APPENDIX-5CONSTRUCTION PLAN AND COST ESTIMATE

1. CONSTRUCTION PLAN

1.1 GENERAL

Construction works for the project includes earth work, concrete work, pipe work, mechanical/electrical work, architectural work and miscellaneous work. These works, in general, will be executed by ordinary construction methods using construction equipment readily available in Braila. Major works are planned to be carried out with mechanical equipment for smooth and economical performance.

Construction site for the proposed facilities are located in the northern part of Braila City. There would be no difficulty to transport materials and equipment because the area has adequately provided road networks. There is neither difficulty in obtaining water nor electricity for construction.

1.2 CONSTRUCTION METHOD

Major construction works are construction of WWTP, installation of wastewater pumps, installation of sewer pipes and construction of CSO regulators.

1.2.1 CONSTRUCTION OF WWTP

The major construction works of WWTP are construction of primary and final sedimentation tank, aeration tank, influent and discharge pumping station, sludge treatment facilities and administration building.

No special construction method will be applied for the construction of WWTP except placing of Pre-stressed concrete for sludge digester tank. Since there are much experiences to construct pre-stressed concrete structure by Romanian contractors, there would not be any difficulty to construct this kind of structures.

1.2.2 INSTALLATION OF SEWER PIPES

Open trench method would be adopted for installation of sewer pipes in principal. However, application of jack-up method would be considered in the railway crossing part.

1.2.3 CONSTRUCTION OF CSO REGULATOR

The CSO regulator is a underground reinforced concrete structure with a excavation depth of 3 to 5 m. Therefore, only ordinary construction methods are used for the construction.

1.3 CONSTRUCTION SCHEDULE

1.3.1 WORKING DAYS

Annual working days are estimated to be 225 days based on the following assumptions:

Winter season idle period:	3 month (from Dec.15 to Mar. 15)
Workable period:	275 days
Sundays in workable period:	9 month x 4 days = 36 days

National holidays in workable period:	1 day
Rainy days in workable period:	10 days (more than 10 mm/day, ave. last 5 years)
Total work suspension days in workable period:	47 days
Working days:	**275 days - 47 days = 228 days : 225 days**

1.3.2 WORK TIME

All the construction works will be done during day time in principle. The working time is eight (8) hours per day

1.3.3 REQUIRED CONSTRUCTION PERIOD AND SEQUENCE OF WORKS

Required construction periods are estimated based on the construction volume and the above mentioned working days and work time assumptions by each construction works/structures by ordinary scale of inputs. Construction plan for the Braila project is presented in the *Figure AII.5.1.*

	Period (Year)	1st year 2000	2nd year 2001	3rd year 2002	4th year 2003	5th year 2004
Wastewater Treatment Plant						
Influent Pumping Station	1.5					
Wastewater Treatment Process	2.5					
Sludge Treatment Process	2					
Discharge Pumping Station	1.5					
Power Receiving Facility	1					
Administration Building	1					
Interceptor	2					

Figure AII.5.1 Construction Plan and Sequence of Works for the Braila Project

2. COST ESTIMATE

2.1 BASIS OF COST ESTIMATE

The project cost consists of I) construction cost, II) equipment cost, III) engineering service cost, IV) government administration cost and V) physical contingency as shown in *Table AII.5.1.* The project cost is estimated under the following conditions.

- All base costs are expressed under the economic conditions that prevailed in June 1999.
- The exchange rates of currencies are US$1 = ROL15,756 = ¥122.
- Only equipment cost is classified into foreign and local currency portions and their rate is FC : LC = 70% : 30%, because all construction works are done by local products and equipment.
- Engineering service cost is including all services for detailed design, tendering assistance and construction supervision. The cost is assumed at 10% of the construction cost.
- Government administration cost is costs that should be prepared by government and/or executing agency (*e.g.* cost for personnel and organization for the project management, cost for commission for external loan, etc.). The cost is assumed at 2 % of the construction cost.

- All percentages mentioned above are assumed from former example of the same kind of projects.
- Physical contingency allowance is assumed to be 10% of the total of construction, equipment, engineering service and government administration cost.
- Price escalation is not counted.

Table AII.5.1 Structure of Project Cost

	Item	Remarks
I	Construction Cost	
II	Equipment Cost	
III	Engineering Service Cost	10% of (I + II)
IV	Government Administration Cost	2% of (I+II)
V	Contingency	10% of (I+II+II+IV)
VI	Project Cost	I+II+III+IV+V

2.2 CONSTRUCTION COST

The construction cost consists of 1) mobilization and demobilization cost, 2) cost for preparatory works, 3) cost for main works, and 4) cost for miscellaneous works as shown in *Table AII.5.2.*

2.2.1 MOBILIZATION AND DEMOBILIZATION COST

Mobilization and demobilization cost is assumed at five (5) percent of the cost for main works.

2.2.2 PREPARATORY WORKS

Cost for preparatory works is assumed at five (5) percent of the cost for main works.

2.2.3 COST FOR MAIN WORKS

The direct cost for main works (cost for civil work, mechanical/electrical equipment cost, mechanical/electrical equipment installation cost, and construction cost for administration building) will be estimated based on the results of preliminary engineering design. Indirect costs such as site expenses and overhead and profit are estimated by percentage.

- The site expense is estimated to be ten (10) percent of the direct cost of main works.
- The overhead and profit are estimated to be ten (10) percent of the direct cost of main works.
- The cost for the miscellaneous works is estimated to be ten (10) percent of the cost for main works.

Table AII.5.2 Structure of Construction Cost

Item		Remarks
I	Construction Cost	Total of I-1 to I-6
I-1	Mobilization and demobilization	8 % of I-3
I-2	Preparatory works	10 % of I-3
I-3	Main works	Total of I-3-1 to I-3-4
I-3-1	Civil work	
I-3-2	Mechanical/electrical equipment	
I-3-3	Mechanical/electrical equipment installation	
I-3-4	Administration building	
I-4	Miscellaneous works	10 % of I-3
I-5	Site expenses	15 % of I-3
I-6	Overhead and profit	10 % of I-3

(1) Cost for Civil and Architectural Work

The cost for civil and architectural work is estimated by multiplying the quantity of works by unit construction costs. The unit construction costs are estimated by unit prices of labor, construction materials and equipment.

The unit prices of personnel, material and equipment operation are estimated based on prevailing market prices referring the data collected from MPWTP and other organizations concerned. The Unit prices that are used in the study, are shown in *Tables AII.5.3 to AII.5.5.*

Table AII.5.3 Unit Costs of Personnel

	lei/month	lei/day
Engineer	3,500,000	140,000
Foreman	2,600,000	104,000
Skilled Labor	2,200,000	88,000
Common Labor	1,600,000	64,000
Technician	2,200,000	88,000
Equipment Operater	2,000,000	80,000
Driver	1,800,000	72,000
Administrator/Clark	3,000,000	120,000

Table AII.5.4 Unit Price of Material

Item		Unit	Price (Lei)
Sand		m3	100,000
Soil		m3	100,000
Crushed stone		m3	200,000
Asphalt		ton	800,000
tack coat		l	15,000
Reinforcing bar		ton	5,000,000
Wooden material		m3	700,000
Ready mix concrete	B50	m3	500,000
	B200		700,000
	B250		900,000
RC pipe	Dia200 mm	m	100,000
	Dia300 mm		150,000
	Dia400 mm		175,000
	Dia500 mm		215,000
	Dia600 mm		250,000
	Dia700 mm		350,000
	Dia800 mm		450,000
	Dia1000 mm		750,000
	Dia1500 mm		2,000,000
	Dia1650 mm		2,350,000
	Dia2000 mm		3,500,000
	Dia2200 mm		4,500,000
	Dia2800 mm		7,000,000
	Dia3400 mm		12,000,000
Steel Pipe	Dia400 mm		500,000

Table AII.5.5 Unit Price of Equipment Operation

Item		Price (Lei/day)
Dunp Truck	10t	800,000
Truck		800,000
Concrete Transporter		1,200,000
Concrete Pumping Car		1,200,000
Bulldozer	11t	1,200,000
Backhoe	0.6m3	1,000,000
Crawler Crane	20t	1,800,000
Truck Crane	20t	1,800,000
Pile Dirving Machine		2,500,000
Tire Roller		800,000
Vibration Roller		400,000
Compactor		200,000

(2) Cost for Mechanical/Electrical Equipment and Installation

Since there are no published standard market price list for mechanical/electrical equipment for wastewater treatment, the cost for mechanical/electrical equipment will be obtained from manufacturer that have experience in Romania and/or neighboring countries based on the specifications resulting from preliminary engineering design.

The appropriate cost decided based on the obtained quotation would be used for the mechanical/electrical equipment cost for the project.

(3) Direct Cost for Main Works

The direct cost for main works are estimated for WWTP and interceptor separately as shown in *Table AII.5.6 and AII.5.7.*

2.3 Project Cost

Estimated total project cost is about ROL 837,376 million, and its breakdown is shown in Table AII.5.8. Of the total project cost, ROL 268,416 million or 32% is foreign currency portion, and remaining ROL 568,960 million or 68% is local currency portion.

Table AII.5.8 Project Cost (Braila Project)

Item	Cost (million Lei)	FC (million Lei)	LC (million Lei)
I Construction Cost	**679,688**	**234,431**	**445,257**
Mobilization and Demobilization	24,275	0	24,275
Preparatory Works	24,275	0	24,275
Main Works	485,491	234,431	251,060
Wastewater Treatment Plant	466,596	234,431	232,164
Influent Pumping Station	46,819	25,665	21,154
Wastewater Treatment Process	216,059	104,008	112,051
Sludge Treatment Process	141,373	78,719	62,654
Discharge Pumping Station	48,266	25,665	22,601
Site Finalization	7,633	0	7,633
Power Receiving Facility	232	0	232
Administration Building	6,216	375	5,841
Interceptor	18,895	0	18,895
Miscellaneous Works	48,549	0	48,549
Site Expenses	48,549	0	48,549
Overhead and Profit	48,549	0	48,549
II Engineering Service Cost	**67,969**	**33,984**	**33,984**
III Government Administration Cost	**13,594**	**0**	**13,594**
IV Contingency	**76,125**	**0**	**76,125**
V Project Cost	**837,376**	**268,416**	**568,960**

(unit: million lei)

2.4 OPERATION AND MAINTENANCE (O/M) COST

Major portions of O/M cost of the WWTP are electric power charge for the equipment and cost for personnel. The O/M cost for the Braila project is estimated at ROL 9,296 million as following *AII.5.9*.

