REPUBLIC OF MOLDOVA

APA CANAL CHISINAU

CHISINAU WATER SUPPLY & SEWAGE TREATMENT - FEASIBILITY STUDY

Contract No: C21156/ECWC-2010-01-01



Final Inception Report

July 2011

seureca A Subsidiary of VEOLIA ENVIRONNEMENT

In association with and Business Consulting Institute

European Bank for Reconstruction and Development and EU Neighbourhood Investment Facility

FORWARD

The Final Inception Report has been prepared by Seureca Consulting Engineers and their partners following visits to Chisinau by the experts of Seureca between November 2010 and March 2011. The work was supported by the local experts of Seureca's Moldovan partners Business Consulting Institute and SC Ingineria Apelor SRL.

The Final Inception Report has taken into consideration the comments, suggestions and outputs of the Workshop that followed the issue of the Draft Inception Report.

Meetings were held with the managers of S. A. Apa Canal Chisinau, the water and wastewater service provider in Chisinau; of the Municipality and of other stakeholders in the Chisinau water sector. Site visits were made to various facilities of the company within which site managers and operatives were met.

With all these people, fruitful discussions were held which were invaluable for the preparation of this Inception Report, and for the planning of subsequent Phases of the Study.

In addition, the intention of the Inception Report was also to stimulate discussion, at the Workshop, between the managers of ACC, the Municipality and within the Bank of the way forward for Apa Canal Chisinau to enhance the performance of the company and improve the quality of services.

This is an opportune time for the Team Leader, on behalf of Seureca, their partners and the team, to thank the company and its staff for the hospitality shown; for arranging the meetings and site visits, and to record the openness within which all those met were prepared to discuss the issues that they face. Without such openness, this Report would not have been possible.

The staff of ACC is duly acknowledged as the source of many of the comments made in the Report.

LIST OF ABBREVIATIONS AND ACRONYMS

ACC	S.A. Apa Canal Chisinau
CAPEX	Capital Expenditure
CCTV	Closed Circuit Television
CDM	Clean Development Mechanism
EBRD	European Bank for Reconstruction and Development
EU	European Union
GDP	Gross Domestic Product
GIS	Geographic Information System
HDPE	High Density Polyethylene
LA	Local Authority
MIS	Management Information System
MTU	Universitatea Tehnica a Moldovei (Moldovan Technical University)
O&M	Operation and Maintenance
OPEX	Operation Expenditure
PIU	Project Implementation Unit
ToR	Terms of Reference
W/W (w/w)	Wastewater. Reference to “wastewater” is to sewage or foul wastewater unless referred to as rain or groundwater drainage.
WWTP	Wastewater Treatment Plant

TECHNICAL ABBREVIATION

BOD	Biological oxygen demand
COD	Chemical oxygen demand
km	Kilometre
M	Million
m^3/d	Cubic metres per day
mg/L	Milligrams per litre
mm	Millimetre
p.e.	Population equivalent

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EXECUTIVE SUMMARY

Seureca has been appointed by Apa Canal Chisinau (ACC), to prepare a Feasibility Study of the water and wastewater service provision in Chisinau. The Study comes as support to the Chisinau Municipality's Programme to rehabilitate the Chisinau water supply and wastewater collection and treatment facilities and in the framework of the EU Neighbourhood Initiative, the European Bank for Reconstruction and Development (EBRD), alongside its co-financing partners, KfW Entwicklungsbank and the European Investment Bank.

The service provider is S. A. Apa Canal Chisinau (ACC), a public water utility incorporated and acting under the laws of the Republic of Moldova. The company is a Joint Stock company, fully owned by the Chisinau Municipal Council.

The overall scope of the Feasibility Study is to prepare the necessary technical, financial, environmental and social due diligence, which will be appraised by the Municipality, ACC and the EBRD for prospective loans and potential grant contributions as funding for the proposed capital works and other investments that will evolve from the Study.

A Draft Inception Report was issued in March 2011 and this was followed by a Workshop at which stakeholders – ACC, the Municipality, the EBRD and others – discussed the issues raised within the Draft Report. The Final Inception Report is now issued and takes into account the comments and other outputs of the Workshop.

Issues identified during the Inception Phase together with their status following the Workshop, the agreed actions and time table are provided in the section "SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS" that follows the Executive Summary.

The current facilities operated and maintained by ACC are in the condition to be expected when there has been an historic lack of investment for the development and rehabilitation of the assets.

The population of Chisinau is forecast to decline from 630,800 in 2009 to 604,800 by 2034, albeit that there will be a move from the city into new development areas.

Water supplied from the Chisinau water treatment works, which supplies 97% of the water in Chisinau, meets Moldovan water quality standards. The plant could benefit from rehabilitation to improve its efficiency, and to overcome treatment problems. The major concern at the water treatment works is the water disinfection process. Within the

Feasibility Study, alternatives to the storage of large quantities of chlorine gas, close to housing in contravention of Moldovan law, have been proposed to ACC. The company has decided to use bulk purchase of sodium hypochlorite. Seureca are preparing the tender dossier for these new disinfection facilities.

The water supply to Chisinau, with its virtual dependence upon the River Nistru as the sole source, is particularly vulnerable to pollution in the River Nistru, and to failure of the intake; the raw water transmission mains and the treatment works. Storage against failure is 19 hours, but this varies across the service area. As Chisinau is the capital city of Moldova, the issue is perhaps as much national, as for ACC/Municipality.

The water and wastewater networks are fully operational and a twenty-four hour pressurised water service is provided, but both networks are generally in a poor condition. Leakage, and other causes of non-revenue water, from the water network is high, around 47m^3/km/day, and the wastewater network suffers from blockages and collapses.

Water demand, at around 150litres/head/day, has fallen by around half in Chisinau since 1997, which has resulted in many of the facilities being oversized. Whilst the only significant affect with the water supply is the oversized pump capacities and infrequent turn-over in some water storage facilities, within the sewer network the oversized sewers do not always reach their self-cleansing velocities, and silting and fermentation of the wastewater can occur.

Within the next phases of the Study, there is to be a 300km leakage pilot study, together with Measurement Campaigns in both the water and wastewater networks; on-going establishment of the GIS; the procurement of CCTV equipment and on-the job-training Computer network models are to be constructed which will be calibrated using the results of the Measurement Campaigns. The models address issues associated with the efficient operation of the two networks, and will be used to consider requirements to extend the networks to areas currently not serviced, and to development areas proposed within the Chisinau development plans.

The final effluent at the wastewater treatment plant would not meet EU standards. Much of the plant is derelict[1] arising from the lack of investment. The major issue at the works is the odour that emanates from the site, due mainly to poor sludge management. The problem has occurred through lack of investment in a suitable sludge treatment process.

Within the Feasibility Study, a sludge treatment process is to be proposed as well as other improvements considered beneficial to the operation and management of the works and the treatment process. The discharge is to the River Bic which runs through the city and flows into the Nistru River[2], and eventually into the Black Sea. As the River is likely to be considered to be “sensitive water” under EU Standards, the objective will be to provide a final effluent that would meet EU standards for a discharge to a water course, so designated.

[1] This has not necessarily affected performance directly, as the works are over-sized for the required flows.

[2] The Nistru River is a water supply source for the city of Odessa as well.

In preparation for the process design, an analytical survey is to be made of the wastewater incoming flow.

A sludge disposal policy for Chisinau is to be formulated. An option to be considered will be the use of incineration plant that we understand is proposed in the vicinity of the wastewater treatment works.

As with the wastewater treatment plant, investment in automation would enable the current high manning levels to be reduced.

In addition to the Chisinau water and wastewater treatment works, there are some minor works. Within the next phase of the Study, the operational suitability and efficiency of these works will be considered. If required, schemes will be proposed to rehabilitate the works or to close them and provide the service from the main Chisinau works; water and wastewater.

Within subsequent phases of the Study, the framework for an ongoing annual asset rehabilitation programme will be formulated around an Asset Management approach.

The ACC service area includes the Municipality administrative area and some areas outside of the Municipality. The total population of the service area is around 811 000.

The service area would seem not to have been legally defined, and has grown to its current area for various historic reasons. For the security of ACC as the sole operator within a defined area, stakeholders at the Workshop agreed that it would be beneficial for the service area to be defined legally within the statutes of the company; ideally on the basis of a regional water company. In this, and perhaps other aspects, Apa Canal Chisinau could be at the vanguard of the development of the Moldovan water sector.

Following the Workshop, it is now determined that the Municipality is the owner of the water and wastewater assets, and ACC is the operator.

A similar situation probably arises with the assets transferred to ACC by the local authorities outside of the Municipality, but this has to be confirmed through discussion with the Local Authorities. Apart from the possible illegality of the situation, clarification of “ownership” will permit further investment in the assets as the “final beneficiary” can be defined.

Similarly, with the “asset owner” and “asset operator” roles clarified a Performance Based Contract or Agreement can be introduced, as required within the Feasibility Study.

There remains a potential legal issue concerning the setting of the common water tariff by the Chisinau Municipality, applying to customers within the administrative areas of other local authorities, outside of the Municipality. The ACC service area includes communities that are outside the perimeter of Chisinau Municipality, but the tariff policy decided by the Chisinau Municipality is directly effective on the whole service area, without additional agreement by those local authorities outside of the Municipality area..

The option suggested is for the Municipality and the authorities to form a Municipality-led association that (i) enters into a Performance Contract with ACC for the operation and maintenance of the assets, and (ii) commonly agrees the tariff. The format has been applied successfully within Romania.

The required Performance Contract or Agreement will be prepared around Key Performance Indicators, based upon agreed levels of customer service, operational standards and regulatory/legal requirements and obligations.

The current organisational structure is similar to that found in local government and is not appropriate for a modern customer orientated service provider. A suggested organisation is provided within the Inception Report based upon four directorates of Finance and Administration; Customer Service; Asset Services and Operations. With a current staffing ratio of 2.5 employees/1000 population compared with 0.9 for Bucharest, ACC staffing levels are high compared with Bucharest, and with the indices provided within the World Bank Utilities Handbook. High levels are to be expected currently within ACC due to the lack of investment in automation and rehabilitation; minimal use of contractors and due to social policies for full employment in Moldova. An indicative level at approximately 60% of current levels is provided, but this should be considered as a medium term aspiration; not realisable in the short-term without substantial investment.

Within the next phase of the Study, an action plan will be prepared for a reduction in the establishment of ACC that will be appropriate for ACC. The plan will be formulated not only around the need for technical changes but also for organisational change; modern business systems and a comprehensive Management Information System. Key to success in implementing change will be the experience gained by international operators, as has been shown successfully in Bucharest and Sofia.

A staff development plan will be produced targeted upon achieving capacity for the new procedures and technologies proposed within the Study, for implementation within ACC.

The evaluation of the financial and economical condition of ACC within the Inception Report has been based mainly on the situation at the end of third quarter of 2010, and for some elements, figures for the whole year 2010.

Analysis of the structure and dynamics of income show a positive trend in revenues in 2009 compared to 2008, and for the first nine months of 2010 compared with the similar period last year. The favourable trend is due to the significant tariff increase that occurred by the 2009 year end.

The main operating costs in 2010 were: electrical energy (20%); depreciation (22%), and wages and related taxes (27%). The net result, after significant losses in 2008 and 2009, appears to be a steadily positive trend for 2010, with turnover +9%, up to the end of September. The trend will probably be eroded in 2011, as no tariff revision has been planned in 2010, or for the beginning of 2011.

The assets were revalued in 2007, on request of the Municipality. The evaluation resulted in a net asset valuation of around 250 Million MLD, i.e. 30% of their former valuation, according to collected figures.

The opinion of ACC is that this revaluation was not perfectly achieved, and it would be necessary to implement again this exercise. The understanding of the Consultant is that, as ACC plan to move its accounting system towards IFRS requirements by 2013, this evolution will require a new valuation of assets.

By the end of 2010, trade receivables amounted to 470 Million MLD, 282 days of turnover. As one of the main elements deducted from the Balance of ACC, the importance of receivables, compared with payables and stocks, must be stressed, as it results from years of commercial difficulties, and has a direct and strong impact on the Working Capital requirements of the company, and consequently upon the day-to-day management of ACC.

One of the most noticeable elements in the breakdown of receivables is the important weight of oldest receivables, i.e. older than 2005, with more than one-third of total amount. Domestic customers represent more than three-quarters of total, between 85% and 90% for recent years, and mainly within the Municipality owned IMGFL accommodation blocks. The debt arises from the disputed responsibility for the variation between the meter reading on the incoming supply, and the sum of the individual client meters.

The debt of industrial customers, which mainly consists of the three heating companies, is occurring from before year 2005. Recent periods appear as being kept relatively under control. Thermocom is owned only at 70% by the Municipality, while CET I and CET II are not municipal companies, but State structures.

While the global level of receivables represents 282 days of turn-over, that for domestics amounts to more than one year (396 days), among which nearly 2 years (634 days) were for the IMGFL accommodation blocks, and 436 days for the APLP accommodation blocks.

The figures confirm that the Municipal communal housing structures, as well as heating companies, bear the largest responsibility for the poor financial condition of ACC. The large amount of receivables of these two Municipal owned client sectors causes ACC's excessive cash requirements.

In accordance with tax legislation, services delivered to domestic customers is exempted from VAT tax, while those delivered to budget & industrial customers is subject to a 20% VAT rate. As a logical consequences, the VAT paid by ACC on the proportional part of goods and services used for the production of such services to domestic customers cannot be balanced with VAT collected, and reimbursed by the State.

If VAT at a zero rate were applied for domestic invoices, enabling corresponding deduction on the VAT to be paid, the corresponding savings are estimated around 25 Million MLD per year.

A zero VAT mechanism was implemented for domestic consumptions on energy more than 10 years ago (1997), resulting from an active lobbying of the related operators. Such lobbying has been considered by ACC, as it could represent a valuable opportunity, especially if supported by international investors involved in water development projects in Chisinau, or more generally in Moldova. ACC appealed for a similar allowance as early as 2004, but this request has not been positively considered by the national administration until now.

A loan was contracted by ACC with the EBRD in 1997, initially for the amount of 30 Million USD, amended in 1999 with a reduction to 22.8 Million USD[3]. The loan had a sovereign guarantee from the Government of Moldova.

ACC faced difficulties during the first years to face its reimbursement obligations, but it seems to have improved until now, except for the fulfilment of some of the covenants e.g. profitability ratios. Reimbursements are running on until end of 2014, with semester payments of USD 796 426.36, for principal. Late payment fines have had to be paid.

The repayment of principal for the EBRD loan is included in the list of justified costs for tariff setting. This is a consequence of interpretation of article 1.5 in the tariff setting methodology issued by ANRE (the National Regulator) in 2004, which states that international financial engagements, provided that they have been approved by the Government and the National Assembly, supersede the national regulations, and as a consequence the corresponding costs must be included in the justified costs for tariff calculation. The loan agreement with EBRD complies with these requirements. In accordance with the ANRE regulation, local loans cannot benefit from the same treatment regarding inclusion in justified costs for tariffs. This specific point has a positive impact on strengthening the capacity of ACC for effective reimbursement, but its sustainability shall be checked through further investigation.

SA “Apa-Canal Chisinau” complied in 2009, as well as in the beginning of year 2010, with the standard relations between the reserve for bad debts and received income; with the standard current ratio, and with the standard factor of the ratio between receivables and income. The corresponding rate of current liquidity is also beneficial, as a part of current assets, to set vulnerable receivables, for which no provisions are made; inactive inventory and other illiquid assets.

The required level of Debt Service Coverage Ratio, at 1.35 expected by EBRD, was at a level of 0.40 in 2009 and 1.24 in 2010. A positive trend of this indicator can be noticed in 2010, and will be challenged for coming months.

It is worth pointing out that the analysis of debt and receivables; evolution of ratios and a more detailed analysis will be performed in the later stage of the Study. The analysis will consider the specific problem of unpaid volumes on accommodation blocks, especially those managed by IMGFL and APLP institutions. The difference of volumes between the meter measured at the entry of each block, and the sum of individual apartment meters or estimated according to the norm are generally not paid by these block managing entities, and this has become a political issue. The volumes unpaid are more than significant, reaching 30% of volumes delivered on IMGFL blocks, and 20% for APLP.

Nevertheless, the global unpaid volumes must include these components when reviewing the global receivables due to ACC.

Paragraph 4.02 (j) of the Contract Agreement Nr. 609 stipulates that Debtor (SA “Apa-Canal Chisinau”) is committed not to admit the existence of any debt, totalling more than

[3] This amount (22.8 Million USD) is the amount stated in EBRD agreement, but ACC only received 21.02 Million USD because some works initially planned have not been implemented by ACC. As per January 2011, 6,4 Million USD are still to be reimbursed as remaining part of principal.

3 000 000 MDL, except for the EBRD loan; debts to trade accounts, arising during the current business practices, and the historical debt to Moldenergo. For the period, year 2009 to the third quarter of 2010, ACC exceeded the established limit as on 30th September 2010, loans stood at 53 000 000 MDL (17.67 times) on a CB Moldinconbank SA loan; with 14 400 000 MDL (4.8 times) on a CB Banca Sociala SA loan and with 2 ,000 000 MDL (7.33 times) on a CB Moldova-Agroindbank SA loan.

In the opinion of ACC, the requirement must be balanced by the fact that:

- No explicit indexation limit on the cap amount for other financial debts was included when establishing this covenant, despite the significant inflation faced by ACC since this time, and
- In any case, the local loans have been in fact contracted for purposes directly related to the current business practice, and should therefore be excluded from the calculation for this covenant

EBRD requires that future Sovereign Guarantees are arranged at a local level, with the Municipality. As a consequence, the borrowing and guaranteeing capacity of the Municipality is to be investigated within the Study.

Raw figures on the budget for 2011 are based on global incomes of 1 889.4 Million MLD, including 73.5 Million MLD from State Budget, and expenses of 2 310 Million MLD. The significant difference between those two figures, a deficit of 420.5 Million MLD, was said to be covered by exceptional sales of public properties.

Such situation was already faced during previous years, but at a reduced scale.

Since 2001, the Municipal Council of Chisinau has refused to approve the tariffs calculated according to the EBRD methodology. Instead of the methodology proposed by EBRD, where a formula for the tariffs calculation is defined, the Municipality has approved the calculation of the tariffs based on a Cost + Fee calculation, supported by estimations of yearly budgets and volumes.

The water and wastewater quantities for the tariff determination are established by ACC independently. The technological water quantity and losses are determined based on norms calculated by the Technical University of Moldova.

In Chisinau, tariffs are approved in coordination with both ANRE (national regulator) and the Municipal Council. The tariff is approved by ANRE, but after the coordination of the tariffs rates with the Chisinau Municipal Council.

For end of 2010 or 2011, ACC have not applied for a tariff increase.

Various issues associated with the tariff setting procedure have been highlighted in the Report. The general opinion of ACC on existing tariff setting mechanism is that the methodology is good, but some improvements can be made. Any changes to the methodology are outside the scope of the Study, but these will be discussed within the proposed Inception Report Workshop. Seureca would be pleased to reasonably assist in any further way. As an example, the regulation of tariff approval/adjustment is not considered to be sufficiently accurate and consistent, which leads to a higher period of tariff approbation. It is acknowledged that some Phase A tasks remain outstanding either

because they were just not able to be completed within Phase A, e.g. network computer model, or were awaiting a decision by ACC, e.g. purchase of the GIS equipment. On the other hand, it has been recognised that additional works have been compelted which were not within the original project scope e.g. preparation of the tender dossier for the chlorine disinfection plant.

The timetable for completion of the Phase A tasks and for the Phase B & Phase C tasks is shown in the following table.

Table 1: Programme for Project Completion

				Month													
				June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mrch	Apr	May	June	July
Phase	**Task**	**Activity**	**Specific**	**Mnth 7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A			**Final Inception Report**														
B	Deliverables		Quarterly Reports														
			Stakeholder Meetings														
			Draft Phase B Report														
			Workshop														
			Final Report										√				
C	Deliverables		Draft Final Report														
			Workshop														
			Final Report														
			Project Presentation Report														√
A	7. Layout of programme for FS		Prepare														
	11. Service contract		Agree scope														
			Agree LA involvement														
			Prepare														
A,B & C	1. Measurement Programme	Measurement Campaign	Completion of Measurement Campaign														
			Analysis of results														
		Network models	Preparation of models														
			Use of models for network analysis														
	2. General Information	Demand survey	Complete industrial survey														
			Analysis of results														
		General Information	Agreement on service area with Municipality & Local Authorities														
			Asset ownership agreed														
		GIS	Completion of Data input														
			Verification and issue														
			Purchase of GIS equipment														
			Continuing applicaton of GIS														

				Month													
				June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mrch	Apr	May	June	July
	3. Water Supply	Water demand	Evaluate water demand over 25 yrs														
		Leak detection	Pilot study: Establish zone														
			Pilot study: Leak detection														
			Pilot study: Analysis & Water Balance														
	4. W/water collection		Industrial W/water discharge study														
	3. Water Supply, 4. W/water Collection & 5. W/water Treatment	Preparation of capital schemes for resolution of issues identified	Prepare outline capital schemes														
			Benefit analysis & select preferred options														
			Preparation of Rehabilitation programmes														
B	6. Institutional & Economic Operation	Human Resources	Agree preferred organisational structure														
			Prepare proposals for staff appraisals, training & other HR improvements														
		Customer service	Proposal improvements for customer service														
			Discuss and agree customer metering proposals with ACC and Municipality														
		Financial Management	Proposal improvements for financial management														
			Tariff study														
			Affordability analysis														
			Complete financial analysis of Municipality														
		Maintenance Plan	Preventative														
			Emergency														
		Environmental & Social due diligence	Environmental & Social analysis														
			Potential for carbon trade														
			Environmental & Social Action Plan														
		Stakeholder Engagement Plan	Prepare														
	7. Summary of Investment Programme		Prepare														
	8. Priority Criteria		Discuss with Stakeholders														

				Month												
				June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mrch	Apr	May	June	July
			and agree													
	9. Phasing of Project Implementation	PIP Programme	Long-term investment programme													
			Priority Investment programme													
C	3, 4 & 5	Preliminary design														
	6. Institutional & Economic Operation	O&M Plan ToR for PIP programme elements														
	7. Procurement Strategy	Project Implementation Plan Financing Plan Procurement Plan	Prepare Prepare Prepare													
	8. Risk Analysis		Prepare													
	9. Project Indicators		Indicators Project Planning Matrix													
	10. Additional appraisal of environmental & social issues		Identify													

Within our work so far, we have seen and been impressed by the efforts that the management of ACC have made in order to improve both the efficiency of the company and the service provided. Indeed, many of the issues that we have highlighted are already fully known to the Management, and strident efforts have been made to mitigate their effects. The successes have been achieved despite the lack of funding and financial difficulties that the company faces.

Finally, Seureca would like to thank the Director General; the Coordinating Committee and the Head of the Project Implementation Unit and her staff for their patience and time taken to assist in the collection of data, and in the arranging of meetings.

SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS

Following the Workshop, issues identified within the draft Inception Report are shown in the following table together with their status after the Worshop, and proposed actions with a timetable for completion. Table 2: Summary of Institutional and Legal Issues Identified

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
Legal	While efforts to approximate national environmental legislation to EU requirements have obviously increased during the last years, this remains a continuous process[4].	This is an issue for resolution outside of the scope of the project.	No action	
	Question of asset ownership to be clarified and, if incorrect, regularised	Clarification has been obtained within the Workshop that the water assets within the Municipality administrative area are owned by the Municipality;	Seureca to draft a letter from the EBRD to ACC and the Municipality to confirm ownership;	Clarification on all asset ownership issues to be resolved for inclusion in Second

[4] EU publication: "Environmental Protection Law and Policy Law Approximation to EU Directives in the Republic of Moldova":

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
		operated by Apa Canal. The situation within the areas outside of the Municipality has to be clarified	Seureca to assist Apa Canal to clarify asset ownership with the relevant local authorities. LA working committee to be formed comprising Apa Canal, representatives of local authorities and Seureca to discuss and agree.	Quarterly Report, for discussion at Report Workshop.
	Justification for the Chisinau Municipality setting a tariff that applies outside the Municipality area.	Suggestion that Municipality and Local Authorities form an Association was not commented upon. Tariff setting to be included into the Service Agreement that will be proposed between Apa Canal, the Municipality and the Local Authorities	Draft Service Agreement to be prepared. Issue to be discussed in LA working group mentioned in above issue	Draft Service Agreement to be prepared for 2nd Quarterly Report, for discussion at Report Workshop.
Institutional)	No legal definition of the Service Area of ACC	Current service area to be defined within Service Agreement	Wider issue to be discussed with EU TA consultant for "*Technical assistance for the implementation of the sector Policy Support Programme in the Water Sector*"	Dependent on TA programme
	There are no service contracts between ACC and the Municipalities and the Local Authorities.	Service contract to be prepared between ACC and Municipality with option to include local authorities	Service contract to be prepared Inclusion of local authorities to be discussed in LA working committee.	Second Quarterly Report, for discussion at Report Workshop.
	ACC is established on a local government administrative basis, not as a regional water company or on water basin basis	This is a national issue. Reference to be made within the Feasibility Study.	Seureca to liaise and discuss with EU TA consultant.	Dependent on TA programme
	Consideration is given to disposing of the district heating business and assets of ACC	No comment made by ACC to suggestion, assumed as accepted.	Option to be discussed by Financial expert and recommendation made within Final Report	End of 2011
Human Resources	ACC has a local government organisation , with	ACC has made changes to the structure and its	HR working committee to be formed with	Second Quarterly Report for

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
	numerous regulations and strictures; not as a customer orientated, commercial service provider	facilities e.g. Customer Information unit within the Reception Area & has commenced a re-structuring process	ACC, and a revised structure agreed	discussion at Report Workshop
	Performance indicators for ACC suggest that it is over-staffed	Agreed that the ACC was over-manned but that any reduction would need to be a part of a long-term programme	HR working committee to prepare a long-term action plan	Second Quarterly Report for discussion at Report Workshop
	There is no staff appraisal feeding into a business objective orientated Staff Training Programme	No comment made by ACC to suggestion, assumed as accepted.	HR expert to propose a procedure.	Second Quarterly Report for discussion at Report Workshop
	Wage structure is complex with many “extras”.	Major review of the wage structure is outside the scope of the project, but reference can be made in the Feasibility Study to the need for a review.	Extent to which the wage structure can be simplified to be explored by HR expert Recommendation to be made in Final Report	Second Quarterly Report for discussion at Report Workshop
Customer Service (income & billing)	Customer service is provided by two departments without a single point of contact, and is not process based	No comment made by ACC to suggestion, assumed as accepted.	Customer service expert to make proposals	Second Quarterly Report for discussion at Report Workshop
	There is no single system to “track” customer enquiries and to monitor response performance	No comment made by ACC	To be jointly considered by Customer Service and Management Information System experts	Second Quarterly Report for discussion at Report Workshop
	Metering and other service charge billing issues to be determined such that ACC receives the full income to which it is entitled.	Agreed that this was a major issue to be addressed but no commitment made by the Municipality to resolve.	Seureca to draft a discussion paper that addresses the billing issues Seureca to offer to facilitate meetings between ACC and the Municipality – these might need to be within a steering committee framework that includes the EBRD in order to obtain Municipality “commitment”.	Discussion paper to be prepared by end of July; Meetings to be held August/September with outcome presented in Second Quarterly Report for discussion at Report Workshop.

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
			Effectiveness of the Infocom contract in "adding value" to be reviewed by Seureca within discussion paper.	
	Domestic meter reading is by customers without adequate checks on the accuracy of reported readings. Meter reading by ACC employees is based upon a paper system	No comment made by ACC to suggestion, assumed as accepted.	Meter reading procedure to be reviewed within billing discussion paper	Discussion paper to be prepared by end of July. Outcome presented in Second Quarterly Report for discussion at Report Workshop.
	Current procedures and methods of working are labour intensive and do not make full use of modern technologies and business systems for income billing and debt management that have proved effective elsewhere.	Agreed as subject for consideration	Meter reading procedure to be reviewed within billing discussion paper	Discussion paper to be prepared by end of July. Outcome presented in Second Quarterly Report for discussion at Report Workshop.

Table 3: Summary of Financial Issues Indentified

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
Financial	Poor debt collection	Agreed as an issue for resolution	As within the "Billing & Income issues" Seureca to draft a discussion paper that addresses the billing issues and related debt	Discussion paper to be prepared by end of July; Meetings to be held August/September with outcome presented in Second Quarterly Report for discussion at Report

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
				Workshop.
	Compliance with loan obligations	Still under discussion		
	Changes to the method of determining the tariff	The tariff is set out and cannot be readily changed	Seureca to make alternative suggestions based upon practices elsewhere. To be discussed, if appropriate, with EU TA consultant for "*Technical assistance for the implementation of the sector Policy Support Programme in the Water Sector*"	Outcome presented in Second Quarterly Report for discussion at Report Workshop.
	VAT to be introduced at zero rate	Agreed that this would be beneficial	Seureca to assist ACC to make a representation to Ministry of Finance, possibly with support EBRD	Outcome presented in Second Quarterly Report for discussion at Report Workshop.

