Management Board members and fees paid to Chairman of Supervisory Board.

All PUCs are obliged to prepare annual programmes and submit them to the Treasury at local or Republican level and also to the Ministry of Finance.

The 2007 **Annual plan** of **Prokuplje PUC** foresees the extension of collection in line with the capacity of the PUC. There are no specific and measurable targets set for those activities.

The 2007 **Annual plan** of **Blace PUC** foresees start of closure and rehabilitation of the local dumpsite, purchase of containers and extension of services to suburbs, closure of illegal dumpsites and a public campaign directed at citizens to purchase containers. It also foresees in a recycling project by placing containers for PET and paper. No specific or measurable targets are set.

The 2007 **Annual plans** of **Kuršumlja** and **Žitorađa PUCs** were not submitted by the time of finalisation of this study.

The **Investment planning** is limited to preparation of proposals which are then submitted to the Municipalities along with requests for funding. Both investments in regular maintenance and extension of services are limited by the financial capacity of the PUCs and the municipalities.

Operation and maintenance plans are not devised separately from annual plans and are limited to reactive maintenance.

7.2.3 Maintenance services

Maintenance services in Prokuplje are carried out by the Maintenance Department that performs mechanical works for all communal services that the company is involved in. With regard to solid waste management services, the Department is responsible for vehicle maintenance and containers repairs. The Maintenance Department has 8 employees. The PUC reported the age of the vehicles as one of the problems and also insufficient number of containers. Frequent break-downs of vehicles have an impact on the collection frequency and cause delays.

PUC Žitorađa is presently using equipment that has been purchased on leasing by the municipal directorate for construction. The PUC does not have its own department for maintenance; these services are outsourced.

In Blace PUC maintenance is carried out by the Vehicle Maintenance and Construction Department. The PUC reported that 4.7% of the total expenditures in solid waste sector are spent on maintenance.

In PUC Kuršumlija the Equipment and Mechanisation Department with its 2 employees is responsible for vehicle maintenance. The PUC reported 0.02% of the total expenditures in solid waste sector are spent on maintenance

7.2.4 Support systems

Management information systems are not developed in any of the PUCs and are limited to maintaining the database of consumers.

Customer relations are limited to the contacts with customers in the process of billing and collection services. Only Prokuplje has one employee responsible for complaints collection & handling. The total number of complaints per year amounts 50 - 60. Customer complaints are mainly reported in event of disturbances in the collection services that the PUCs contribute to break-downs of the equipment.

Financial operations and accounting systems of the PUCs are presented in chapter 5 along with the recommendations for improvement. Billing and collection pose a critical issue for the project success.

7.2.5 Conclusions and recommendations regarding the local PUCs

The local PUCs perform solid waste management services is below what is considered to be average practice in Serbia. Major investments are required in the solid waste collection services that will otherwise cause potential problems in the delivery of solid waste to the new regional landfill. This problem is addressed by the purchase of new equipment that is proposed in this project and also by the introduction of proactive maintenance.

The overstaffing can partially be resolved by transfer of employees from the local PUCs to the regional PUC, with no additional recruitment at local level. All PUCs should further develop their planning system through development of long-term business plans and proactive maintenance plans and also by management information systems that include precise billing and collection as well as monitoring of waste flows. Customer relations services need to be developed in all municipalities along with a public campaign aimed at appropriate use of solid waste management services. Billing and collection have been identified as the area of operations that requires to be urgently improved. This should be dealt with through collection systems changes, public campaign and staff trainings. Operational systems of the local PUCs need to be aligned with those of the regional PUC as presented in sections 7.3 to 7.5.

7.3 Future situation

7.3.1 Regional PUC corporate structure

The four municipalities signed the Agreement for establishing a new Public Utility Company that manage and operate the RSWM system (see chapter 6). After reviewing the possibility that Prokuplje's PUC manage the RSWM scheme, the consultants have opted for establishing a new company. A summary of advantages of such a corporate structure is given below.

Table 7-3 Multi-criteria evaluation of the most appropriate legal set-up

Item	1. Local (Prokuplje) PUC managing landfill	2. Regional PUC managing landfill, local PUCs perform collection	3. Regional PUC manages landfill and performs collection
Costs	+	++	+++
Decision making	+	++	++
Applicability	++	+++	+
Ownership	+	+++	++

+ less favourable, ++ neutral, +++ more favourable

We make the following observations:

- Costs: the option of the local PUC would be cheaper as it would profit from the existing infrastructure; even more favourable would be option 3 due to considerably reduced overhead costs;
- Decision making: the regional PUC options 2 and 3 have the advantage that the owners will have a forum for joint decision making in the Board of Management. The ratification of major decisions by the councils could be (partially) offset in the statutes of the Regional PUC, this would guarantee compliance of the municipalities with core issues related to RSWM scheme;
- Applicability: the Local PUC under a Management Contract is not recommended due to a) limited capability of a local PUC to manage the scheme b) identified lack of commitment of all municipalities to such scheme and in particular operation costs; the Regional PUC option 3 is not recommended at first stage as it requires separation of the solid waste component from the local PUCs through a legal procedure without a strong commitment of all municipalities to such model. Option 3 would be recommended at a later stage provided that the aforementioned conditions are met by all municipalities;
- Ownership: the regional PUC option 2 will have ownership of assets acquired through grants and other sources of funding. The regional PUC option 3 will have to separate and value assets from the existing combined services PUCs.

The advantages and disadvantages of the three options are given in a table below, along with practical examples.

Table 7-4 Options Legal set-up Utrine Landfill

Criteria	Advantages	Disadvantages	Examples	Observations
Option 1: Local (Prokuplje) PUC manages the regional landfill under a management contract				
Costs	Cheap (no overhead)		Landfill Nova Varos, Piro (under implementation, not operational yet)	New in Serbia
Decision-making		Municipal assemblies have to approve major decisions (de facto right to veto)		
Applicability		Capability of local PUC to manage a sanitary landfill Commitment required of all four municipalities		
Option 2: Regional PUC manages the regional landfill, local PUCs continue to collect solid waste				
Costs		Expensive (overhead) No creditworthiness as PUC is new	Regional RSWM scheme Duboko (new) Regional water supply scheme RZAV	New in Serbia for the solid waste sector
Decision-making		Municipal assemblies have to approve major decisions (de facto right to veto)		
Applicability	Complies with current practices Need to set up a new organisation through contract- agreement-founding act (legal basis for registering new PUC)			
Option 3: Regional PUC manages the regional landfill and performs solid waste collection in all municipalities				
Costs	Cheap, reduced overhead from both local PUCs		No such examples in Serbia present	
Decision-making		Municipal assemblies have to approve major decisions (de facto right to veto)		
Applicability		Need to set up a new organisation through separation of solid waste departments from the existing combined PUCs. Valuation of assets is required. Tariffs have to be harmonized in all municipalities regardless of the costs incurred (transfer station in Kuršumljaja)		

The **Capital** of the Company should be set at the value of the investment. Shares should be valued on basis of the proportion of initial capital provided by each of the municipalities.

The **Governing organs** in the new Public Utility Company will comprise a Supervisory Board, a Management Board, and a General Manager. The management of the Company will be ensured by the General Manager and the Management Board (the Administration). The Management Board decides a.o. on general policies, approves financial reports, budgets, investments, tariffs, decides on the allocation of profits c.q. coverage of losses (considering the advice of Supervisory Board) and makes the strategic planning (long term as well as middle term). The Management Board comprises members nominated by the Municipalities and a representative of the employees.

The Supervisory Board monitors on behalf of the Owners the general functioning of the Company and ensures that the Company operates within the statutes and Serbia Law. The Board advises on the allocation of profits. The Supervisory Board is composed of members nominated by the Municipalities.

Alternatives regarding the process of decision making and the qualified vote in event of disagreement have been proposed in the Draft inter-municipal contract (see chapter 6). A decision still has to be made on acceptable alternatives and has to be ratified by all municipal councils.

7.3.2 Operational arrangements

Before dealing with the organisation and the operational arrangement, it will be useful to highlight the business model behind the operations of the RSWMS.

The activities of the operation is to:

- accept waste collected by:
 - the Municipality of Kuršumlija at the transfer station;
 - the other municipalities at the gate of the sanitary landfill;
- compact and transport the waste to the sanitary landfill in case the waste is offered to a transfer station;
- sanitary disposal of the waste;
- and (in future) extract and utilise the biogas.

An overview of existing and future operations and the link between existing PUCs and the new regional solid waste management PUC is given in the table below.

Table 7-5 Overview of the change in activities in solid waste management services

Activities	Local PUCs	Regional PUC
Solid waste management activities		
Waste collection	Yes, increased collection over time	No collection services
Direct transport to the regional landfill	No change of scope for Prokuplje; Larger distance for Žitораđa PUC and Blace PUC ¹⁾ No activities for Kuršumljia	Transport of waste from Kuršumljia transfer station to the sanitary landfill
Transport to the transfer station	Yes, Kuršumljia PUC Yes, Blace PUC	No
Waste disposal at the landfill	No	Yes
Operations of the transfer station in Kuršumljia	No	Yes, new activity
LFG extraction	No	Yes, new activity
Landfill maintenance	Activity transferred to the regional PUC	Yes, new regulations
Financial operations		
Billing and collection to end users	Yes, improvement recommended (see chapter 5)	No
Billing and collection to local PUCs	No	Yes, new activity

1) PUC might consider transporting its waste to the Transfer Station of Kuršumljia

Bearing in mind that a number of activities will be transferred to the new Regional PUC, it is recommended that existing staff performing such activities is transferred to the regional PUC as presented in table in section 7.3.3.