Table AII.5.9 Operation and Maintenance Cost for Braila Project

Item	unit	unit price	Q'ty	Total
Personnel	lei/month/person (average)	2,000,000	50	1,200
Electricity	lei/kwh	500	1,124	4,854
Chemical	lei/kg	5,000	894,000	447
Excess Sludge Disposal	m^3	20,000	297,990	1,490
Repairing	0.5% of Mechanical cost		23,000	460
Ohters	10% of above			845
Total				9,296

(unit: million lei)

3. IMPLEMENTATION PROGRAM

3.1 IMPLEMENTATION SCHEDULE

The project will be completed within five (5) years from 2000. Pre-construction stage of one (1) year is assumed for the detailed design period and tender process followed by four (4) years' construction works.

Proposed implementation schedule is presented in *Figure AII.5.2.*

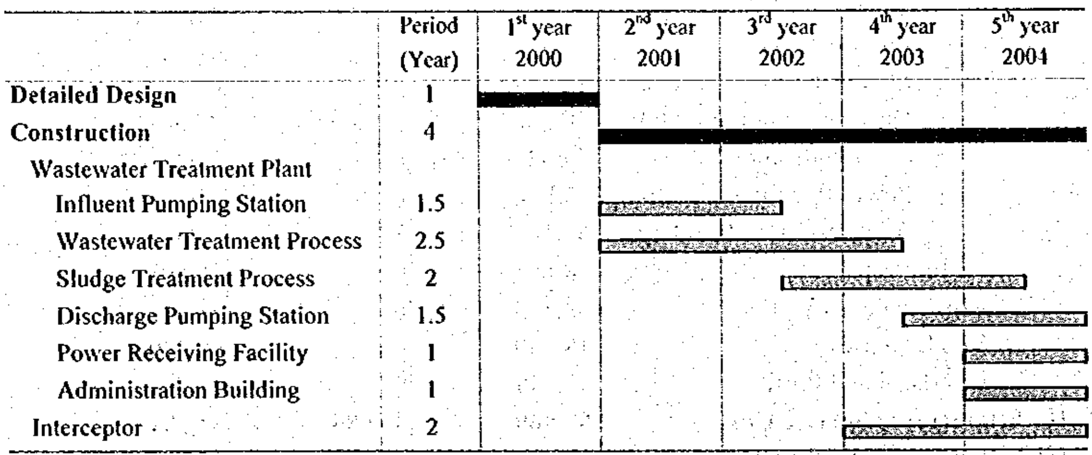


Figure AII.5.2 Implementation Schedule (Braila Project)

3.2 DISBURSEMENT SCHEDULE

Proposed annual cost disbursement schedule of the Braila project for entire project life is shown in *Table AII.5.10.*

Table AII.5.6 Direct Construction Cost of WWTP (Braila)

Item		Unit	Quantity	Unit Price (Lei)	Amount (million Lei)	FC (million Lei)	LC (million Lei)
1 Influent Pumping Station							
1-1 Civil Work							
1) Earth Work							
Excavation		m3	9,044	5,000	45	0	45
Backfill		m3	6,654	22,000	146	0	146
2) RC Concrete							
RC Concrete I	Floorborad	m3	168	1,543,000	259	0	259
RC Concrete II	Wall	m3	763	1,771,000	1,351	0	1,351
1-2 Architectural Work		m2	658	4,000,000	2,632	0	2,632
1-3 Mechanical							
1) Equipment		ls	1	36,664,000,000	36,664	25,665	10,999
2) Installaiton		%	15		5,500	0	5,500
1-4 Electorical		ls	1	220,800,000	221	0	221
2 Wastewater Treatment Process							
2-1 Preliminary Treatment Process							
(1) Civil Work							
1) Earth Work							
Excavation		m3	25	5,000	0	0	0
2) RC Concrete							
RC Concrete I	Floorborad	m3	2,180	1,543,000	3,364	0	3,364
RC Concrete II	Wall	m3	840	1,771,000	1,488	0	1,488
3) Pile Work (ave.L=10m, incl. driving work)		pcs	330	4,810,000	1,587	0	1,587
(2) Mechanical							
1) Equipment		ls	1	28,434,400,000	28,434	19,904	8,530
2) Installaiton		%	15		4,265	0	4,265
(3) Electorical		ls	1	124,617,600	125	0	125
2-2 Secondary Treatment Process							
(1) Civil Work							
1) Earth Work							
Excavation		m3	47,655	5,000	238	0	238
Backfill		m3	8,113	22,000	178	0	178
2) RC Concrete							
RC Concrete I	Floorborad	m3	9,328	1,543,000	14,393	0	14,393
RC Concrete II	Wall	m3	8,055	1,771,000	14,265	0	14,265
3) Pile Work (ave.L=10m, incl. driving work)		pcs	1,191	4,810,000	5,726	0	5,726
(2) Architectural Work		m2	338	4,000,000	1,352	0	1,352
(3) Mechanical							
1) Equipment		ls	1	114,963,200,000	114,963	80,474	34,489
2) Installaiton		%	15		17,244	0	17,244
(4) Electorical		ls	1	709,861,200	710	0	710
2-3 Final Treatment Process							
(1) Civil Work							
1) Earth Work							
Excavation		m3	2,625	5,000	13	0	13
Backfill		m3	1,080	22,000	24	0	24
2) RC Concrete							
RC Concrete I	Floorborad	m3	263	1,543,000	406	0	406
RC Concrete II	Wall	m3	408	1,771,000	723	0	723
3) Pile Work (ave.L=10m, incl. driving work)		pcs	48	4,810,000	231	0	231
(2) Architectural Work		m2	90	4,000,000	360	0	360
(3) Mechanical							
1) Equipment		ls	1	5,184,800,000	5,185	3,629	1,555
2) Installaiton		%	15		778	0	778
(4) Electorical		ls	1	6,102,000	6	0	6
3 Sludge Treatment Process							
3-1 Civil Work							
1) Earth Work							
Excavation		m3	21,234	5,000	106	0	106
Backfill		m3	13,892	22,000	306	0	306
2) RC Concrete							
RC Concrete I	Floorborad	m3	2,004	1,543,000	3,092	0	3,092
RC Concrete II	Wall	m3	326	1,771,000	577	0	577
3) PC Concrete	Sludge digestion tan	m3	1,272	3,010,700	3,830	0	3,830
4) Pile Work (ave.L=10m, incl. driving work)		pcs	20	4,810,000	96	0	96
3-2 Architectural Work		m2	640	4,000,000	2,560	0	2,560
3-3 Mechanical							
1) Equipment		ls	1	112,456,000,000	112,456	78,719	33,737
2) Installaiton		%	15		16,868	0	16,868
3-4 Electorical		ls	1	1,481,274,000	1,481	0	1,481

Table AII.5.6 Direct Construction Cost of WWTP (Braila)

Item		Unit	Quantity	Unit Price (Lei)	Amount (million Lei)	FC (million Lei)	LC (million Lei)
4 Discharge Pumping Station							
4-1 Civil Work							
1) Earth Work							
Excavation		m3	1,801	5,000	9	0	9
Backfill		m3	937	22,000	21	0	21
2) RC Concrete							
RC Concrete I	Floorborad	m3	102	1,543,000	157	0	157
RC Concrete II	Wall	m3	393	1,771,000	696	0	696
4-2 Architectural Work		m2	314	4,000,000	1,256	0	1,256
4-3 Mechanical							
1) Equipment		ls	1	36,664,000,000	36,664	25,665	10,999
2) Installaiton		%	15		5,500	0	5,500
4-4 Electorical		ls	1	458,328,000	458	0	458
4-5 Discharge Sewer	dia 2000 mm, EC=2m	m	1,100	3,186,000	3,505	0	3,505
5 Site Finalization							
5-1 Civil Work							
1) Embankment by Excavated soil		m3	51,708	22,000	1,138	0	1,138
2) Embankment by Purchased soil		m3	50,744	128,000	6,495	0	6,495
6 Power Receiving Facility		ls	1	231,735,504	232	0	232
7 Administration Building							
7-1 Architectural Work							
1) Architectural Work		m2	1,200	4,000,000	4,800	0	4,800
2) Pile Work (ave.L=10m, incl. driving work)		pcs	91	4,810,000	438	0	438
7-2 Labo. and Office Equipment							
1) Labo. and Office Equipment		ls	1	750,000,000	750	375	375
2) Installaiton		%	0		0	0	0
7-3 Electorical		ls	1	228,000,000	228	0	228
TOTAL					466,596	234,431	232,164

361,289

Table AII.5.7 Direct Construction Cost of Interceptor (Braila)

Item		Unit	Quantity	Unit Price (Lei)	Amount (million Lei)	FC (million Lei)	LC (million Lei)
1 Pipe, Manhole and CSO							
1-1 Installation of interceptor pipe (RC pipe)							
1) RC pipe 300 mm	earth coverage 1 to 3 m	m	20	914,000	18	0	18
2) RC pipe 600 mm	earth coverage 1 to 3 m	m	40	1,225,000	49	0	49
3) RC pipe 1650 mm	earth coverage 1 to 3 m	m	1,256	4,440,000	5,577	0	5,577
4) Inverted siphon		m	40	8,880,000	355	0	355
5) RC pipe 1650 mm	earth coverage 3 to 5 m	m	1,210	4,737,000	5,732	0	5,732
6) RC pipe 3400 mm	earth coverage 1 to 3 m	m	182	16,443,000	2,993	0	2,993
7) RC pipe 3400 mm (with suppor	earth coverage 1 to 3 m	m	15	21,375,900	321	0	321
1-2 Sewer construction by sheild tunneling method							
1) Dia 1650 mm sewer	sheild tunneling method	m	234	7,950,000	1,860.3	0	1,860
1-3 Installation of CSO							
1) CSO type I	small type	place	2	22,906,000	45.8	0	46
2) CSO type II	large type	place	1	92,960,000	93.0	0	93
1-4 Installation of Manhole							
1) Manhole	d=1000mm, EC=2m	place	1	9,911,000	9.9	0	10
2) Manhole	d=1650mm, EC=2m	place	7	15,854,000	111.0	0	111
3) Manhole	d=1650mm, EC=4m	place	8	19,320,000	154.6	0	155
4) Manhole	d=1650mm, EC=6m	place	3	22,786,000	68.4	0	68
5) Manhole	d=2200mm, EC=2m	place	1	22,253,000	22.3	0	22
6) Manhole	d=3400mm, EC=2m	place	2	43,101,000	86.2	0	86
1-5 Installation of Valve							
1) Installation of Valve	d=3400mm	pcs	2	700,000,000	1,400	0	1,400
Total					18,895	0	18,895