Table 4: Summary of the Water Supply and Distribution Issues identified

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
Water procurement	Water quality within the River Nistru is at risk from pollution. There are no facilities available to rapidly detect pollution within the river, or to maintain supplies should the river be polluted.	No comment made to draft Inception Report nor in Workshop. Assumed as agreed issues to be addressed	Required additional treatment facilities to treat polluted water to be considered and proposal made Consideration being given to extent that emergency supplies could be obtained from groundwater sources.	Conclusions with proposals to be presented in Second Quarterly Report for discussion at Report Workshop.
	Security of supply within Chisinau is vulnerable as		Action required to be considered within	

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
	it is based almost solely on the River Nistru source; the pipeline from the intake to the Chisinau works, and the single treatment works within Chisinau.		Emergency Response Plan	
	The two raw water collection systems and transmission systems are considered to be in need of rehabilitation. Their poor condition exasperates the risk to the Chisinau water supply.		Extent of rehabilitation to be considered as a "complete project" in association with possible need to rehabilitate the raw water intake pumps	
Water treatment	The legal requirements for the storage of pure chlorine on the Chisinau treatment site are not met, with a consequential unacceptable risk to people in the neighbourhood.	A specific options study has been completed. The solution of bulk supply of sodium hypochlorite has been selected by ACC. Seureca are preparing the tender documents to implement this new facility.	No further action required other than to assist ACC as may be requested	
	The coagulation and flocculation processes are static without mechanical stirring. The global efficiency of colloidal and dissolved compounds is probably low.	Agreed as an issue	Changes to the treatment process to be considered Other issues relating to wider aspects of water supply will also be considered e.g. water quality of the well fields	Conclusions with proposals to be presented in Second Quarterly Report for discussion at Report Workshop.
Water treatment (contd.)	There is no facility for drawing sludge off the bottom of the settling tanks. It is the lack of ability to extract efficiently the sludge that requires pre-chlorination in order to stop biological activity commencing within the sludge.		Changes to the treatment process to be considered	Conclusions with proposals to be presented in Second Quarterly Report for discussion at Report Workshop.
Water network	Parts of the water network are approaching the end of their working life and will need to be		A mains replacement programme to be to be considered with an Asset Management	Provisional programme to be prepared for 3rd Quarterly

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
	replaced, especially the smaller diameter steel pipes.	Agreed as issues	Approach that also considers the need for new mains for growth and efficiency, and pump efficiencies – all with use of network model	Report. Final proposals to be included into prioritised capital investment programme.
	The number of repairs is high with an adverse effect upon customer service			
	Whilst there is 80% storage against average demand for the whole of Chisinau, some localities have less than 12 hours. Within other reservoirs there is poor turn-over frequency.		Required storage locations and capacities and optimised pumping requirements and pressure management to be studied using the network model	Conclusions with proposals to be presented in 3rd Quarterly Report. Final proposals to be included into prioritised capital investment programme.
	Excess capacity is provided within the pumping stations. Pumps are probably operating off the maximum efficiency.			
	Approximately 4% of the power used for pumping is lost through regulating valves			

Table 5: Summary of Wastewater Collection and Treatment Issues identified

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
Wastewater collection	Poor structural condition of many sewers	Agreed as issues for resolution	A sewer replacement programme to be prepared within an asset management programme.	Provisional programme to be prepared for 3rd Quarterly Report. Final proposals to be included into prioritised capital investment programme.

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
	Sewers are over-sized causing silting and H2S gas generation - itself potentially damaging to the sewers, producing odours and adding to the problems of treatment.		To be investigated after production of the hydraulic model, and remedial measures proposed	Final proposals to be included into 3rd Quarterly Report and included into prioritised capital investment programme.
	River Bîc siphons are not correctly operated and may have silted			
	Overflows from pumping stations discharge onto adjacent fields without minimal screening.			
	Surface and ground water enter the network			
	The quality of wastewater discharged to the sewers is often non-compliant with the standards for discharge. This arises from improper or illegal discharges, inadequate pre-treatment and non-functional grease and oil traps.		Procedures to be recommended including Industrial Discharge Register and tighter control and enforcement	Conclusions with proposals to be presented in Second Quarterly Report for discussion at Report Workshop.
	Illegal dumping of sludge from septic tanks			
Wastewater treatment	In addition to the odours from the works, issues at the Chişinau wastewater treatment works include the structural condition of the plant, the process performance and quality of the final effluent.	Agreed as issues	Long-term strategy for wastewater treatment and sludge disposal to be prepared Quality standards to which treatment is required to be agreed with ACC. Tertiary treatment may be later phase within prioritised capital works programme	Proposals to be presented in Second Quarterly Report for discussion at Report Workshop.
	The condition and performance of the smaller works are such that the final effluents are unlikely to meet EU standards		The options for remedial works or transfer of wastewater to Chisinau will be considered	

Table 6: Summary of Operational Issues Identified

Function of ACC	Issue	Status as after Workshop	Next Actions	Timetable
All operations	Operational structure is of a functional and centralised nature	Agreed as an issue	HR working committee, with co-opted operational staff to prepare a revised organisational structure with long-term action plan to reduce staff establishment	Second Quarterly Report for discussion at Report Workshop
	Establishment is possibly over-resourced			
	Non-revenue water at high level	ToR requirement	A NRW pilot study	Provisional results presented to 2nd Quarter workshop
	Records are held as paper records, with asset history collected in a format for ready analysis	. GIS is a ToR requirement	GIS isbeing implemented	Progress to be reported within Phase B Quarterly Reports
	Records of the sewer locations are inadequate			
	M&E equipment is not maintained within a regime of planned preventative inspections, recognised as best practice	Agreed that ACC does have a programme of planned preventative inspections etc but not necessarily to best practice	Planned Preventative Maintenance Plan to be produced to be considered by ACC for implementation	To be provided for 2nd Quarterly Report and discussion at Workshop
	Plant is old and critical items are not available, particularly for sewer maintenance, inspections and CCTV	Agreed as an issue	O&M Plan to be produced to be considered by ACC for implementation that will specify items of plant etc required	To be prepared for 3rd Quarterly Report. Final proposals to be included into prioritised capital investment programme.

1. INTRODUCTION

1.1. PROJECT BACKGROUND

The Municipality of Chisinau, the capital city of the Republic of Moldova, wishes to improve the quality of life of its citizens and to reduce the health risks that are inherent with an inadequate water and wastewater service.

The Municipality wishes also to ensure the environmental health of the city area, and to prevent excessive exploitation of natural resources.

In order to achieve these objectives, the Municipality has commenced a programme of works intended to rehabilitate the city's water supply and wastewater collection and treatment assets.

The Municipality has identified the following as the main problems to be tackled within its initiative:

1. Quality of potable water supplied in some parts of the service area due to the age and condition of the network.;
2. A high level of leakage from the water supply network, with frequent interruptions in supply;
3. Insufficient service coverage for the collection of wastewater within the city area;
4. Unsatisfactory treatment of wastewater with non-compliant[5] discharge of effluent to the receiving River Bic;
5. Poor sludge disposal and management, causing odour nuisance to the people of Chisinau, and
6. A lack of technical expertise and economic sustainability of the operation and maintenance of the water sector assets.

1.2. S. A. APA CANAL CHISINAU

The designated water and wastewater service provider within Chisinau is S.A. Apa Canal Chisinau, created in 1997, out of the state enterprise Regia Apa Canal Chisinau.

The company is a joint stock company, with the Municipality holding 100% of the share capital. The activities of the company are supervised by a Board, with representation from the Municipality.

Other institutional aspects of the company are discussed in Section 3.1.

In addition to the supply of potable water and the collection and treatment of wastewater, ACC also supplies small volumes[6] of raw water, industrial water and heating water.

[5] Against EU Standards

1.3. CHISINAU MUNICIPALITY

Chisinau Municipality comprises (i) the City of Chisinau, which is divided in 5 sectors: Centre, Rascani, Botanica, Buiucani, Ciocana, and (ii) thirty-three suburban settlements that are organized into eighteen first level local public administrations.

The Municipality is an independent second level of local government.

Chisinau City is run by a Municipal Council and Mayor. Both are directly elected every four years. The Council is made of fifty-one councillors.

The city of Chisinau and the other eighteen local governments which comprise the Municipality of Chisinau have two roles, as provided by the Statute of Chisinau Municipality:

1. The Municipal Council coordinates and cooperates with the other eighteen mayors and local councils in the implementation of actions with municipal scope, and
2. The Municipal Council decides on the transfers from the municipal budget to the other eighteen local budgets.

The eighteen component local governments are independent of the City council and Mayor, in issues of local interest.

The Mayor of Chisinau is the executive authority of the city. He is aided by four Deputy Mayors, elected by the Council. The Mayor runs the City Hall, through which he implements the Council decisions, and oversees the activity of the local institutions and Municipal enterprises.

The Council takes decisions upon: (i) institutional affairs; (ii) financing; (iii) strategies and development projects of the city and Municipal interest; (iv) human resource management; (v) property management, and (vi) the city service delivery. The Council is assisted by a Secretary.

City legislation consists of Administrative Acts issued for the implementation of laws, or Administrative Acts of the central government. Council decisions are endorsed for legality, by the Secretary.

All Council decisions and Mayoral orders are subject to the administrative control of the State Chancellery and its territorial offices in order to ensure the legality of the decisions and orders of the Council.

The functional responsibilities of the Municipality are divided into exclusive, shared and delegated.

Principal[7] exclusive responsibilities include:

- Urban planning;

[6] See Section 3.1.13.8

[7] The City alone has decision-making power and provides financing and capital expenditure from base revenues.

- Waste collection and management;
- Water and sewerage;
- Road management;
- Local public transportation;
- District heating and city natural gas distribution, and
- Maintenance of municipal housing and privatized blocks of flats.

Shared[8] responsibilities include:

- Maintenance of pre-university education infrastructure and related activities;
- Public safety and traffic police, and
- Fire fighting.

1.4. THE FEASIBILITY STUDY AND STUDY FUNDERS

In the framework of the European Union Neighbourhood Initiative, the European Bank for Reconstruction and Development, together with co-funders: KfW Entwicklungsbank and the European Investment Bank, wishes to support the initiative of the Municipality to improve the water sector service provision in Chisinau. The support is to be provided through a phased investment programme aimed at a sustained improvement of the water supply and wastewater collection and treatment within Chisinau.

Seureca Consulting Engineers, in association with their local Moldovan partners: Business Consulting Institute and SC Ingineria Apelor SRL, have been appointed to prepare a Feasibility Study that will identify and address the issues associated with the current water and wastewater service provision in Chisinau. The Study will propose solutions to the issues that are identified, in line with considered best international practice.

The funds for the Feasibility Study are provided from the European Union Neighbourhood Investment Fund.

The contract for the preparation of the Feasibility Study is of twenty months duration, commencing on 1st December, 2010. The Inception Report is the first deliverable of the Study, and is to be provided within four months of the commencement.

1.5. STUDY IMPACTS

The anticipated impacts of the Municipality's Programme for improvement upon the Chisinau water sector are:

[8] The decision-making and/or financing is split between the county and central government.

1. Identification of issues, and the introduction of technical, environmental and efficiency improvements within the water and wastewater service delivery, in line with national and EU environmental standards;
2. The introduction of (i) a Performance Based service contract for the operation and maintenance of the waters sector assets, (ii) tariff increases, (iii) appropriate incentives for efficiency improvements at the level of ACC, and (iv) encouragement measures for the outsourcing of certain appropriate activities;
3. An improvement of ACC's financial transparency and quality of financial information;
4. The optimised technical and economic sustainability of ACC;
5. The development and implementation of an Environmental and Social Action Plan to improve the environmental management practices of ACC and the overall performance of the company, in line with national and EU standards, and
6. The delivery of high demonstrable effects which could be seen as a model for water sector improvements in other Moldovan Municipalities.

1.6. STUDY OBJECTIVES

The overall objective is to prepare a Feasibility Study to be appraised by the Municipality and potential funders, including the EBRD, as the basis for prospective loans and grants to fund the proposals recommended by the Study.

Some of the impacts of the Municipality's programme for improvement are to be provided by the specific objectives of the Study, which are set out within the consultant's ToR and summarised as follows:

1. Prepare a base line study of ACC activities to include for technical, financial, managerial and operational aspects of the company's business in order to better understand the present situation and the institutional, legal, financial, technical, efficiency, capacity and environmental issues facing the company;
2. Develop remedial measures as technical solutions within a 25 year Priority Investment Programme, with schemes prioritised for maximum operational and cash flow benefits, and provide a procurement strategy for the proposed solutions;
3. Prepare a detailed financial analysis of ACC and the Municipality, and recommend improvements to the company's financial, administrative and management structures and processes, including for income and billing;
4. Perform an Environmental and Social Due Diligence to ensure that the Priority Investment Programme fully complies with the EBRD's Performance Requirements, including preparation of an Environmental and Social Action Plan.

In addition to the above, there are specific deliverables required of the consultant:

1. The purchase of GIS software and hardware, and the establishment of a GIS database with training of ACC staff in the application of the software;
2. A long-term sludge disposal strategy with particular emphasis upon a “quick-fix” solution to the current odour and environmental problems associated with sludge management at the wastewater treatment works;
3. A viable and sustainable alternative for the current use of chlorine gas for water disinfection;
4. A tariff study and affordability analysis;
5. A Non-Revenue Water Pilot Study;
6. A draft Service Agreement between the Municipality and ACC, and
7. An Emergency Response Plan.

1.7. DEFINITION OF THE PROJECT STUDY AREA

The Project Study Area is not specifically designated within the consultant’s Terms of Reference; reference is made merely to “Chisinau” or the “Municipality”.

In addition to providing a water and wastewater service within “Chisinau” and the “Municipality”, ACC also provides a service to communities outside of the Municipality, as shown in Table 7.

From our understanding of the long-term objectives of the Study, the Project Study Area has been defined to include:

1. Those communities that are located within the administrative boundary of the Municipality, irrespective of whether ACC is the water or wastewater service provider, and
2. Those communities within which ACC is either the water or wastewater service provider.

In suggesting the above definition of the Project Study Area, we have taken note that within the Terms of Reference, the design horizon for the Investment Programme is to be 25 years. We would consider that within this period, the Municipality would wish to ensure that all areas within its geographical boundary have the benefit of a pipe wastewater collection system.

Within the 25 year horizon, we anticipate that Moldova will have established water supply on a Regional Water Company basis, as set at with the EU Water Framework Directive. Within the Study, we have considered proposals on the assumption that ACC could be the nucleus for a Region Water Company.

Where the current service provider is shown in Table 7 as “Unknown”, this will be determined within Phase B in order to assess the capital investment required for a centralised system.

The Project Study Area is shown geographically in Figure 1.

Table 7: Study Area

Rayon or Municipality	Sector	Commune	Village	ACC is the Service Provider for		Operation & Management of Systems is by	Assessed[9] 2009 Population
				Water Supply	Wastewater Collection		
Chisinau	**Chisinau City**			**Yes**	**Yes**	**ACC**	**630 800**
	Botanica	Bacioi	Bacioi village	LA	Unknown		8 703
			Braila	LA	Unknown	Unknown	919
			Frumusica	LA	Unknown	Unknown	467
			Straisteni	LA	Unknown	Unknown	501
		Sangera	Dobruja	Yes	Yes	ACC	3 247
			Revaca	LA	Unknown	Unknown	976
			Sangera	Yes	Yes	ACC	7 503
		Galata village – Airport City		Yes	Yes	ACC	n/a
	Buiucani	Condrita	Condrita	LA	Unknown	Unknown	662
		Durlesti	Durlesti	Yes	Yes	ACC	16 206
		Ghidighici	Ghidighici	From wells	Yes	ACC	5 140
			Pruncul	Yes	Yes	ACC	
		Truseni	Dumbrava	Yes	Partial network	ACC	418
			Truseni	Unknown	Unknown	Unknown	7 890
		Vatra	Vatra	Yes	Yes	ACC	3 304
	Centru	Codru	Codru	Yes	Yes	ACC	14 399
	Ciocana	Bubuieci	Bac	Yes	Unknown	ACC	1 086
			Humulesti	Unknown	Unknown	Unknown	235
			Bubuieci	Yes	Yes	ACC	5 942
		Budesti	Budesti	ACC + LA (from	Unknown	ACC	4 555

[9] Assessed by the consultant based upon year 2004 National Population Census

Rayon or Municipality	Sector	Commune	Village	ACC is the Service Provider for		Operation & Management of Systems is by	Assessed[9] 2009 Population
				Water Supply	Wastewater Collection		
				artesian wells)			
			Vaduleni	Yes	No	ACC	551
Chisinau (continued)	Ciocana (cont.)	Colonita	Colonita	Yes	W/w treatment plant owned by LA, operated by ACC	ACC	3 385
		Cruzesti	Ceroborta	Unknown	Unknown	Unknown	43
			Cruzesti	Yes	Only for social buildings	ACC	1 648
		Tohatin	Bunet	Bulk supply	Unknown	LA maintains water network	48
			Cheltuitor	Yes	Unknown	ACC	335
			Tohatin de Jos	Yes	Yes	ACC	n/a
			Tohatin	Yes	Yes	ACC	2 166
		Vadul lui Voda	Vadul lui Voda	Yes	Yes W/w goes to ACC's V/Voda works	ACC	4 531
	Riscani	Ciorescu	Ciorescu	LA	LA	LA	5 460
			Fauresti	Unknown	Unknown	Unknown	456
			Goian	Unknown	Unknown	Unknown	1 112
		Cricova	Cricova	LA	Yes Treatment plant owned/operated by LA	LA	10 039
		Gratiesti	Gratiesti	Yes	Yes	ACC	4 743
			Hulboaca	Yes	Unknown	ACC	1 567
		Stauceni	Goianul Nou	Yes	Yes W/w goes to ACC's Goianul Nou works	ACC	626

Rayon or Municipality	Sector	Commune	Village	ACC is the Service Provider for		Operation & Management of Systems is by	Assessed[9] 2009 Population
				Water Supply	Wastewater Collection		
			Stauceni	Yes	Yes	ACC	6 999
Anenii Noi		Floreni		Bulk supply	No network	Water network operated by LA	3 721
		Maximovca		Bulk supply	Unknown	Water network operated by LA	1 790
Criuleni		Balabanesti		Yes	Yes W/w goes to ACC's Vadul works	ACC	2 108
		Cosernita		Yes, bulk supply	Unknown	~~ACC~~ AL	1 523
		Onitcani		Yes	Unknown	Unknown	2 065
		Slobozia Dusca		Yes	Unknown	Unknown	2 661
Ialoveni		Ialoveni		Wells	Yes	ACC	15 233
Straseni		Straseni		Unknown	Yes Discharges to ACC network	Sewerage network operated by LA	18 365
		Cojusna		Unknown	Yes Discharges to ACC network	Sewerage network operated by LA	7 008
							811 148

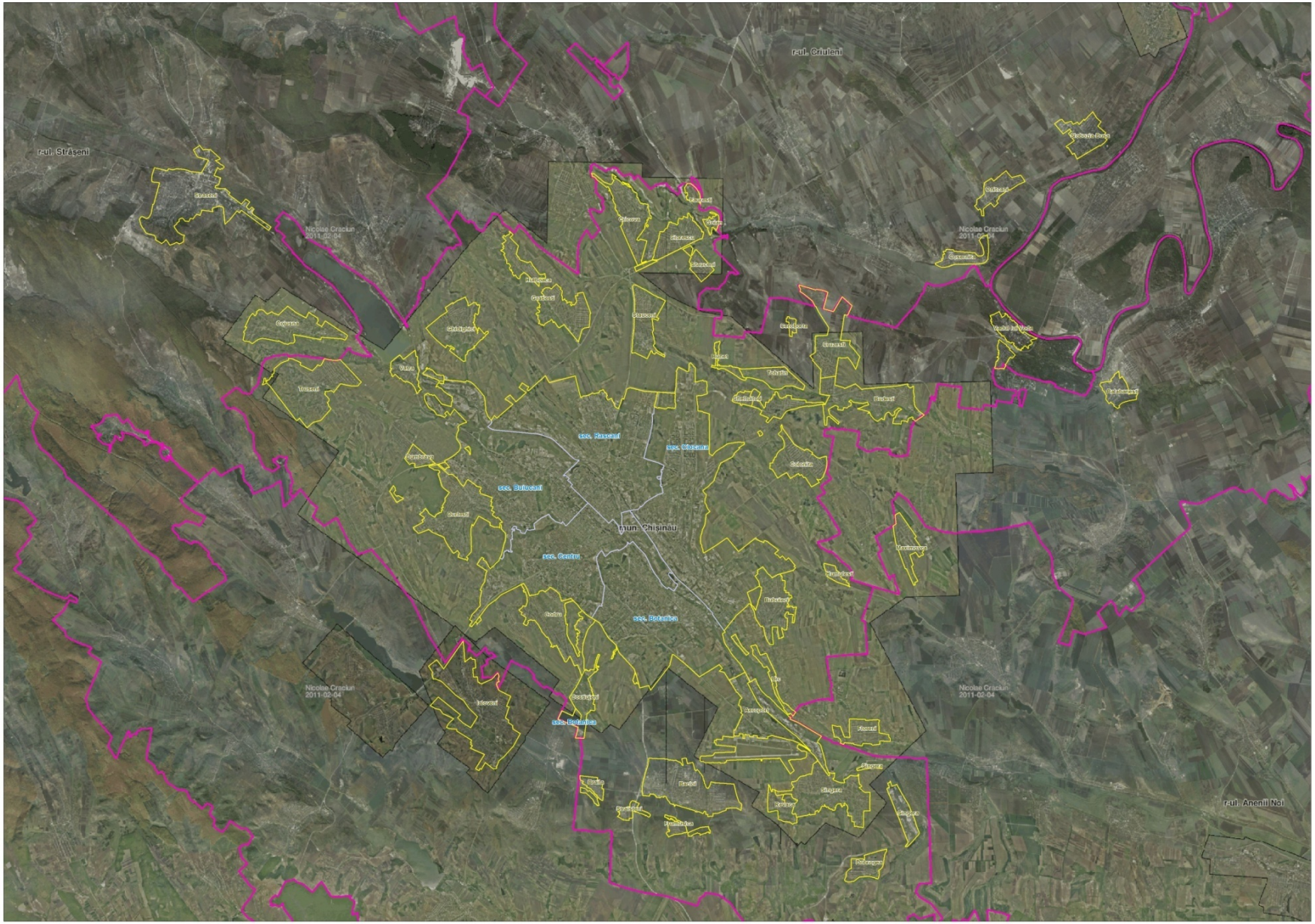


Figure 1: Aerial View of Project Study Area

The city of Straseni and the village of Cojusna send their wastewater to ACC network, but their network and pumping stations are operated by the Local Authority. ACC charges the Local Authorities for the wastewater volumes discharged.

The relationship between ACC and (i) the Municipality and (ii) the Local Authorities for the areas scheduled in Table 7 is discussed further in Section 3.1.6.

1.8. PHYSICAL, SOCIOLOGICAL AND ECONOMIC CHARACTERISTICS OF THE PROJECT AREA

1.8.1. REPUBLIC OF MOLDOVA

Located between Romania and Ukraine, the Republic of Moldova was declared as an independent state in August 27th, 1991. The total population of Moldova is considered to be 3.6M (UN 2010), with a GDP of US $1 590 (World Bank, 2009). The major languages are Romanian and Russian. The major religion is Christianity.

1.8.2. NATIONAL IMPORTANCE OF CHISINAU

Chisinau is the capital city of the Republic and is the most economically developed and industrialised city of the Republic. It is the political, administrative, economical and cultural centre of the country, and is the national centre for strategic urban growth.

As such, Chisinau promotes the economic competitiveness and the development of the national economy. Chisinau is the major industrial and services centre for the country.

The city is the transportation hub of Moldova and has one international airport. Therefore, it acts as one of the principle tourist areas of Moldova.

1.8.3. GROWTH OF CHISINAU

Founded in 1436 as a monastery village, the city had grown only to a population of 600, by 1774. Thereafter, the population grew steadily, until the fall of the USSR. In comparison to the 1989 Census, the current population has decreased by almost 9% as a direct result of relatively intensive waves of emigration, and now stands at around 800 000[10].

Interestingly, with a slight increase in the birth rate and stabilising of the mortality rate, there has been a small, but positive natural growth within the last five years rising from 0.1% in 2004 to 2.1% in 2009.

The prominent ethnic groups in the city are: Moldovans (68%), Russians (14%), Ukrainians (8%), and Romanians (4%).

[10] See Table 7: Study Area

Within the last twenty years, the city has become a relatively lively and well-provisioned capital, with a much higher standard of living than in the remainder of the country.

1.8.4. INDUSTRY

The economy of the city is mainly centred on industry, predominantly: the food, beverage and construction sectors, and on service industries. The latter have particularly grown in importance in the last ten years. Other main industries are consumer and electrical goods; building materials; plastics; rubber, and textiles. The machinery building industry is in continuous decline.

Currently, there are nineteen industrial sites in the city, occupying an area of about 2800 ha, upon which are located about one thousand five hundred companies. The sites are located predominantly in the north-eastern part of the city, with some in the protection zone of River Bic.

1.8.5. ECONOMY

Chisinau contains approximately 21% of the population of Moldova and produces greater than 60% of the GDP. The city is responsible for over 50% of the national industrial output, and over 75% of the business turnover of Moldova.

Chisinau is the hub through which the rest of the country participates in foreign trade.

The capital city budget is only 25% of the accrued funds on municipal territory, which is two to three times lower than in other European capital cities and too low to meet the vital needs of the city.

1.8.6. REGIONAL DEVELOPMENT OF CHISINAU

Regionally, Chisinau is considered to be a peripheral city with (i) limited international influence; (ii) poor metropolitan services and (iii) poorly developed international functions.

The main economic and social indicators for Chisinau are lower than for the capitals of neighbouring countries.

Achievement of the conversion of Chisinau into an important regional centre requires the removal of a number of obstacles. Development is subject to the limitations of urban, technical and transport infrastructure, and to poor national, regional and international communications.

In many respects, the population is unaware of the opportunities and risks to be found in a city open to international competition. The questionable quality of some services offered in recent years has prejudiced some public opinion to commercial development.

1.8.7. GEOGRAPHY OF CHISINAU

The city is situated in the centre of the Republic on the River Bic, a tributary of the River Dniester, which flows into the Black Sea. The city lies on seven hills and occupies the territory of around 120 sq. km.

Chisinau is justifiably considered to be one of the greenest cities in Europe. There are many parks[11] in the city, within which there are a total of twenty-three lakes. The Municipality is aware of the environmental heritage under its care and is determined to safeguard that heritage for future generations.

Figure 2: View of Botanica Sector, Chisinau

Chisinau has a continental climate, with characteristic hot dry summers and windy winters. Winter temperatures are often below 0 °C (with average temperature in January at the level of -4°C falling as low as -36°C, although they rarely drop below −10°C. In summer, the average temperature is approximately 25 °C, sometimes reaching 40 °C. Although average precipitation and humidity during summer is low, there are infrequent, yet heavy storms.

1.9. CHISINAU DEVELOPMENT PLANS

In 2007, Chisinau Municipal Council approved the Municipality Spatial Development Plan and City General Urban Plan for the period up to 2025. Both documents are based upon the previously approved Concept of Chisinau Urban Development (2004).

Apart from Chisinau city, the other towns and villages of the municipality do not possess formal urban planning documents.

66.1% of the total land is owned by Chisinau Municipal authorities, 20.8% by state authorities, and 13.1% by private sector. The privatisation is an on-going process, resulting in an average yearly 2% growth of land in private ownership.

Planned development of the city is based upon a moderate or very small demographic growth scenario – the optimistic variant in the planning analysis, and an intensive spatial development approach.

[11] 22.8% of the area is defined as “green areas” – Urban Planner’s Report Section 1.

The key factors affecting the future population of Chisinau are the ageing population and negative migration out of the city. According to the optimistic scenario for growth, until 2015 the population of Chisinau is expected to be negative with an average -0.14% growth per year. The growth pattern varies between districts due to differences in the age structure within each district. The only one of the five historic Chisinau districts to show growth over the period 2009 to 2014 is Ciocana, with a growth rate of 1.57%.

After 2019, all of the five districts are showing negative growth. Only within the new development areas is growth forecast.

Within Chisinau city, the net effect is for the population to decline from 630 800 in 2009 to 604 800 by 2034. Eleven new housing zones are planned, in accordance with the stipulations of Chisinau General Urban Plan, as shown in Figure 3.

Across the whole assumed Project Study Area, the population is forecast to fall from 811 148 in 2009 to 790 959 over the 25 years of the project horizon i.e. by 2034.

Within the past 20 years, a significant part of the former industrial zones have seen unplanned changes in land use due to (i) a very fragmented privatisation process, (ii) economic decline and (iii) de-industrialisation of the city. Within the former industrial zones are located a wide variety of commerce and industry ranging from education institutions to commercial offices and residential areas. With the lack of planning, the precise nature of the development within these areas is unknown.

Within the planning proposals shown in Figure 3, Chisinau is to follow a polycentric development strategy that aims to move the commercial and social functions from the city centre to the districts.

Whilst the City General Urban Plan sets out to move industry from the city, it does not propose any industrial development within ‘green-field’ sites. Of relevance to the performance of the wastewater treatment plant, the area around the River Bic, into which the plant discharges the final effluent, is to be transformed from its former industrial use into a recreation and leisure based facility for the inhabitants of the city.