The revenues of the operations are generated by the waste charges to the four Municipal PUCs responsible for the collection of waste in the respective Municipalities and by the sales of the valuable components (secondary raw materials), if any. The RSWM PUC should conclude contracts with each of the four PUCs for its services. The Municipalities should recover their costs by raising their fees for the various waste categories. However, since there is a limit on raising the tariffs at annual level, it is recommended to introduce separate charges for waste disposal.

The experience of the regional water supply system Rzav shows that the level of collection rate achieved by the local PUCs has an proportional impact on payments made to the regional PUC. In the project area the collection rates are rather low and range between 20% to 62%. Therefore, increase of the collection rate at local PUCs is required.

The economic rationale behind operating a landfill is that the economic lifetime should be extended as much as possible by waste minimisation. Apart from compacting the volume of waste is minimised by separating those components which can be processed in different ways, i.e. reuse, recycling. The last option is always disposal. Waste is preferably separated at the source. It is the task of the Municipalities to promote this its populations. The second best solution is sorting at the transfer station or landfill. The residual waste is subsequently compacted and transported in containers to the landfill. In this way transportation costs are minimised. The separated materials are, after claeing and/or compacting, sold to the recycling industries.

Business (landfill) operation requires proper management focussing a/o on costs reduction. Extension of the economic life of the landfill by minimising the amount of waste is an important element to achieve this. Selling the valuable components, extracted from the waste, is a second element. This includes biogas extraction and utilisation of it for electricity production. The possibility of generating Carbon Credit income is reflected in chapter 3.

Since some separation at source by the local PUCs is foreseen, the regional PUC shall not derive revenues from this activity.

An appropriate tariff strategy and structure should stimulate waste minimisation.

7.3.3 Organisational and management structure

Basic considerations

A project organisation conceived to facilitate the realisation of Utrine landfill complex shall basically need to cope with the following functions:

- Managerial: general management, external relations, regulatory compliance;
- Technical: one department dealing with the transfer station, the transportation and the sanitary landfill;
- Administrative/financial: one unit dealing with accounting and customer relation (billing and collection) and human resource management.

The following assumptions have been used in the review of the proposed organisation

- A separate Head Office shall be established in Prokuplje;
- Major vehicle maintenance and IT support will be outsourced;
- Working hours of the system shall be limited to 7 hours per weekday, 5 hours per Saturday, 6 days per week, (40 hours in total);
- In the table on the next page the full time positions are given.

Management

The proposed management structure should be able to (i) deal with new technologies, (ii) operate in a complex political environment, (iii) manage an operation at a limited number of different locations and (iv) realise this all in a cost effective manner. We propose that the Management structure consist of the following three management positions:

- General Manager: general management, external relations and regulatory compliance;
- Chief Technical Services: responsible for all technical operations i.e. the transfer station, the transportation and the landfill;
- Administrative/Financial Services Supervisor: responsible for all administrative operations, i.e. accounting and administration, customer relations (billing and collection), financial planning and human resource management.

The management shall be supported by the following staff positions:

- Business Secretary/Accounting Assistant;
- System Administrator (outsourced);
- Legal Advisor (outsourced).

Technical Services

The technical operations shall be directed by the Chief Technical Services and comprise the following operations:

- **Sanitary Landfill**
Operations comprise acceptance of waste, sanitary disposal; waste, leachate and LFG quality control, monitoring of the landfill, and general hygiene. Staff includes a laboratory/LFG operator, shovel/tractor/compactor driver, a sweeper and security/receptionists.
- **Transfer Station**
Operations comprise acceptance of offered waste, registration (weighing depending on the availability of a weigh bridge), disposal in containers and shunting (replace full containers by empty ones), release containers for transport (weighing), and maintenance of general hygiene. Staff comprises a shovel driver/operator, security/receptionists and worker/sweeper.
- **Transportation**
This operation concerns the transportation of containers from the transfer station in Kuršumlja to the Utrine landfill. Operations include operating of the long haul truck and open truck, small maintenance and urgent repairs. Staff will include a driver and a mechanic.