14,631

Table AII.5.10 Disbursement Schedule of Braila Project

		Total	1	2	3	4	5
Detailed Design	Total	33,984	33,984				
	FC	16,992	16,992				
	LC	16,992	16,992				
Construction		679,688		131,314	187,460	207,404	153,510
Mobilization and Demobilization		24,275		12,137			12,137
Wastewater Treatment Plant Construction							
Influent Pumping Station	Total	46,819		22,657	24,161	0	0
	FC	25,665		8,555	17,110	0	0
	LC	21,154		14,102	7,051	0	0
Wastewater Treatment Process	Total	216,059		65,622	86,424	64,013	0
	FC	104,008		20,802	41,603	41,603	0
	LC	112,051		44,820	44,820	22,410	0
Sludge Treatment Process	Total	141,373		0	28,275	56,549	56,549
	FC	78,719		0	15,744	31,488	31,488
	LC	62,654		0	12,531	25,061	25,061
Discharge Pumping Station	Total	48,266		0	0	23,622	24,643
	FC	25,665		0	0	8,555	17,110
	LC	22,601		0	0	15,067	7,534
Site Finalization	Total	7,633		0	0	0	7,633
	FC	0		0	0	0	0
	LC	7,633		0	0	0	7,633
Power Receiving Facility	Total	232		0	0	0	232
	FC	0		0	0	0	0
	LC	232		0	0	0	232
Administration Building	Total	6,216		0	0	0	6,216
	FC	375		0	0	0	375
	LC	5,841		0	0	0	5,841
Interceptor Construction	Total	18,895		0	0	9,448	9,448
	FC	0		0	0	0	0
	LC	18,895		0	0	9,448	9,448
Other Costs	Total	169,922		30,898	48,601	53,771	36,652
	FC	0		0	0	0	0
	LC	169,922		30,898	48,601	53,771	36,652
Construction Supervision	Total	33,984		8,496	8,496	8,496	8,496
	FC	16,992		4,248	4,248	4,248	4,248
	LC	16,992		4,248	4,248	4,248	4,248
Government Administration		13,594		2,626	3,749	4,148	3,070
Contingency		76,125	3,398	14,244	19,971	22,005	16,508
O/M Cost	Total	819,750					
	FC	600,000					
	LC	219,750					
Total Disbursement		1,657,126	37,383	156,681	219,676	242,052	181,584
FC		868,416	16,992	33,605	73,705	85,894	53,221
LC		788,710	20,391	123,076	140,971	156,159	128,363

		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
O/M Cost	Total	8,790	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,700	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,790
	FC								200,000								200,000								200,000	
	LC	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Total Disbursement		8,790	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,700	8,790	8,790	8,790	8,790	8,790	8,790	208,790	8,790
FC		0	0	0	0	0	0	0	200,000	0	0	0	0	0	0	0	200,000	0	0	0	0	0	0	0	200,000	0
LC		8,700	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790

APPENDIX-6 FINANCIAL AND ECONOMIC ANALYSIS

1 FINANCIAL ANALYSIS

1.1 MAJOR PRECONDITIONS AND ASSUMPTIONS

Following preconditions and assumptions were applied in the financial plan.

- The financial plan deals with only the cost and the revenue accrued by the project.
- Currency unit is ROL and the value of ROL is expressed as the June 1999 prices.
- Projection period is 30 years since the start of project implementation.
- Target year is 2010. From 2010 on the values of variables related to revenues and O & M cost are assumed to keep the 2010 level.
- Implementation period is 5 years from 2000 to 2004.
- 38 % of profit before tax is levied as a corporate tax.

Depreciation period is assumed as follows.

Depreciation Period

Item	Mechanical equipment	Civil works and sewer pipes
Depreciation period	8 years	40 years

1.2 TERMS AND CONDITIONS OF EXTERNAL FINANCIAL SOURCES

Conditions of possible external financial sources are assumed as shown in the table below.

Assumed Financing Terms for Possible External Financial Sources

Financial Organs	Financing Ratio (%)	Loan/Grant	Interest Rate (%)	Repayment Period (Years)	Grace Period (Years)
JBIC	70	Loan	2.7	30	10
EBRD	(70)	Loan	(6.5)	15	3
ISPA	75	Grant	-	-	-

It should be noted that they are nothing other than an example or assumption. In the case of EBRD, financing ratio depends on the circumstances and interest rate fluctuates in parallel with LIBOR (London Inter-bank Offered Rate).

1.3 BACKGROUND DATA FOR FINANCIAL PLAN

1.3.1 SERVED POPULATION

The sewerage served population in 2010 was estimated 221,600. It was assumed that the present population increases linearly until 2010 and ever since remains 221,600. In addition, the household size was assumed to be constant at present value of 3.3 persons/household.

The numbers of served population and served household were estimated as follows.

Number of Served Population and Household

Year	2005	2006	2007	2008	2009	2010	from 2011
Served population	210,204	212,483	214,763	217,042	219,321	221,600	221,600
Served household	63,698	64,389	65,080	65,770	66,461	67,152	67,152

1.3.2 QUANTITY OF WASTEWATER

Similar to the served population, the quantity of wastewater was assumed to increase linearly from the present value to the estimated value in 2010, and since ever to remain at the level in 2010. Non-domestic wastewater is composed of commercial, institutional and industrial ones.

The estimated quantities of domestic and non-domestic wastewater are as follows.

Quantity of Domestic and Non-domestic Wastewater

(Unit : 1,000 m^3/year)

Year	2005	2006	2007	2008	2009	2010	from 2011
Domestic	18,507	18,795	19,085	19,376	19,670	19,966	19,966
Non-domestic	13,659	13,919	14,179	14,441	14,702	14,965	14,965

The coefficient *b*, the ratio of non-domestic sewerage charge to domestic one, was estimated 1.91 based on the values in 1998 and 1999.

1.3.3 HOUSEHOLD INCOME

The average monthly household income was estimated at ROL 1,643,600 in 1999 based on the result of the people's awareness survey conducted in this study. It was assumed to grow 3 % per year until 2010, and to remain the level of 2010 whereafter. The annual household income was calculated by multiplying the monthly value with 12.

The estimated average annual household income is as follows.

Average Annual Household Income

(Unit : 1,000 ROL/year)

Year	2005	2006	2007	2008	2009	2010	from 2011
Annual Household Income	23,551	24,257	24,985	25,734	26,506	27,302	27,302

1.3.4 COLLECTION RATE

The charge collection rate was assumed to linearly increase from 58% in 1999 to 95% in 2010, then remain 95% ever since.

The collection rate of sewerage charge was estimated as follows.

Sewerage Charge Collection Rate

Year	2005	2006	2007	2008	2009	2010	from 2011
Collection Rate	78.2 %	81.5 %	84.9 %	88.3 %	91.6 %	95.0 %	95.0 %

1.4 FINANCIAL STATEMENTS FOR PROPOSED FINANCIAL PLANS

The financial statements for the proposed financial plans are shown in *Tables AII.6.1 to AII.6.4*.

The structure of applied financial statements is as follows.

Structure of Applied Financial Statements

R.A. APTERCOL account	
Revenue	A
Operation and maintenance cost	B
Lease fee	C
Profit before tax	D = A – B – C
Corporate tax	E = D × 0.38
Profit after tax	F = D – E
Working capital	G = F
Cumulative working capital	H = Σ G
City's sewerage service account	
Revenue from lease fee	I = C
Depreciation	J
Payment of interest	K
Profit	L = I – J – K
Loan	M
Subsidy from general budget	N
Depreciation	O = I
Sources	P = L+M+N+O
Investment cost	Q
Payment of principal	R
Applications	S = Q + R
Working capital	T = P – S
Cumulative working capital	U = Σ T
City's general account	
City general revenue	V
Corporate tax from R.A. APTERCOL	W = E
Revenue from lease fee	X = I
Total current revenue	Y = V + W + X
Subsidy	Z = N
Subsidy ratio	AA = Z/Y
Repayment ratio	AB = (K + R)/Y

It is noted that leveled allocation of lease fee was applied for EBRD cases, taking into consideration of quite intense repayment schedule for relative short period under EBRD conditions.

2 ECONOMIC ANALYSIS

Based on the economic benefit of the project estimated by the people's awareness survey conducted in this study and the project cost, an economic analysis was conducted.

Applied preconditions and assumptions are as follows:

- Currency unit is ROL and the value of ROL is a constant one expressed at the June 1999 prices.
- Project Life: 30 years since the start of project implementation.

- Target Year: 2010. From 2010 on the values of O & M cost variables are assumed to keep the 2010 level.
- Implementation Period: 5 years 2000 to 2004.
- OCC (Opportunity Cost of Capital): 10%.
- Conversion factor: 98.4% to capital cost (initial and replacement cost) taking account of customs duty for foreign components.