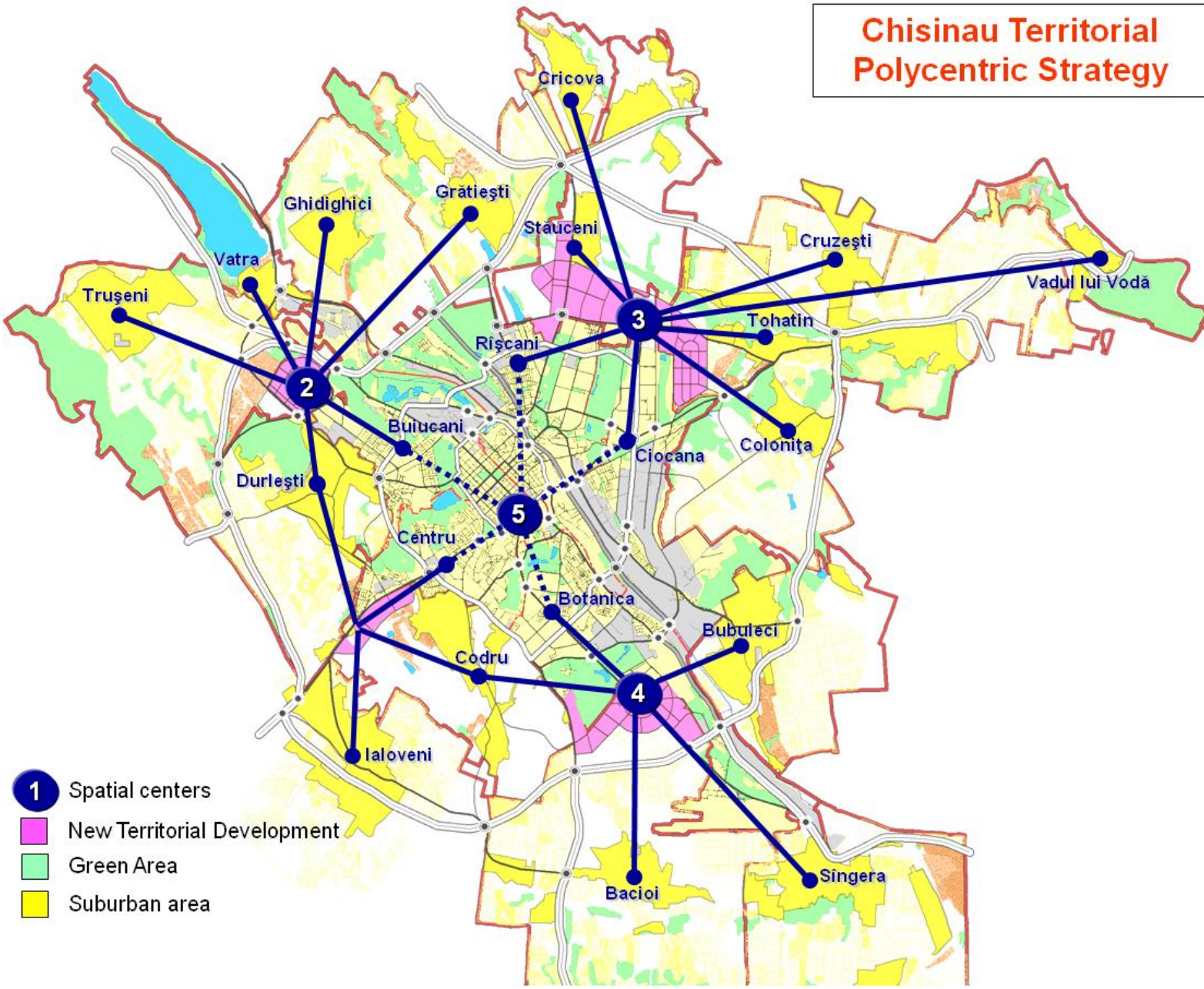


Figure 3: Chisinau Polycentric Development Strategy

2. COMMENTS UPON THE CONSULTANT'S TERMS OF REFERENCE

2.1. APPROPRIATENESS OF THE TERMS OF REFERENCE

The Terms of Reference are comprehensive, and fully inclusive of the requirements to prepare a Feasibility Study that will provide a suitable external investment funding application, for the Chisinau water sector infrastructure.

The ToR requires the Feasibility Study to be prepared within three phases:

Phase A: An inventory and assessment of the current situation to be delivered within an Inception Report;

Phase B: The preparation of the Investment and Action Plan, and

Phase C: Conclusion of the Study and the elaboration of preliminary designs.

2.2. OUR APPROACH TO THE PREPARATION OF THE INCEPTION REPORT

Our approach to the preparation of this Inception Report has been to perform a classic three-stage "GAP" analysis.

1. Within the first stage, Section 3 of this Inception Report, we provide the "As Is" inventory and assessment required within the Phase A of the Study, and as explicitly described in Section 3 of the Terms of Reference: Scope of Work;
2. Within the second stage, Section 4, we have identified best international practices. The section is sub-titled "Criteria for Success". The Section sets out the practices to which we consider that ACC would wish to aspire. On achievement of the practices, ACC may consider itself to be a successful best-of-class service provider, and
3. The practices proposed will form the basis for the organisation changes, procedures and schemes that we will elaborate within Phases B and C of the Study, and outlined within Section 5.

2.3. SPECIFIC ISSUES INDENTIFIED WITH THE TOR DURING PHASE A

We appreciate the difficulty of producing a Terms of Reference for a complex project such as the Chisinau Feasibility Study. As so often happens, issues cannot always be fully identified and tasks defined until the project has commenced, and the issues laid out.

As the consultant to ACC for the Feasibility Study, we have taken a flexible approach in order to accommodate any changing requirements.

We have some potential concerns that we wish to draw to the attention of ACC and the Bank, and for which we would request clarification or recognition of the issue raised. The issues so far identified are listed in Table 8.

Table 8: Table of Issues with the ToR Identified within Phase A

Topic	Issue	Comment	Proposed Action to Resolve
Definition of Project Study Area	The project area has not been defined within the ToR, nor is the service area of ACC is legally established	Within the Inception Report and consequently throughout the project, the Project Study Area has been taken to include: 1. Those communities that are located within the administrative boundary of the Municipality, irrespective of whether ACC is the water or wastewater service provider, and 2. Those communities outside of the municipality boundary within which ACC is either the water or wastewater service provider.	We request that the proposed definition be confirmed as the Project Study Area, and that this forms the basis for the service area of ACC.
Service contract between Municipality and ACC	The legal opinion of ACC is that the Municipality *"cannot sign a Service Contract with ACC on the operation and maintenance of the assets, because the respective parts are in a relationship of Founder and Commercial company*."	This issue is to be explored more fully in Phases B and C, and solutions proposed for consideration	We ask confirmation that a Service Contract is possible.
Definition of "Preliminary design"	The term is used in the ToR without definition as to the extent of the design to be provided.	Proposed approach is to prepare designs to the stage necessary for ACC to either: 1. Submit to a design consultant for detailed design. The design consultant will provide designs for approval (FIDIC Red Book approach), or 2. Use as the basis for the preparation of a Terms of Reference for the preparation of a FIDIC Yellow Book design and construct contract within which the contractor uses a local design institute to obtain approvals.	We ask for confirmation that this approach is acceptable
Conditions of Contract – application FIDIC "Yellow Book"	Within the Moldovan approval process, detailed designs must be submitted for local planning approval. Is it possible to use a Yellow Book approach to be adopted where the detailed design is only known after the contract has been let?		

Topic	Issue	Comment	Proposed Action to Resolve
Non Revenue Water Pilot Study	Ability of ACC to repair leaks at the same rate as found in the Pilot Study, because of inadequate finance or capacity.	If leaks are not repaired, this will limit the ability of the Pilot Study to demonstrate the extent to which NRW reduction can be achieved, for the given leak detection resources employed. The Pilot Study will be able only to provide information upon the number, frequency and location of leaks.	We ask ACC to confirm that the required resources will be made available.
Measurement Campaign	Critical manholes will not be accessible, located or otherwise made available for the Campaign.	Without the ability to record the flows at desired points, it may not be possible to fully prove the network model.	
On-site activities requiring cooperation of ACC	For financial or resource reasons, ACC is unable to provide the necessary staff to assist the consultant's engineers.	Without the resources of ACC to complete or perform the on-site activities, we will not be able to complete the required outputs.	
Treatment works and other facilities	Record drawings of the existing facilities will need to be provided for determining modifications for improved operational efficiency, water quality compliance etc.	The drawings may not be available.	We ask confirmation that the drawings will be made available.

3. INVENTORY AND ASSESSMENT OF THE CURRENT SITUATION

3.1. INSTITUTIONAL AND LEGAL

3.1.1. GOVERNMENT POLICY TOWARDS THE SECTOR

Over the past 10 years, the Moldova water sector has seen changes as it normalises with international practices and, in particular, EU Directives. The main drivers have been multilateral environmental agreements, the aspiration of European integration and the national reform process.

The National Environmental Policy Concept of 2001 is the main policy document, but there are many in the sector. However, they lack prioritisation and are not oriented towards environmental improvements since there are no quantifiable national environmental targets established[12].

The sector has been given greater prominence, but problems in securing and developing the sector remain to be addressed. Good quality drinking water and sanitation are recognised as important national priorities for improving the quality of life of Moldovan people.

The 1996 National Environmental Action Plan estimated that the social and economic impact of water pollution lead to a monetary cost to the country of between US $66 and US $127M through higher levels of morbidity and premature deaths. The Government has prioritised the improvement of water and wastewater services, and the Economic Growth and Poverty Reduction Strategy, adopted by Parliament in 2004, included the achievement of the Millennium Development Goals, as a long term objective.

To this end, the Government adopted service level targets through Decree No. 1406 at the end of 2005. The *"Plan for water supply and sewerage in Localities of the Republic of Moldova up to the Year 2015"* is in accordance with the Goals, and contains both quantitative and qualitative targets. The water and sanitation quantitative targets are to "*halve by 2015 the proportion of population who do not have sustainable access to safe drinking water*" and to "*halve by 2015 the proportion of people without adequate sanitation"*, respectively.

The Government has prepared a "*Programme of Water Supply and Sewerage in Communities of the Republic of Moldova"*. This programmes includes 3 stages (1st stage: renovation of the existing systems; 2nd stage: rehabilitation and development, till 2009 and 3rd stage: rehabilitation and development, till 2015), as stated in the Government Decree #1406/2005. The strategy acknowledges that organization and management of water supply and sanitation services are the responsibility of local authorities, and that an enabling policy and legal framework is needed to allow and encourage equitable,

[12] EU publication: "*Environmental Protection Law and Policy Law Approximation to EU Directives in the Republic of Moldova"*

sustainable, and efficient service provision. The investment needs are stated in the Programme as €78.5M/year in the period 2008 to 2012 and €198.4M/year thereafter until 2025. However to quote from the Apele Moldovie web site[13]:

> *"The Strategy is overly ambitious, thus rather impossible to implement as was concluded by the recent OECD/EUWI Water Financing Strategy. Further the Strategy does not contain a detailed implementation plan, the approach and basis for the capital cost breakdown is not described, the current costs are not estimated and the affordability thereof is not assessed as was concluded in the inception report of the OECD/EUWI project."*

3.1.2. PRINCIPAL MOLDOVAN LAWS RELATING TO WATER SECTOR

3.1.2.1. Laws Relating to Water and Wastewater

The Moldovan National legislative framework for water and wastewater comprises:

3.1.2.2. Laws Relating to Potable Water

Draft Water Law

A new Water Law has been drafted to harmonise Moldovan water policy with the EU Water Framework Directive 2000/60 CE (the latter seeks to implement among others the Drinking Water Directive 98/83 EC, the Urban Wastewater Treatment directive 91/271EEC and the Nitrates Directive 91/676 EEC). The Draft Water Law sets out the rights to use of water, principles of water management and measures for prevention of pollution and makes provision for the introduction of regulatory impact assessment. It also seeks to consolidate the provisions of the 2005 Decree and the 2007 Strategy and proposes the establishment of a Water Fund, which would be used to support the development of water supply and sanitation projects. The Draft Water Law is still undergoing screening for its compliance with EU legislation, which means that the current legal framework (Water Code 1993) does not fully take account of the EU water-related legislation to which the Republic of Moldova seeks to converge.

In addition, Regulation No. 934 of 15.8.2007 "Sanitary Norms on Drinking Water Quality" relates to the quality of drinking water.

3.1.2.3. Laws Relating to Wastewater

The legal framework for sewers and wastewater is weaker than for potable water.

The Government Decree #1141/2008 "Regulations on the conditions of urban wastewater discharge to watercourses", Disposition nr.40/2005 etc. is applicable for wastewater.

[13] http://www.apelemoldovei.org/2007wssstrategy.html

3.1.2.4. Other Water-Related Legislation

The current national legal framework consists of a set of legislative documents, including: Water Code No. 1532-XII of 22.6.1993; Law "On Ecological Expertise and Environment Assessment" No. 851-XIII of 29.5.1996; Law "On Public Communal Services" No. 1402-XV of 24.10.2002; Law "On Payment for Environment Pollution" No.1540-XIII of 25.2.1998; Law "On Environment Protection" No.1515-XII of 16.6.1993; State supervision of the public health No 10-XVI of 03.02.2009; Law "On Protection Zones and Belts of River and Water Basins" No. 440-XIII of 27.4.1995; Law "On the State of Public Health Surveillance" No. 10-XVI of 3.02.2009; Law "On Industrial and Domestic Waste" No. 1347 of 9.10.1997.

3.1.2.5. Secondary Legislation

For both water and wastewater service provision, there are numerous Government Decisions, Ministry and other Central Authority Regulations and Standards. Sometimes, the law contains very general provisions that require support within secondary legislation.

3.1.3. NORMALISATION WITH EU DIRECTIVES

Key applicable European Directives are:

- Directive 98/83/EC on the Quality of Water Intended for Human Consumption;
- Council Directive 91/271/EEC concerning Urban Wastewater Treatment
- Water Framework Directive 2000/60/EC

Implementation of the Framework Directive requires the elaboration of River Basin Water Management.

The introduction of river basin management for Moldova, as set out in the Directive has two implications:

1. The requirement to work in close cooperation with the neighbouring countries, Ukraine and Romania, through existing bilateral cooperation agreements such the "*Convention on the Protection and Use of Trans-Boundary Watercourses and International Lakes*", and
2. A possible move towards Regional Water Companies.

Within the 25 year horizon of the Study, we anticipate that Moldova will have established water supply on a Regional Water Company basis. Within our deliberations, we have considered proposals on the assumption that ACC could be the nucleus for a Region Water Company.

To quote the EU publication: "*Environmental Protection Law and Policy Law Approximation to EU Directives in the Republic of Moldova":*

In summary of key progress to date in law approximation in the environment sector in Moldova, the clear position emerges that:

• Moldovan environmental legislation lacks a systematic and coherent approach;

• Legislation in regard to nature protection, urban wastewater treatment, drinking water quality requirements and GMOs are at best partially compliant with EU standards;

• Legislation in regard to good governance (EIA, SEA, access to information, public participation), air quality, water management, groundwater protection, flood management, waste management, industrial permitting and pollution control, chemicals and noise are not compliant with EU standards;

• At the same time, the permitting / authorisation regimes and the corresponding enforcement measures fall short of European standards;

• The current national legislation reflects to varying degrees the requirements of international environmental treaties;

• While efforts to approximate national environmental legislation to EU requirements have obviously increased during the last years, this remains a continuous process.

• With important draft legislation and related secondary legislation advancing at the present time, further progress can be expected in the coming years; although it will take many more years to achieve full approximation in the environmental field."

3.1.4. PRINCIPAL STAKEHOLDERS WITHIN THE MOLDOVAN WATER SECTOR

Overall policy coordination is within the Government Office, under the Prime Minister.

The Moldovan Government Ministries within the sector, and their primary water sector roles, are:

1. Ministry of Environment: Management of the Moldovan water resources and environmental protection, as well as monitoring of surface and ground water quality;
2. Ministry of Finance: National public financial budgetary control and management, including for the water sector;
3. Ministry of Health: Monitoring of potable water quality supplied to customers;
4. The Agency "Apele Moldovei" is the administrative authority responsible for the implementation of the state politics for: (i) management of water resources (ii) water quality improvements (iii) the supply of water and sewerage. The Agency is subordinate to the Ministry of Environment. In order to contribute to the development of the strategy for the water sector and the application of the technological and scientific advances in the Moldovan water sector, the Agency has established an education facility, which trains scientists from the scientific institutions and specialists in the sector, and.
5. Local Public Administrations: Responsible for the establishment, organization, coordination, and controlling of water and sewerage services within their administrative boundaries.

3.1.5. LITIGATION CONCERNING ACC

ACC is involved currently in two critical legal arguments that may affect the future business and financial sustainability of the company:

1. The Competition Protection Agency said in February this year that it will insist on ACC complying with *"the provisions of....., by requiring it to purchase and install the water taps* (meters) *of the multi-storey residential apartment blocks and individual houses from taps counters own water."* ACC disputes this finding of the Agency and *"calls on the Agency to legally annul the decision and prescription issued by the NACP, as it considers contrary to the provisions of laws and regulations in force.*" For a fuller discussion on metering of residential blocks, see Section 3.1.13.6.
2. The second concerns the dispute with SA Termocom, the Municipality owned district heating company. The dispute concerns whether ACC or SA Termocom should be responsible for losses from the hot water distribution network of Termocom.

3.1.6. ACC SERVICE AREA AND LIMIT OF RESPONSIBILITY

The service area of ACC is considered by ACC to be the communities whose assets are managed by ACC, as shown in Table 7.

We have been unable to identify any legal or formal record that defines the service area of ACC.

We consider,, and confirmed at the Worshop, that for the commercial security of ACC, there should be a clear legal definition of the service area that establishes ACC as the sole water and wastewater service provider within the stated geographical area.

Logically, the service area would be that within which ACC currently operates; potentially wider as the basis for a Regional Water Company.

3.1.7. RESPONSIBILITY OF CHISINAU MUNICIPALITY FOR THE WATER SECTOR

Within the service area, ACC is responsible first to the Municipality for the service provided. Under the various Laws, the Municipality has the legal responsibility for:

- Quality of the service;
- Tariff setting;
- Rehabilitation of the assets;
- Extension of the network;
- Concession of the public assets;
- Procuring loans, and

- Setting of local norms.

The Municipality is responsible for setting the tariffs for the potable water and wastewater service based upon a formula approved by the Agentia Nationala pentru Reglementare in Energetica (ANRE).

The opinion of ACC is that the jurisdiction of Chisinau Municipality is established by the Law on administrative-territorial organisation and therefore may take decisions on tariff setting only for Chisinau Municipality. Therefore, the legality of the Municipality setting tariffs to be applied within areas outside of its own area, but within areas supplied by ACC, has to be investigated.

3.1.8. OWNERSHIP OF ASSETS MANAGED BY ACC

Within Moldova, water sector assets comprise two groups:

The first group are “Public interest” assets which are those that ACC operates to provide the service to customers, e.g. the water mains, sewers and treatment works;

Second are those assets which are owned by ACC and used to operate the O&M tasks, e.g. excavators. Assets operated and maintained by ACC can be considered in two further groupings: those in the Municipality area, and those outside of the Municipality.

By the Chisinau Municipal Directive of August 2003, which constituted ACC as it is currently functions, the water sector assets were transferred legally to ACC with the “right of ownership”. However, under the subsequent Law regarding Administration and Privatisation of Public Property No 121 of 2007, ACC is forbidden to be the owner of the “public interest” assets.

During the Workshop it was confirmed that the Municipality is the owner of the assets and ACC, the operator.

The situation within the areas outside of the Municipality is unclear, and requires t be clarified. The transfer of assets and obligations to ACC was by the Decisions of the Municipality and the respective local authority. The assets were transferred to the “centralised system” according to the Regulation on Mode of Transfer of the State Enterprises, approved by Governmental Decision No 688 of 1995. Again, the transfer might now contravene the 2007 Law on Privatisation of Public Property.

3.1.9. OWNERSHIP OF S.A. ACC CHISINAU

SA "Apa Canal Chisinau" is a joint stock company fully owned by the Chisinau Municipality.

3.1.10. APPROVAL OF ACC BUDGET

The operating budget of ACC is approved by the Executive Committee, and coordinated with the Board of Directors.

The Board of Directors is a Steering Committee, which includes 9 members: 5 from the Municipality and 4 from ACC (it has to be noted that the General Director cannot be a member of this board), while the Executive Committee is an executive body made up exclusively with permanent employees of the company (4 directors), appointed for one year term by the General Assembly of shareholders.

The Municipality Council neither determines nor approves the budget of ACC. Nevertheless, as owner it has a strong influence on the budget decisions of the ACC Board.

3.1.11. PERFORMANCE BASED O&M CONTRACT

Modern best practice is for a Performance Based Contract to be entered into between the "asset owner" and the "asset operator", for the O&M of the water sector assets.

No such Contract or Agreement exists by which the performance of ACC can be monitored. ACC provides the service based solely upon the Law, Municipality dictates and the norms.

The options for a Performance Based Contract or Agreement will be considered within Phase B of the Study[14]. Issues with ascertaining the asset owner have been previously discussed in Section 3.1.8.

3.1.12. HUMAN RESOURCES

3.1.12.1. Legal

The Human Resources policy of ACC is governed by the legislation in force. The main legislative measures being:

1. The Labour Code of the Republic of Moldova no. 154-XV of 28th March, 2003, as subsequently amended;
2. Moldavian Law no 847-XV of 14th February, 2002 on wages;
3. Law on "State of Public Health Surveillance" No 10-XVI of 3rd February 2009, and
4. National Strategy regarding the employment policies for 2007-2015. Annex no. 1 to GD no. 605 of 31st May, 2007.

The current Collective Work Agreement for the period 2011-2013, registered at the Chisinau Territorial Labour Inspectorate under No. 50/11 of 22.02.2011, has been recently approved after recent negotiations between ACC management representatives and those of the Trade Union. The content of this contract is in compliance with Labour Code, Chapter V, Article 31.

[14] See also Section 5.12 Phase A11: Service Contract

3.1.12.2. Human Resource Procedures

The company has in place procedures for:

- Producing staff orders (PSAA-03-01);
- Producing job descriptions (PSAA-01-01);
- Producing the Regulations (PSAA-02-01);
- Staff training (PG-10-01);
- Consultation and Communication (PG-09-01);
- Internal Regulation - ILAA-08-01, and
- Occupational health and safety procedures.

3.1.12.3. Employee Relations

Employee relations within ACC are essentially conducted within a forum of the management representatives and the representatives of the Employees' Trade Union – Trade Union Committee.

The forum:

1. Offers both employers and employees the opportunity to discuss company policy, working conditions, working time and especially wages;
2. Allows the employees' trade union representatives to give opinions regarding company strategy, and,
3. Allows the employee representatives the opportunity to be involved in the management decision-making process.

3.1.12.4. The Organisational Structure of ACC

The organisational structure[15] of ACC comprises 172 posts[16] of whom 80 are in "management" posts and 92 in "non-management" positions.

The structure is linear, with six hierarchical levels. The hierarchal levels and reporting lines are clearly established, reinforced by the controls and rules of delegation for each subdivision and department.

In summary, the following points of note were identified:

1. There are eleven functional sections directly subordinated to the Director General, which could be a source of delays in making decisions;

[15] Excluding manual operative posts

[16] The number of employees is higher than the number of posts: several employees can be appointed for a post / job description such as welder or accountant.

2. The Production Technical Director has 1 508 subordinates, out of a total number of 1 972 employees - 76% of the staff, and
3. There is no unity between the ACC structures; for instance, within the same directorate there are departments, sections, offices, teams and centres who report directly to the Director, not their line manager.

3.1.12.5. Manpower Performance Indices

Permanent manpower levels have decreased from 2 073 in 2008 to a current establishment of 1 935, of whom 28% were graduates and 11% of specialised secondary education. The remainder are of vocational secondary education. 29% of the employees are women.

The mean age of employees is 49, with 45% aged over 50 years (890 employees). 25% are approaching or have passed retirement age.

Negative factors influencing staff numbers are:

1. Lack of plant automation permitting unmanned sites, or day time working only;
2. Age and condition of the assets – old assets and those in poor condition suffer more failures, requiring additional staff for repair and routine maintenance;
3. Minimal outsourcing of services;
4. Social policy for full employment, and
5. Lack of modern, computer business systems.

As all of these exist within ACC, employee numbers can be expected to be higher than “best practice”.

For comparison of current ACC establishment size, two tables are provided. Within

Table 9 are shown some comparisons with the Bucharest[17] water utility and within Table 10, the World Bank IBNET international indices for establishment size.

Table 9: Chisinau and Bucharest Comparative Establishment

	Chisinau	Bucharest
Data		
Staff numbers	1 935	1 890
City population	770 000	2 000 000
Length of water and wastewater networks	2 800km	5 100km
No of water main and sewer “failures” per year	42 900	75 500
Performance Indices		
Staff/1000 city population	2.5	0.9
Length of network/employee	1.45km	2.69km
No of network incidents/employee	22	39

[17] Bucharest is considered an appropriate utility with which to make a comparison

The World Bank's "International Benchmarking Network for Water and Sanitation Utilities Data Book", February 2011 edition, provides the following indices for the number of employees per 1 000 customers:

Table 10: IBNET National Staff Indices

Country	Ratio
Singapore[18]	0.3
Czech Republic	0.8
Hungary	0.9
Russia	1.3
Bulgaria	1.6
Romania	2.0
Moldova	2.6

It is generally considered as "good practice" for the operational to administrative staff ratio to be 5:1. The current ratio in ACC is around 3:1[19].

Targeting 1.5 employees/per 1 000 customers and a 5:1 operational to administrative ratio, would see an establishment reduced to 1 200 from the current 1 935; comprising 1 000 operational staff and 200 administrative staff, a reduction from 1 485 and 450, respectively.

The ratios and subsequent reduction in establishment, must be considered as the medium-term aspiration of ACC. Within Phase B, we will analysis the appropriateness of these ratios to the circumstances of ACC, and prepare an action plan by which ACC could reduce the establishment, should that be ACC policy.

As previously mentioned, before such a reduction can be considered there is a requirement for (i) major investment on renewing assets and on plant automation and (ii) a policy change towards outsourcing and from using ACC as a means of achieving full employment.

The envisaged establishment for 2011 is 564 specialists and 1 446 workers; 34 more employees than in 2010.

The largest workforce sector is for plumbers (13.45%), followed by drivers (12.73%) and repairman (8.61%).

Currently, 48 employees are on paid study-leave; not all related to the business objectives of ACC. In accordance with the Moldovan Legislation, the first study-leave is always paid by the employer, whatever the purpose of the study. Only the second study-leave shall be approved by the employer (i.e. be related to the business objectives of ACC).

[18] Singapore is often considered as the "model utility" to which developing utilities aspire.

[19] Based upon 1,485 operational staff out of a total complement of 1,935, i.e. 450 non-operational, admin staff

3.1.12.6. Recruitment Policy

Regarding the recruitment regulation, there is no documented procedure within ACC that would establish a procedure for recruitment, selection and hiring of employees and makes the hiring process more transparent. However, there is Labour Code with certain requirements to this process.

The current process for recruitment in ACC follows a series of internal rules that have been valid for years. The Collective Labour Agreement states that when hiring, "*priority shall be given to the family members of the S.A. "Apă-Canal Chisinau" employees*".

After being employed, employees who will work in hazardous conditions, or who will require a certain level of health are periodically medically checked. The medical committee decides if the employee's health is satisfactory for his duties.

3.1.12.7. Appointments and Promotion

The Chief of the Prices and Economic Analysis Section refers to the "Occupational Classification in the Republic of Moldova", which is compulsory, to determine the number of positions required within the structure.

The ACC has a Qualification Committee which convenes every quarter in order to assess the promotion demands. Promotion requests come from the employees; not from their immediate supervisors. Promotions are approved only if there are vacancies in the organisation chart.

During the past three years, only employees with professional secondary education have been promoted. The number of promotions has decreased significantly from 70 in 2008 to 41 in 2010. So far in 2011, there have been 23, as a result of a smaller number of positions becoming available.

3.1.12.8. Wage Indicators

The ACC has a Wage Regulation, negotiated with the Trade Union Committee and drafted in line with the Salary Law in the Republic of Moldova; the Labour Code of the Republic of Moldova, and other regulated regulations.

Staff employment expenditure has increased from 114M lei in 2008 to 126.5M lei in 2010. To these, a 26.5% on-cost is added. These taxes on wages are paid by ACC, as the employer. Out of the total expenditure of ACC, wages represented 27.4% of the total in 2008, 27.8% in 2009 and 30.8% in 2010.

The average 2010 monthly wage in ACC was 5 396 lei (€340). Comparative 2010 wages are:

- National average: 2 930 lei
- Chisinau average: 3 148 lei

- National sector[20] average: 4 767 lei
- Chisinau sector average: 5 681 lei

The basic wages, which grid is established by the Government represents 60-80% of the average calculated wage described above. The law provides also additional payment such as bonuses, payments for the activity in adverse conditions, overtime payments, payments for anciently for the workers in the domain of public services and other bonuses, which are regulated by the state and collective labour contracts.

The average salary mentioned above (5 396 lei) is the average calculated wage that includes the additional payments.

The wage structure is established by the law and it is different for workers and specialists.

By a Governmental Decision some lower limits and recommended ranges of the component parts of the wages are established. In particular, for the specialists the law provides a wage increment for the work complexity and the intensity, at a salary rate up to 40% from the basic wage, but with a much smaller bonus up to 15% from the basic wage, if it is compared with the bonuses of the workers that are up to 80-100%.

The average wage includes the increment for the complexity and intensity of the work, i.e it is not paid extra to the average wage paid.

Significant increments are granted to workers in the production services, such as the Technical Production Directorate: 28.6%, preparation and organization of production: 23.5%, repairs and constructions service: 24.5% and protection and prevent Significant increments are granted to workers in the production services, such as the Technical Production Directorate: 28.6%, preparation and organization of production: 23.5%, repairs and constructions service: 24.5% and protection and prevention service: 23.6%.ion service: 23.6%.

The average increment paid in 2010 for employees considered as specialists was 16.6%, of the reference wage.

It is worth pointing out that bonuses calculated and paid on a quarterly basis on achieving company targets. Indeed, each employee can receive a bonus of X% which takes into consideration a set of defined indicators (X% = x% for indicator 1 + x% for indicator 2 + …). For example specialists may have a bonus of 15% maximum.

The remuneration policy of ACC is designed to act as an incentive for productivity and for the delivery of quality service.