Administrative Services

The administrative operations shall be directed by the Administrative/Financial Unit Supervisor and comprise the following operations

- **Accounting/Financial Planning:** accounting will consist of collecting information, preparation of the necessary input files, consultation/reporting for the MIS, financial planning. Staff only consists of one business secretary/accounting assistant.
- **Housekeeping:** A coffee lady / cleaner can be employed in Utrine. As security and receptionist tasks are combined these are allocated to Technical Services.

Table 7-6 Staffing schedules

Position	Education	Tasks	Location	Existing	Total
Management			Prokuplje/Utrine	N-New	
General Manager	Academic	General management, external relations, regulatory compliance		N	1
Chief Technical Services	Academic	Technical management, responsible for the landfill, transportation, and the transfer station		N	1
Technical					
Landfill			Utrine		
Laboratory/LFG operator	Technician	Waste water and treated water analysis, LFG analysis		N	1
Driver/ operator	Technician	Operates shovel/tractor and compactor		E-P	1
Worker/Sweeper	Unschool	Trucks and mobile equipment washing and disinfection, Physical works, Auxiliary works, Cleaning			1
Security/receptionists	Technician	General security, accept waste, weighbridge, registration, issue statements		E-P	3
Transfer station			Kuršumlja		

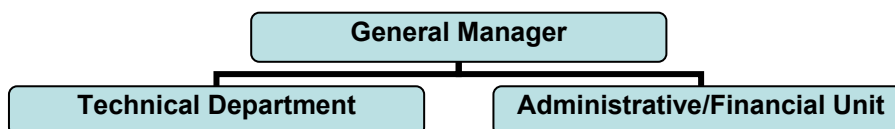
Position	Education	Tasks	Location	Existing	Total
Driver/ operator	Technician	Operates shovel/forklift and other heavy equipment-press machine, shunts containers		E-K	1
Worker/Sweeper	Unschool ed	Trucks and mobile equipment washing and disinfection, Physical works, Auxiliary works, Cleaning			1
Security/receptionists		General security, accept waste, weighbridge, registration, issue statements		E-K	3
Transportation			Kuršumlja/ Utrine		
Driver	Technician	Transportation of open truck and long-haul truck, compacted waste containers and offloading		E-K	1
Mechanic/Store keeper	Technician	Maintenance (mobile) equipments and urgency repairs			1
Administrative/ support staff					
			Utrine		
Administrative Financial Unit Supervisor	Academic/College	Accounting and administration, house keeping, reporting for the MIS, payroll, financial planning			1
Secretary/ Accounting Assistant	Technician	General secretarial work, correspondence, archiving, accounting data input, maintaining personnel files			1
Coffee lady/ cleaning	Unschool ed	Head office cleaning			1
Total Staff				9	18

E-P existing Prokuplje

E-K existing Kuršumlja

The organisational chart of the proposed regional PUC is presented below:

Figure 7-1 The proposed organisational chart of the regional PUC



7.3.4 Recommendations regional PUC

The regional PUC has a number of important factors working for it such as a clear need for a sanitary landfill in the region, a clear commitment of the donors and potential commitment of the municipalities to the investment, a legal set-up which could work if strictly applied, and compliance with national policies. However, a number of issues appeared that needs to be addressed. These issues concern:

Decision making processes

All major decisions of the Management Board need to be ratified by the Municipal counsels. This takes time while it is also not clear what will happen if no consensus is reached among the counsels. It will be necessary to come to a working arrangement to address this event. The obvious controversial items might be tariff increases and investment decisions. An agreement on a tariff formula with allowances for inflation that is updated annually is highly useful. Due to the government limitations on tariff increase (see chapter 6), alternative methods of payment through e.g. eco tax/separate charges for landfilling only should be taken into consideration. Decision making procedures need to be standardised for all counsels with a fixed time limit. Recommended is the preparation in time of plans for increases of tariffs/tipping fee within the Annual operational programme that is submitted once in a year for approval to municipal counsels. Also, procedures shall be established in event that the municipal counsels do not decide which is not uncommon in Serbia.

Proposed solutions:

- Tariffs should be based on an agreed formula. Tariff levels shall be evaluated annually by the Supervisory Board based on audited accounts, who will advise the Municipal counsels accordingly;
- Alternative method of payment is by the introduction of an eco-tax or separate charges for landfilling. Introduction of taxes and/or charges have to be approved by Municipal counsels;
- Standardise decision procedures with fixed time limit;
- Reach consensus on how to resolve disagreements in the voting procedures either through the Management Board or through the Intermunicipal Agreement.