The cost benefit stream of the project, which calculates the EIRR (Economic Internal Rate of Return), NPV (Net Present Value), and B/C (Ratio of Benefit to Cost), is shown in *Table AII.6.5.*

Obtained EIRR, NPV, and B/C are as below:

NPV (ROL 1,000,000)	B/C	EIRR (%)
26,168	1.03	11.6

Results of the sensitivity analysis are as shown below:

Conditions	EIRR (%)	NPV (million Lei)	B/C
Cost: +20%	NA	- 137,167	0.86
Cost: +10%, Benefits: -10%	NA	- 139,784	0.84
Benefits: -20%	NA	- 142,401	0.83

Table AII.6.1 Financial Statements of Braila Financial Plan (Case IB3)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)						44,493	48,415	52,580	57,007	61,699	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Lease fee calculation base						35,920	48,472	57,881	57,881	57,881	57,881	57,881	57,881	57,881	57,881	56,944	47,826	36,441	23,898	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A−B−C)						865	4,787	8,953	13,380	18,071	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050
Corporate tax (E = 0.38 * D)						329	1,819	3,402	5,084	6,867	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759
Profit after tax (F = D − E)						536	2,968	5,551	8,295	11,204	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291
Working capital (G = F)						329	2,148	5,550	10,634	17,501	26,260	35,019	43,778	52,537	61,296	70,055	78,814	87,573	96,332	105,091	113,850	122,609	131,368	140,127	148,886	157,645	166,404	175,163	183,922	192,681
Cumulative W.C. (H = Σ G)						536	3,504	9,055	17,350	28,555	42,846	57,137	71,428	85,719	100,010	114,301	128,592	142,883	157,174	171,465	185,756	200,047	214,338	228,629	242,920	257,211	271,502	285,793	300,084	314,375

2. Braila City Sewerage Account (million ROL)

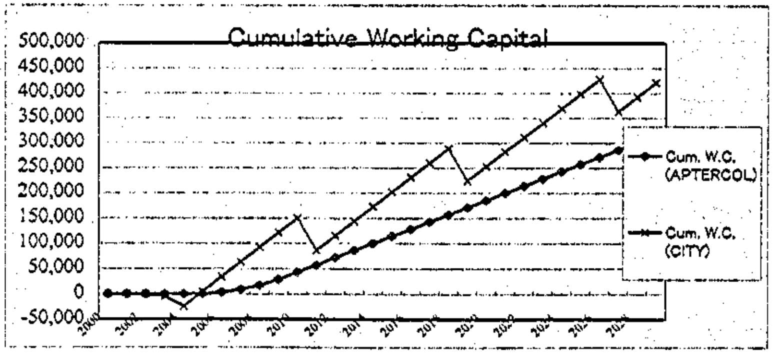
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	0	0	0	0	0	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	2,055	10,548	22,000	33,946	41,715	38,786	35,666	32,343	28,804	25,035	21,022	16,747	12,195	7,598	3,758	1,149	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I−J−K)	0	0	0	−2,055	−10,548	−16,140	−28,086	−35,855	−32,926	−29,806	−26,483	−22,944	−19,175	−15,162	−10,887	−6,335	−1,738	2,102	4,711	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	37,020	62,106	80,925	80,925	80,925	80,925	80,925	80,925	80,925	80,925	77,051	60,813	38,045	12,959	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860
Depreciation (O = I)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	239,998	171,036	49,857	62,997	74,047	76,977	80,097	83,420	86,958	90,727	94,741	99,016	99,694	88,052	69,125	46,648	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	0	0	0	1,820	9,565	20,880	34,020	45,070	47,999	51,119	54,442	57,981	61,750	65,763	70,038	70,716	59,074	40,147	17,671	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	37,383	156,681	219,676	243,872	191,149	20,880	34,020	45,070	47,999	51,119	54,442	150,981	61,750	65,763	70,038	70,716	59,074	40,147	17,671	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P−S)	0	0	0	−3,874	−20,113	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	−3,874	−23,987	4,991	33,968	62,946	91,923	120,901	149,878	85,856	114,833	143,811	172,788	201,766	230,743	259,721	288,699	224,676	253,654	282,631	311,609	340,586	369,564	398,541	427,519	363,496	392,474	421,451

3. Criteria for State Guarantee (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	329	1,819	3,402	5,084	6,867	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759
Revenue from lease fee (X=I)	0	0	0	0	0	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	213,119	219,948	227,030	234,376	241,993	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893
Subsidy (Z=I+K+R−M)	0	0	0	3,874	20,113	37,020	62,106	80,925	80,925	80,925	80,925	80,925	80,925	80,925	80,925	77,051	60,813	38,045	12,959	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	2.3%	11.6%	17.4%	28.2%	35.6%	34.5%	33.4%	32.4%	32.4%	32.4%	32.4%	32.4%	30.8%	24.3%	15.2%	5.2%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	2.3%	11.6%	20.1%	30.9%	38.2%	37.0%	35.9%	34.7%	34.7%	34.7%	34.7%	34.7%	33.2%	26.7%	17.6%	7.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	1.56%
Coverage to Interest (%)	50.0%
Coverage to depreciation (%)	50.0%
Coverage to principal (%)	50.0%

Averaged profit rate	19.7%
Averaged criteria values for guarantee	27.2%
Highest subsidy ratio	35.6%



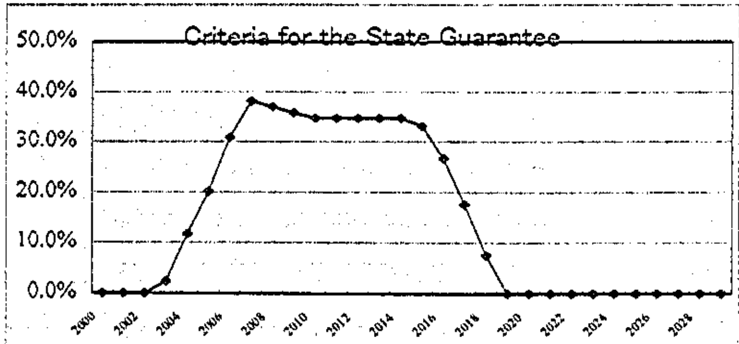


Table AII.6.1 Financial Statements of Braila Financial Plan (Case IB3)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)						44,493	48,415	52,580	57,007	61,699	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Lease fee calculation base						35,929	48,472	57,881	57,881	57,881	57,881	57,881	57,881	57,881	57,881	55,944	47,825	36,441	23,898	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A−B−C)						865	4,787	8,953	13,380	18,071	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050
Corporate tax (E = 0.38 * D)						329	1,819	3,402	5,084	6,867	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759
Profit after tax (F = D − E)						536	2,968	5,551	8,295	11,204	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291	14,291
Working capital (G = F)						329	2,148	5,550	10,634	17,501	26,260	35,019	43,778	52,537	61,296	70,055	78,814	87,573	96,332	105,091	113,850	122,609	131,368	140,127	148,886	157,645	166,404	175,163	183,922	192,681
Cumulative W.C. (H = Σ G)						536	3,504	9,055	17,350	28,555	42,846	57,137	71,428	85,719	100,010	114,301	128,592	142,883	157,174	171,465	185,756	200,047	214,338	228,629	242,920	257,211	271,502	285,793	300,084	314,375

2. Braila City Sewerage Account (million ROL)

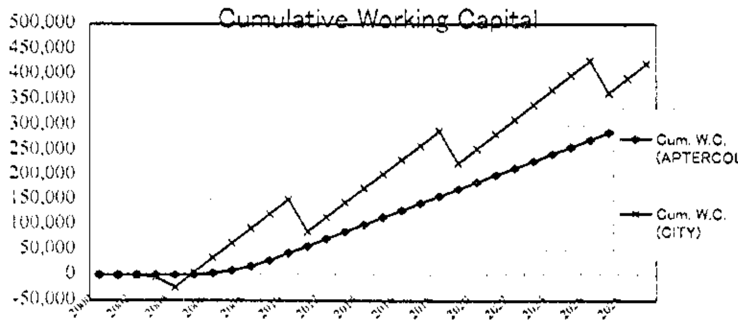
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	0	0	0	0	0	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	2,055	10,548	22,000	33,946	41,715	38,786	35,666	32,343	28,804	25,035	21,022	16,747	12,195	7,598	3,758	1,149	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I−J−K)	0	0	0	−2,055	−10,548	−16,140	−28,066	−35,855	−32,925	−29,806	−26,483	−22,944	−19,175	−15,162	−10,887	−6,335	−1,738	2,102	4,711	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860	5,860
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	37,020	62,106	80,925	80,925	80,925	80,925	80,925	80,925	80,925	80,925	77,051	60,813	38,045	12,959	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860
Depreciation (O = J)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	239,998	171,036	49,857	62,997	74,047	76,977	80,097	83,420	86,958	90,727	94,741	99,016	99,694	88,052	69,125	46,648	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	0	0	0	1,820	9,565	20,880	34,020	45,070	47,999	51,119	54,442	57,981	61,750	65,763	70,038	70,716	59,074	40,147	17,671	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	37,383	156,681	219,676	243,872	191,149	20,880	34,020	45,070	47,999	51,119	54,442	150,981	61,750	65,763	70,038	70,716	59,074	40,147	17,671	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P−S)	0	0	0	−3,874	−20,113	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	−3,874	−23,987	4,991	33,968	62,946	91,923	120,901	149,878	85,856	114,833	143,811	172,788	201,766	230,743	259,721	288,699	274,676	253,654	282,631	311,609	340,586	369,564	398,541	427,519	363,496	392,474	421,451

3. Criteria for State Guarantee (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	329	1,819	3,402	5,084	6,867	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759	8,759
Revenue from lease fee (X=I)	0	0	0	0	0	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837	34,837
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	213,119	219,948	227,030	234,376	241,993	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893	249,893
Subsidy (Z=I+K+R−M)	0	0	0	3,874	20,113	37,020	62,106	80,925	80,925	80,925	80,925	80,925	80,925	80,925	80,925	77,051	60,813	38,045	12,959	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860	−5,860
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	2.3%	11.6%	17.4%	28.2%	35.6%	34.5%	33.4%	32.4%	32.4%	32.4%	32.4%	32.4%	30.8%	24.3%	15.2%	5.2%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%	−2.3%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	2.3%	11.6%	20.1%	30.9%	38.2%	37.0%	35.9%	34.7%	34.7%	34.7%	34.7%	34.7%	33.2%	26.7%	17.6%	7.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	1.56%
Coverage to Interest (%)	50.0%
Coverage to depreciation (%)	50.0%
Coverage to principal (%)	50.0%

Averaged profit rate	19.7%
Averaged criteria values for guarantee	27.2%
Highest subsidy ratio	35.6%