The requirement to pay the “extras” is subject to the ability of ACC to be able to afford the payments.

3.1.12.9. Overtime

Overtime is worked to meet the service requirements of the company. The amount of overtime worked has reduced from 21 200 hours in 2008 to 14 300 in 2010, a 67%

[20] Sector includes water, gas, electricity and heat

decrease due to the procurement of new equipment and machines. The reduction is significant for the limited investment that has been made.

In 2010, the overtime represented 0.41% of the total wage fund. The percentage is very low. Whilst minimising the ACC wage bill, the low percentage suggests that essential out-of-hours service may not be taking place, to the detriment of the level of service achieved.

3.1.12.10. Temporary Employees

The number of temporary employees has fallen from 107 in 2008 to 37 in 2010.

3.1.12.11. Mobility Index

The Mobility Index[21] shows the reasons for employees leaving.

Table 11: Reasons for Employees Leaving the Employment of ACC

Reason for Leaving	2008	2009	2010
Own decision	113	71	43
End of temporary contract	26	16	12
Temporary hired pensioners	41	66	24
Pensioners	1	11	6
Invalidity	16	5	5
Death	18	5	4
Staff reduction policy	9	14	8
Total	**224**	**188**	**102**
Mobility Index	**10.8%**	**9.4%**	**5.2%**

The fall in the number of people who left the company out of their own will is a direct consequence of the local economy.

3.1.12.12. Absence

The ACC 2010 absence rate was 14%. The reasons for absence were annual leave (66 456 days); medical leave (32 259 days) and unpaid leave of absence (4 076 days): a total of 102 791 days, an average of 52 days per employee.

3.1.12.13. Work Accidents

Since 2001 there have been 29 accidents. Seven accidents were fatal, with 2 in 2011. The most common causes of the accidents were:

- Falling from a height - 9
- Animal (dog) bite - 7
- Road accidents - 6

[21] The Mobility Index is calculated by relating the number of people who ended their individual labour agreement to the average manpower of the organisation

3.1.12.14. Health and Safety

The company is certified in the Integrated Management field, and especially in line with the Standard OHSAS 18001. The Standard regarding Occupational Health and Safety presents the requirements of a management system which allows the company to control the risks related to occupational Health and Safety.

Of the total 1 972 employees of the company, 1 288 people or 65.3% are considered as working in dangerous or unfavourable work conditions which require additional medical examination. Such employees are working in all company departments. The number is high for the nature of the business.

Every year the company prepares a Safety Plan which identifies the occupational risks by indicating actual measures for prevention, removal or diminishing of the unfavourable consequences.

3.1.12.15. Training

The staff training plans are developed within the Human Resource Service and are focused on ensuring employees are capable to perform their required tasks, particularly for health and safety; industrial safety; maintenance and improvement of the IMS and for technical and professional training.

In 2010, a “train the trainer” training programme was completed.

The training budget in 2009 was approximately 480 000 lei and 564 700 lei in 2010. According to the requirements of the Moldavian Labour Code, the training budget should be at least 2% of the salary expenditure i.e. 2.5M lei for 2010.

3.1.12.16. Staff Appraisal

There is no procedure for staff appraisal within ACC.

3.1.12.17. Disciplinary Procedure

ACC has a Disciplinary Procedure, in line with the Labour Code. The sanctions are: warning, reprimand, severe reprimand and dismissal.

In the past two years, 71 people (4%) have been sanctioned in 2009 and 49 (2%) employees in 2010. No employee has been dismissed.

3.1.13. CUSTOMER SERVICE – INCOME AND BILLING

3.1.13.1. Customer Service Management – Overview

Customer service within ACC is divided into two distinct functions, located within different Directorates:

1. The Customer Services Directorate is in charge of all client income and billing related activities, and is managed by a Customer Services Director, reporting to the Director General.

2. Dispatch Office, within the Technical and Production Directorate, which receives operational calls regarding water and wastewater service.

ACC does not have an integrated Customer Service acting as single point of entry, for all customer requests for service or enquiries. There is no Call Centre function that can provide an immediate one-stop response to customer enquiries, irrespective of the content. At present,

1. Income and billing enquiries go to the Customer Services Department.
2. Water/wastewater operational calls go to the Dispatch Office, 24/24. The Dispatch Office does not receive income and billing calls.

Enquires received by the Dispatch Office are acted upon by a Dispatcher contacting outside operational staff, or go to the appropriate department of ACC.

Customers are obliged to come to the company's head office in order to find information or register a complaint. ACC opened in March 2011 a unique centre for information and contacts.

ACC does not have an integrated customer information system, but several data bases have been produced by internal IT teams. Consequently, all customer requests and enquiries are not registered into a single database and there is no easy traceability of the type of demands, nor the means to monitor the sufficiency of the response made.

Within the Customer Service Department, service teams are not process based dedicated to separate processes such as metering, billing and debt recovery which makes it difficult to establish the proper allocation of responsibilities.

The Client Service, which is responsible for client relations, is divided into two teams, with similar tasks; one for domestic and the other for commercial/industrial clients.

3.1.13.2. Categories of Clients

On 1st January, 2011, ACC had 64 926 registered clients in its database, whereas the population in the service area is approximately 786 300 inhabitants.

A client is defined as an entity that has a contract account and is supplied through one or several connections. If a house or factory has several connections, it is considered one client. For example, there are 447 housing associations each one of which have a contract with ACC and are each considered as a single client, but the total number of water connections for the associations is 3 442.

According to statistic data, the percentage of the population having access to the services provided by ACC is 94,5% for water and 92,2% for sewerage.

The inhabitants having access to water and / or sewerage services, but do not have contracts with ACC can be defined as "customers". In other word, the "client" is the one who pays the bill, and "customers" are those who benefit from the service.

A family of four, within a house with a single connection comprises, one "client"; four "customers". Arguably, employees in an office who come from outside of ACC's area of

supply, become “customers” of ACC when they are at work and use water supplied by ACC.

More than 99% of the people living in block apartments are owners of their apartment. Yet, because the Government decided to maintain the Municipal companies in charge of the administration of the blocks, there are few cases in which the owners chose to form an association of owners, as a distinct legal entity.

Clients are divided into several categories, see Table 12. Residential houses can be distinguished from residential housing “blocks”. The forms of organisation of the blocks are four.

The Municipal companies comprise:

1. IMGFL – *Intreprinderi Municipale de Gestionare a Fondului Locativ* – of which there are 32, comprising more than 70% of the population living in block apartments.
2. CCL – Cooperative de Constructii de Locuinte - former construction companies which have built the block and which continue to perform the administration tasks.

Concerning the associations of owners, there are also two forms of organisation:

1. APLP – Asociatia Proprietarilor de Locuinte Private
2. ACC – Asociatii de Proprietari in Condominium (association of owners in condominium)

The difference between the two consists in the fact that APLP does not administer the common parts of the condominium, but there are no differences in terms of billing methods. Hereafter, these are referred to collectively as Associations.

The total number of clients is 64 926 divided by ACC into several categories as shown in the following table.

Table 12: Categories of Clients of ACC

Type of Customer	Number of Clients	Number of contracts	Number of connections
IMGFL	32	32	7066
CCL	274	274	3042
Associations	447	447	3442
Department houses	391	391	2353
Houses and villas	47 890	39440	53506
Apartments	7281	7123	19404
Public institutions	258	258	4223
Companies	8353	8353	28658
Total	**64 926**	**56318**	**114249**

Public institutions are generally the state and municipal administration, hospitals, schools etc.

For the 64 926 clients, there are 56 318 contracts, supplied through 114 249 connections to the network of ACC.

3.1.13.3. Industrial and Process Water

In order to avoid any confusion in the reading of the present report, the definition we propose[22] for the different types of water is given hereafter:

- **Potable water:** water treated to the required standards to make it suitable for human consumption, and supplied to all customers irrespective of its intended use.
- **Process water:** partially treated water used for maintenance purposes by ACC only. It includes the water used in water treatment process and comprises the treatment plant "water losses". The literal translation of the Romanian word is “Technological” water.
- **Industrial water:** Water treated to an Industrial Water Standard and supplied to certain industrial clients for use in their industrial processes.

The demand for Industrial Water can be met from the volume of backwash water from the Chisinau water treatment plant filters. The volume supplied in 2010 was 1 818 000 m^3. If the demand exceeded the backwash water flow, process units would be required to treat water to the Industrial Standard.

The tariff for industrial water is approved by ANRE. The tariff for industrial water is lower than that for potable water. The major discrepancy between the tariffs for the industrial and potable water is related to the fact that the Municipal Council approves for potable water differentiated tariffs for different customer’s categories (domestic and non domestic customers). The differentiated approach is used to provide some sort of support to population by decreasing the tariff for the domestic consumers (households) with a cross subsidy supported higher tariffs for non-domestic consumers.

3.1.13.4. Raw Water

26,000 m^3 of raw water is supplied by ACC from its source works. There is no centralised raw water supply, therefore the tariff for raw water is not regulated or approved by a public authority.

3.1.13.5. Water for Urban Heating

In Moldova, there is no supplier of hot water: ACC supplies cold water at the entry of the heating units, called “thermal point”, then Termocom is responsible to heat the water before it arrives to the consumer. Today, Termocom only supplies thermal energy to heat the water. In other words, the water supplied to the clients of the centralised heating system is not billed as “hot water” by Termocom, but as “water for heating” by ACC; Termocom only bills the thermal energy. Termocom has so far refused to sign a contract

[22] These definitions might not be conform to the definitions stated in the Moldovan Law.

recognising the heating units as points of delivery of the service by ACC because Termocom does not want to accept the cost for the water losses between the “Thermal Point” and the client’s water meter.

The “relation” between ACC and Termocom will be looked at/ revised in collaboration with the Legal Department of ACC during the Phases B and C of the Study.

In 2010, ACC billed 6 994 000 m^3 of water for heating. This total volume of cold water delivered for the hot water production comprises 10 000 m^3 delivered to the heating centrals managed by ACC, and the 6 984 000 m^3 billed directly to the population without any contract for hot water service provided by SA Termocom.

3.1.13.6. Meter Reading

ACC does not read regularly the meters of domestic clients and only performs checks[23] on the meter readings of clients who, in effect, pay a month in arrears.

It has to be noted that the Constitutional Court of Moldova just ruled[24] that the customers who do not allow representatives of the water utility into their residence to check water meters, will be fined.

The service charge bill sent to a client contains the previous meter reading; the calculated consumption for the previous month, together with a column within which the client enters the current reading. When a client pays the bill at ACC`s head office, the reading made by the client is entered into the billing data base, to be used to compute the next charge. If the client pays at a Bank, the segment of the bill with the client reading is handed to the Bank, who forwards it to ACC.

If the index is not read or communicated by the client, the bills are issued on estimated basis for two months, and afterwards on fixed rates using the “norms”. For a large water user, there could be an incentive not to read the meter.

The meters of other categories of clients are read every month by ACC employees.

The reading process is entirely manual. There are special booklets for each industrial/commercial client in which the readings are noted by the meter reader, and the client signs to confirm his agreement with the reading.

92.5% of clients pay at a Bank or Post Office.

3.1.13.7. Billing

Every client is billed each month, on the meter reading,, an estimated amount or on “norms”.

ACC has a contract for invoicing and cash collection services with the Municipal Company, Infocom. It has to be noted that Infocom does not perform meter reading.

[23] Reported as quarterly.

[24] Dated 12 April 2011

Although this should be done by IMGFL`s, it appears that in reality they only collect the readings communicated by the apartment owners. The suitability of this procedure will be considered further within Phase B. Infocom issue invoices to IMGFL, CCL, Associations and to Municipal Enterprise clients and provides a similar service to other utilities.

The bills issued by Infocom contain cold water, hot water and sewerage. The printed bills are sent to the administrators of the IMGFL, Associations and CCL who distribute them to apartments.

Billing for IMGFL Clients

The bills are determined according to the readings of the apartment meters. Where there are no meters or the meters failed, the charges are determined according to the "norms".

The difference between the meter in the service pipe the "block" and the sum of the apartment meters, is not distributed to the clients.

ACC bills the IMGFL according to the general meter, but collects only what is billed by Infocom to the individual apartments. The IMGFLs rarely pay the difference[25].

According to the Law on Potable Water, the Municipality has the responsibility for "*organising the metering and the consumption records of the water distributed"*. Consequently, the Municipality has a conflict of interest between ACC and the IMGFLs i.e. the residents/clients of ACC.

CCL and Association Clients

Eighty-one Association and CCL clients have decided on the distribution of the difference between the incoming meter and the sum of the apartment meters, and have communicated the method of distribution to Infocom.

Where there is no agreed procedure, the same issue regarding meter readings occurs as for the IMGFL.

A separate contract may exist with the Association or CCL for water used for gardens or cleaning the common parts of the building.

3.1.13.8. Volumes of Potable Water, Industrial Water & Wastewater Billed

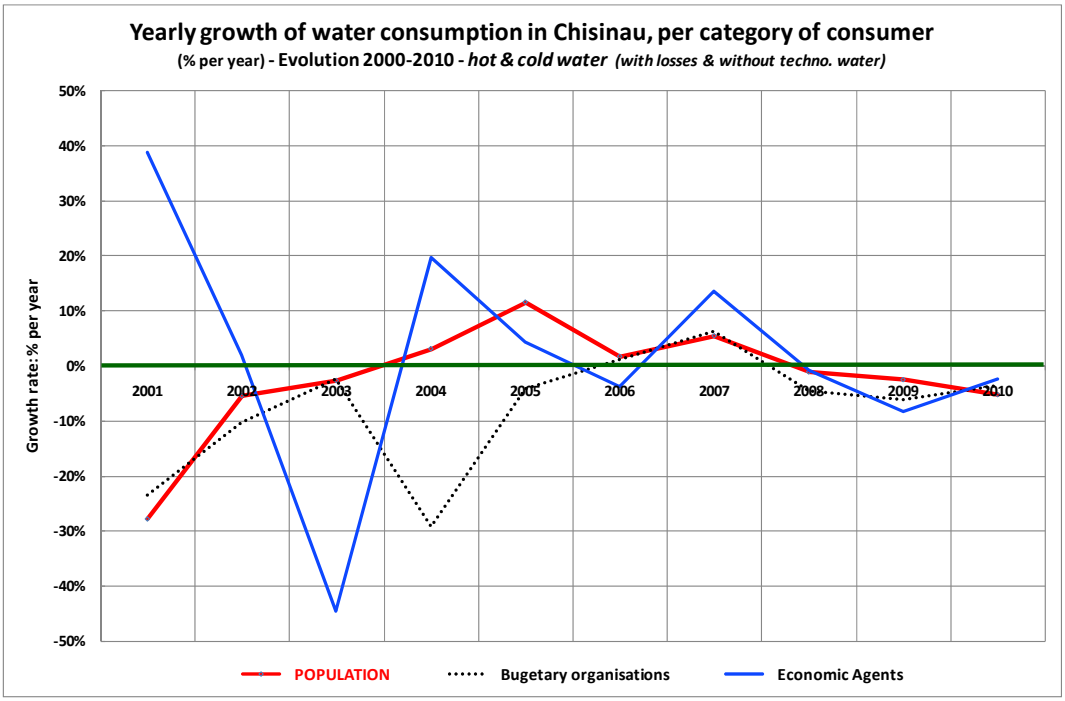
The volumes billed have declined as shown in the following table and as shown in the following graph Figure 4,

Table 13: Volumes Billed 2008:2010

Year	Volumes Billed (10^3m^3)		
	Water	Industrial Water	Wastewater
2008	48 428	2 465	46 419
2009	46 701	1 950	43 898
2010	44 468	1 818	42 320

[25] For the consequences upon the financial sustainability of ACC, see Section 3.2.1.2.

Figure 4: Decline in Water Consumption 2001-2010



"Water" billed in 2010 (x$10^3 m^3$) comprises:

- Potable water : 37 474
- Hot water: 6 994, including losses from the hot water system of 348 000 m^3, disputed by Thermocom.

Wastewater is billed as 100% of the potable water, except for the industrial clients who use water in their processes. In these cases, the percentage of wastewater discharged is agreed, and established in the service contract.

For the year 2010, the division between volume billed on meter readings and that on fixed rates consumptions (based on norms) is presented below:

Table 14: Volumes Billed on Meter and on Fixed Rate Consumption, 2010

Client Category	Volumes Billed ($10^3 m^3$ and %)	
	Metered	Norms
Associations	23 588 (80%)	5 968 (20%)
Apartments	471 (61%)	302 (39%)
Houses	3 165 (58%)	2 323 (42%)
Public Institutions	2 190 (90%)	247 (10%)
Companies	5 685 (91%)	531 (9%)
TOTAL	**35 099 (79%)**	**9 371 (21%)**

ACC bills on norms when (i) there is no meter on the connection and (ii) when there is a meter, but it cannot be read or the client does not communicate the meter reading for more than 2 months. This explains why the percentage of volumes billed on norms is higher than what would normally result from the connections without meters.

The ratio connection with meters / total number of connections is presented in the table below:

Table 14: Connections with meters, by categories of clients

Type of Customer	Connections with meters
Associations	97%
Apartments	89%
Houses	77%
Public institutions	98%
Companies	98%

3.1.13.9. Debt

According to the Law 1402/2002, article 25, if a client does not pay his service charge, upon giving 5 working days notice ACC is entitled to suspend the service. If the client remains in arrears, ACC may sue the client.

ACC practices a sympathetic debt recovery procedure that seeks to assist the client to pay the charges.

The global payment efficiency in 2010 was 88%. A very significant part of the missing amounts is coming from the well-identified disagreement between ACC and public housing structures (IMGFL and APLP) regarding the repartition and billing of the difference of measured volumes between the block meters and the sum of individual apartment meters.

According to the figures collected for year 2010, this difference was around 56 M Lei over a total billed by ACC of 543 M.Lei (without VAT). If this amount was duly billed by IMGFL and APLP, and collected in the same proportion as the remaining part of the volumes they effectively bill to domestic customers (collection rate around 94%), the global collection rate for 2010 would have reached around 96 – 97%

35% of the current debt is older than 5 years. 45% of the debt older than 5 years is found with the IMGFL category of clients; the Energy complex is responsible for 28% of this debt. This efficiency indicator is, as presented above, highly depending from the solution of pending problem of billing the difference of indexes, with IMGFL and APLP. A comparison of indicator “with” and “without” this specific item could be developed further in the course of the project, but the economical situation of ACC is nevertheless directly impacted by the global amount of unpaid bills.

Public institutions do not have debts older than 2010.

3.1.14. INSTITUTIONAL & LEGAL ISSUES IDENTIFIED

Issues identified during the Inception Phase together with their status following the Workshop, the agreed action and timetable are provided in the section “SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS” that follows the Executive Summary.

3.2. FINANCIAL ANALYSIS

3.2.1. ACCOUNTING ISSUES FOR ACC

3.2.1.1. Financial Overview of the Company

The Yearly Accounting Statement for 2010 has not been officially issued at the time of preparation of the Inception Report. The yearly accounts are prepared in cooperation with an official accounting auditor, selected every year through public tender. Since 2003, Soverina Audit has been repeatedly selected.

Our evaluation of the financial and economical condition of ACC has been based on figures made available to us, mainly the situation by the end of third quarter of 2010, and for some elements, figures for the whole year 2010.

Table 15: Yearly Profits and Losses accounts for 2008, 2009 & part 2010

in Current MLD	2008	2009	9 months 2010
Revenue from sales(turnover) VAT and duty exclusive	**441 169 343**	**447 550 287**	**428 499 464**
Service rendering	440 947 398	447 334 251	428 323 801
water supply	*303 052 195*	*310 731 954*	*307 039 906*
wastewater treatment and discharge	*122 316 954*	*115 177 102*	*99 457 198*
[thermal energy generation and supply)	*5 392 523*	*8 280 702*	*10 225 911*
-other services	*10 185 726*	*13 144 493*	*11 600 786*
Income from leasing	221 945	216 036	175 663
Costs and expenses—Total	**522 100 316**	**490 201 127**	**388 789 696**
Material costs and expenses	**170 774 526**	**150 067 709**	**135 788 518**
Raw materials, materials, spare parts	30 724 755	22 728 055	29 693 115
combustible—total, *inclusive*	22 980 630	17 895 721	15 094 078
Purchase electricity	97 031 854	98 958 393	86 699 991
Costs/expenses, services rendered by third parties	**33 855 734**	**34 179 053**	**31 227 229**
Long term assets depreciation	**111 261 869**	**106 875 521**	**61 430 716**
Wages	**113 663 562**	**108 773 375**	**91 083 760**
Social insurance and mandatory health insurance	**29 293 717**	**27 444 739**	**23 030 637**
Other operational costs and expenses	**63 250 908**	**62 860 730**	**46 228 836**
Interests on loans and borrowings	21 072 691	24 476 082	12 919 133
Taxes and charges included in expenses	30 588 230	29 685 160	28 206 885
Other expenses	10 678 625	8 188 368	4 290 977
Net profit(loss)	**-53 696 406**	**-29 077 713**	**38 418 367**
as% of turn-over	-12,2%	-6,5%	9,0%

The Analysis of the structure and dynamics of income presented in Table 15, show a positive trend in revenues in 2009 compared to 2008, and for the first nine months of 2010 compared with the similar period last year.

The positive trend is due to the significant tariff increase that occurred by the 2009 year end.

“Water and Wastewater Services” represent, logically, the main part of revenues, while revenues from “Heating Services” are limited to 1% to 1.5% of turn-over, equivalent to revenues from “Other Services”.

Main operating costs in 2010 are, (in ascending cost):

1. Electrical energy (20%);
2. Depreciation (22%), and
3. Wages and related taxes (27%).

The net result, after significant losses in 2008 and 2009 of -12.2% and -6.5%, respectively appear to be steadily positive in 2010. Turnover for 2010 is +9% up to the end of September. The trend will probably be eroded in 2011, as no tariff revision has been planned in 2010, or for the beginning of 2011.

3.2.1.2. Balance Sheet

Table 16 is the Balance Sheet for the period 2007 to 2010.

Table 16: ACC Balance Sheet for 2007 to 2010

BALANCE SHEET				
in current MLD	**2007**	**2008**	**2009**	**2010**
Total Assets	**1 368 678 395**	**1 335 868 919**	**1 317 634 442**	**1 383 103 382**
Long term Assets	**978 638 665**	**903 016 072**	**841 948 312**	**820 488 570**
Tangible fixed assets	973 626 615	902 517 218	841 541 956	820 080 952
Intangibles	305 535	487 504	395 006	396 268
Current Assets	**390 039 730**	**432 852 847**	**475 686 130**	**562 614 812**
Stock	33 764 151	40 177 357	39 908 163	40 399 156
Trade Account Receivable	317 410 865	355 645 117	398 418 433	470 003 214
Other Receivables	32 912 220	31 892 618	31 504 673	47 516 252
Cash	1 344 813	1 275 755	858 090	508 133
Other current assets	1 971 669	2 457 099	2 109 972	2 129 186
Liabilities	**1 368 678 396**	**1 335 868 919**	**1 317 634 442**	**1 383 103 382**
Equity	**993 393 095**	**950 082 097**	**925 033 694**	**1 004 183 360**
Share Capital	553 745 129	553 745 129	553 745 129	566 745 129
Reserves	201 426 004	165 966 792	148 192 033	128 930 596
Revaluation reserve	321 144 991	320 810 480	320 945 382	320 586 343
Retained earnings (previous years)	-135 955 020	-100 495 809	-140 741 561	-151259481
Retained earnings (current year)	-15 000 001	-57 465 390	-29 077 713	68 065 044
Grants-Subsidies	68 031 992	67 520 895	71 970 425	71 115 729
Long term Liabilities	**131 782 893**	**156 255 325**	**138 068 600**	**175 504 420**
EBRD	126 208 729	147 503 886	134 623 981	171 437 490
Other	5 574 163	8 751 439	3 444 619	4 066 930
Current Liabilities	**243 502 408**	**229 531 497**	**254 532 148**	**203 415 602**
Short term credit	72 942 765	44 547 962	31 975 000	4 000 000
Other short term financial liabilities	12 028 722	11 665 321	10 606 092	5 977 426
Trade accounts payables	21 957 660	28 229 594	40 588 814	36 192 101
Payable to the employees	9 883 166	9 240 831	9 995 884	10 555 833
Payable to the budget	55 824	8 274 419	12 260 845	3 613 366
Social insurance payable	3 308 389	2 955 032	2 525 185	2 438 189
Payable to the founders	88 918 353	91 328 854	108 078 816	129 028 210
Other Creditors	34 407 529	33 289 484	38 501 512	11 610 477

Asset Valuation

The reevaluation of assets was performed in 2007 on request of the Municipality. The evaluation resulted in a net asset valuation of around 250 Million MLD, i.e. 30% of their former valuation, according to collected figures.

The opinion of ACC is that this revaluation was not perfectly achieved, and it would be necessary to implement again this exercise. The understanding of the Consultant is that, as ACC plan to move its accounting system towards IFRS requirements by 2013, this evolution will require a new valuation of assets, and will therefore solve the problem.

Within Section 3.1.8[26], we have discussed the issues of ownership of assets by ACC. We will consider further within Phase B, the implication for the financial Balance Sheet of ACC, should the water sector assets be returned to the Municipality and the local authorities.

Receivables

By the end of 2010, trade receivables amounted to 470M MLD; the breakdown by age and by categories of customers is presented in Table 17.

Table 17: Receivables by Age and Customer Category

Breakdown of Receivables	Debt at 01.01.2011	Including quantities billed in year: 2010	2009	2008	2007	2006	2005	<2005
TOTAL	**100,0%**	**26,4%**	**11,2%**	**11,3%**	**7,0%**	**3,9%**	**5,8%**	**34,4%**
1 DOMESTIC CUSTOMERS	**77,8%**	**84,1%**	**92,8%**	**88,9%**	**92,8%**	**96,2%**	**85,9%**	**57,9%**
IMGFL Chisinau	54,1%	47,0%	66,4%	64,5%	69,9%	74,7%	65,6%	44,6%
IMGFL outside Chisinau	0,9%	1,2%	1,2%	1,0%	0,6%	0,8%	0,4%	0,6%
APLP	17,6%	20,8%	21,1%	20,3%	20,3%	18,8%	18,5%	12,3%
CCL	2,5%	7,4%	1,9%	1,8%	0,5%	0,6%	0,7%	
Department houses	0,8%	1,6%	0,7%	0,6%	0,4%	0,8%	0,6%	0,3%
State owned	0,1%	0,2%						
Private sector - houses	1,5%	5,1%	0,7%	0,3%	0,2%	0,1%	0,0%	0,0%
Apartments	0,5%	1,1%	0,7%	0,5%	0,9%	0,5%	0,0%	0,0%
2 PUBLIC INSTITUTIONS	**0,7%**	**2,7%**	**0,1%**	**0,1%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**
State budget	0,2%	0,9%	0,0%					
Municipal budget	0,4%	1,7%						
Local budget - towns, villages	0,0%	0,1%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%
3 COMPANIES	**21,5%**	**13,2%**	**7,0%**	**11,1%**	**7,1%**	**3,8%**	**14,1%**	**42,1%**
Energy complex	14,0%	5,9%	5,7%	6,5%	6,4%	3,2%	13,7%	28,2%
Termocom	4,6%	3,9%	5,7%	6,5%	6,4%	3,2%	2,7%	4,4%
CET 1	4,0%	0,6%					10,9%	9,2%
CET 2	5,4%	1,4%						14,6%
Moldcarton	5,0%		0,1%	3,9%				13,2%
Others	2,5%	7,3%	1,3%	0,7%	0,8%	0,7%	0,4%	0,7%

The table includes the debt related to the water meter difference. An alternative calculation, without this specific debt, will be developed further in the course of the project, but will necessitate the precise identification of such unpaid amounts in past years.

It should be pointed out that the performance is obscured by the inclusion of challenged debt. The indicator "*the average duration of collection of the bills*", including the non-due debts (meter differences) would provide a more positive picture. Nevertheless, these challenged bills are considered as legally due by ACC and should therefore be included.

As one of the most noticeable fact resulting from the review of the Balance of ACC, the importance of Receivables, compared with payables and stocks, must be stressed, as it results from years of commercial difficulties, and has a direct and strong impact on the

[26] It would seem that the assets are owned by ACC, in contravention of the Law on privatisation of public property, 2007.

Working Capital requirements of the company, and consequently upon the day-to-day management of ACC.

One of the most noticeable elements in the breakdown of receivables is the important weight of oldest receivables, i.e. older than 2005, with more than one-third of total amount.

Regarding the global cumulated receivables, domestic customers represent more than three-quarters of total, between 85% and 90% for recent years, and mainly within the Municipality owned IMGFL accommodation blocks. We understand that the debt is not with the customers who live within the blocks but with the IMGFL who mange the blocks. The debt arises from the responsibility for the disputed variation between the meter reading on the incoming supply and the sum of the individual client meters[27].

The debt of industrial customers, which mainly consists of the three heating companies, is occurring from before year 2005. Recent periods appear as being kept relatively under control. Thermocom is owned only at 70% by the Municipality, while CET I and CET II are not municipal companies but states structures.

Another relevant indication for receivables is the conversion of monetary amounts into days of turn-over[28]. The conversion can be made for each category of customers, related to the category turn-over generated in year 2010, Table 18.