For the last two items above, alternatives are proposed in Draft Inter-municipal contract (see chapter 6)

Cost recovery

A modern Sanitary Landfill will require on average that a new cell will be constructed every 5 years. In the case of Prokuplje, phase I is expected to cover a lifetime of 10 years. Although the first phase will mainly be constructed by using grant finances, a strict adherence to the cost recovery principle in order to reserve sufficient funds for future investments, but also clear commitment of the municipalities to support investments for which external funding is not provided, will be required. The principle of cost recovery has been recognised in the NWMS and confirmed in the draft Waste Law. Issues to address in these respects are tariff setting and approval, collection of outstanding invoices and safeguards that sufficient reserves can be built up for debt service and future investments. Experience of Rzav system shows that the collection rate of local PUCs has a proportional impact on payments to the regional system.

Proposed solutions:

- Municipalities will guarantee the payment in due time of their own PUCs;
- A special bank account shall be created for a dedicated reserve earmarked for debt service and investments;
- Municipalities shall commit their own funds for the construction of additional cells in event that full cost recovery is not reached;

- Local PUCs shall issue draft bills of exchange to the regional PUC.

Management

Serbia has no available human resources experienced in managing regional sanitary landfills. The required managerial skills of the management are high, not only in the field of operating a sanitary landfill in compliance with the requirements of the new Waste Law but also in dealing with Investment Planning and Commercial Management, i.e. sales of the valuable components, etc.. There is always the danger of interference of the owners in the day-to-day management, a/o with human resource management.

Managerial experience can be made available by contracting qualified Operators or Technical Assistance. Private Sector Participation (PSP) is not included in this RSWM scheme. Technical Assistance could cover a wide range of activities such as providing the specific technical skills, advising the Management, and train staff. This could be either realised by attracting a consultant or through development of a Financial and Operational Performance Improvement Programme. The latest has the advantages that a number of preparatory measures before starting up the landfill could be realised.

Proposed solutions:

1. Implement a Financial and Operational Performance Improvement Programme designed to prepare the RSWM PUC for the exploitation of the scheme and to create the proper conditions. The measures shall include as a minimum:
 - a) **Policy framework:** a Regional Solid Waste Management Plan (RSWMP) shall be prepared. The municipal PUCs and the regional PUC will need assistance to align their own operational plans with the RSWMP;
 - b) **Service Level Agreement:** assist the four Municipalities and the regional PUC to develop a Service Level Agreement with realistic targets;
 - c) **Decision making:** assist the four Municipalities and the regional PUC to come up with pragmatic procedures for decision-making on strategic issues. Reach consensus on a tariff structure and its approval or on introduction of separate charges or taxation;
 - d) **Information Systems:** develop and implement the required information systems with at least an accounting system, a waste registration system and a Management Information System (MIS);
 - e) **Outsourcing:** identify tasks which are economically attractive and feasible to outsource and conclude the necessary arrangements. These tasks could include major vehicle maintenance or information system administration;
 - f) **Organising:** design of the organisation structure and staffing requirements, recruitment, and training. Develop and implement the necessary manuals of procedures. Issues to address are a/o how to deal with waste that is not accepted at the landfill, how to deal with large waste producers, etc;
 - g) **Annual operational plan of the regional PUC:** assist the new regional PUC in developing the annual operational plan which is a prerogative for the start of operations as prescribed by the MoF;
 - h) **Business Plan:** develop a business plan with a time horizon of 5 years with clear targets. Investigate the possibility of a performance-based incentive scheme.
2. Attract a consultant as Advisor to the management of the regional PUC



7.3.5 Service Level Agreement

Both the Founding Act and the Statutes are of a very general nature and are not specific to the desired levels of operation of the regional PUC in financial, operational, as well as managerial terms.

The Law on Public Utility Companies Companies (Official Gazette of the RS, no. 25/2000, 25/2002 and 105/1005, hereinafter: the Law) states in Article 8 that in addition to the Founding Act and the Statutes a contract may be concluded between a public utility company and a local self-governemnt unit. The Contract may contain specific provisions regarding:

- Work and operations of the company;
- Rights and obligations regarding utilizing of the funds in state ownership for performing of the activities of common interest, in accordance with the Law;
- Company obligations regarding provision of conditions for continuous, tidy and quality satisfying of the consumers' needs for products and services;
- Mutual rights and obligations in case that economic and other conditions for performing of the activities of common interest have not been met;
- Rights and obligations in case of disturbances in company operations;
- Other rights and responsibilities deriving from the provisions of the Law regulating performance of individual activities of common interest and of this Law;
- Other questions important for resolving and protection of the common interest.

Although there is a legal possibility for this type contracts to be prepared, this is not a common practice in the country. Internationally, defining financial, operational and managerial requirements in a contract is usually done through a management contract or a Service Level Agreement (SLA). Experience with a SLA has been gained in Serbia with the PUC of Subotica for drinking water and wastewater.