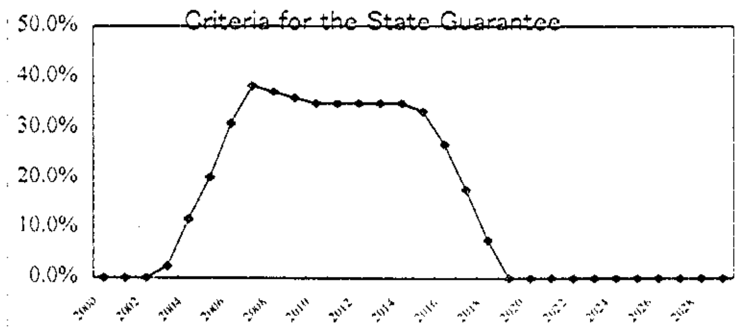


Table AII.6.2 Financial Statements of Braila Financial Plan (Case IIB3)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)						44,493	48,415	52,580	57,007	61,699	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Lease fee calculation base						29,803	38,762	45,483	45,483	49,483	45,483	45,483	46,463	45,483	45,483	44,100	38,300	30,169	21,210	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A−B−C)						6,679	10,601	14,766	19,194	23,885	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864
Corporate tax (E = 0.38 * D)						2,538	4,028	5,611	7,294	9,076	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968
Profit after tax (F = D − E)						4,141	6,573	9,155	11,900	14,809	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896
Working capital (G = F)						2,538	6,566	12,178	19,471	28,548	39,516	50,484	61,453	72,421	83,389	94,357	105,326	116,294	127,262	138,231	149,199	160,167	171,135	182,104	193,072	204,040	215,009	225,977	236,945	247,914
Cumulative W.C. (H = Σ G)						4,141	10,714	19,869	31,769	46,578	64,473	82,369	100,265	118,160	136,056	153,952	171,847	189,743	207,639	225,534	243,430	261,325	279,221	297,117	315,012	332,908	350,804	368,699	386,595	404,491

2. Braila City Sewerage Account (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	0	0	0	0	0	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	1,468	7,534	15,714	24,247	29,797	27,704	25,475	23,102	20,574	17,882	15,015	11,962	8,710	5,427	2,684	820	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I−J−K)	0	0	0	−1,468	−7,534	−15,668	−24,201	−29,751	−27,658	−25,429	−23,056	−20,528	−17,836	−14,969	−11,916	−8,664	−5,381	−2,638	−774	46	46	46	46	46	46	46	46	46	46	46
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	30,582	48,501	61,943	61,943	61,943	61,943	61,943	61,943	61,943	61,943	59,176	47,577	31,315	13,396	−46	−46	−46	−46	−46	−46	−46	−46	−46	−46	−46
Depreciation (O = J)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	240,585	174,050	43,892	53,277	61,170	63,263	65,491	67,865	70,392	73,084	75,951	79,005	79,489	71,174	57,654	41,599	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	0	0	0	1,300	6,832	14,914	24,300	32,193	34,285	36,514	38,887	41,415	44,107	46,974	50,027	50,512	42,196	28,677	12,622	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	37,383	156,681	219,676	243,352	188,416	14,914	24,300	32,193	34,285	36,514	38,887	134,415	44,107	46,974	50,027	50,512	42,196	28,677	12,622	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P−S)	0	0	0	−2,767	−14,366	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	−2,767	−17,134	11,844	40,822	69,799	98,777	127,754	156,732	92,709	121,687	150,664	179,642	208,619	237,597	266,574	295,552	231,529	260,507	289,485	318,462	347,440	376,417	405,395	434,372	370,350	399,327	428,305

3. Criteria for State Guarantee (million ROL)

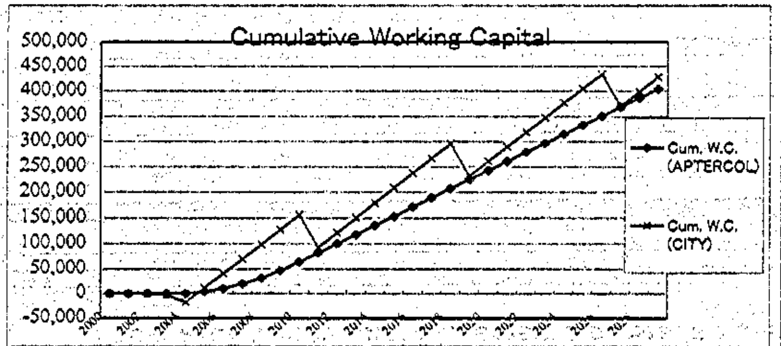
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	2,538	4,028	5,611	7,294	9,076	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968
Revenue from lease fee (X=I)	0	0	0	0	0	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	209,515	216,344	223,425	230,771	238,388	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,282	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,258	246,288	246,288
Subsidy (Z=I+K+R−M)	0	0	0	2,767	14,366	30,582	48,501	61,943	61,943	61,943	61,943	61,943	61,943	61,943	61,943	59,176	47,577	31,315	13,396	−46	−46	−46	−46	−46	−46	−46	−46	−46	−46	−46
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	1.6%	8.3%	14.6%	22.4%	27.7%	26.8%	26.0%	25.2%	25.2%	25.2%	25.2%	25.2%	24.0%	19.3%	12.7%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	1.6%	8.3%	14.6%	22.4%	27.7%	26.9%	26.0%	25.2%	25.2%	25.2%	25.2%	25.2%	24.0%	19.3%	12.7%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to income (%)	1.56%
Coverage to interest (%)	100.0%
Coverage to depreciation (%)	100.0%
Coverage to principal (%)	100.0%

Averaged profit rate: 25.3%

Averaged criteria values for guarantee: 19.7%

Highest subsidy ratio: 27.7%



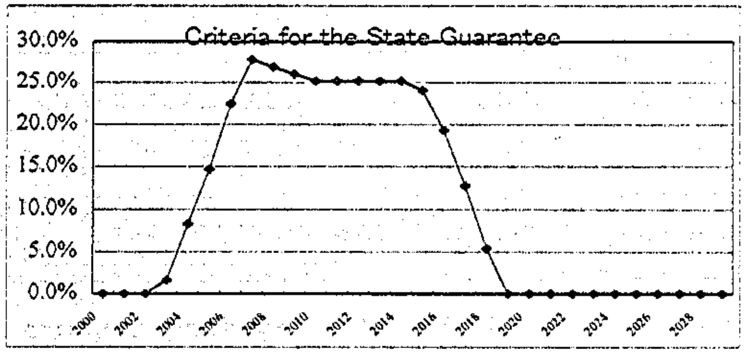


Table AII.6.2 Financial Statements of Braila Financial Plan (Case IIB3)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue (A)						44,493	48,415	52,580	57,007	61,695	66,677	66,677	66,677	66,677	66,677
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Lease fee calculation base						29,803	38,762	45,483	45,483	45,483	45,483	45,483	45,483	45,483	45,483
Profit before tax (D = A-B-C)						6,579	10,601	14,766	19,194	23,885	28,864	28,864	28,864	28,864	28,864
Corporate tax (E = 0.38 * D)						2,538	4,028	5,611	7,294	9,076	10,968	10,968	10,968	10,968	10,968
Profit after tax (F = D - E)						4,141	6,573	9,155	11,900	14,809	17,896	17,896	17,896	17,896	17,896
Working capital (G = F)						2,538	6,565	12,178	19,471	28,548	39,516	50,484	61,453	72,421	83,389
Cumulative W.C. (H = Σ G)						4,141	10,714	19,869	31,769	46,578	64,473	82,369	100,265	118,160	136,056

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677
Operation and maintenance	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Lease fee calculation base	44,100	38,300	30,169	21,210	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A-B-C)	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864	28,864
Corporate tax (E = 0.38 * D)	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968
Profit after tax (F = D - E)	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896	17,896
Working capital (G = F)	94,357	105,326	116,294	127,262	138,231	149,199	160,167	171,135	182,104	193,072	204,040	215,009	225,977	236,945	247,914
Cumulative W.C. (H = Σ G)	153,952	171,847	189,743	207,639	225,534	243,430	261,325	279,221	297,117	315,012	332,908	350,804	368,699	386,595	404,491

2. Braila City Sewerage Account (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue from lease fee (I = C)	0	0	0	0	0	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	1,468	7,534	15,714	24,247	29,797	27,704	25,475	23,102	20,574	17,882	15,015	11,962
Profit (L = I-J-K)	0	0	0	-1,468	-7,534	-15,668	-24,201	-29,751	-27,658	-25,429	-23,056	-20,528	-17,836	-14,969	-11,916
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	30,582	48,501	61,943	61,943	61,943	61,943	61,943	61,943	61,943	61,943
Depreciation (O = J)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	240,585	174,050	43,892	53,277	61,170	63,263	65,491	67,865	70,392	73,084	75,951	79,005
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0
Payment of principal (R)	0	0	0	1,300	6,832	14,914	24,300	32,193	34,285	36,514	38,887	41,415	44,107	46,974	50,027
Applications (S = Q + R)	37,383	156,681	219,676	243,352	188,416	14,914	24,300	32,193	34,285	36,514	38,887	134,415	44,107	46,974	50,027
Working capital of the year (T = P-S)	0	0	0	-2,767	-14,366	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	-2,767	-17,134	11,844	40,822	69,799	98,777	127,754	156,732	92,709	121,687	150,664	179,642

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Depreciation (J)	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	8,710	5,427	2,684	820	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I-J-K)	-8,664	-5,381	-2,638	-774	46	46	46	46	46	46	46	46	46	46	46
Loan (M)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	59,176	47,577	31,315	13,396	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46
Depreciation (O = J)	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	79,489	71,174	57,654	41,599	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	50,512	42,196	28,677	12,622	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	50,512	42,196	28,677	12,622	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P-S)	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978
Cumulative working capital (U = Σ T)	208,619	237,597	266,574	295,552	231,529	260,507	289,485	318,462	347,440	376,417	405,395	434,372	370,350	399,327	428,305

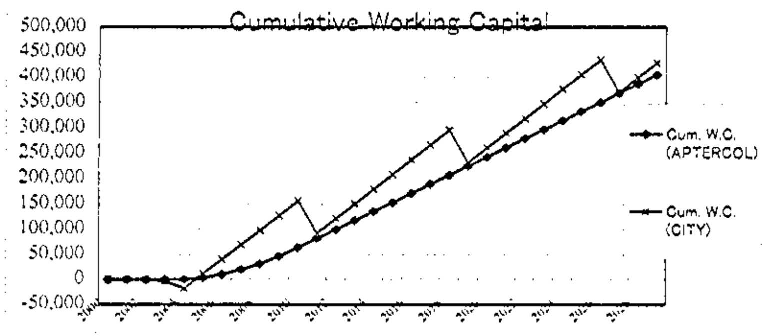
3. Criteria for State Guarantee (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	2,538	4,028	5,611	7,294	9,076	10,968	10,968	10,968	10,968	10,968
Revenue from lease fee (X=I)	0	0	0	0	0	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	209,515	216,344	223,425	230,771	238,388	246,288	246,288	246,288	246,288	246,288
Subsidy (Z=I+K+R-M)	0	0	0	2,767	14,366	30,582	48,501	61,943	61,943	61,943	61,943	61,943	61,943	61,943	61,943
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	1.6%	8.3%	14.6%	22.4%	27.7%	26.8%	26.0%	25.2%	25.2%	25.2%	25.2%	25.2%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	1.6%	8.3%	14.6%	22.4%	27.7%	26.9%	26.0%	25.2%	25.2%	25.2%	25.2%	25.2%