Table 18: Receivables as "Turn–Over Days"

Customers	Debt at the beginning of the period	Debt at the end of the period	debt end of period as days of turnover
1	**2**	**7**	
TOTAL	**388 127**	**458 159**	**282**
1 DOMESTIC CUSTOMERS	**291 164**	**356 369**	**396**
IMGFL Chisinau	199 230	247 785	**634**
IMGFL outside Chisinau	3 946	3 974	**367**
APLP	63 801	80 708	**436**
CCL	8 639	11 283	**126**
Department houses	6 924	3 581	**49**
State owned	148	266	**8**
Private sector - houses	5 733	6 748	**51**
Apartments	2 892	2 291	**115**
2 PUBLIC INSTITUTIONS	**4 273**	**3 366**	**18**
State budget	922	1 134	**13**
Municipal budget	3 217	2 019	**20**
Local budget - towns, villages	134	213	**381**
3 COMPANIES	**92 690**	**98 424**	**183**
Energy complex	63 002	64 072	**798**

[27] See Section 3.1.13.6

[28] i.e. is the receivables are equivalent to one year of turn-over, then it represents 365 days

Customers	Debt at the beginning of the period	Debt at the end of the period	debt end of period as days of turnover
Termocom	16 519	21 189	**1196**
CET 1	19 140	18 200	**2897**
CET 2	27 343	24 683	**438**
Moldcarton	22 837	22 837	
Others	6 851	11 516	**25**

It is noticeable that, while the global level of receivables represents 282 days of turn-over, that for domestics amounts to more than one year (396 days), among which nearly 2 years (634 days) were for the IMGFL accommodation blocks and 436 days for the APLP blocks.

Within the industrial sector, the main problem occurs with the three Municipal local heating companies. Other companies have a much better performance. The figures confirm that the communal housing structures, as well as heating companies, bear the largest responsibility for the poor financial condition of ACC. The large amount of receivables of these two Municipal owned client sectors causes the excessive cash needs of ACC.

Solving, or at least improving, this situation can come only from the Municipality.

3.2.2. VALUE ADDED TAX

In accordance with tax legislation in Moldova Republic, services delivered to domestic customers is exempted from VAT tax, while those delivered to other customers (budget & industries) is subject to a 20% VAT rate.

Reduced rates are applied for food products (8%) or gas purchase (6%).

As a logical consequences, the VAT paid by ACC on the proportional part of goods and services used for the production of such services to domestic customers cannot be balanced with VAT collected, and reimbursed by the State.

Only the paid VAT corresponding to costs occurred for services to budget and industries can be balanced.

In case a 0% VAT rate would be applied for domestic invoices, enabling reimbursement, the corresponding savings are estimated around 25 Million MLD per year, or 5.4% of production costs for domestics.

It must be noted that a 0% VAT mechanism has been implemented in 1997 for domestic consumptions on energy (electricity and gas), resulting from an active lobbying of the related operators. Such lobbying has has been considered by ACC - ACC appeals for the amendment of the FC were addressed in 2004 - as it could represent a valuable opportunity, especially if supported by IFIs involved in water development projects in Chisinau, or more generally in Moldova.

3.2.3. EBRD LOAN

3.2.3.1. Existing situation:

A loan was contracted by ACC in 1997, initially for the amount of 30 Million USD, amended in 1999 with a reduction to 22.8[29] Million USD. This loan had a sovereign guarantee from the Government of Moldova.

ACC faced difficulties during the first years to face its reimbursement obligations, but it seems to have improved until now, except for the fulfilment of some of the covenants e.g. profitability ratios.

Reimbursements are running on until end of 2014, with semester payments of US $796 426.36 each, for principal.

Forecast for EBRD loan repayment for the period April 2011 — October 2014 is as follows,

Table 19: EBRD Loan Repayment

Due date	Loan rate (USD)	Interest rate forecast (USD)
23rd April 2011	796 426.36	45 137.62
23rd October 2011	796 426.36	23 901.07
23rd April 2012	796 426.36	20 486.63
23rd October 2012	796 426.36	28 211.01
23rd April 2013	796 426.36	24 106.28
23rd October 2013	796 426.36	19 145.43
23rd April 2014	796 426.36	21 462.15
23rd October 2014	796 426.34	18 923.97
Total	**7 167 837.22**	**201 374.18**

*At the time of analysis the amount of interest for the payment date 23rd October 2010 was actually paid, which means that this amount is not projected.

3.2.3.2. EBRD Debt service for 2009 and 2010

The following cash movements occurred in ACC accounts during these two years:

Table 20: EBRD Debt Service 2009 & 2010

Period	Reimbursement according contract conditions		Actual reimbursement		Interest calculated and paid	
	Data	Amount (USD)	Data	Amount (USD)	Data	Amound (USD)
2009	23/04/09	796 426.36	28/05/09	796 426.36	28/05/09	227 087.70
	23/10/09	796 426.36	16-19.10.09	574 572.36	02/11/09	118 041.85
			02/11/09	221 854.00		
2010	23/04/10	796 426.36	02/03/10	155 625.11	22/04/10	63 818.09
			07/04/10	640 801.25		
	23/10/10	796 426.36	07-21.10.10	796 426.36	21/10/10	54 239.12
TOTAL		**3 185 705.44**		**3 185 705.44**		**463 186.76**

Million USD

According to the data from the above table, in 2009 SA "Apa-Canal Chisinau" did not strictly fulfil the terms of repayment of the main part of the loan in the 2nd and 4th quarters, as well as accrued interest, which led to the accrual and payment of fine amounting to US $6 241.65 (equivalent to 69 876.94 MDL), US $5 934.38 in 2009 and US$307.27 USD in April 2010.

3.2.4. DEBT SERVICE AND TARIFF SETTING

The repayment of principal for the EBRD loan is included in the list of justified costs for tariff setting. This is a consequence of interpretation of article 1.5 in the tariff setting methodology issued by ANRE (the national regulator) in 2004, which states that international financial engagements, provided that they have been approved by the Government and the National Assembly, supersede the national regulations, and as a consequence the corresponding costs must be included in the justified costs for tariff calculation. The loan agreement with EBRD complies with these requirements.

In accordance with the ANRE regulation, local loans can not benefit from the same treatment regarding inclusion in justified costs for tariffs.

This specific point has a positive impact on strengthening the capacity of ACC for effective reimbursement, but its sustainability shall be checked through further investigation.

3.2.5. COMPLIANCE WITH OTHER LOAN COVENANTS

The comparison described in Table 17 proves that SA "Apa-Canal Chisinau" complies in 2009, as well as in the beginning of year 2010 with the standard relations between the reserve for bad debts and received income, with the standard current ratio, and with the standard factor of the ratio between receivables and income.

The corresponding rate of current liquidity is also beneficial due to the existence as a part of current assets of a significant amount that relate to jeopardised receivables, for which no provisions are made, inactive inventory and other illiquid assets.

At the same time the required level of Debt Service Coverage Ratio (1.35 expected by EBRD), with a level of 0.40 in 2009 and 1.24 in 2010. A positive trend of this indicator can be noticed in 2010, and will be challenged for coming months.

It is worth pointing out that the analysis of debt and receivables, and evolution of ratios, a deeper and more detailed analysis will be performed in the later stage of the project, and will consider the specific problem of unpaid volumes on blocks (especially those managed by IMGFL and APLP structures). The difference of volumes between the index measured at the entry of each block, and the sum of individual consumptions of apartments (or metered, or estimated according to the norm) are generally not paid by these entities, and this has become a political issue. The volumes unpaid are more than significant, reaching 30% of volumes delivered on IMGFL blocks, and 20% for APLP.

Nevertheless, the global unpaid volumes must of course consider these components when reviewing the global receivables due to ACC.

Paragraph 4.02 (j) of the Contract Agreement Nr. 609 stipulates that Debtor (SA "Apa-Canal Chisinau") is committed not to admit the existence of any debt, totalling more than 3 000 000 MDL, except for:

- EBRD loan
- Debts to trade accounts, arising during the current business practices;
- Historical debt to Moldenergo, existing on 31st January 1997.

In the opinion of ACC, the requirement must be balanced by the fact that:

- No explicit indexation limit on the cap amount for other financial debts was included when establishing this covenant, despite the significant inflation faced by ACC since this time
- In any case, the local loans have been in fact contracted for purposes directly related to the current business practice, and should therefore be excluded from the calculation for this covenant

Following the analysis, it was revealed that for the period year 2009 – Third Quarter 2010 SA "Apa-Canal Chisinau" exceeded this limit as follows:

Table 21: ACC Debt

Nr.	Creditor	The amount of debt (MDL) as at			Receipt of new loans (tranches) for the period 01.01.09 — 30.09.10
		1st January 2009	31st December 2009	30th September 2010	
1	CB Moldinconbank SA	40 100 000.00	36 650 000.00	60 000 000.00	58 740 002.90
2	CB Banca Sociala SA	3 302 952.50	18 600 000.00	17 400 000.00	47 800 000.00
3	CB Energbank SA	3 020 833.33	-	-	-
4	Banca de Economii a Moldovei	10 500 000.00	13 375 000.00	-	11 554 480.52
5	CB Moldova-Agroindbank SA	-	-	25 000 000.00	25 000 000.00

Data presented suggests that for the period 2009/10, ACC does not comply with this standard, exceeding the established limit as at 30.09.2010 with 53 000 000 MDL (17.67 times) on CB Moldinconbank SA loan, with 14 400 000 MDL (4.8 times) on CB Banca Sociala SA loan, with 22 000 000 MDL (7.33 lei) on CB Moldova-Agroindbank SA loan.

3.2.6. MUNICIPAL BUDGET

The 1997 EBRD loan to ACC has been supported by a sovereign guarantee from the State of Moldova. In the future, EBRD wants that such guarantees would be arranged at a local level, i.e. with the Municipality. As a consequence, the borrowing and guaranteeing capacity of the Municipality must be investigated in the course of the present study.

Table 22: Municipal Budget

Municipal Budget Evolution - Million MLD current

	Revenues	2005	2006	2007	2008	2009
	million MDL	1304	1766	1916	1838	1716
1	**Own Revenues**	**725**	**902**	**1090**	**1201**	**1195**
1.1	personnal income tax	552	717	890	979	968
1.7	water fee	8	7	7	14	14
2	local public institutions revenues (special means	50	70	49	58	53
3	special fund (special taxes or lottery revenues)	3	4	6	6	7
4	**shared revenues**	**286**	**400**	**532**	**310**	**189**
5	**transfers**	**184**	**334**	**133**	**123**	**207**
6	**revenues from asset sales**	**56**	**56**	**106**	**140**	**65**

	Gap (incomes - expenses)	69	-19	232	121	96
	as % of incomes	5,3%	-1,1%	12,1%	6,6%	5,6%
	Gap without asset sales (6)	13	-75	126	-19	31
	as % of incomes	1,0%	-4,2%	6,6%	-1,0%	1,8%
	Gap without asset sales and transfers (5 & 6)	-171	-409	-7	-142	-176
	as % of incomes	-13,1%	-23,2%	-0,4%	-7,7%	-10,3%

	Expenditures	2005	2006	2007	2008	2009
	Total expenditures	1235	1785	1684	1717	1620
1	**Current expenditures**	**868**	**1082**	**1328**	**1504**	**1464**
1.1	wages	177	246	349	401	550
1.2	current transfers	430	528	603	710	514
1.3	Goods & Services	159	169	281	299	275
1.3.3.	*water and sewerage*	*22*	*17*	*32*	*33*	*32*
1.4	Social insurance contributions	51	63	74	81	108
1.6	interest payments on outstanding loans	6	17	13	2	1
2	**Capital expenditures**	**302**	**646**	**269**	**153**	**83**
2.1	capital investments	148	375	171	76	28
2.2	repair works	68	113	54	53	36
2.3	acquisitions	80	149	27	11	6

Raw figures on the budget for 2011 are based on global incomes of 1 889.4 Million MLD, including 73.5 Million MLD from State Budget, and expenses of 2 310 Million MLD. The significant difference between those two figures (deficit of 420.5 Million MLD) was said to be covered by exceptional sales of public properties.

Such situation was already faced during previous years, but at a reduced scale (see line “Gap without asset sales” in the table above).

3.2.7. TARIFF SETTING

Some EBRD loan covenants (1997) refer to the tariff calculations (for drinking water and sewerage). Based on the EBRD recommendations and methodology, ACC should determine and adjust the tariff on a quarterly basis.

From 97 to July 2001, the tariffs have been adjusted according to the aforementioned covenants, but not every quarter.

Starting from 2001, the Municipal Council of Chisinau has refused to approve the tariffs calculated according to the EBRD methodology. Instead of the methodology proposed by EBRD where 1 formula for the tariffs calculation was proposed, it has been approved the calculation of the tariffs based on a Cost + Fee calculation supported by estimations of yearly budgets and volumes.

The tariff for the technological water is approved by ANRE, but after the coordination of the tariffs rates with the Chisinau Municipal Council.

The calculation for the potable water tariff is submitted for approval concurrently to ANRE and CMC, because the tariffs for the technological water and for potable water and sewerage services cannot be examined separately. The ANRE opinion is presented to the municipality, because the tariff for technological water can be approved only after the coordination with CMC.

ANRE verifies whether the minimal costs are included in the unit costs, dictated by the water balance, the collected waste water volumes, major suppliers, by the more homogeneous markets or by the limits imposed by the national legislation. The prognosis of water balance and the wastewater volumes are also verified.

ANRE was initially established in 1997 by the Government of Moldova as the regulator for public energy, heating, gas and petrol activities (regulation of tariffs, issue of licences for operators, protection of customers); it is a legal entity directly responsible to the Government and not attached to a specific Ministry or organization.

The Technical University of Moldova calculates on contract basis the normative water losses which are approved at central public administration level (by Apele Moldovei Agency).

Tariff increases are proposed by ACC, discussed and endorsed by the specialised municipality departments (Mayoralty subdivisions) and commission and finally approved by the Municipal Council after a vote (51 deputies). When the decision has been taken by the MC, the new tariff grid enters into force immediately, through official publication in local mass media.

From 2011 to 2007, the increases in tariffs proposed by ACC have been systematically refused by the Municipal Council.

In 2007, a minor increase has been approved although it did not allow to include for the expenses of the Company. In 2007, the Republic of Moldova and the FMI signed some agreements, which may explain this favourable decision. A second increase, more significant, was done in 2009.

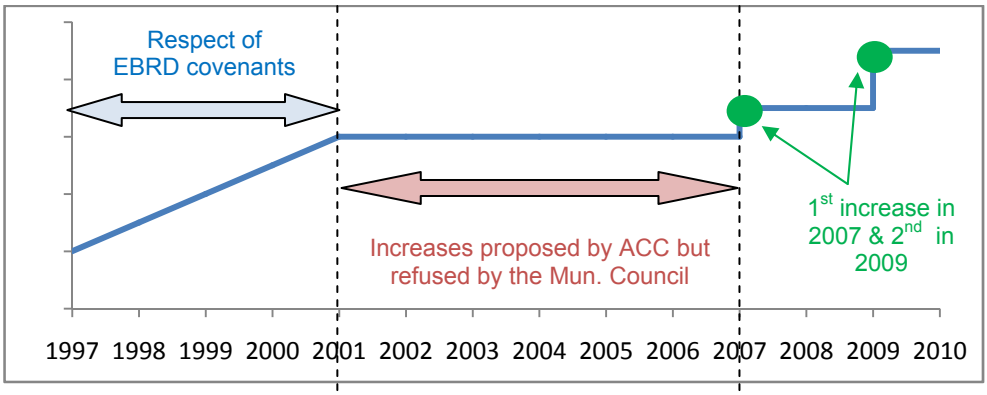


Figure 5: Tariff Evolution (scheme explaining the trend only)

The supporting documentation (calculation grid) for the last tariff increase that occurred in September 2009 is public and directly available on ACC website.

From 2001 to 2009, the cumulated losses due to the "non increase" of tariff reach 1 114 618 000 Lei.

It corresponds to the difference between the "real" revenues and the ones that should have been expected if the covenants of EBRD would have been accepted by the Municipal Council.

For end of 2010 or 2011, ACC did not apply until now for any tariff increase.

The territory managed by ACC includes 10 villages that are outside the perimeter of Chisinau Municipality (and 20 inside), but the tariff policy decided by the MC is directly effective on the whole territory, without additional agreement by these 10 villages.

Having analyzed the Methodology and the process of tariff approval, the initial opinion of the Consultant, subject to further investigation, is that:

1. The Methodology can be described as being too general. This allows subjective decisions in tariff calculation. The process of tariff calculation and approbation is a vulnerable one, which can relatively easily move from the written norm to opinions of persons involved in the process of calculation, decision and approval of tariffs;

2. Based on a "cost+fee" mechanism, the Methodology does not allow any remuneration of the Company or stakeholders for savings achieved; it does not stimulate the improvement of company efficiency through incentive, just through arbitrary constraints regarding some lines of the budget;

3. One of the weaknesses of the tariff setting method currently in use comes from its inability to incorporate investment financing. Indeed, this yearly-oriented mechanism prevents ACC from considering future increases of costs beyond the next year, even if these costs are already identified, which may pose obstacles to smooth successive tariff.

4. The current methodology for calculating tariffs does not permit ACC to include some necessary costs in the water and sewerage charges such as the cost of fixing meters, for example.

5. The professional capacity of the Institutions involved in this process is unbalanced, with more expertise on ACC side. ANRE is an institution not specialized in the water sector, somehow in the shadow compared to Energy. In addition, the fact that ANRE does not finally approve water and sewerage tariffs, but only makes recommendations subject to final review and approval by the Municipality, discourages a stronger involvement of ANRE, as it does not have a complete regulating responsibility;

6. The regulation of tariff approval/adjustment is not sufficiently accurate and consistent, which leads to a higher period of tariff approbation. It is also not always written, which makes it difficult to apply the existing legal levels for tariff adjustment, especially when the Municipality is reluctant due to political reasons.

7. Constraints created by agreements with IFIs, and especially the covenants of loans, can generate distortions in the implementation of Tariff Setting regulations, and potential defaults of compliance with Moldovan legislation and rules.

The general opinion of ACC on existing tariff setting mechanism is that the Methodology is good, but some tracks of improvements can be mentioned

1. It would be appropriate to include in it some Development Fund for investments or raise the rate of return for old assets, and allow expenses that are necessary to implement some projects that is impossible to predict at the beginning;

2. The approval of tariffs should be of the responsibility of a fully skilled, empowered and independent body, for avoidance of political interferences, and

3. There is no tariff setting formula for bulk water, but it seems appropriate to develop one.

Justified margin / Profitability (title 5 of Ordinance 164 / 29.11.2004):

The justified margin added on justified costs in the Tariff Setting mechanism aims at guaranteeing a sufficient profitability for fixed assets, making a distinction between assets existing before 2004 (for which the net value is remunerated at a rate annually decided), and assets invested after 1st January 2004, for which the net value is remunerated according to normal remuneration of Moldovan Treasury Bonds for self-investments, and to long-term rates issued by National Bank of Moldova, plus a maximum of 5%, for assets funded through loans.

Deductible costs:

Amount reaching 10% of net value of assets can be included in costs, as a budget for repairs and maintenance on assets. ANRE said that this 10% limit is according to Moldovan Fiscal Code, but now the limit of deduction for reparation of Fixed Assets is moving up to 15%. A corresponding increase in justified maintenance costs can be expected for the next tariff revision.

As already mentioned in the comments on accounting findings, it appears that the repayment of principal for the EBRD loan is included in the list of justified cost, which is not the case for other loans (domestics) contracted by ACC.

3.2.8. FINANCIAL ISSUES IDENTIFIED

Issues identified during the Inception Phase together with their status following the Workshop, the agreed action and timetable are provided in the section “Schedules of Issues Discussed at the Workshop, thier Status and Agreed Actions” that follows the Executive Summary.Water Supply

3.2.9. WATER RESOURCES & TREATMENT

ACC draws water from a single river source and groundwater sources.

The main source of water for Chisinau is the River Nistru. From the intake, raw water is supplied to the Chişinau and Nistru water treatment plants. Combined, the water treatment plants produced more than 97% of the potable water delivered to the network in 2010, 83% of the total is supplied from the Chisinau works.

The River Nistru intake is located about 20 km east of Chisinau, in the downstream tail water of the Dubăsari reservoir, near Vadu lui Vodă. Water is drawn through two structures:

1. Water Intake Structure 1, floating, built in 1958, with a capacity of 75 000 m^3/day,
2. Water Intake Structure 2, built in 1971, operated in 1972, with a capacity of 316 000 m^3/day,

The raw water transmission to the Chisinau treatment works, known as STA and built in 1971 (in operation in 1972), comprises the No2 water intake; the Pumping Stations Stage II and IIA together with four steel delivery mains diameters of 1000, 1200 and two of 1400 mm, of length 15.2km. Only two mains are in service at one time; their use is alternated due to reduced demand.

The Chisinau raw water transmission system is considered to require rehabilitation. The rehabilitation needs will be assessed within Phase B.

The transmission system from the Nistru treatment works to Tohatin is known as SAN. The system was constructed in 1958 and has undergone several modifications in the following years. The system draws water from the No1 intake and delivers it to the Nistru works (built in 1958 and upgraded in 1963-1964). Before 1972, the water was pumped directly from the Nistru Treatment Plant to Tohatin through the Pumping Station Stage II. In 1972, the Pumping Station Stage IIA was installed and the water was pumped from the Pumping station Stage II to the Stage IIA and then to Tohatin. Since 1995, the Pumping Station Stage IIA has been extended and the works pump into supply through the Pumping Stations Stage II, IIA and one delivery steel pipe of 800mm.

Since 1995, no upgrading or modifications have been made. For energy saving purposes, the old water intake system (floating intake + water intake 1958) is only used as back-system in case of necessity (maintenance or problem on the water intake No.2).

The system is considered to be in a poor condition with the need for rehabilitation. The rehabilitation needs will be assessed also, within Phase B.

Some ground water source wells exist in the city and the suburbs:

a. Water from the Balşevsc wells, located in the city, is mixed with water from the network; filtered; chlorinated and pumped into supply.

b. The water from the wells of Ghidighici is treated by chlorination before being pumped into supply. In Ghidighici village, other wells are operated by ACC that supply an independent network, and

The water from the wells in Ialoveni is chlorinated, and supplies the independent water network in Ialoveni.

There has been a dramatic decline in the volumes of water abstracted since 1997, but of late the abstraction has stabilised, as shown in Table 23, and as was shown in Figure 4.

Table 23: Raw Water Abstraction 1997:2010

Source		Volumes abstracted (Mm^3/yr)		
		1997	2005	2010
Nistru river source	Chisinau treatment works	147	69	68
	Nistru treatment works	18	12	11
	Total	165	81	79
Groundwater wells		12	2	2
TOTAL		177	83	81

Treatment at the Chisinau works is simple, and that commonly found in surface water treatment works, with the following stages:

- Pre-chlorination;
- Static coagulation with injection of aluminium chloro-hydroxyde or aluminium sulphate;
- Static flocculation with injection of polymer;
- Settling;
- Rapid dual media filtration (activated carbon + zeolith or quartz sand), and
- Final disinfection with chlorine.

The initial design capacity of the plant is 330 000 m^3/d; the current production is around 200,000 m^3/d. The plant was built in three phases: 1972, 1977 and 1981.

No significant additional investment has been made since the construction of the third phase, with the consequence that the plant is in need of rehabilitation.

In addition to potable water, filter back-wash water is supplied, after settlement, as industrial water to a small local industrial zone. The volume supplied in 2010 was 1,818,000 m^3.

The Nistru water treatment plant supplies Vadul Lui Voda, Coşerniţa, Tohatin, and ultimately Chişinau, via Tohatin tanks. The plant was built in 1958, and has a nominal capacity of 50 000 m^3/d. Production is limited to 24 000 m^3/d.

The treatment line and the technologies at Nistru are very similar to those of the Chisinau plant, except that disinfection is by sodium hypochlorite injection.

The water supply to Chisinau, with its virtual dependence upon the River Nistru as the sole source, is particularly vulnerable to pollution in the River Nistru and to failure of the intake, the raw water transmission mains and the treatment works; both unintentional and intentional from terrorist attack. As Chisinau is the capital city of Moldova, the issue is perhaps as much national, as for ACC/Municipality.

3.2.10. RAW WATER QUALITY

The analysis of the water quality within the river shows the water to be typical of a natural, large water course flowing through agricultural and urban areas. No high levels of any toxic substances or pathogens were found within the 2009-2010 period. The only minor concern might be the high pH and calcium levels which can cause calcareous deposits within the water distribution network, and the moderate variations in levels of suspended solids.

Water from the Balisevsc wells is hard and is blended with water from the network. The water in artesian wells cannot be classified as of satisfactory quality because there are deviations from the current standards.

3.2.11. WATER DISTRIBUTION NETWORK

3.2.11.1. Overview of Network

Chisinau is located on seven hills, with ground levels varying between 35m and 230m, above datum. The operation of the network is complex and incorporates twenty pumping stations, around sixty tanks of which fifty are in operation and around eighty boosters, supplying water within six pressure zones.

Water from the Chisinau treatment works enters into supply by gravity into zone 2, and by pumping into zones 3 and 4, with subsequent re-pumping into the other zones.

The principal operating regime is to pump water into (i) a distribution zone and (ii) into ground tanks located within the next higher pressure zone. Pumps draw from a ground tank, and pump into the distribution network.

The pressure within the network is required to be maintained between 10 and 60 metres (0.1 to 0.6 MPa).

Boosters, within the basement of buildings, are used to supply to the upper floors of taller buildings that could not otherwise be supplied. The logic of why ACC should fund these boosters rather than the developer/owners is not clear, provided that ACC maintains the required pressure in the network.

Generally, partially closed valves are avoided. Pressure is regulated by valves and by six pressure reducing valves in the network. Energy dissipated by the regulation system is significant[30], representing about 3% of the total electricity used for pumping.

The cumulated capacity of the working reservoirs operated by Apa Canal is 169 300 m^3, which represents 80% of the average daily water demand and 75% of the daily peak water demand. While the storage capacity may seem sufficient at a large scale, there might be local deficiencies that cannot be assessed at this stage of the study.

On the other hand, the residual time in some tanks (300 hours in Sîngera) is high. The quality of the water may be impacted, especially if there is no booster chlorination to maintain the required chlorine residual levels.

During the phase B of the project, a detailed hydraulic analysis will be performed using the hydraulic model and will enable a detailed diagnosis of the reservoir system (capacity) over the whole network. In addition a structural diagnosis will be carried out to assess the condition of the tanks: leakage, overflow...

On average, only 37% of pumping capacity at the pumping stations is used. Except for Gribov PS, stations have standby capacity. Due to their age and change in duty flows and pressures, the pumps are probably inefficient. ACC does not perform an annual energy audit, nor has a pump replacement programme within an asset replacement policy.

3.2.11.2. Materials and Age of the Network

Records of the length of the network vary, but the considered total length is 1,844kms.

As to be expected of a network that has been constructed over an extended period, most materials in common usage are to be found. In the 60's, cast iron was commonly used, with asbestos cement, reinforced concrete and steel. Between 1970 and 1980, steel was the preferred material for most pipes. In recent years, HDPE pipe has been used.

The length of the different materials used is shown in Table 24.

Table 24: Pipe Materials within the Distribution Network

Network Element	Pipe Length (km)					
	Steel[31]	Cast Iron	Asbestos cement	Concrete	HDPE	Total
Raw & Technical water	60	0	0	13	0	73
Distribution	698	699	5	25	344	1 771
TOTAL	758	699	5	38	344	1 844

[30] Estimated to be 5,934 kWh/day

[31] We understand that the steel pipes do not have a protective coating nor are protected by cathodic protection.

The most common materials in service are steel: 758km (41%); cast iron: 699km (38%), and HDPE: 343km (19%).

523km (28%) of the network is of diameter up to 100mm, of which 290km (55%) is of steel.

Almost 60% of the pipes are more than 20 years old, and 263km of cast iron pipes were laid over 40 years ago. 326km polyethylene mains have a life of less than 10 years.

In summary: for pipes:

- under 10 years there are 483km, or 26% of the total network;
- 11 – 20 years 279km 15% ;
- 21 – 30 years 395km 22%;
- 31 – 40 years 368km 20%;
- 41 – 50 years 277km 15%;
- 50 years 40km 2%.

The weighted age of the network can be computed at between 25 years.

The normal expected life of a pipe correctly manufactured, laid and protected against corrosion can be considered as anything above 40 years. In many locations, pipes of over 100 year age continue in service. Considering the circumstances that prevailed in Chisinau in recent years, the probable life of the network, as a whole, can be considered to between 50 and 70 years.

On this basis, the average remaining life of the network is somewhere between 25 and 45 years i.e. the whole network will require to be replaced within 25 to 45 years.

With the most favourable scenario, ACC should programme to replace around 26kms per year, at an estimated cost[32] €1M per year. The majority of which can be expected to be in the smaller diameter steel pipes where, commonly, the majority of leaks from a distribution network are found. This statement is borne out by the fact that in 2010, 48% of the leaks repaired were in pipes of less than 100mm diameter.

Except for 2008, when there were 11 944 failures, during the period 2006 to 2010, the number of pipe failures has been consistent between 13 000 and 14 000 a year, the equivalent of 40 leaks a day[33], or 7 repairs/km of network/year. The rate is high and represents a significant detrimental effect on the level of service provided by ACC, whilst repairs were made.

[32] Assumes that the majority will be in the smaller size range with a relay cost of €40 per metre.

[33] At such a consistent rate, it is interesting to speculate if this is the number of leaks occurring or the capacity of ACC to repair leaks.

Using the Moldovan norms, the leakage from the repaired failures is determined at 15M m^3/year[34]. With leakage from hidden losses assessed at 12M m^3/year[35], it would suggest that there are in the order of 11 000 undetected leaks in the network, around 6 leaks per km of main. This is an assessment of the current position. As leaks are repaired and pressures increase, new leaks can be expected to occur as the network becomes "proven" at the higher pressure.

The above analysis on a replacement budget and the number of undetected leaks is very indicative. ACC engineers should not use these numbers as factual; merely as an indication of the requirement if leakage is to be reduced, and a sustainable water supply system provided.