Basically, a SLA is an agreement between the Municipalities and the PUC on the sustainable exploitation of the RSW system. It defines the roles and responsibilities of the Municipalities and the PUC vis-à-vis the Users and the General Public. The SLA breaks down the business processes of the PUC and identifies the acceptable practices to be applied, the service levels and the performance indicators which should be met (benchmarking).

Accepted Practices

Accepted Practices in general contain a brief description of a critical process, identify the required methodologies, and indicate the minimum acceptable standards. The SLA should comprise at least accepted practices for the following key processes:

- Acceptance of waste, i.e. the acceptance or rejection of waste offered to the regional PUC (either at a transfer station or at the landfill);
- Compacting of waste;
- Transportation of waste;
- Deposal at the sanitary landfill;
- Operating of the sanitary landfill;
- LFG extraction (& ulitisation if feasible);

- Waste registration and reporting, also anticipating on future legal requirements
- Maintenance of the assets of the PUC;
- Billing and collection;
- Complaints;
- HSE (Health, Safety and Environment);
- HRM (Human Resources Management).

Service levels

Service levels define the minimum service level provided by the Utility to its clients, i.e. the four local PUCs. This in fact only relates to acceptance and billing.

- Acceptance
 - Operating hours;
 - Queuing time;
 - Hygienic conditions.
- Billing and collection
 - Invoicing;
 - Debt management;

Performance indicators

The four owners are entitled to expect that the management of the regional Solid Waste Management system is efficient and state-of-the-art. This is usually measured through performance indicators (benchmarks). The final choice of the performance indicators depends on the level of detail and the meaning the management wishes to assign to this tool.

- Effectiveness
 - Transfer Station: Average queuing time;
 - Transportation: Transported tons/km;
 - Maintenance: downtime/category of equipment.
- Efficiency
 - Transfer Station: Costs/ton collected waste;
 - Transportation: Costs/ton transported waste;
 - Sanitary landfill: Costs/deposited waste.
- Financial
 - Cost recovery;
 - Collection Efficiency/Debtor days.
- Management
 - Staff/ton collected waste;
 - Compliance with the law (including all necessary permits).

A vital component of the SLA is also the list of the obligations of the Municipalities to ensure the sustainability of the operation. For the regional Solid Waste Management system these should as a minimum comprise:

- Policy:
 - The establishment of a Regional Waste Management Plan endorsed by all Municipalities.
- Financial:

- The engagement of the Municipalities to maintain the adequate balance ratios;
- The engagement of the Municipality to cover defaulting local PUCs.

The SLA finally should deal with the case of non-respect of the agreement and deal with sanctions, arbitration and resiliation.

We recommend that the SLA will be developed during the project implementation phase and agreed upon by all major players. It will be necessary to update the SLA regularly and it is advised to let the update coincide with the nomination of a new management.

7.3.6 Management Information Systems

Modern IT applications will be required to ensure that the regional PUC will be managed adequately as a system in its various aspects, also noting the demonstration effects of this Project. The following systems shall be needed:

Accounting system

The system needs to support International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS). The system shall recognize cost centres and contain a budgeting module. The system shall be linked to a Management Information System to allow monitoring of previously defined benchmarks.

Waste flow administration

This system shall record the waste flows from their first entry into the system, the various transformations and its ultimate destination. It shall deal with acceptance, transportation, disposal and billing. Automated data acquisition from the weighbridges should be considered. Automated billing may be considered but obviously depend on the volume. The systems should be able to produce a number of standard reports aimed at different audiences. It shall contain all information which will enable it to generate the required reports to the competent Ministries in line with the legal requirements.

Planning Systems

The new PUC shall maintain adequate models for financial planning which will be able to cope with capital planning as well as revenue planning. These plans will have to be backed up by municipal guarantees for investments.

Management Information System

The Management Information System should combine financial, technical, and commercial information, both short-term and long-term. It should be structured as a Business Plan with clearly defined operational targets and monitored regularly (monthly) for its realisation. The system should allow benchmarking and will facilitate the application of performance-based incentive schedules for core staff members.

The project implementation plan is given in chapter 8.

8 PROJECT IMPLEMENTATION SCHEDULE

8.1 Works and goods planning and procurement packages

The designer Company the Institute "Kirilo Savić", Belgrade, proposes three phases for the new regional sanitary landfill implementation including all infrastructural objects:

- Phase I: Construction of all infrastructure objects and phase I of the sanitary landfill body;
- Phase II: Construction of phase II of the sanitary landfill body;
- Phase III: Construction of phase III of the sanitary landfill body.