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968	10,968
Revenue from lease fee (X=I)	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024	29,024
Total current revenue (Y=V+W+X)	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288	246,288
Subsidy (Z=I+K+R-M)	59,176	47,577	31,315	13,396	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46
Criteria for subsidy level (Z/Y)	24.0%	19.3%	12.7%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Criteria for State Guarantee ((K+R)/Y)	24.0%	19.3%	12.7%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	1.56%
Coverage to Interest (%)	100.0%
Coverage to depreciation (%)	100.0%
Coverage to principal (%)	100.0%

Averaged profit rate	25.3%
Averaged criteria values for guarantee	19.7%
Highest subsidy ratio	27.7%



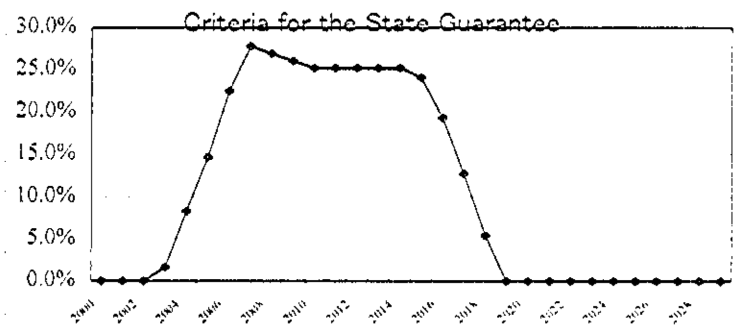


Table AII.6.3 Financial Statements of Braila Financial Plan (Case IIIB2)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue (A)						27,380	29,794	32,357	35,081	37,969	41,032	41,032	41,032	41,032	41,032
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Lease fee calculation base						23,677	29,053	33,086	33,086	33,086	33,086	33,086	33,086	33,086	33,086
Profit before tax (D = A−B−C)						−4,620	−2,206	357	3,082	5,969	9,033	9,033	9,033	9,033	9,033
Corporate tax (E = 0.38 * D)						0	0	136	1,171	2,268	3,432	3,432	3,432	3,432	3,432
Profit after tax (F = D − E)						−4,620	−2,206	222	1,911	3,701	5,600	5,600	5,600	5,600	5,600
Working capital (G = F)						0	0	136	1,307	3,575	7,007	10,440	13,872	17,305	20,737
Cumulative W.C. (H = Σ G)						−4,620	−6,826	−6,604	−4,693	−993	4,608	10,208	15,808	21,408	27,009

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032
Operation and maintenance	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Lease fee calculation base	32,255	28,770	23,897	18,021	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A−B−C)	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033
Corporate tax (E = 0.38 * D)	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
Profit after tax (F = D − E)	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600
Working capital (G = F)	24,169	27,602	31,034	34,467	37,899	41,332	44,764	48,196	51,629	55,061	58,494	61,926	65,358	68,791	72,223
Cumulative W.C. (H = Σ G)	32,609	38,209	43,809	49,410	55,010	60,510	66,210	71,810	77,411	83,011	88,611	94,211	99,812	105,412	111,012

2. Braila City Sewerage Account (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue from lease fee (I = C)	0	0	0	0	0	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	881	4,520	9,428	14,548	17,878	16,622	15,285	13,861	12,345	10,729	9,009	7,177
Profit (L = I−J−K)	0	0	0	−881	−4,520	−15,196	−20,316	−23,640	−22,390	−21,053	−19,629	−18,113	−16,497	−14,777	−12,945
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	24,145	34,896	42,961	42,961	42,961	42,961	42,961	42,961	42,961	42,961
Depreciation (O = I)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	241,172	177,064	37,926	43,557	48,293	49,549	50,886	52,310	53,826	55,442	57,162	58,994
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0
Payment of principal (R)	0	0	0	780	4,099	8,948	14,580	19,316	20,571	21,908	23,332	24,849	26,464	28,184	30,016
Applications (S = Q + R)	37,383	156,681	219,676	242,832	185,683	8,948	14,580	19,316	20,571	21,908	23,332	117,849	26,464	28,184	30,016
Working capital of the year (T = P−S)	0	0	0	−1,660	−8,620	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	−1,660	−10,280	18,697	47,675	76,652	105,630	134,608	163,585	99,563	128,540	157,518	186,495

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Depreciation (J)	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	5,226	3,256	1,611	492	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I−J−K)	−10,994	−9,024	−7,379	−6,260	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768	−5,768
Loan (M)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	41,301	34,342	24,585	13,833	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768
Depreciation (O = I)	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	59,284	54,295	46,183	36,551	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	30,307	25,318	17,205	7,573	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	30,307	25,318	17,206	7,573	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P−S)	28,978	28,978	28,978	28,978	−64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	−64,022	28,978	28,978
Cumulative working capital (U = Σ T)	215,473	244,450	273,428	302,405	238,383	267,360	296,338	325,316	354,293	383,271	412,248	441,226	377,203	406,181	435,158

3. Criteria for State Guarantee (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	0	0	136	1,171	2,268	3,432	3,432	3,432	3,432	3,432
Revenue from lease fee (X=I)	0	0	0	0	0	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	201,163	206,501	212,136	218,835	225,766	232,939	232,939	232,939	232,939	232,939
Subsidy (Z=I+K+R−M)	0	0	0	1,660	8,620	24,145	34,896	42,961	42,961	42,961	42,961	42,961	42,961	42,961	42,961
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	1.0%	5.0%	12.0%	16.9%	20.3%	19.6%	19.0%	18.4%	18.4%	18.4%	18.4%	18.4%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	1.0%	5.0%	9.1%	14.1%	17.5%	17.0%	16.5%	16.0%	16.0%	16.0%	16.0%	16.0%

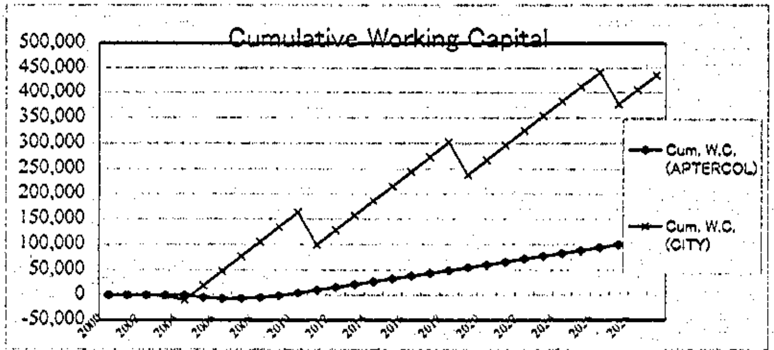
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
Revenue from lease fee (X=I)	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Total current revenue (Y=V+W+X)	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939
Subsidy (Z=I+K+R−M)	41,301	34,342	24,585	13,833	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768
Criteria for subsidy level (Z/Y)	17.7%	14.7%	10.6%	5.9%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Criteria for State Guarantee ((K+R)/Y)	15.3%	12.3%	8.1%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	0.96%
Coverage to Interest (%)	50.0%
Coverage to depreciation (%)	50.0%
Coverage to principal (%)	50.0%

Averaged profit rate: 11.3%

Averaged criteria values for guarantee: 12.4%

Highest subsidy ratio: 20.3%



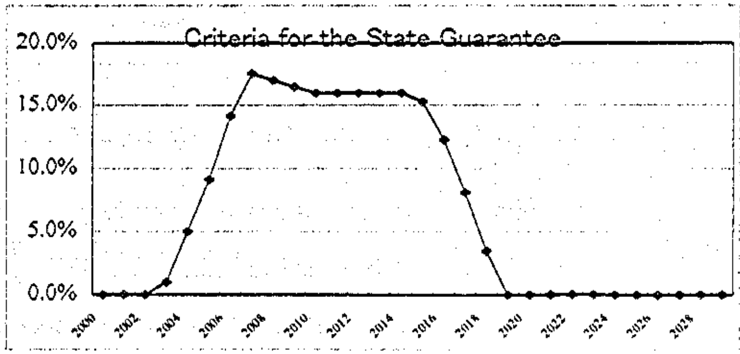


Table AII.6.3 Financial Statements of Braila Financial Plan (Case IIIB2)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)						27,380	29,794	32,357	35,081	37,969	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032	41,032
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Leveled lease fee (C)						23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Lease fee calculation base						23,877	29,053	33,086	33,086	33,086	33,086	33,086	33,086	33,086	33,086	32,255	28,776	23,897	18,521	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489	14,489
Profit before tax (D = A-B-C)						-4,620	-2,206	357	3,082	5,969	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033
Corporate tax (E = 0.38 * D)						0	0	136	1,171	2,268	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
Profit after tax (F = D - E)						-4,620	-2,206	222	1,911	3,701	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600
Working capital (G = F)						0	0	136	1,307	3,575	7,007	10,440	13,872	17,305	20,737	24,169	27,602	31,034	34,467	37,899	41,332	44,764	48,196	51,629	55,061	58,494	61,926	65,358	68,791	72,223
Cumulative W.C. (H = Σ G)						-4,620	-6,826	-6,604	-4,693	-993	4,608	10,208	15,808	21,408	27,009	32,609	38,209	43,809	49,410	55,010	60,610	66,210	71,810	77,411	83,011	88,611	94,211	99,812	105,412	111,012