3.2.12. WATER SUPPLY AND DISTRIBUTION ISSUES IDENTIFIED

Issues identified within Phase A, with the water supply and distribution together with their status following the Workshop, the agreed action and timetable are provided in the section "SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS" that follows the Executive Summary...

3.3. WASTEWATER

3.3.1. WASTEWATER COLLECTION (SEWER NETWORK)

3.3.1.1. Wastewater Collection Systems

Within the older areas of Chişinau, there exist three "wastewater" collection systems: (i) for "foul" i.e. sewage wastewater; (ii) another for surface and storm water drainage including that from roads, and (iii) a drainage system for the collection of groundwater in order to lower the ground water table level within the city.

Elsewhere within the ACC area of service, there is either (i) only a "foul" wastewater collection system; (ii) both "foul" and surface water systems, or (iii) neither. Outside of the old city area, there is no ground water collection system.

S.A. Apa Canal Chişinau is responsible only for the collection of "foul[36]", or sewage wastewater. The surface water drainage system is operated and maintained by a 100% Municipality owned company: "Exdrupo".

[34] NRW is calculated every year in Moldova for all water supply utilities by MTU through a normative approach. For repaired/visible leaks, water losses are assessed by calculations based on the annual number of repaired leaks and by diameter and type of leak.

[35] Section 3.4.3.1

[36] "Foul" includes both domestic and industrial wastewater.

The wastewater collection systems are designed as “separate” systems. As indicated by the flows received at the wastewater treatment works during heavy rainfall, some surface water does find its way inevitably into the “foul” wastewater system, either by intent or accident.

3.3.1.2. Coverage

In terms of population, in the ACC service area[37], the sewerage system serves:

- All Chisinau city which itself represents 77% of the population in the service area of ACC;
- About 2/3 of the cities and villages in Chişinau Municipality - 16% of the population in the service area, and
- About 3/4 of the 9 cities and villages, outside Chişinau Municipality, but operated one way or another by ACC - 7% of the population in the global service area.

In the area with a wastewater network, not all the population is connected. There are still some septic tanks. Solutio Grup has a contract with ACC to empty septic tanks. They charge customers by volume and for the transport; the volume charge is paid to ACC.

Population connected to the ACC sewerage network in 2009 was about 633 000. The population served with potable water is 657 740. The inference is that 4% of the population with a piped water supply have alternative wastewater disposal arrangements.

3.3.1.3. Wastewater catchments

Within Chisinau, the flow is towards and then via main collectors laid either side of the River Bic to the Chisinau wastewater treatment plant (WWTP).

There are 3 other WWTP inside the service area in Goianul nou, Coloniţa and Vadul lui Voda.

The WWTP of Durleşti was decommissioned in 2010 and its wastewater is sent now via the Cartusa pumping station to the ACC sewerage network.

There are therefore 4 wastewater catchments in ACC service area:

- Chişinau city : 28 370 ha
- Vadul lui Voda. : 3 170 ha
- Coloniţa : 1 090 ha
- Goianul nou : 110 ha

3.3.1.4. Wastewater Network

The system was commenced in 1912, within the older city centre area which is generally on the left bank of the River Bîc. The latest pipes were laid in the 1970’s and 1980’s with

[37] See also Table 7: Study Area and Figure 1: Aerial View of Project Study Area

the development of the city that took place during that period. There have been few sewers laid since that period.

The average age of the sewer pipes is 30 years old.

The volume of potable water supplied within the service area has decreased significantly over recent years, as shown in Figure 4. Consequently, the "return to sewer" flows have also decreased with the result that many of the sewers may be over-sized. Should this be the case, the sewers may be flowing at less than "self-cleansing" velocity, with the inherent risk of siltation and partial blockage[38].

The wastewater network operated and maintained by ACC, is considered to comprise approximately 985km of sewers, of which 77km are considered as "main collectors". The considered length of sewer, within each Sector, is shown in the following Table:

Table 25: Length of Sewers by Location

Location	Length of Sewer (km)
RâŞcani	188
Centra	193
Buiucani	216
Botanica	204
Ciocana	138
Ialoveni	31
Vadul lui Voda	14
Total	**985**

As the system has been designed as a separate system, there are no stormwater overflows. Stormwater does find its way into the sewage network, but does not seem to cause flooding. The probable reason being that, with the reduced flows in the network, there is adequate capacity within the system to "store" stormwater and gradually to release the excess flow to the treatment works, without localised flooding.

The sewer materials and lengths within each material category are shown in the following Table:

Table 26: Sewer Lengths by Material

Sewer Material & Length (km)							
Vitrous Clay	Asbestos Cement	Unreinforced Concrete	Reinforced Concrete	Steel	Iron	HDPE & uPVC	Total
309	291	39	176	13	96	63	985

The above data on infrastructure is that in January 2011 and will be updated in parallel to the implementation of the GIS.

[38] In these circumstances, the sewers rarely block. As siltation occurs, the sewer bore is reduced and the velocity increases until a balance is again restored at the reduced "self-cleansing" velocity. The silting will cause problems if (i) the flows are subsequently increased, permanently with housing development or temporarily during specific high flow reasons such as an exception heavy storm, and (ii) the silting has hardened to a substance that cannot be eroded by the increased flow. Problems also occur when a CCTV camera is tried to be passed through the sewer.

The small pipes are mainly vitrous clay and asbestos-cement; larger pipes are only in reinforced concrete.

The small diameters represent the majority of the network length, corresponding to the tertiary network. The important length of larger pipes suggests a possible over-sizing or the presence of stormwater.

The condition of the sewers is considered to vary between:

- Very poor - 39km of concrete sewers;
- Poor - 479 km of the asbestos cement, reinforced concrete and steel;
- Reasonable - 404 km of the vitrous clay and iron, and
- Good – 63 km for the HDP and PVC sewers.

The figures suggest that approximately half of the sewer network is in need of rehabilitation, some urgently.

The main problem with the sewerage network is considered by the ACC O&M staff to be sewer collapses, due to the condition of the pipes. Tree roots growing into the sewers are another concern, as is the use of the sewer system by the public as a general waste disposal route.

Grease discharged by restaurants and the like into the sewerage system is a problem. The installation of grease and oil removal traps within the sewer discharge pipe is compulsory by a regulation from the Ministry of Environment, but not all properties are compliant. In order to check the compliance with the norms, technical inspectors from ACC regularly take samples of the wastewater discharged by each industry for analysis.

The most frequent problems are encountered on the 200mm sewers, in the city centre and the Rîşcani area due to the age and condition of the sewers within those localities.

There are considered to be 25 559 manholes or, on average, a manhole every 40 metres of sewer. Such a frequency will considerably ease the task of locating faults and maintaining the network.

3.3.1.5. Pumping Stations

There are 30 pumping stations operated by ACC, with flows ranging between 2 707m^3/d at PS Motel to 27 m^3/d at Zaichin 30/1.

Although most of the network is of gravity pipes, some pressure pipes are located at the outlet of the pumping stations. The pressure pipes represent a length of about 83 km.

The pumping stations have several pumps operating under both automatic and manual control: pump start/stop is automatic using level sensors in the wet well. The operators manually switch the pumps between duty and standby. During rainfall events, extra pumps are put in duty.

Pumping stations usually have two outlet pressure pipes and a coarse screen at the inlet, which is cleaned manually.

In the event of a power failure, until the connection to another power supply, wastewater is accumulated in storage tanks or sewers. Wastewater discharge into an adjacent field is not permitted. Within subsequent phases, the adequacy of the capacity of these tanks will be studied.

3.3.2. WASTEWATER TREATMENT

The wastewater treatment plants operated by ACC are the Chisinau plant, and smaller works at Coloniţa, Goianul nou, and Vadul lui Vodă.

3.3.2.1. Chisinau Plant

The Chişinau wastewater treatment plant is located southeast of the city, approximately 7km from the city centre, beside the River Bic into which the final effluent is discharged.

With the low flows and the fact that it is within the city area, flowing ultimately into the Black Sea, under EU standards it would be classified as a sensitive watercourse.

Figure 6: River Bic within Chisinau

The treatment works have been constructed in successive phases; the first phase of the WWTP was put into operation in September 1968.

The Chisinau plant is oversized for the current inlet flow. The wastewater flow to the works is approximately 152 000m^3/d, considerably below the works design capacity, with an hourly peak flow rate of twice the daily average. Flows have declined by 5% over the period 2008 to 2010.

The poor condition of the works; inadequate process control, and the lack of an optimised sludge management scheme and odour control measures on the site, result in an unacceptable odour emanating from the site. A sustainable solution to the odour problem is a specific deliverable of the Study.

Wastewater is discharged to inlet chambers at the head of the works through three separate sewer inlet mains (see Section 3.3.1). Flows to the work are not metered as flows through the “inlet” meters include the returned flows. None of the inlet chambers are

covered and the industrial wastewater entering the works is a particular source of obnoxious odours.

There has been little pre-treatment of industrial wastewater prior to discharge into the public sewers since 1994. Although discharges are monitored by ACC, the lack of pre-treatment is a risk to a compliant final effluent; especially as the main industries in Chişinau are food processing and breweries (see Section 1.8.4).

The average treatment load concentrations have been estimated to 500 mg COD/L and 208 mg-BOD_5/L. The pollution load to be treated is comparable to a 525 000 population equivalent. In addition to the incoming load, re-circulated activated sludge is returned to the inlet chamber.

The sampling point used to monitor the quality of the incoming wastewater is located just upstream the sand removal tanks. The available records, whilst they record the quality of wastewater entering the treatment process, do not represent the quality of the raw wastewater entering the site, due to the mixing with other streams: the mixing with the re-circulated settled sludge from the secondary clarifiers especially increases the content of organic material and total suspended solids.

Within the Study, we have instigated a programme to sample and analyse the incoming wastewater to be treated. The programme is essential to determine the most appropriate treatment process to recommend to ACC. Preliminary results will be complemented by a more thorough and longer measurement campaign during Phase B of the Study.

The wastewater treatment at the works comprises the conventional processes for a medium loaded activated sludge plant – fine screens; grit removal; primary settlement; biological treatment including “contact stabilisation”, and secondary clarification.

The extremely poor condition of the works and equipment, and the absence of both process sensors and of a control system impedes the efficient operation of the plant. The quality of the final effluent is poor and would not comply with EU standards.

The sludge treatment line initially included static thickeners, digestion and drying beds, before final disposal off-site. The digesters have never been commissioned due to construction defaults. Consequently, the treatment line has never been in operation. The mixture of primary and biological sludge had been directly disposed onto drying beds, which caused serious odour problems. “Geotubes” have recently been installed to reduce the problems. The dehydrated sludge is currently disposed in a dumping site nearby the plant. Odours from the site continue to be a problem.

3.3.2.2. Other Plants

Coloniţa plant has a capacity of 400m^3/d and was built in1974. The mechanical primary treatment comprises de-gritting and screens. The treatment is biological with biological sludge discharged into the sludge drying beds.

The Vadul lui Voda plant, built in 1975, has a theoretical capacity of 5 600 m^3/d. It has treated an average of 2 000 m^3/d in 2010 from Vadul lui Voda City, Balabaneşti and Vaduleni villages, which includes the bathing areas, poultry farms and the wine factory.

Further investigation of these two smaller plants and of the 32.5 m^3/day Goinul Nou works, built in 2009, will follow within Phase B.

3.3.3. ISSUES IDENTIFIED WITH THE WASTEWATER COLLECTION AND TREATMENT

Issues identified during the Inception Phase together with their status following the Workshop, the agreed action and timetable are provided in the section "SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS" that follows the Executive Summary.

3.4. OPERATIONS & MAINTENANCE

3.4.1. ORGANISATION STRUCTURE

Operations on the water supply and wastewater collection systems are within the Technical and Production Directorate.

Operational offices and depots are spread out across Chisinau, and are mainly located on plots with operational sites e.g. pumping station or treatment works. In total, excluding the head office (located at No.38, Albisoara Street), there are eleven separate office sites. The only teams located in the service area are the five sector water network teams; the five sector teams in charge of waste water network are located in the central office of the Sewage Networks and Pumping Stations Operation Service, located at No.25, Albişoara Street. The current organizational chart is provided below:

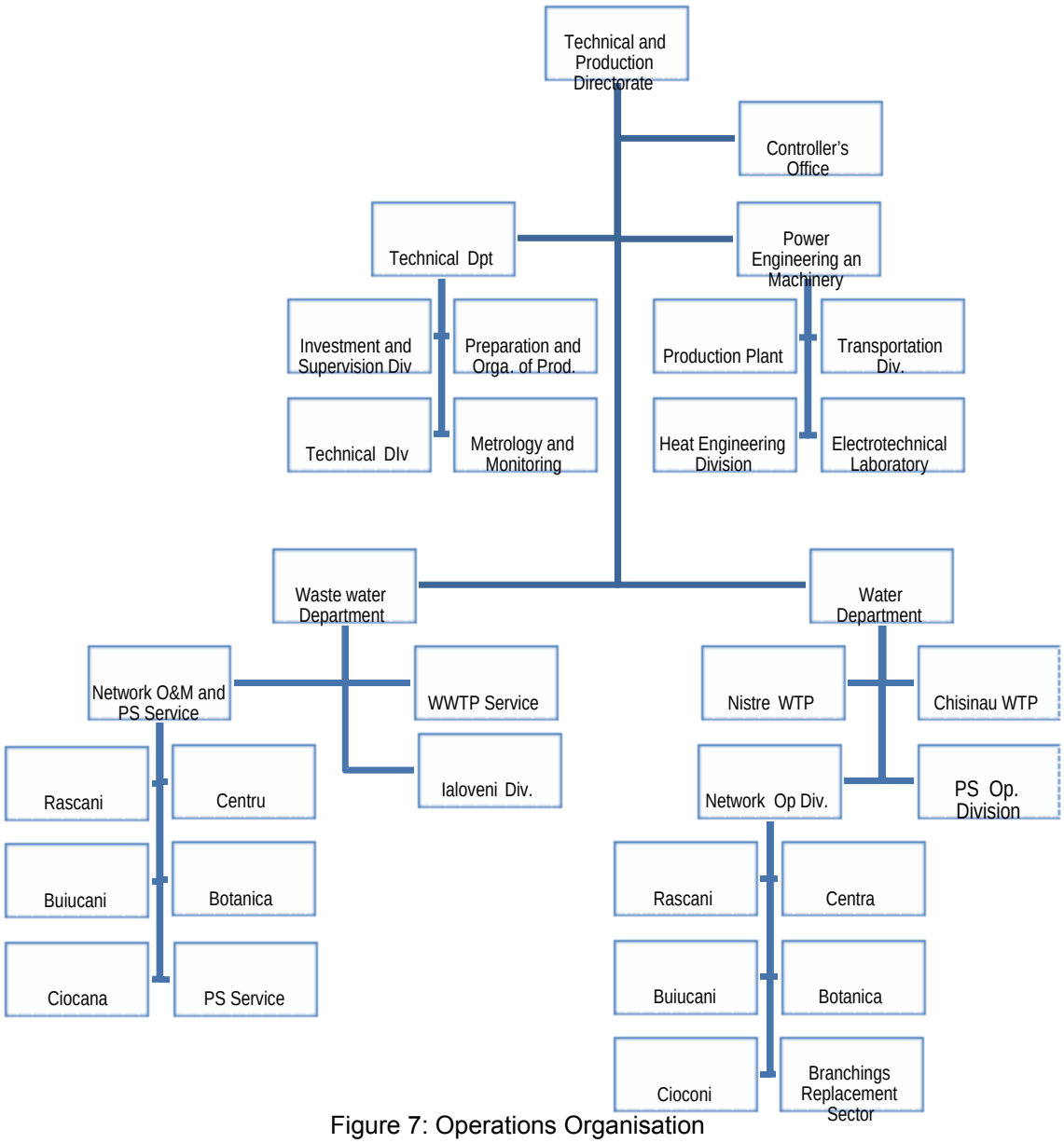


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Figure 7: Operations Organisation

Notable numbers of employees, within the above are:

- Nistru intake and plant: 161 employees
- Chisinau water treatment plant: 65
- Chisinau wastewater treatment plant: 134
- Water pumping stations: 158
- Transportation: 194

Figure 7 is a classic functional organization, rather than location based:

- There are few examples of horizontal communications, even in teams working in the same sectors;
- The strong centralization of ACC is illustrated by a very powerful Controller's Office.

An organization can be seen either as (i) responding to the constraints of the environment or (ii) as a construction to deliver a product or a service. ACC better fits with the first.

3.4.2. WORK ORGANISATION

Activities and responsibilities are set for each service within the Quality Management documents. The activities are those commonly found within the O&M function. ACC make projected planned schedules for the maintenance/ preventive repairs for the M&E equipment. The extent of the Planned Preventative Maintenance practiced, compared with best practice will be investigated during the Phases B and C of the Study.

With the lack of funding in rehabilitation, much of the work on the network is reactive to events. An annual network maintenance schedule is produced for manhole inspections.

Most of the equipment required for the O&M of the network and facilities is available to the maintenance teams, albeit old. From our discussions with operational staff, there are some notable gaps in equipment, e.g. saddles for tapping cast iron mains. If any extra equipment is needed, for mains and sewers in excess of 400mm diameter or for sewers of length greater than 30m between manholes, the network team calls upon the Construction and Repair Section within which is centralised ACC's major repair and construction activities.

For major works outside of the capacity of the Construction and Repair Section, contractors are employed.

Generally, paper plans are available, but for some important locations drawings would seem to be missing. Whilst considerable historic data is held concerning the network and the pumping stations, the data is paper-based, and not readily available for use as a basis for asset rehabilitation/replacement programming, for work planning or for other management/budgetary purposes

A specific task within the Study is to procure and populate a GIS and database; not a full asset inventory.

3.4.3. SPECIFIC ACTIVITIES

3.4.3.1. Non Revenue Water

Introduction

Non-revenue water is calculated[39] every year for all water utilities by the Moldovan Technical University (MTU). The normative water losses calculated by MTU on contract basis and approved at central public administration level (by Apele Moldovei Agency), are used in the yearly calculation of water tariffs.

[39] Through a normative approach approved in 1999: *"Metodica elaborarii normativelor de consum tehnologic al apei la intrepriderile prestatoare de servicii alimentare cu apa si canalizari a Republicii Moldova*".

The fact that the normative estimate of losses is used in the tariffs calculations highlights an important point: if losses are under-estimated the tariff will not cover the cost of losses.

The technical inputs required for the calculation of the losses and the tariff are provided by ACC, based on real operational data. The data provided for the year N is used to determine the losses and the tariff for the year N+1.

Water Balance based on the Normative Approach

The normative approach calculates water losses for four components, described below. The methodology is comprehensive[40] and includes for raw water, water used in the treatment process and potable water:

1. Water consumption during catchment, treatment and transport/distribution processes;
2. Water losses in treatment facilities;
3. Physical and commercial[41] water losses in the transport/distribution process, and
4. Water consumption for the utility's O&M needs and other external authorized use.

Using the normative approach, the losses determined for 2010 were 33M cubic metres, of which repaired and invisible leaks comprised 45% and 38%, respectively.

A further 2.2M cubic metres were determined as used by ACC for operational purposes.

From the normative approach, the 2010 revenue water and the non-revenue water volumes comprised 57% and 43% of the input in the water supply system.

The 2010 network efficiency[42] was 60%.

Physical losses represent the majority of the volume of losses, with approximately 85% of the total while commercial losses represent 15% of the total.

Water Balance Based on Measured Flows

Based upon volumes that entered the supply network and volumes of water sold, as recorded and reported by ACC, we have computed the 2010 non-revenue water volume for potable water to be 31.7M cubic metres, i.e. a non-revenue water of 42%.

A similar calculation shows the 2010 non-revenue industrial water at 30%.

Using recorded volumes, it is not possible to differentiate between physical and commercial losses within the distribution system.

[40] For example, as prescribed by IWA for the NRW calculation, non metered water used for maintenance purposes is taken into consideration.

[41] For example from meter under-registration errors, incorrectly estimated accounts and unknown connections

[42] Calculated from: (1 – losses volumes / input volumes)

Comparison in Results from the Two Methods

Within Table 27, the figures obtained by using recorded flows are compared with those obtained by the MTU, for all water supplied.

Table 27: Losses Determined by Norms and Recorded Flows

Criteria	Determined Flows M m^3		Variation	
	MTU	Recorded Flows	M m^3	Percentage
Flows input to the system	81.57	78.83	2.74	3.5%
ACC operational use	2.48	1.65	0.83	33%
Water losses + unbilled consumption	32.78	30.90	1.88	6%
Water losses + operational use + unbilled consumption	35.26	32.55	2.71	8%
Revenue Water	46.31	46.28	-	-

Water volumes used by ACC for operational purposes, when determined from the norms are a third greater than when computed from the recorded flows.

The difference between the NRW estimated by MTU and the volume determined based on the recorded flows was about 8% in 2010. This deference was only 1% in 2009. ACC claims that this shows that they have made huge efforts last year to reduce and bring under control the high leakage observed on the network. The performance indicator on leakage (m3 of losses per km) get consequently much better year after year.

However, the losses equate to 47m^3/km of network/day from the potable water network, and categorise the network as the “very poor” category[43].

3.4.3.2. Sewer Maintenance and CCTV

Most of the interventions occur on the pipes with a diameter smaller than 300 mm. This is because they are the most frequent pipes and also those with a small section subject to blockages.

When problems occur on bigger pipes, ACC maintenance teams face difficulties: hydro-cleaning trucks can only clean up to 400 mm pipes. Interventions on big pipes are scarce because they are less at risk, but it should be noted that ACC does not have the proper equipment for such interventions.

The hydro-cleaning trucks are old and there working pressure dramatically decrease in the years: about 1/3 of their initial pressure. Therefore, they are no longer efficient enough.

Some vehicles are simply too big for interventions in the small streets and there is no CCTV equipment available to inspect the pipes.

[43] As used by Veolia Water to categorise networks in France

3.4.3.3. Available data

The operation of a network requires a good cartographic system. Currently, ACC has a good local knowledge of its system, but misses a central database with all the information. Data are available but in bits and pieces without a global view.

A detailed sewer network paper plan is available for each Sector, but it is not always up-to-date and it is difficult to read. Moreover, the Sectors are not divided in a coherent hydraulic way (administrative division) and there is no global exhaustive map.

There is no precise localization of the major problematic zones.

The GIS implemented in the frame of the project will give a solution to this problem.

3.4.4. ISSUES IDENTIFIED WITH THE O&M OF THE ASSETS

Issues identified within the O&M of the assets during the Inception Phase together with their status following the Workshop, the agreed action and timetable are provided in the section "SCHEDULES OF ISSUES DISCUSSED AT THE WORKSHOP, THIER STATUS AND AGREED ACTIONS" that follows the Executive Summary.

4. BEST INTERNATIONAL PRACTICE – "CRITERIA FOR SUCCESS"

4.1. GENERAL

Within this section, we have set out examples of best international practice that we consider ACC would wish to achieve as a professional and competent service provider in Chişinau.

We have sub-titled the section "Criteria for Success".

ACC may wish to monitor their progress towards achieving the best practice as an indicator towards success in their objective to become a best-of-class service provider within Europe; potentially world-wide.

4.2. ACTIONS REQUIRED BY ACC TO ACHIEVE BEST PRACTICE

Examples of best practice and the actions required by ACC to achieve best practice are shown in the following tables. These will be elaborated within Phases B and C of the Study.

The actions provided in the table are not fully inclusive of those that ACC may choose to adopt. Other aspects are discussed more fully elsewhere within this Report, or will be explored within Phases B and C of the Study.

Table 28: Best Practice to be Achieved by ACC

Area of Activity	Considered Best Practice	What ACC has to do to achieve Best Practice	Current Status within ACC	Action Required
Institutional	An effectively organised utility service provider fulfilling a clearly defined role and adding value to the process of service delivery, with a modern structure of adequate capacity for the required tasks and using modern methods of work.	Legality of ACC fully established as the service provider within a designated area. A working legal relationship established between ACC and the local authorities, within its designated service area	Status of ACC as the service provider is not clearly and adequately defined. Ownership of assets unclear	Service area to be defined and ownership of assets "regularised".
		An organisational structure that clearly defines roles, accountability and responsibility	The current structure is local government orientated; not that a commercial service provider	New structure to be implemented
		ACC to be resourced with adequate staff capacity of well trained within the framework of a Staff Development Plan.	There is adequate capacity but additional training is required	A Human Resource Plan to be developed to include for staff appraisal
		Appropriate business systems to be provided to support employees in their duties	Business systems are being developed. The project to include for a review of the MIS and for the introduction of GIS.	Continued introduction of systems
		The assets are operated and maintained by ACC within the framework of a Performance Agreement that establishes the duties and obligations of ACC, as an operator	An Agreement is to be produced as Phase A11.	Agreement to be implemented, after ownership of assets has been clarified
Financial	The financial affairs of the company are managed proficiently in accord with local financial and audit rules, in order to ensure that maximum benefit is derived from the income of the utility.	Water service charges with the tariff to be adequate to operate and maintain the service systems, with provision for replacement.	Tariff study is included with Phase A6 of the project	Tariffs to be set independent of political influence, necessary to fund budgets and commensurate with service provided

Area of Activity	Considered Best Practice	What ACC has to do to achieve Best Practice	Current Status within ACC	Action Required
Financial (contd)		Modern financial systems in place to manage expenditure so that reports are produced for tariff setting, budget control and financial management purposes.	Financial accounts are produced but more detailed reporting is required for delegated budget monitoring and control	Financial system to be revised in line with delegation to managers for budgetary responsibility
		Prepare financial analysis and projections considering the company revenues, expenditure and capacity for debt.	Prepared by ACC	No action required
Customer Service	Be a customer orientated company having customer service at the forefront of all its activities, giving customers "value for money" in the services provided	Respond professionally to customer enquiries and requests for service.	ACC provides a 24hour service with the Dispatch team established to respond to customer operational calls. Income and billing enquiries go to a separate Customer Service Department.	Single Customer Services Directorate suggested to be established. Preparation and issue of Levels of Customer Service and a Customer Service Manual
		Be readily accessible to customers, providing a one-stop entry point for customers to the services of ACC		
		Respond quickly when (i) water supplies are interrupted or services are otherwise disrupted, where necessary making an alternative water supply available or (ii) sewer failures cause flooding or in some other way adversely affect customers.	ACC responds to emergencies but there are no Levels of Service setting out the requirements for time to respond, alternative supplies etc	
		Ensure the currency and completeness of the Customer DataBase, and maintain an Industrial Wastewater Discharge register.	An Industrial Wastewater discharge inventory is to be prepared within Phase A4 task.	
		Optimise all activities for maximum efficiency and "bench mark" performance against "best-of-class"	ACC at present does not bench mark performance	
		Adopt comprehensive Customer Levels of Service and monitor performance against these Levels. Publish results	ACC has not produced a Customer Levels of Service document. Such levels do exist within regulatory requirements and norms.	

Area of Activity	Considered Best Practice	What ACC has to do to achieve Best Practice	Current Status within ACC	Action Required
Income and billing	Establish meter reading, invoice issue and bill payment procedures that ensure (i) the accuracy of bills and (ii) the company fully and promptly receives the income to which it is entitled.	Provide accurate water service bills that are issued on-time and clearly state the cost of services provided.	Monthly billing for all clients. Different types of bills per client categories. The domestic customers write down readings on the bills.	Consider the introduction of Automated Meter Reading
		Establish suitable methods of payment that are suitable and easy to customers for making payments.	92% of the amounts are paid at banks and post offices. Most of the payments in blocks are collected by Infocom and transferred to ACC.	Review the continued use of Infocom so that ACC directly interfaces with its clients
		Be sympathetic to genuine customer hardship to the payment of bills yet aggressively manage customer debt.	ACC agrees to instalment payments for clients facing difficulties. Yet the debt collection process is difficult, based on manual listings and several levels of approval.	Review the procedure
		Meter supplies to customers and promptly repair or replace meters reported or found to be faulty.	Metering of customers is a specific issue for ACC and is fully discussed elsewhere within this Report, Section 3.1.13.6	Agreement with the Municipality upon issues with heating companies and IMGFLs
Water and Wastewater Operations	Provide a high quality water and wastewater service that fully meets Customer Levels of Service, Operational Standards and regulatory requirements efficiently and competently, with due regard taken for the requirement to replace assets at the end of their working life.	Have in place current Water and Wastewater Master Plans that address growth in customer demand and wider service coverage, and provide for operational efficiency in meeting customer levels of service and operational service levels.	The proposals made within Phases A3,4 & 5 of the Study will, in effect, provide the basis of a Water and Wastewater Master Plan.	Ensure the Master Plan produced in the Study is maintained as current
		Adopt an asset management approach with Asset Register that includes Planned Preventative Maintenance of asset and for the timely replacement of assets within an asset rehabilitation programme.	ACC does not currently practice an asset management approach nor have a defined asset replacement programme. These and the introduction of work planning will be pursued within Phases B and C of the Study	Instigate an asset replacement programme within an Asset Management approach

Area of Activity	Considered Best Practice	What ACC has to do to achieve Best Practice	Current Status within ACC	Action Required
Water and Wastewater Operations (contd)		Maintain leakage and non revenue water at acceptable levels, and minimise ingress into the wastewater network.	The Study includes for a NRW Pilot Study an proposals for improved NRW performance by ACC	Introduce an active leak reduction policy to achieve and maintain target levels of NRW
		Be prepared for emergencies by having an Emergency Response Plan and by holding annual emergency response exercises	Assessment and proposals for emergency repairs is a task of the Study (Phase A8)	Review the existing Emergency Response Plan and make recommendations for improvement.
Service to the Community	Play a key role in the social and economic development of the service area, ensuring due care and consideration to the environment and to the public.	Minimise all adverse affects on the environment by efficient use of resources, chemicals and power and disposing all sludge, excavation and other waste with due care for the protection of the environment.	To be assessed and proposals made in Phases B & C	Adopt and maintain measures proposed
		Act as a “good neighbour” by minimising odour, noise, dust and other nuisance at ACC sites and from general operations and excavations.		
		Adopt traffic management practices when working in the road, and work safely with barriers etc, where there is public access to avoid accidents to the public.		
		Practice an “Open door” policy and hold open days at the works, invite school and other parties around the works and generally ensure that the public is fully aware of the activities of ACC.		