Based on the presented waste scenario (chapter 3) it is calculated that phase I of the sanitary landfill body will have sufficient space for almost 11 years. This means that the implementation of phase II should start around 2020. Phase III will be some 8 year thereafter.

Phase I is divided into two lots:

- Lot 1:
 - Construction (of phase I) of the regional sanitary landfill complex at Utrine.
- Lot 2:
 - Closure of the existing landfill in Prokuplje, Žitorađa, Kuršumlija and Blace (2 sites).
 - Construction of a transfer station;
 - Several mobile waste compacting / collection / transport equipment including containers and laboratory equipment.

Due to the fact that the EU-IPA funding decision can not be expected before the summer 2008, with funds actually becoming available by 2009, the project implementation of Lot 2, which is targeted to be funded by IPA, cannot start before the year 2009. Lot 1, the construction of phase I of the regional sanitary landfill complex, can be financed in 2008 using ECO fund, Development fund and municipal financing. Start of the operation of the sanitary landfill can be expected during the second half of 2009.

The consultants detailed the tasks and timetable required for implementation of phase I of the project as given in the Project Implementation and Procurement Schedule (PI&PS). As shown in the PI&PS the works are grouped in the below mentioned major lots:

Lot 1-1: Regional sanitary landfill at Utrine

The detailed designs from 2007 are in accordance with the EU Directive as described in chapter 3. Only some small adaptations are required. The design works will be part of the tender document (category: Works).

Lot 1-2: Access road to Utrine Landfill

The access road and connection to the power grid will be managed and funded directly by the Roads department of the Municipality of Prokuplje. Funding is targeted to be included in the 2008 budget of Prokuplje municipality.

Lot 2-1: Closure of the existing landfills in Prokuplje, Žitorađa, Kuršumlija and Blace (2 sites)

The following activities shall be started as soon as possible (with time requirement):

- Investigate dumpsites including a/o (three months):
 - physical condition of the dumps;
 - topographic map preparation;
 - geotechnical & hydro-geotechnical investigations;
 - leachate and groundwater analyses;
- Identify and work-out for the technical solutions possible including detailed investment estimations (2 months);
- Select the most appropriate solution (1 month);
- Prepare detail design & tender documentations (category: Works) based on the selected solution(s) (9 months);
- Tender the works.

As soon as Utrine landfill becomes operational, the works can start by taking basic environmental measures, amongst others:

- Avoid direct access to the sites e.g. by installing a fence around the dumpsite;
- Sites should be consequently closed by covering. Only after 1 to 3 years, depending on the settlement of the sites, final closure can take place as proposed in chapter 3.1.

It is proposed to assign a consultant experienced with the EU legislation for the above detailed tasks.

Lot 2-2: Transfer station

The site selection shall start as soon as possible. Only after the site selection the conceptual design can be worked out and tender documents can be drawn up. There is no strict time requirement, only ready by the middle of 2009.

Lot 2-3: Several mobile waste compacting / collection / transport equipment incl. containers and laboratory equipment

Tender documents can be drawn up. There is no strict time requirement, only ready by the middle of 2009. The tender document (Category: Delivery of goods) can contain requirements concerning maintenance (after-sale service) etc.

8.2 Institutional planning and technical assistance

Institutional planning

The following activities shall be started as soon as possible:

- Endorsement of inter-municipal contract specifying financial arrangements of the municipalities (ASAP, before the start of construction)
- Registering and start of operations of a regional PUC (3 months before start of the landfill operations)
- Amendments to municipal Decisions on communal arrangements (3 months before the start of the landfill operations)
- Preparation and implementation of Financial and Operational Improvement Plan (FOPIP) including Service Level Agreement (SLA) (3 months before the start of operations)

- Conclude contracts between the regional and local PUCs (2 months before the start of operations)
- Preparation of a Regional Solid Waste Management Plan (6 months before the start of operations)
- Launch Public Awareness Campaign aimed at reduction of inappropriate dumping/illegal dumpsites and possible tariff increases or introduction of eco-tax (3 months before the start of operations)

Technical Assistance

Based on the analysis in this report, the following technical assistance activities are recommended:

Table 8-1 Technical assistance requirements

TA element	Estimated costs (€ '000)	Time frame
Financial and Operational Performance Improvement Plan (FOPIP) including the SLA	400	3 months before the start of operations
Public awareness campaign	100	3 months before the start of operations
Preparation of a Regional Solid Waste Management plan	200	6 months before the start of operations
TOTAL in 1000x€	700	

8.3 Procurement plan

Table 8.2 provides a summary of the various procurement packages for, based on the identified packages and financing identified.