2. Braila City Sewerage Account (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	0	0	0	0	0	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	881	4,520	9,428	14,548	17,878	16,622	15,285	13,861	12,345	10,729	9,009	7,177	5,226	3,256	1,611	492	0	0	0	0	0	0	0	0	0	0	0
Profit (L = I-J-K)	0	0	0	-881	-4,520	-15,196	-20,316	-23,646	-22,390	-21,053	-19,629	-18,113	-16,497	-14,777	-12,945	-10,994	-9,024	-7,379	-6,260	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768	-5,768
Loan (M)	26,168	109,676	153,773	169,437	127,109		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	24,145	34,896	42,961	42,961	42,961	42,961	42,961	42,961	42,961	42,961	41,301	34,342	24,585	13,833	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768
Depreciation (O = J)		0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	241,172	177,064	37,926	43,557	48,293	49,549	50,886	52,310	53,826	55,442	57,162	58,994	59,284	54,295	46,183	36,551	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Investment cost (Q)	37,383	156,681	219,675	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	0	0	0	780	4,099	8,948	14,580	19,316	20,571	21,908	23,332	24,849	26,464	28,184	30,016	30,307	25,318	17,206	7,573	0	0	0	0	0	0	0	0	0	0	0
Applications (S = Q + R)	37,383	156,681	219,676	242,832	185,683	8,948	14,580	19,316	20,571	21,908	23,332	117,849	26,464	28,184	30,016	30,307	25,318	17,206	7,573	93,000	0	0	0	0	0	0	0	93,000	0	0
Working capital of the year (T = P-S)	0	0	0	-1,660	-8,620	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	-1,660	-10,280	18,697	47,675	76,652	105,630	134,608	163,585	99,563	128,540	157,518	186,495	215,473	244,450	273,428	302,405	238,383	267,360	296,338	325,316	354,293	383,271	412,248	441,226	377,203	406,181	435,158

3. Criteria for State Guarantee (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A APTERCOL (W=E)	0	0	0	0	0	0	0	136	1,171	2,268	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
Revenue from lease fee (X=I)	0	0	0	0	0	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210	23,210
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	201,163	206,501	212,136	218,835	225,766	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939	232,939
Subsidy (Z=I+K+R-M)	0	0	0	1,660	8,620	24,145	34,896	42,961	42,961	42,961	42,961	42,961	42,961	42,961	42,961	41,301	34,342	24,585	13,833	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768	5,768
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	1.0%	5.0%	12.0%	16.9%	20.3%	19.6%	19.0%	18.4%	18.4%	18.4%	18.4%	18.4%	17.7%	14.7%	10.6%	5.9%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	1.0%	5.0%	9.1%	14.1%	17.5%	17.0%	16.5%	16.0%	16.0%	16.0%	16.0%	16.0%	15.3%	12.3%	8.1%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	0.96%
Coverage to Interest (%)	50.0%
Coverage to depreciation (%)	50.0%
Coverage to principal (%)	50.0%

Averaged profit rate	11.3%
Averaged criteria values for guarantee	12.4%
Highest subsidy ratio	20.3%

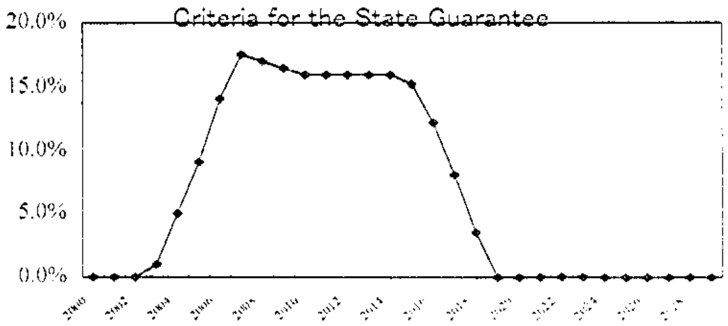


Table AII.6.4 Financial Statements of Braila Financial Plan (Case IVB3)

1. Financial Statements of R.A. APTERCOL (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue (A)						44,493	48,415	52,580	57,007	61,699	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677	66,677
Operation and maintenance						8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790	8,790
Lease fee (C)						14,489	14,489	14,489	14,489	14,489	15,605	20,284	26,844	34,072	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495
Profit before tax (D = A-B-C)						21,214	25,136	29,301	33,728	38,420	42,282	37,604	31,044	23,815	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393	18,393
Corporate tax (E = 0.38 * D)						8,061	9,552	11,134	12,817	14,600	16,067	14,289	11,797	9,050	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989
Profit after tax (F = D - E)						13,153	15,584	18,167	20,912	23,820	26,215	23,314	19,247	14,766	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404	11,404
Working capital (G = F)						8,061	17,613	28,747	41,564	56,164	72,231	86,520	98,317	107,367	114,356	121,345	128,335	135,324	142,313	149,303	156,292	163,281	170,271	177,260	184,249	191,239	198,228	205,217	212,207	219,196
Cumulative W.C. (H = Σ G)						13,153	28,737	46,903	67,815	91,636	117,851	141,165	160,412	175,177	186,581	197,985	209,388	220,792	232,196	243,599	255,003	266,406	277,810	289,214	300,617	312,021	323,425	334,828	346,232	357,636

2. Braila City Sewerage Account (million ROL)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue from lease fee (I = C)	0	0	0	0		14,489	14,489	14,489	14,489	14,489	15,605	20,284	26,844	34,072	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495
Depreciation (J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Payment of interest (K)	0	0	0	0	0	0	0	0	0	0	922	4,752	9,987	15,561	19,403	18,577	17,728	16,856	15,961	15,042	14,097	13,128	12,132	11,109	10,059	8,980	7,872	6,734	5,566	4,366
Profit (L = I-J-K)	0	0	0	0	0	-14,489	-14,489	-14,489	-14,489	-14,489	-14,295	-13,446	-12,121	-10,466	-8,886	-8,060	-7,211	-6,339	-5,444	-4,525	-3,580	-2,611	-1,615	-592	458	1,537	2,645	3,783	4,951	6,151
Loan (M)	26,168	109,676	153,773	169,437	127,109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsidy from city/state budget (N)	11,215	47,004	65,903	72,616	54,475	14,489	14,489	14,489	14,489	14,489	15,605	20,284	26,844	34,072	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495
Depreciation (O = J)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978	28,978
Sources (P = L+M+N+O)	37,383	156,681	219,676	242,052	181,584	28,978	28,978	28,978	28,978	28,978	30,288	35,816	43,701	52,583	59,586	60,412	61,261	62,133	63,028	63,947	64,892	65,861	66,857	67,880	68,930	70,008	71,117	72,255	73,423	74,623
Investment cost (Q)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0	0	0	0	0	0	93,000	0	0
Payment of principal (R)	0	0	0	0	0	0	0	0	0	0	1,310	6,838	14,723	23,606	30,608	31,435	32,284	33,155	34,050	34,970	35,914	36,884	37,880	38,902	39,953	41,031	42,139	43,277	44,445	45,646
Applications (S = Q + R)	37,383	156,681	219,676	242,052	181,584	0	0	0	0	0	1,310	99,838	14,723	23,606	30,608	31,435	32,284	33,155	34,050	127,970	35,914	36,884	37,880	38,902	39,953	41,031	42,139	136,277	44,445	45,646
Working capital of the year (T = P-S)	0	0	0	0	0	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978	28,978	28,978	28,978	28,978	28,978	-64,022	28,978	28,978
Cumulative working capital (U = Σ T)	0	0	0	0	0	28,978	57,955	86,933	115,910	144,888	173,865	109,843	138,820	167,798	196,775	225,753	254,730	283,708	312,685	248,663	277,641	306,618	335,596	364,573	393,551	422,528	451,506	387,483	416,461	445,438

3. Criteria for State Guarantee (million ROL)

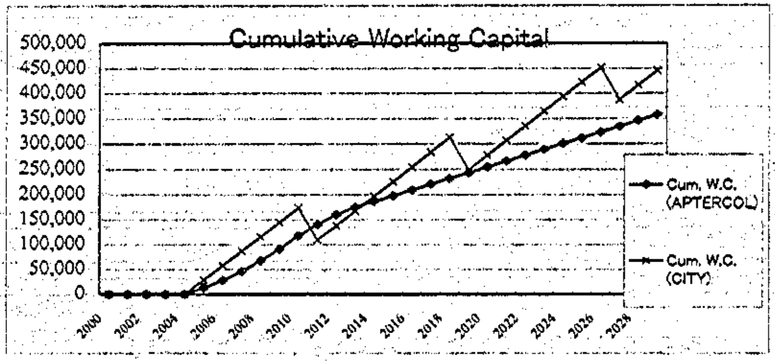
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Revenue (=V)	153,504	158,109	162,852	167,738	172,770	177,953	183,292	188,791	194,454	200,288	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297	206,297
Corporate tax from R.A. APTERCOL (W=E)	0	0	0	0	0	8,061	9,552	11,134	12,817	14,600	16,067	14,289	11,797	9,050	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989	6,989
Revenue from lease fee (X=I)	0	0	0	0	0	14,489	14,489	14,489	14,489	14,489	15,605	20,284	26,844	34,072	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495
Total current revenue (Y=V+W+X)	153,504	158,109	162,852	167,738	172,770	200,503	207,332	214,414	221,760	229,376	237,969	240,870	244,937	249,418	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780	252,780
Subsidy (Z=I+K+R-M)	0	0	0	0	0	14,489	14,489	14,489	14,489	14,489	15,605	20,284	26,844	34,072	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495	39,495
Criteria for subsidy level (Z/Y)	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%	7.0%	6.8%	6.5%	6.3%	6.6%	8.4%	11.0%	13.7%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%	15.6%
Criteria for State Guarantee ((K+R)/Y)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	4.8%	10.1%	15.7%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%

Parameter Input Section	
Ratio of Sewerage Charge to Income (%)	0.96%
Coverage to Interest (%)	50.0%
Coverage to depreciation (%)	50.0%
Coverage to principal (%)	50.0%

Averaged profit rate: 22.4%

Averaged criteria values for guarantee: 17.4%

Highest subsidy ratio: 15.6%



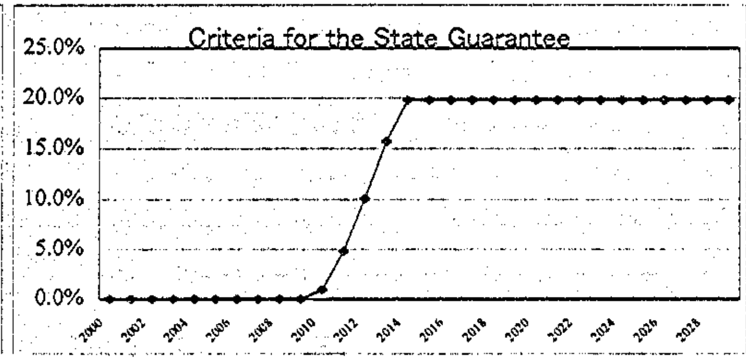


Table AII.6.5 Cost Benefit Stream for Braila WWTP Project

(Unit: million ROL)