5. ACTIVITIES WITHIN PHASES B AND C OF THE STUDY

5.1. INTRODUCTION

Within Section 3, we have set out to an inventory of the current situation and issues facing ACC. In Section 4, we scheduled the recommendations that we respectfully suggest that ACC needs to have in place in order to achieve best international practice.

In this Section, we will provide an overview of the activities that we intend to pursue within Phases B and C to meet the specific requirements of the Terms of Reference, and to assist ACC cross from the current “as is” to achieving “best practice.”

The proposals are made following the discussions within the Workshop that followed the issue of the draft Inception Report.

All proposals will include an action plan and an implementation programme that will include for any staff training and additional capacity within ACC.

Where appropriate, a financial or economic cost benefit analysis will be prepared.

In addition to the CAPEX requirements to be fed into the capital investment programme, OPEX effects will be determined for use in the tariff study.

5.2. PHASE A1: MEASUREMENT CAMPAIGN

To assess and improve the existing operation of the Chisinau water and wastewater networks, two hydraulic models are to be built within the Study, one for potable water and a second for wastewater.

The “Epanet” software will be used for the potable water model and the “Infoworks” software for the wastewater model.

The models will allow (i) diagnosis of the operating conditions of the networks, in particular bottlenecks and other hydraulic problems; (ii) determination of network operating configurations and pump regimes for maximum OPEX efficiency and to achieve Customer Levels of Service, and (iii) emergency planning.

For the wastewater model, the model is developed to estimate the dry weather flow at any time of the day in any point of the network.

The models will be run to simulate future operating conditions under the medium or long Term Investment Plan, which enables required capital schemes to be devised to meet future demands, with maximum CAPEX efficiency.

In order to provide confidence in a model, the model has to be “proved” against the in-situ network, and calibrated. To enable the comparison between reality and the models, two Measurement Campaigns will be performed on the two networks in order to determine “real-time” flows and pressures at specific locations, which can be compared with the parameters indicated by the model.

After the in-situ tests are completed and the results analysed for inconsistencies, the models will be calibrated to achieve a match between the two sets of data – as recorded on site and as provided by the model.

5.2.1. WATER MEASUREMENT CAMPAIGN

The key-points of the water network, such as tanks, pumping station and any regulating system have been visited. The aim of the visits was to understand the functioning of the system in order to define:

1. The locations in the network at which measurements are to be made;
2. The measurement devices to install. In some locations e.g. pumping stations measuring devices exist. The visits enabled an assessment of the existing equipment, and the additional needs for the measurement campaign to be ascertained;
3. The locations where the measuring sensors are to be installed and the preliminary work required prior to the measurement campaign to enable the sensors to be installed, and
4. The necessary site surveys in order to know the ground elevation where pressure measures are to be made.

The parameters to be measured during the campaign, at strategic points and within the network are:

1. Flow. The flow meters used during the campaign will be either the ultrasonic flow meters already installed or Hydreka's "Hydrin" electromagnetic insertion pipe flow meter.
2. Pressure, i.e. water head, related to a datum. Pressure will be measured through a water level recorder, as found in a tank, or a pressure sensor, both related to the elevation at the measurement location.

The following equipment and measurement points will be used, Table 29:

Table 29: Number of Measurements within Water Measurement campaign

Measuring Device	Number of locations to be used
Ultrasonic flow meters	61
"Hydrin"	11
Mechanical flow meters	10
Pressure sensors	101
Water level recorders	42
Topographical ground elevation points	46
Total Measurement Locations	**271**

There will be six measurement campaigns, each campaign lasting two weeks, as shown in Table 30.

Table 30: Programme for Water Measurement Campaign

Weeks	Networks to be "Measured"
1 & 2	Zone 2
3 & 4	Zone 1 + Zone 4 "Buiucani"
5 & 6	Zone 3 "Buiucani" + Zone 3 "Ciocana & Rîscani" + Zone 3 "Centru & Botanica"
7 & 8	Zone 4 and 4a "Centru & Botanica" + Durlesti
9 &10	Zone 4 "Ciocana" + Vadul Lui Voda
11 & 12	Codru + Ialoveni

The weeks may not be consecutive as it will be necessary to transfer equipment between locations, analysis results and possibly repeat the measurements.

Some preliminary work will have to be carried out by ACC, in order to install the equipment, in the most advantageous position.

Table 31 lists the pumping stations at which preliminary work is required, and the nature of the work. We must stress that without this work completed by ACC within the required timeframe, we will be unable to satisfactory complete the Measurement Campaign with consequential downstream adverse effects on the construction of the hydraulic model, and its availability for other activities required in the project.

Table 31: Preliminary Work Required for Water Measurement Campaign

Pumping Station	Work Required	Pumping Station	Work Required
Aeroport	3no. tappings required for Hydrins.	Independenţa	No work required. Existing equipment is adequate.
Balşevsc	No work required. Existing equipment is adequate.	Schinoasa	No work required. Existing equipment is adequate.
Botanica	No work required. Existing equipment is adequate.	Sîngera	2no. tappings required, one for a pressure sensor and one for a Hydrin.
Buiucani	No work required. Existing equipment is adequate.	Stauceni	3no. tappings required for Hydrins.
Cartuşa	2no. tappings required for Hydrins.	Telecentru	Air valve to be replaced by a tap adapted for a pressure sensor.
Ciocana	3no. tappings for pressure sensors, with a minor pipework modification.	Tohatin	No work required. Existing equipment is adequate.
Codru	No work required. Existing equipment is adequate.	Universita agrara	No work required. Existing equipment is adequate.
Codru Tanks	No work required. Existing equipment is adequate.	Valea Dicescu	No work required. Existing equipment is adequate.
Coloniţa Tank	No work required. Existing equipment is adequate.	WTP (Chisinau)	No work required. Existing equipment is adequate.
Ghidighici	No work required. Existing equipment is adequate.	WTP (Nistru)	2no tappings for pressure sensors
Gribova	2no. tappings required for Hydrins.	Booster n°47	No work required. Existing equipment is adequate.
Ialoveni	No work required. Existing equipment is adequate.		

5.2.2. WASTEWATER MEASUREMENT CAMPAIGN

5.2.2.1. Objectives of the Measurement Campaign

The wastewater measurement campaign has several purposes:

- To assess the volume of wastewater within catchments;
- To define the daily profile of the wastewater discharge in the network;
- To estimate the volume of additional intrusive water under dry weather conditions, and
- To collect data for the calibration of the hydraulic model.

The objective of the Campaign is to assess the dry weather conditions. The storm water will not be taken into account, as the network is supposed to be a separate system and stormwater is not under ACC responsibility. One aspect to be considered within the Study is to locate cross-connections between the systems. The implications of disconnecting

the cross-connections will be investigated in order to avoid the inefficiency to ACC of pumping and treating drainage water.

5.2.2.2. Methodology

The Measurement Campaign will include sewer flow measurement and rainfall in order to remove the storm water flow from the calculation of the wastewater discharge: days of rain will be excluded from the period of analysis.

A Measurement Campaign is defined within three steps;

1. Obtain an accurate map of the network and a good knowledge of the flow directions and hydraulic connections;
2. Define the measuring points and the measured catchments according to the understood operation of the network, and
3. Visit measurement sites and define the exact location, i.e. which manhole, to locate the equipment

The flow in the pipes is obtained by recording the fluctuation of both:

- Water level : with a piezometric sensor, and
- Velocity : with an ultrasonic sensor (Doppler)

The sensors are installed on a stainless steel plate fixed to the pipe by drilling. The measuring equipment is called a MAINSTREAM (Hydreka).

A specific Measurement Campaign will be performed in each of the five major hydraulic catchments. Each campaign will last about two weeks, depending upon the occurrence of rain, and will use six flow meters and two rain gauges.

The programme for the Measurement Campaign will be detailed in Phase B of the Study.

5.3. PHASE A2: GENERAL INFORMATION

5.3.1. SOCIO-ECONOMIC ANALYSIS

The socio-economic analysis includes ad hoc surveys quantitative (household survey) and semi-quantitative (large summers survey); (ii) statistics on population, on water consumption and on economy; (iii) spatial development within the study area.

All these pieces of information will be set in order and their consistency will be checked. Then two separate calculations will be made, one for domestic demand (related to households) and the other for non-domestic demand (for administrative bodies and economic agents).

Household Survey

A household survey is to be carried out in order to assess, among others, households affordability (based on the share of the family budget devoted to water purchase and

sanitation) and willingness to pay for an improved service in water and sanitation, but also average water consumption, cost of water and other public utilities, expenditures and income, etc. A statistically representative sample 1,000 households selected at random all over the study area will be interviewed at their home (face to face).

Large Consumer Survey

A large consumer survey is being prepared in order to identify the specific features, expectations and intentions of these organisations, the consumption of which has a major influence on the total non-domestic consumption (and water supply company's turnover). The 50 larger consumers in the study area will be identified and interviewed (face to face). This basic information will give an accurate understanding of their present and future water consumption, and consequently of an important percentage of the non-domestic demand in the study area.

Within Phase B, we will complete the household and industrial demand survey in order to forecast future water demand, and associated topics such as affordability.

The methodology to be followed for the survey is compliant with EBRD requirements and guidelines and presented in the annexed report "Water Demand Study".

5.3.2. ROLE OF ASSET OWNER AND ASSET OPERATOR

Within a previous section we have discussed the issue of the asset owner of the infrastructure operated and managed by ACC. The issue is a legal one, and for Municipality/Ministry resolution; not within the Study. We will assist and advise the appropriate decision makers as required.

We have set out our proposal for the Phase B and C activities for ACC, as the operator, within Task A6: Institutional and Economic Operation of Operator ACC.

5.3.3. SERVICE AREA

If required, we will assist the ACC and Municipality to prepare a definition of the ACC service area should stakeholders agree that such a definition would be advantageous.

We would suggest that this might be an opportunity for ACC to be at the forefront of the development of the Moldovan water sector by the service area being defined in such a way that it forms the nucleus for a regional water company (See also Section 5.12)

5.3.4. ESTABLISHMENT OF DIGITAL DATABASE (GIS)

5.3.4.1. Overall Objective of a GIS

A GIS captures, stores, analyzes, manages, and presents data that is linked to location.

It is a cartographic tool where each graphic element is associated with its characteristics, e.g. a pipe with its age, dimensions, material. A GIS allows users to create interactive

queries, analyze spatial information, edit data, maps, and present the results of all these operations.

Whilst hydraulic modelling is used for planning & emergency response and a SCADA System provides a live picture of the status of the system, a GIS is used for asset management:

1. To centralise and store information on the assets of ACC;
2. To provide a complete knowledge of the network facilities;
3. To enable specific requests and applications relating to the assets to be made, and
4. To permit work planning for the maintenance of the assets.

5.3.4.2. Establishment of a GIS

The steps in the implementation of the GIS include:

Phase 1: Construction

- Determine the interface requirements of the GIS database,
- Specify, select and procure the GIS software and hardware;
- Development of base maps, and
- Data collection and populating of the GIS.

Phase 2: Operation and use

- Prepare organisation and a strategy for GIS use;
- Training of ACC staff in the use of the GIS.

5.3.4.3. Technical Specifications

Within the ToR are specified the requirements with which the selected GIS software must comply. Of these, the most critical are:

- Compatibility with the RINEDAC system used by the Department of Architecture and Urbanism of Chisinau City Hall;
- Geospatial data storage of water and sewerage networks in the PostGis database;
- Support the projections provided in MOLDREF99 system and WGS84;
- Provide access to geospatial data system via WMS / WFS, and
- Provide access to data, drafting and drawing geometry objects attributes of objects through the web- browser-ui.

Details and definitions are given below:

RINEDAC System

This is a local web-based GIS platform that aims to automate most of the work-flow of the Chisinau Municipal Department of Architecture and Urbanism. The RINEDAC product, which represents the infrastructure networks of Chisinau city, is based on software elements such as “postgis”, “php” and “linux”. It permits editing of layers, searching by address, and viewing imagery.

MOLDREF99

This is a coordinate projection system that is currently used in Moldova. It is compatible with the latest revision of the World Geodetic System (WGS) standard. The WGS comprises a standard coordinate frame for the Earth; a standard spheroidal reference surface (ellipsoid) for raw altitude data, and a gravitational equipotential surface (geoid) that defines nominal sea level. WGS84 is the reference coordinate system that is used for Global Positioning System (GPS).

Web Map Service

The Web Map Service (WMS) is a standard protocol for serving over the Internet the georeferenced map images from a GIS database.

It is worth pointing out that the interface specifications for WMS are very advanced. The advanced specifications are reflected in the purchase cost and limit the options proposed.

5.3.4.4. Available Data

Neither ACC, nor the Municipality of Chisinau have developed a GIS. Some data is available, and will be used for the construction of the GIS. Data that is available is listed below.

In digital format

AutoCAD drawings are available in ACC: covering 90% of the water network; only around 25% of the sewerage network.

Only the diameter of the pipes is indicated. All attributes are graphical and are not georeferenced. Water and wastewater treatment plants and pumping stations are shown but without any information, except their names.

It has to be noted that some of the cadastral maps (scale 1:500) from the City Hall (A3 format) have been scanned and are used by ACC as base maps in Autocad for drawing the water networks.

In paper format

ACC has some copies of cadastral maps (scale 1:500), including the networks of the town. The cadastres have been provided by the Department of the Architecture and Urbanism from the City Hall Chisinau in 2000-2001. The cadastral maps from the City Hall have not been updated for more than 10 years.

ACC also owns longitudinal drawings and profiles of the existing network.

Available Data in the Municipality of Chisinau

The Department of Urbanism from the Chisinau City Hall is using the 'RINEDAC' application as a tool for storing the cadastral information, which allows the on-line editing on a WEB interface.

Water and sewerage networks have not been digitised. There is no spatial or attribute information.

The GIS used by the City Hall is constituted of layout elements made of the scanned images of the cadastral maps at the scale of 1:500, and of the aerial images at the scale of 1:2000 for the city and 1:5 000 for the suburbs – georeferenced in the Moldref99 Design System.

5.3.4.5. Proposed Methodology for the Implementation of GIS

Based on the available data, the implementation of a GIS in ACC requires:

- For the water supply network: to transfer the digitised data from AutoCAD to the chosen software and to complete all the missing information, and
- For the wastewater network: to scan the paper cadastral maps; to import them into the chosen software and to digitise the entire network.

The suggested methodology is:

- Digitise the networks based on the scanned cadastral maps (1:500) georeferenced in Moldref99 System;
- Define the alphanumeric fields corresponding to the required attributes together with the Cadastre Agency in accordance with the sites data base developed together with the specialists of ACC;
- Store the digital data on the Cadastre Agency server;
- Export the data in the required format (shp,dgn,dwg), and
- Retrieve and edit the data with a GIS software.

GIS Operators

The expected average rate of input to the GIS is about 1.5 km/day/operator. A team of eight full-time GIS operators is required for the construction of the GIS, over a 10 month period. The team will work under the direct supervision of Seureca.

Three employees of ACC will join the team as GIS operators, so they will participate to the construction of the GIS, ideally located with our operators in order to be able to share the learning experience.

The ACC employees will be trained at both the user and administrator level.

5.3.4.6. Selection of GIS Software

In our Methodology, we proposed to use ESRI's Arcview software for the GIS; the most commonly used GIS in the water industry.

Taking into consideration the technical specifications set forth in the ToR and the financial constraints, an alternative is suggested for the consideration of ACC.

Option 1: Rinedac + Open Source Software

The first option uses the open source software QGIS, one of the most common open source GIS. It is a community driven GIS project, licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It supports numerous vector, raster, and database formats and functionalities.

QGIS is continually maintained by an international active group of GIS users and volunteer developers who regularly release updates and bug fixes. Currently, developers have converted Quantum GIS into 31 languages and the application is used internationally in academic and professional environments.

QGIS provides integration with other open source GIS packages, including PostGIS, GRASS, and MapServer to give users extensive functionality. It allows use of shapefiles, coverages, and personal geodatabases. MapInfo, PostGIS, and a number of other formats are supported in Quantum GIS. Web services, including Web Map Service and Web Feature Service, are also supported to allow use of data from external sources.

The advantage of PostGIS is that it uses open source software, which is free and can be updated without charge. The disadvantage is that because it is a community driven GIS project, a very skilled programmer is required to maintain the software. There is no open software support for a corporate GIS.

Should this option be selected, we will assess the training needs for users and an administrator.

The cost estimate[44] for the Option 1 is presented in the table below:

Table 32: Cost Estimate – Option 1: QGIS

Item	Description	Unit Cost	Quantity	TOTAL
License	RINEDAC	61€ /user/month	6 (15 months)	5 490 €
License	MS Windows server 2008 R2	1 000 €	1	1 000 €
Computer	-	750 €	8	6 000 €
Scanner A1	-	2 500 €	1	2 500 €
Server		from 1 200 €	1	1 200 €
TOTAL				**16 190 €**

[44] Both options are based on the assumption that the access to RINEDAC application costs 1,000 lei/user/month. Maintenance costs are excluded.

Option 2: Rinedac + ArcGIS

ArcEdit is developed by ESRI, a US firm having distributing offices all over the world.

ESRI's ArcGIS products support the Web Map Service (WMS) protocol mentioned above. ArcEdit also allows importation and exportation of data from or to any other GIS or CAD software.

The advantages of ArcGIS are that (i) ESRI provides user support and (ii) ArcGIS benefits from a wide analytical potential. It is also a powerful server decisions. The disadvantage is the cost of the license and this makes the selection of ArcGIS, a strategic decision for ACC.

The cost estimate for the Option 2 is presented in the table below:

Table 33: Cost Estimate for Option 2 - ArcGIS

Item	Description	Unit Cost	Quantity	TOTAL
License	RINEDAC	61€ /user/month	6 (15 months)	5 490 €
License	ArcGIS (Standard)	3$51,100	1	33 500 €
License	MS Windows server 2008 R2	1 000 €	1	1 000 €
Computer	-	750 €	8	6 000 €
Server		from 1 200 €	1	1 200 €
Scanner A1	-	2 500 €	1	2 500 €
TOTAL				**49 690 €**

Decision of ACC

We have been informed[45] that ACC has decided to proceed with the second option.

The cost of ArcGIS exceeds the amount set in the contract budget. At the time of drafting the Inception Report, ACC is exploring possible source of funds for the shortfall.

5.3.4.7. Development of Base Maps

The eight GIS operators have been provided with appropriate desktops, and ACC has provided working place for the operators.

We understand that ACC has signed a contract with the Cadastral Agency for the use of eight licenses RINEDAC.

The base maps currently used by ACC for the network maps contain too much information on the background, which makes it difficult to read and use the maps. Simplified base maps have been developed by aggregating Google Earth images.

The images and the network, converted in geodata base files, have been imported in ArcGIS in MOLDREF99 coordinate system, as shown in the next figure.

[45] By letter dated 16th March

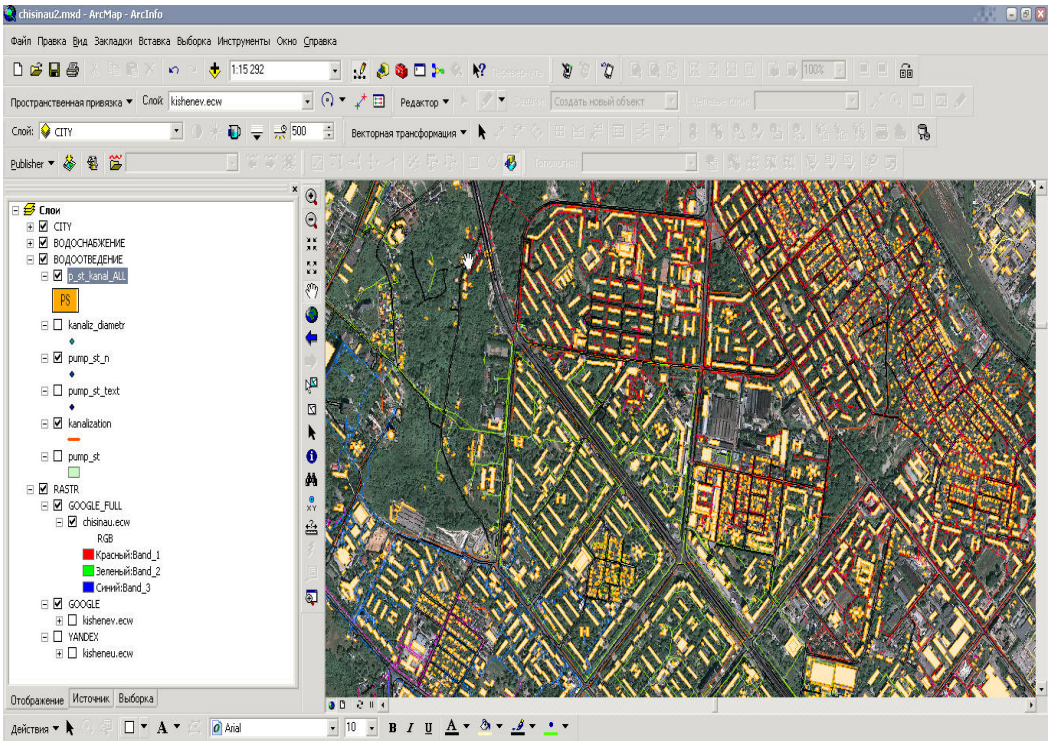

Figure 8: Import of Google Earth Images and Shape Files in ArcGIS and Mapinfo Files

5.3.4.8. Selection of Items to Be Included in the Initial GIS Database

We are discussing with ACC the network and facility elements data that is to be included in the GIS.

The database could be expanded in order to take into consideration such information as:

- Network incidents and asset history;
- Work planning schedules;
- Client information and contacts, and
- Management of Metering Data.

5.3.4.9. Functional Structure

Figure 9 shows the proposed functional structure for GIS, within ACC.

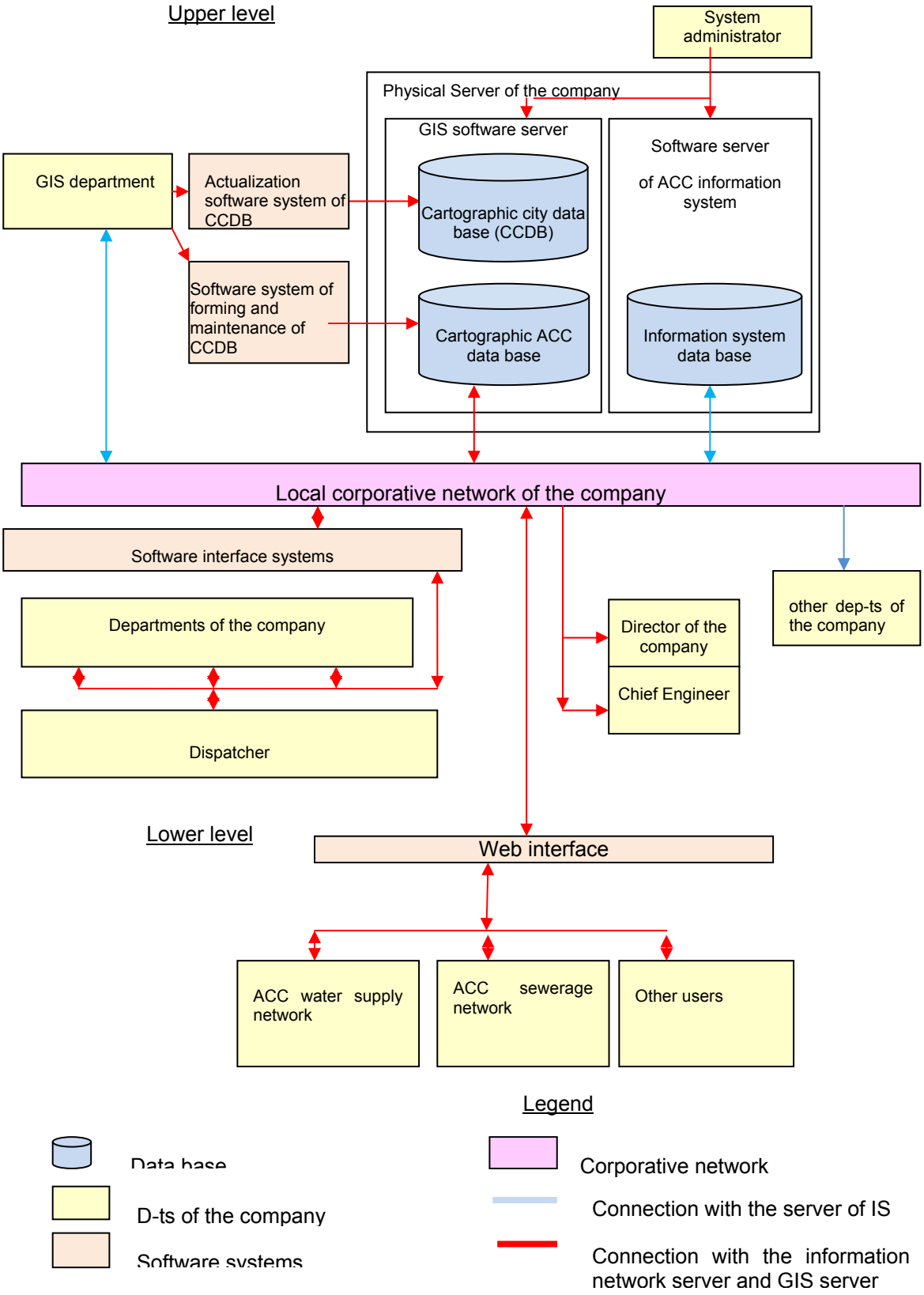

Figure 9: Functional Structure for GIS within ACC

5.4. PHASE A3: WATER SUPPLY

5.4.1. WATER TREATMENT WORKS

Water disinfection at the Chisinau water treatment works is discussed in Section 5.11.

Within Phases B and C, we will perform the following tasks, relating to the water treatment works:

5.4.1.1. Detailed diagnosis of the Chisinau Water Treatment Plant

Within the Phase A, we have focused upon of the chlorination issue, which was presented as an emergency.

A more detailed investigation of the whole plant will be made in the subsequent phases of the Study, focused on the issues identified and discussed in Section 3.2.9.

Recommendations for improving the current operational procedures will be prepared, if relevant.

5.4.1.2. Complementary Investigations at Other Water Sources

The Chisinau water treatment plant is not the only source of drinking water used in Chisinau. In order to have a general picture of the production strategy, we will perform a diagnosis of the water quality of the groundwater wells which are currently operated: Balsevsc, Ialoveni, Ghidighici.

According to the recommendation of the water modelling, the relevancy of keeping these sources in operation will be assessed; then, the necessity of implementing new treatment facilities for these sources, or to rehabilitate existing treatment works at Balsevsc source, will be assessed.

In addition, a detailed diagnosis of the condition and process of Vadul Lui Voda plant will be made.

5.4.1.3. Short Term Rehabilitation or Upgrading Plan

Based on the findings of the detailed diagnosis, we will propose a short term investment plan, aimed at securing the water production in the coming years with maximum capital efficiency.

The short term investment plan will include plant modifications that can be achieved without major alterations to the existing works and so minimize the effect on service. Any proposals will be focused upon significantly improving the current situation, and/or increase the operational life of the assets.

5.4.1.4. Long term investment plan

We will propose a long term investment strategy for the water production. The strategy will be based on the assessment of the water demand evolution. A general water

production strategy will be proposed, taking into account the different potential sources and production sites.

Capital and Operational expenditures will be assessed over a 25 year design horizon.

The required investments will be phased according to the constraints that will be determined by the financial model.

5.4.2. WATER NETWORK

Within Phase B we will construct the water network model so that it will be available for detail network analysis. Schemes will be evolved within an all-embracing asset management approach.

5.4.2.1. Mains Programme for Growth and Rehabilitation

We will look to see where new mains are required to ensure customer levels of service are met, with increased customer demand.

The same approach will be used:

1. To provide for increased service coverage to any new development areas, as shown in the Chisinau development plans, and,
2. In conjunction with the studies for water procurement, if the network is to be extended to enable some of the existing groundwater wells to be taken out of service.

In conjunction with the non-revenue water reduction studies, we will prepare the framework for a mains replacement programme.

The framework will, by necessity, concentrate on a procedure for the collection of data on asset conditions, rather than provide a specific programme. Without such data, an efficient rehabilitation programme is not possible.

We will provide an indicative annual budget that should be made available for main rehabilitation and recommend some mains that should be considered as candidates for early replacement.

5.4.2.2. Tank Capacities

Water storage requirements will be assessed in order to check that the available storage meets the objective of 12 hours of provision. While the existing storage capacity may seem sufficient at a large scale, there might be local deficiencies that cannot have been assessed at during Phase A but will be in Phase B through the hydraulic model analysis.

On average, only 37% of pumping capacity at the pumping

According to the preliminary assessment, five tanks would seem to have excess capacity, with possible negative effect on the quality of the water. This will be investigated, as will possible chlorine residual boosting at remote locations.

5.4.2.3. Pumping Station Capacities & Efficiencies

The capacity of the pumping stations will need to be optimised against water demand.

According to our preliminary assessment, almost all the pumping stations seem to be oversized. Indeed, in the pumping stations, less than 67% of the pumps are generally working at once.