Table 8-2 Procurement plan

In Euro '000				Financed by					
Description	Cost estimate /1	Type	Procurement method	Municipalities	Ecofund	Development Fund	EU-IPA, others	Un-identified	Total
Phase I, lot 1									
Landfill phase 1	3,585	Works	Local procurement	224	1,893	1,469			3,585
Access road & power connection	872	Works	Local procurement	872					872
Supervision	235	Services	Local procurement	235					235
Subtotal phase I, Lot 1	4,693			1,331	1,893	1,469	-	-	4,693
Phase I, lot 2									
Closure existing dumpsites	3,789	Works	EU-PRAG (Fidic red book)				3,789		3,789
Mobile & auxiliary equipment	1,763	Goods	EU-PRAG (supply)				1,763		1,763
Transfer station	269	Works	EU-PRAG (Fidic red book)				269		269
Supervision, design closure dumpsites	402	Services	EU-PRAG (services)				402		402
Land acquisition transfer station	30	n.a.	Local procurement	30					30
Subtotal phase I, lot 2	6,253			30	-	-	6,223	-	6,253
Total priority investment plan	10,946			1,361	1,893	1,469	6,223	-	10,946
Regional waste management strategy	200	Services	to be identified					200	200
FOPIP	400	Services	to be identified					400	400
Public awareness campaign	100	Services	to be identified					100	100
Total additional TA	700			-	-	-	-	700	700

/1 including VAT and contingencies

8.4 Time schedule

The Project Implementation and Procurement Schedule (PI&PS) is shown on the page following next.



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9 RISK ANALYSIS

Table 9.1 summarizes the most important financial, environmental, operational, institutional and socio-economic risks associated with the project and the project implementation. The probability that these risks will occur has been assessed, the severity of the effects has been indicated and mitigation measures are proposed.

Table 9.1: Risk matrix

Risk	Category Financial, Environmental, Operational, Institutional Socio-economic Human	Probability H: High M: Moderate L: Low	Adverse effect From: 1 (severe) to 5 (none)	Mitigation measures (for effects 1, 2 and 3 only)
PROJECT PREPARATION				
<i>Acquisition of the remaining land for the landfill unsuccessful</i>	Institutional/ Socio-economic	Low	5	Early start of land acquisition of proposed Transfer Station. No land acquisition for land fill required
<i>Municipalities fail to allocate funds for the project</i>	Financial	Moderate	1	Support municipalities in understanding financial requirements of the project and benefits of the project
<i>Inter- municipal Contract not endorsed</i>	Institutional	Low	4	Endorse one of the acceptable alternatives offered in the Draft Contract
<i>Public acceptance of regional scheme</i>	Institutional/Environmental/Financial	Low	4	Initiate, stimulate and enhance pro-actively the public consultation process related to illegal dumping and tariff setting. Make additional TA support available
<i>Limited management capacity available</i>	Operational/ Institutional	High	2	Training and capacity enhancement programs
<i>Limited capacity of existing landfill in Prokuplje</i>	Environmental	High	1	Availability of funds in time
PROJECT IMPLEMENTATION				
<i>Poor accessibility of landfill</i>	Operational	Moderate	1	Technical and organisational support in order to realise the road in time
<i>Construction delays may occur due to longer than expected unworkable winter periods</i>	Operational	Moderate	4	None possible
OPERATION				
<i>Uncontrolled streams of not accepted waste (industrial, mining, agricultural, construction, hazardous, medical, slaughter, bulky, cars, etc).</i>	Operational	High	1	Implement regional waste management strategy. Assure alternate destinations for not accepted waste.
<i>Enforcement of illegal dumping fails</i>	Institutional	Moderate	3	Incorporate in inter-municipal agreement time action plan + timing of closure. Prepare Regional solid Waste management Plan. Amend/Prepare Municipal Decisions on Communal Arrangements.

Risk	Category Financial, Environmental, Operational, Institutional Socio-economic Human	Probability H: High M: Moderate L: Low	Adverse effect From: 1 (severe) to 5 (none)	Mitigation measures (for effects 1, 2 and 3 only)
<i>Inadequate tariff policies and payment discipline</i>	Institutional	Moderate	3	Ensure adequate tariff policy in inter-municipal agreements. Insist on municipal payment guarantees before operation of scheme. Launch Public Awareness Campagn.
<i>Low HSE standards</i>	Human	Moderate	1	Live up to proper HSE standards
<i>Emissions to groundwater</i>	Environmental	Low	2	Apply proper monitoring program
AFTERCARE				
<i>Emissions to groundwater</i>	Environmental	Low	2	Apply proper monitoring program after closure
<i>Enforcement of illegal dumping fails</i>	Institutional	Moderate	3	Apply strict control on illegal dumping. Agree on enforcement and penalties.