We will study the replacement of the existing pumps by less powerful pumps, more adapted to the current water demand.

In some pressure zones supplied by several pumping stations, the possibility to shut down one of the pumping station will be studied. This solution would enable the other pumping stations to be operated according to their capacities, with improved asset utilisation and power efficiency.

Pump operating schedules will be produced for maximum pump operating efficiency.

5.4.2.4. Regulation Upstream the Tanks

The hydraulic model will help to define:

1. Optimised pressure management in the supply zones, with flow adjustment according to upstream water demand;
2. Water tank operating level regime that ensure (i) a suitable turn-over frequency and (ii) possible improved efficiency in the operation of the pumps delivering to the tanks.

Optimisation of pressure within the zones will not only reduce energy consumption but, by lowering pressures, reduce leakage.

5.4.2.5. Energy Saving

The preliminary assessment highlighted some current practices that could be improved to save energy.

These will be pursued further and actions to improve energy efficiency will be proposed.

The hydraulic model will allow us to simulate different scenarios and check if the existing organization of pressure zones could be improved to reduce unnecessary pumping.

Furthermore, an Electro-Mechanical Engineer will come to Chisinau early in June to assess the existing E&M equipment and review the sizing and efficiency of pumping facilities (head, flow rate, pump curves). He will as well choose energy efficient devices for new facilities or equipment and adjust operating schedules to minimise energy use during peak tariff periods.

5.5. PHASE A4: WASTEWATER COLLECTION

5.5.1. USE OF THE NETWORK COMPUTER MODEL

As with potable water supply, we will develop the wastewater model and use it to analyse identified issues within the wastewater network:

5.5.1.1. Design Flow and Risks Arising from Oversized Sewers

If the system is oversized, the velocity in the sewers can be too low to maintain the self cleaning conditions. Sedimentation/siltation occurs, and deposits accumulate in the bottom of the pipes.

Over-sizing of sewers will be assessed and, if required, remedial measures proposed.

5.5.1.2. Stormwater Overflow

According to ACC, there is no illegal discharge of untreated wastewater into water courses, or to the natural environment. This will be further inspected in the next phase of the Study.

The analysis will include for the pumping station overflows.

5.5.1.3. Siphons under the River Bic

Currently the two siphons under the River Bic are always completely open. The consequences will be assessed and, if required, remedial solutions sought.

5.5.1.4. Increased Wastewater Service Coverage

Options will be considered to provide for 100% coverage for the sewer network.

In conjunction with the investigation of the smaller wastewater treatment plants, the options for closing these stations and transferring flows to the Chisinau works will be considered.

5.5.1.5. Pumping Station Efficiency

The model will be used to optimise pumping stating pumping regimes and to identify where pumps could be advantageously changed.

5.5.2. INDUSTRIAL DISCHARGES TO SEWER

Within Phase B, we will prepare an inventory of industrial discharges into the pubic sewer.

The accompanying investigation will include for:

1. The quality and quantity of the discharge;
2. The extent to which there is on-site treatment and the extent to which this could be beneficially required;

3. Proposals for monitoring the discharge and the actions to be taken in the event of a non-compliant discharge;
4. Any required legal changes that could be proposed, and
5. A review of how other utilities have approached and resolved the problem.

We will also consider mechanisms to manage the discharge of sludge from private septic tanks into the wastewater system of ACC.

5.5.3. CLOSED CIRCUIT TV INSPECTION OF SEWERS

5.5.3.1. Current Situation

ACC has a CCTV, with the ancillary equipment and mobile laboratory (IBAK) that it uses for the inspection of artesian wells only. Such equipment would be suitable for sewers. The same equipment could not be used for both well and sewer surveys.

The real condition of the sewers is not known to ACC and the precise identification of problems is not possible. It is essential that ACC has in place, and invests in a sewer rehabilitation/replacement programme. Such a programme can only be prepared after a thorough examination and survey of the sewers, manholes, pumping stations and other assets. An essential requirement for the O&M of the sewers and for the preparation of the rehabilitation/replacement programme will be CCTV surveys of the sewer network.

Within subsequent Phases of the Feasibility Study, we are required to prepare the ACC team for CCTV survey of the whole sewer network. In order to achieve this task, several equipments will be purchased; a global methodology presented and the ACC team trained.

The details of this programme will be defined in Phase B, after discussion with ACC.

5.5.3.2. Required CCTV equipment

The current CCTV-IBAK auto-laboratory is suitable for a sewerage system. It is used infrequently, and could be used for sewer inspections.

The equipment for computing and recording the video and picture would need to be updated so as to record live and directly print the report after the inspection. Such an update corresponds to an investment of about €1 500.

The CCTV-IBAK could be replaced for the artesian well surveys by a Gator Cam 3 that can be used down to 100 m deep (10 bars) in clear water. Gator Cam 3 is smaller, can fit in any vehicle and is easy-to-use. The cost of this water equipment is estimated in total at €16 000.

Quick View equipment

To be used in association with the CCTV for the sewer survey, the video equipments known as “Quick View” are proposed. They are cheaper, quicker and easier to use than full CCTV equipment. As they are simpler, they are also less detailed but are a very efficient first step in the inspection of the sewerage system.

The equipment comprises a rod with a video camera which is inserted into sewer manholes. The camera is pointed to inspect the internal bore of the incoming and outgoing sewer, and the manhole. The camera can focus, and thus inspect, up to 50 m from a chamber i.e. with each insertion into a chamber up to 100m of sewer can be inspected. The equipment cost is €13 500.

In addition, a vehicle and other requirements such as safety barriers, road traffic cones and portable warning signs will be required for each team.

A two-man team with Quick View equipment could make 15 to 20 surveys per working day, inspecting 600 to 800 metres per day.

The requirements for the Quick View survey team and the programme will be considered further with Phase B, related to the available project budget of €30 000.

5.5.3.3. Methodology

The “Quick View” could be used to survey the sewers and identify problems.

Depending upon the extent of damages, the condition of the sewer or for any other problem for which a more detailed survey is required, a CCTV survey would be arranged.

Most of the time, CCTV will require a jetting / hydro-cleaning of the sewer prior to the inspection.

From the survey, and in conjunction with the hydraulic model, the sewers in need for rehabilitation will be identified; the most appropriate solution determined, and cost-estimated. Individual projects will be prioritised according to the seriousness of the current sewer condition and according to the consequences of a failure both for the operation of the sewer system and for other consequences, such as flooding or traffic disruption in the event of a collapse.

5.6. PHASE A5: WASTEWATER TREATMENT INCLUDING SLUDGE DISPOSAL

The centrifuge test drying of sludge is discussed in Section 5.10.

5.6.1. CHISINAU TREATMENT WORKS

As exposed in Chapter 3.4.2 and detailed in the report “Chisinau WWTP Assessment” enclosed in the separate appendices, the existing facilities are in very poor conditions.

The full renovation of the existing structures of Chisinau WWTP is not a good option either economically or technically due to the advanced damage of the works and to the future treatment requirements. Eventually a new plant will have to be built. Also flows to the works will probably vary as i) new areas are connected to the wastewater collection network from within Chisinau and from the surrounding areas and ii) population and industrial activities will change with time

However the time required before a new WWTP being operational is likely to be more than 5 years. Solutions must then be found in order to secure the good operation of the existing – and possibly modified – WWTP until the construction of the new WWTP. In particular efforts should be made to reduce odours.

It should also be taken into consideration that a new sludge treatment facility must be implemented to solve the issue of sludge odour and sludge disposal. This new facility must be designed in such a way that it can be easily integrated into the future new WWTP. If the implementation time of this new sludge facility is more than 2 years it will be more cost-efficient to directly integrate it into the design of the new WWTP.

One should note that the easiest and fastest solution would consist in installing centrifuges to dewater the sludge prior to its disposal, whereas in the design of the future WWTP sludge digestion may be chosen as the best alternative for sludge treatment. In that case it would not really be cost-efficient to implement centrifuges in a first stage for only a couple of years of operation.

A set of actions (short term: < 6 months; medium term: < 2 years and long term: > 2 years) is proposed in the report presented in Appendix.

Activity within Phase B &C will concern the following:

1. Addressing the issues identified at the Chisinau works in order to improve the quality of the treated water
2. Ensuring the optimum performance of the plant in respect of chemical and power usage, and
3. Developing solutions for the current odour problems.

5.6.2. OTHER TREATMENT WORKS

We will assess the viability of the smaller wastewater treatment plants. We will formulate proposals to rehabilitate the works to ensure their final effluent meets discharge standards, or to close the works and transfer the wastewater to the Chisinau works.

5.6.3. SLUDGE TREATMENT & DISPOSAL

A strategy for sludge treatment and disposal from the Chisinau and other wastewater treatment works has to be formulated in the frame of our Study. Where appropriate, the strategy will include sludge from the potable treatment works.

Based on the assessment of the current facilities (see Chapter 3.4.2.1), revamping the existing digesters will be more expensive than constructing new ones. A preliminary cost estimates is provided in the report presented in Appendix.

Possibility to reduce significantly the OPEX with energy generation and potential CDM project development will be investigated during the next phases of the Project.

The final sludge disposal is a critical issue in Chisinau: a sustainable solution must be identified.

Taking into consideration the local context and the availability of agricultural lands around Chisinau, the solution consisting in using the sludge for agricultural purposes is the preferred one.

However, as agricultural use imposes stringent constraints on sludge quality and requires a reliable back-up system, further investigations are required to assess the feasibility of this option, taking into account of Moldovan environment laws and appropriate EU Directives.

That is why this option will be studied as well as other alternatives including:

- Landfill disposal
- Incineration, possibly integrated to an on-going solid waste incineration project nearby the WWTP
- Use in cement factories or in another industrial process to be identified

These sludge disposal alternatives will be compared according to a multicriteria analysis.

5.7. PHASE A6: INSTITUTIONAL AND ECONOMIC OPERATION OF THE OPERATOR ACC

5.7.1. INSTITUTIONAL

Within Phases B & C we will seek to address the institutional issues identified within Phase A.

5.7.1.1. Human Resources

We will agree with the ACC, a suitable staff organisational structure. Our suggestion[46] is for a structure based upon the four divisions of Finance and Administration, Customer Services, Asset Services and Operations, appropriate to the requirements of ACC. It is probable that the changes will require to be phased, for which we will prepare an action plan and implementation programme.

As discussed in Section 5.12, should it be decided that the water sector assets are to remain in the ownership of ACC, there will need to be a clear division in the structure between “asset owner” and “asset operator” functions, in order to permit a Service Agreement.

[46] As presented to the ACC in March, 2011.

Staff establishment and capacity will be discussed and considered to the extent requested by ACC. We appreciate that the comparative ratios provided in Section 3.1.12.5 are not immediately achievable. An action plan will be provided for a reduction in staff establishment, over an appropriate period, that will show how staff can be reduced following investment in asset rehabilitation and plant automation.

The methodology for the introduction of annual staff appraisals and the linkage between the appraisals and a staff development programme will be proposed. We will suggest that training records be maintained using the two matrix system: a Job Matrix within which the training requirements for each job are maintained and the Employee Matrix within which the training delivered and that required for each employee will be held.

Other issues identified within Phase A, will be considered further and solutions evolved in conjunction with ACC.

5.7.1.2. Customer Services

The issues raised within Phase A will be pursued and, within discussions with appropriate ACC staff, we will make proposals to assist ACC to become a proficient service provider.

We will advice on the requirements to establish a single Customer Services Directorate for all customer contacts, should that become ACC policy.

We will evolve with the ACC customer service staff, a series of Customer Service Levels that will set down the required standard for ACC customer service to be achieved. These can be included into a Customer Services Manual, the framework for which we will propose, and within the set of Performance Indicators[47] to be used in the Service Contract, Section 5.12.

Based upon our experiences in other locations, we will look to see where income and billing efficiency can be improved. In conjunction with the Municipality and appropriate ACC staff, we will investigate how the particular issues associated with the metering of the accommodation blocks can be resolved.

An output from Phase B will be a review of the procedures to ensure the currency of the customer database.

The viability of cancelling the Infocom contract will be considered so that ACC will be responsible for all meter reading. Irrespective of the Infocom question, we make recommendations for automated meter reading, where we consider it to be appropriate.

5.7.1.3. Operational Activities

As a part of the consideration for human resources, we will consider the specific requirements for the operational teams in terms of capacity and skills.

The review will consider operational requirements for new equipment and plant.

[47] See Section 5.7.3.1

5.7.2. FINANCIAL

Within Phase B, we will continue to develop the outlines for improved financial management set out in this Inception Report.

In addition to the financial management of ACC, we will consider budget setting and budget management techniques to focus the available monies where they can be most effective. In additional we will raise with ACC the extent to which budget management can be delegated to operational and other function managers.

5.7.3. OVERALL EFFICIENCY

5.7.3.1. Benchmarking and Key Performance Indicators

Internal and external benchmarking is an important tool by which a utility can demonstrate, and improve efficiency. The introduction of Performance Indicators will strengthen the existing performance enhancement procedures that have been adopted by the ACC.

Within Phase B, we will propose Key Performance Indicators intended to ensure that:

1. Legal and regulatory obligations of ACC are fulfilled;
2. Required targets for the service provided to customers are met, and
3. The assets that are operated and managed by ACC are:
    a. “Sweated” to achieve their full potential;
    b. Used to their maximum advantage, and
    c. Their continued availability for service provision is assured.

Internally, ACC can use the Indicators to (i) help them understand the reasons behind poor performance; (ii) set targets for improvement; (iii) focus operational and capital expenditure on justifiable need, and (iv) compare performance between the operational districts and against previous performance.

The Indicators will enable ACC to monitor and report improvements in performance. Externally, ACC will be able to bench-mark its performance against international water and wastewater service providers[48].

Performance Indicators comprise commonly two groups – levels of customer service and of operational performance:

1. Performance Indicators relating to customer service are divided into those that (i) measure performance against a legal and/or a self-set obligation, such as time to make a connection, and (ii) those which relate to the level of service that ACC

[48] For example, through The World Bank’s “International Benchmarking Network for Water and Sanitation Utilities Data Book”

wishes to provide, e.g. Indicators related to the response time to customer complaints, and

2. Performance Indicators relating to operational performance comprise those that measure the condition and/or suitability of the assets managed by ACC, e.g. frequency of pump failures, sewer collapses or blockages and those that relate to the standard of the O&M practiced by ACC, such as frequency of valve inspections or length of sewers cleaned per year.

For a single event, such as a mains failure, the event would feed into two Indicators. The first relates to the number of mains failures per year - an asset performance Indicator; the second would relate to the time taken by ACC to respond to the failure - a customer level of service Indicator

Other Performance Indicators can relate to (i) management performance; (ii) financial performance; (ii) human resource management and (iii) asset management.

5.7.3.2. Outsourcing

We will make proposals to ACC of the activities that could be outsourced to contractors to the benefit of ACC, whilst still maintain the desired levels of customer service.

Typical opportunities to be considered would be:

1. The IT function;
2. Grounds and buildings maintenance;
3. Vehicle maintenance, and
4. Network maintenance.

5.7.4. TARIFF STUDY

Within Phase C, we will complete the tariff study, which will be fully compliant with, and take into consideration the requirements set out within the Terms of Reference.

By necessity this activity will occur towards the end of the Study in order to take into consideration the outputs of the other experts e.g. staff numbers and cost, financial benefits to be derived and that element of the cost of the proposals to be borne by the tariff.

The study will take into consideration the affordability and willingness to pay results of the socio-economic survey.

5.8. PHASE A7: LAY-OUT OF THE WORKING PROGRAMME FOR THE FEASIBILITY STUDY

The long-term investment programme will be prepared following the development of the capital works programme within the other tasks of Phase B and C.

Within the Phase B Report, we shall set out issues for discussion with the Phase B Workshop, and which will decide how the schemes proposed will be prioritised.

The programme will include a procurement strategy for the schemes proposed.

5.9. PHASE A8: PROPOSAL FOR EMERGENCY REPAIR REQUIREMENTS

All water service providers must be able to respond professionally and efficiently to emergencies.

Within Phase B, we set out the framework for an Emergency Response Plan based upon the establishment of emergency response tactical teams and strategic teams for dealing with the emergency on-site and, strategically, within an Incident Room.

Following the preparation of the framework, we will assess, against the framework, the capability of ACC to respond to an emergency.

In conjunction with the water supply and wastewater experts, we will investigate the extent to which risk can be mitigated by capital investment, in particular the dependence of Chisinau water supplies on the River Nistru source and the Chisinau treatment works.

5.10. PHASE A9: SHORT-TERM TESTING OF CENTRIFUGAL DRYING OF SLUDGE

In order to the most efficient dewatering method and assess the operating cost of the centrifugation, short-term testing of centrifugal drying of sludge has been re-instated in the Consultant's scope of work.

These tests are going to be performed by the German Company Huning Umwelttechnik.

The Figure below presents the equipment that will be installed on the WWTP.

Figure 10: Photos of the equipment to be used for the sludge dewatering tests

The results obtained shall be compared to those from an initial test of sludge drying in geotubes carried out by ACC.

5.11. PHASE A10: ASSESSMENT OF DISINFECTION METHOD FOR THE WATER TREATMENT PLANT

As a result of non compliance with safety regulation in the current provision for chlorine gas disinfection of water at the Chisinau water treatment works, we have studied the suitable options that could be proposed as an alternative solution.

In a separate report enclosed in the appendices, are presented:

- An audit of the current situation at the treatment works;
- Specification for alternative solution choice and design;
- Description and comparison of the possible options, with cost estimates;
- A recommended solution with proposition of future activities

The purpose of the above mentioned analysis is to enable ACC to take rapidly a decision and launch the implementation process.

Given the limitation on pure chlorine storage and the necessity of having a chlorine residual in treated water, the use of hypochlorite remains the only solution, at least for post disinfection. Hence, the solution for replacement of the existing plant must be selected among the following three options:

- Option 1: on site hypochlorite production by electrolysis (electro chlorination);
- Option 2: bulk supply of sodium hypochlorite – (with possibly 60 kg pure chlorine bottles as stand-by facilities), and
- Option 3: combination of chlorine dioxide for preoxidation and sodium hypochlorite, supplied in bulk, for final disinfection.

The process of the Option 1 is safe, well known and widely used. It has been developed as an alternative to pure chlorine storage. The operation and maintenance would not be complex compared to the general requirements of a large water treatment plant. The critical point would be the supply of salt. At least two suppliers must be found, and the delivery way must be defined. The quality of the salt must be carefully monitored.

The Option 2 would be safe as well and simple to operate. The only difficulty would be the control of the dilution and of the actual concentration of the stored hypochlorite, especially in case of long retention time resulting from a low chlorine demand period. The delivery chain of the sodium hypochlorite must absolutely be secured and the quality of the product must be checked and guaranteed by the suppliers. Access to the site must be assured considering the weight and size of the delivery vehicles. The economical feasibility of this solution relies on the cost of sodium hypochlorite and the possibility of negotiating it for large quantities.

This solution corresponding to the Option 3 is the most complex from an operation point of view. The treatment will suppose the supply and storage management of three different chemicals: sodium hypochlorite, sodium chlorite and hydrochloric acid. In addition, for safety reason, the hydrochloric acid must not be stored close from the sodium hypochlorite (as an accidental mix of these chemicals would bring about a strong

degassing of chlorine). Concerning water quality, the main problem created by the use of chlorine dioxide is the possible creation of chlorite (ClO2-). Chlorite may also be generated by reaction of chlorine dioxide with ferrous iron or manganese.

The technical and economical comparison of these 3 options is presented in Appendix.

However our recommendation would be for on-site electrolysis, ACC have decided upon their preferred option which is the bulk purchase of sodium hypochlorite with chlorine gas used as a back-up.

Provided that the issue of access does not present an undue risk to Apa Canal, we would consider this option to be satisfactory and to provide a long-term sustainable water disinfection solution to Apa Canal.

The tender dossier for this option has been prepared.

5.12. PHASE A11: SERVICE CONTRACT

A Service Contract is required to be prepared between the “asset owner” and the “asset operator” in order to ensure that the “operator” (i) operates the assets efficiently for the benefit of its customers and (ii) maintains the assets to ensure that the “owner” achieves the full working life expectation of his assets.

We will use existing Service Agreements in use in the region, and approved by the EBRD as the basis for the Contract/Agreement.

The Contract would be performance based setting out the obligations of both parties, and be based upon the Key Performance Indicators, as discussed in Section 5.7.3.1.

The ToR requires the Contract to be between the Municipality and ACC. In light of the question raised about ownership of the “public interest assets”, Section 3.1.8, prior to the introduction of the Contract, the question of the ownership of the assets will need to be determined in order to establish the “owner” and “operator” roles.

If ACC is decided to be the “owner” as well as “operator”, a division will be required within the ACC organisational structure. The division will be necessary to differentiate the “asset owner” and “asset operator” roles. An Agreement[49] can be prepared between the two elements.

If the assets were to revert to the Municipality and the Local Authorities, a Contract between the Municipalities and ACC would be feasible, albeit financial terms would come within a second phase in the introduction of the Contract.

Were the “public interest” assets to be returned to the Municipality and Local Authorities, ACC would need to enter into Contracts with each Local Authority, as the “operator” across the whole service area. In addition to being bureaucratic, the issue of agreeing a common tariff across all local authority administrative areas would apply.

[49] A Contract would be inappropriate as there could not be any financial terms.

An alternative, as introduced in Romania, would be for the Chisinau Municipality to take the lead and, with the Local Authorities outside of the Municipality, form an Association. The Association would enter into a single contract with ACC, for ACC to be the “operator” within all areas of the Association members.

Appendices

LIST OF APPENDICES

Appendix 1 Workshop Attendees

Moldova: Chisinau Water Supply & Sewage Treatment - Feasibility Study Attendance List

seureca

Project: Moldova: Chisinau Water Supply & Sewage Treatment - Feasibility Study

Program: WORKSHOP I

Date: 26-05-2011

Place: APA CANAL CHISINAU

Chaired: Vincent JALBERT

No.	Name	Position	Signature
1	AKIHIRO KUDO	Associate Banker	
2	Dana Craciunescu	~~Senior~~ Banker	
3	Marco BEROS	Senior Engineer	
4	Martin Schriever	Sector Expert	
5	CHRISTOPH ISENMANN	PROJECT MANAGER	
6	Stefano Sedda	EC MONITOR	
7	Vladimir Mocreac	SA „Apa-Canal"	
8	Ivan Busdila	S.A. „Apă-Canal	
9	Traian Brăila	SA „Apa Canal	
10	Vitalie Midoni	SA „Apă Canal Chișt	
11	Rusnac Arcadie	SA " Apă Canal Chișinău	
12	Roisa Cecan	S.A. „Apă-Canal Chișinău"	
13	Mihail Mazurean	S.A. Apa-canal chiși	
14	sylvain GAUTIER	Seureca / Deputy Team) leader	
15	Mihai ROSIORAN	BCI DIRECTOR	
16	Valentina Revenco	SA „Apă Canal Chiș"	
17	Ion Constantinescu	SA Apă Canal	
18	Jacques BONNELLE	Finance expert	
19	nicolas de langlade	Treatment expert	

Moldova: Chisinau Water Supply & Sewage Treatment - Feasibility Study Attendance List

No.	Name	Position	Signature
20	HEBEL Pierre	Water Network Expert	
21	Vozian Grigore	Sef. serv SAGIA	
22	ROBERT Denis	Institut. Expert Seureca	
23	HENNEQUIN Camille	Seureca Wastewater network expert	
24	MERCORE GABRIELA	Seureca - Billing expert	
25	Tony Lewis	Seureca Team Leader	
26	Edgeu Verdes	EBRD	
27	Mavelseli Natalia	SA Apa-Canal Chis	
28	Lariono Vladimir	Asociatia „Moldav Apă - Canal"	
29	Grozavu Nistor	Viceprimar PMC	
30	JALBERT Vincent	Project Director - Seureca	
31	PIETIKAINEN Jaani	EIB - Senior Loan Officer	
32	Maria Mursa	interpreter Seureca	
33			
34			
35			
36			
37			

Appendix 2 Photographs Taken at the Workshop


S.A. "APĂ-CANAL CHIŞINĂU"

Appendix 3 Press Reports of Workshop

http://www.acc.md/news_md.html

Press release

During the last years the S.A. "Apă-Canal Chișinău" has been facing a lot of problems related to the technical, ecological, organizational aspects, etc.

A need for a detailed assessment of the current working situation has been established in order to redress the situation and to identify the proposals and technical solutions for short, medium and long term, that would permit to attract further investments necessary for the rehabilitation of the municipal water supply and sewage treatment system and improvement of the water treatment, which as a result, will lead to an improvement of the ecological situation, living conditions and reduction of health risks for the population

This Study is currently carried out by the French company Seureca in frame of the project related to the elaboration of the Feasibility Study: Water Supply and Sewage Treatment in mun. Chisinau.

> The Study works will be carried out in 3 Phases for the period of 20 Months, during which it will be made an inventory of the economic-financial activity of the company, the technology of the water and wastewater treatment, sludge treatment at the WWTP. In this context, several investment programs will be drafted on short, medium, long terms necessary for the solving of all the problems related to the quality of the water supplied to the consumers, as well as for the problem of the excessive use of the environment and natural resources. It will be performed measurements of the working programs on water and sewerage systems, the elaboration and calibration of the hydraulic model, and the elaboration of the GIS. It is now under implementation the Phase A: "Inventory of the existing infrastructure and general operating environment", which will last seven months".

In order to attract financial resources for the necessary rehabilitation objectives of centralized water supply and sanitation system in the city and for the unconditional fulfillment of the Terms of Reference, and directing the efforts targeted by the French company Seureca (Consultant) to achieve the success, today, 26th of May 2011, has started on the first Workshop, held under the patronage of the Delegation of the European Union, with the participation of European Bank for Reconstruction and Development, European Investment Bank, KfW Bank, the Municipality of Chisinau.

The Preliminary Report presented today is the first result of the project, summarizing the conclusions and proposals of experts who worked during 4 months in Chisinau.

It should be noted that the project has already brought concrete results. Thus, following the completion of one of project phase, the Consultant has proposed alternative methods of water disinfection by replacing the use of pure chlorine. Based on the selected option, the tender dossier was drawn up and the tender for the implementation of the new safe water disinfection technologies has been launched.

We believe that in the future, our company will benefit from the project, aimed to protect the environment, addressing in particular issues related to sustainable use of water resources and water quality services.

Apa-Canal expresses sincere gratitude to all parties involved in financing this project; those who made it possible to achieve, not least, Seureca Consulting Company that thoroughly examined the issues that our company faces, taking into account our comments and proposals.

Press Service S.A. Apa-Canal Chisinau

Press Article CAPITALA en

http://webcache.googleusercontent.com/search?q=cache:2CXoeOZ6QsIJ:www.capitala.md/index.php%3Foption%3Dcom_content%26view%3Darticle%26id%3D2801%253Aautoritile-municipale-pun-la-punct-modernizarea-serviciului-de-ap-i-canalizare-%26catid%3D2%253Asocial%26Itemid%3D4%26lang%3Dro+http://www.capitala.md/index.php%3Foption%3Dcom_content%26view%3Darticle%26id%3D2801%253Aautoritile-municipale-pun-la-punct-modernizarea-serviciului-de-ap-i-canalizare-%26catid%3D2%253Asocial%26Itemid%3D4%26lang%3Dro&cd=1&hl=mo&ct=clnk&gl=md&client=firefox-a&source=www.google.md

The experts of the French consultancy company Seureca presented yesterday the first report of **the Feasibility Study within the „**Program for water supply and wastewater treatment in Chisinau Municipality**". The meeting was attended by the administration and specialists of** Apa-Canal Chisinau JSC, the ad-interim mayor of the capital, Nistor Grozavu, the representatives of the European Bank for Reconstruction and Development, the European Investment Bank, KfW banking group and others.

Nistor Grozavu noted that there exists already a first "palpable" result in the "Program for water supply and wastewater treatment in Chisinau Municipality", namely: finding an alternative for water treatment (by replacing the the chlorine with other disinfectants). The ad-interim mayor has listed the expectations of the Municipality in this project: a better quality of services provided by Apa-Canal Chisinau SA, by eliminating the olfactory pollution in the capital; the signing of a contract of public services between the water provider and the local public administration etc.

The Investment plan for the rehabilitation of water and sewerage networks, for the reconstruction of the Wastewater Treatment Plant has to be achieved in the shortest term. Nistor Grozavu agrees that the expenses in the modernization program of water and sewerage services will be quite large, but the results expected from planned reconstructions will also have a major positive impact on the municipality.

The elaboration of the Feasibility Study of the Program for water supply and wastewater treatment in Chisinau Municipality is entirely financed by the European Union, in the framework of the Neighbourhood Policies, its costs being estimated to 3 million Euros.

According to Constantin Becciev, the Director General of Apa-Canal Chisinau SA, the future project will solve the problems concerning the rehabilitation of the Wastewater Treatment Plant , of the the water and sewerage networks.

For the experts of Seureca Company, it is important to determine the amount of investments necessary to be made at Apa-Canal SA, as to prioritize the respective investments. „After having completed the verifications within the company, we will propose a list of ulterior priority investments. We will try to establish a balance between the modernization priorities and the payment capacity of consumers", says Vincent Jalbert, the head of the project for the elaboration of the Feasibility Study.

The study will be elaborated in 3 stages, within 20 months, during which there will be evaluated the economic-financial activity of Apa-Canal Chisinau SA, will be analyzed the methods of water and wastewater treatment, as the sludge drying method at the Wastewater Treatment Plant.

In the same context, there will be elaborated a series of short, middle and long term investment programs, necessary to solve the problems concerning the quality of water provided to consumers, the environment protection and the exploitation of natural resources.

Tatiana Lupascu