Year	Project cost		Economic benefit (C)	Benefit - Cost (C-A-B)	Discounted cash flow**	
	Investment cost* (A)	O&M cost (B)			Cost	Benefit
2000	36,785	0		-36,785	36,785	0
2001	154,174	0		-154,174	140,158	0
2002	216,161	0		-216,161	178,645	0
2003	238,180	0		-238,180	178,948	0
2004	178,679	0		-178,679	122,040	0
2005	0	8,790	325,529	316,739	5,458	202,128
2006	0	8,790	325,529	316,739	4,962	183,753
2007	0	8,790	325,529	316,739	4,511	167,048
2008	0	8,790	325,529	316,739	4,101	151,862
2009	0	8,790	325,529	316,739	3,728	138,056
2010	0	8,790		-8,790	3,389	0
2011	0	8,790		-8,790	3,081	0
2012	196,800	8,790		-205,590	65,507	0
2013	0	8,790		-8,790	2,546	0
2014	0	8,790		-8,790	2,315	0
2015	0	8,790		-8,790	2,104	0
2016	0	8,790		-8,790	1,913	0
2017	0	8,790		-8,790	1,739	0
2018	0	8,790		-8,790	1,581	0
2019	0	8,790		-8,790	1,437	0
2020	196,800	8,790		-205,590	30,560	0
2021	0	8,790		-8,790	1,188	0
2022	0	8,790		-8,790	1,080	0
2023	0	8,790		-8,790	982	0
2024	0	8,790		-8,790	892	0
2025	0	8,790		-8,790	811	0
2026	0	8,790		-8,790	738	0
2027	0	8,790		-8,790	670	0
2028	196,800	8,790		-205,590	14,256	0
2029	0	8,790		-8,790	554	0
Total	1,414,378	219,750	1,627,645	-6,483	816,678	842,846

* Conversion factor = 0.984

** Discount rate = 10.0 %

EIRR=	11.6%
NPV =	26,168 million ROL
B/C =	1.03

APPENDIX 7
ENVIRONMENTAL IMPACT ASSESSMENT SURVEY

1. INTRODUCTION

1.1 THE OBJECTIVE AND SCOPE OF THE STUDY

According to "Scope of Work for the Feasibility Study on Wastewater Treatment Along the Danube River Downstream Reach in Romanian" agreed upon between Ministry of Public Works and Territorial Planning (hereafter called as MPWTP) and Japan International Cooperation Agency (hereafter called as JICA), Environmental Impact Assessment (hereafter called as EIA) would be carried out based on the Romanian regulations as a part of the Feasibility Study on Wastewater Treatment along the Danube River Downstream Reach in Romanian. The objectives of the EIA are as follows:

(1) To review the existing environmental conditions in EIA study area;
(2) To assess environmental impacts of the proposed projects, and
(3) To propose countermeasures for mitigating impacts and environmental monitoring plan.

The Environmental Impact Assessment areas cover three cities, which are Braila, Galati and Tulcea.

1.2 EIA SITUATION IN ROMANIA

The methodology for EIA is outlined in "Official Order of Romania, No. 125/1996," issued by MWFEP. The application procedures for EIA are prescribed under "Permitting Procedures for Economic and Social Activities Having an Environmental Impact According to the Environmental Protection Law No.137/1995, April 11th, 1996," by MWFEP.

The Order No.125 sets out the typical contents of an environmental assessment as follows:

(1) Introduction, methodology and goals;
(2) Engineering baseline including function of the project;
(3) Environmental baseline, including;

- geology
- soils
- water resources
- climatic data
- aquatic and terrestrial ecology, including flora, fauna, aquatic habitats and deltas
- socio-economic and cultural issues including the protection of historic buildings
- health, pollution and microclimatic issues, and
- noise, transport and affected population

(4) Pollution issues, including water pollution/water quality, air pollution, noise and vibration, radiation, waste management, and toxic/dangerous substance management;
(5) Environmental impact. This comprises two categories, initial study and monitoring study, which address, water impact, air impact, flora and fauna, soil and subsoil

(6) Mitigation/reduction or elimination of impact, and
(7) Evaluation of final impact and conclusion.

According to the Law, the wastewater treatment plant development and improvement program is required to submit the EIA to the local regulatory agencies for review and public debate. The comments made thereon are then incorporated in the EIA report, which is submitted to MWFEP for final approval.

Two steps are generally taken for the assessment; Initial Environmental Examination (IEE) and EIA. Although there are no IEE national guidelines at present, the IEE is basically designed as a means of reviewing the environmental integrity of projects to determine whether EIA-level studies must be performed. In this sense the IEE is used for project screening to determine which environmental impact items require a full-scale EIA.

In accordance with Law 137/1995 and other relevant regulations, EIA shall be carried out only be certified Natural or Legal Persons. The analysis of samples for EIA shall be completed only by specialized laboratories using adequate equipment and methodologies in conformity with the existing norms and regulations.

1.3 THE REGULATIONS USED IN EIA STUDY

The regulations used in EIA study are showed as follows:

(1) Environmental Protection Law, No. 137/1995;
(2) The Order of Ministry of Water, Forests and Environmental Protection (MWFEP), No. 125/1996 – EIA;
(3) The Water Law, No. 107/1996;
(4) NTPA 001 – Load Limits of Pollutants in Waste Water Discharged in Water Resources;
(5) NTPA 002 – Quality Indicators of Waste Water Discharged into Sewage Systems;
(6) STAS 4706/1988 – Surface Waters (Categories and Quality Condition);
(7) STAS 1342/1991 – Standard for Drinking Water Quality;
(8) The Order of MWFEP, No. 756/1997 – Environmental Protection for Soil Pollution;
(9) The Order of MWFEP, No. 462/1993 – Maximum Concentrations of Effluents Pollutants Emitted into the Atmosphere Given for Emissions Levels;
(10) STAS 12574/1987 – Maximum Allowable Concentrations for Air Pollutants in Human Settlements;
(11) The Governmental Decree, No. 71/1996 – Fire Precaution;
(12) The Order of Health Ministry, No. 1935/1996 – Hygiene at Working Places;
(13) The Work Protection Law, No. 90/1996;
(14) The Order of Health Ministry, No. 536/1997 – Noise Admissible Level at the Limit of the Developed Location;
(15) STAS 12025/2-81 – Vibration Standard, and
(16) STAS 10009/1988 – Urban Noise Standard.

1.4 EIA IMPLEMENTING ORGANIZATION AND SPECIALISTS

Research and Development National Institute for Environmental Protection (hereafter called as ICIM Bucharest) which is selected as the implementing organization for EIA is certified by MWFEP for performing EIA with the certificate R-EIM-1-764 (be valid from Jan. 28, 1999 to Jan. 28, 2001) for transportation, power supply, civil and hydrotechnics constructions, waste management, tourism, industrial activities, water and wastewater treatment.

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The EIA survey works is performed by the following specialists:

- Team Leader for all the three projects – Dr. Alexei Atudorei
- Team Leader for each city

  Tulcea – Mr. Gabriela Pietrareanu
  Galati – Mr. Mihaela Chiarescu
  Braila – Dr. Vasile Calin

- Five experts for each city (sewerage, hydrologist, geologist, ecologist and sociologist)

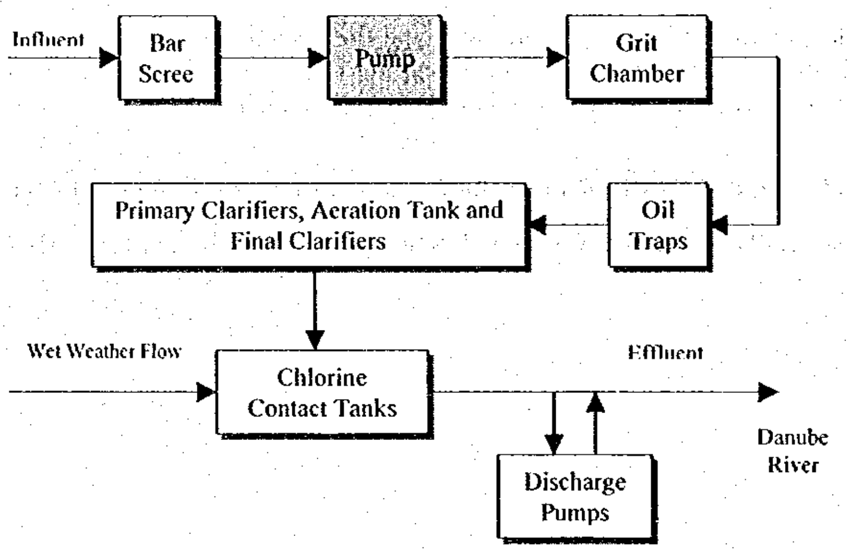
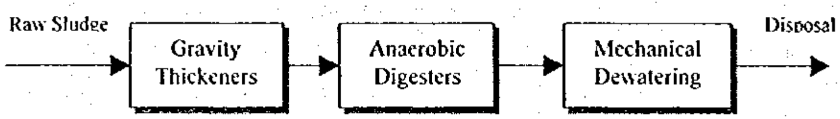
2. EIA FOR BRAILA WWTP PROJECT

The present environmental situations and the potential impacts on the environment after the construction of WWTP are defined and the results and possibilities to reduce or remove the environment impacts are shown in following paragraphs.

2.1 DESCRIPTION OF PROPOSED PROJECTS IN THE FEASIBILITY STUDY (F/S)

The details of proposed WWTP in F/S Study are summarized in Table AII.7.1

Table AII.7.1 Summary of proposed WWTP in Braila City

Item	Description of Proposed WWTP
1. Location	The proposed WWTP site with about 16 hectares is located on the northern edge of the City area about 4 km downstream from the center of the City along the road DJ221A (Figure AII.7.1).
2. Capacity etc.	Service population in the year 2010: 257,000 (Total population: 257,000) Design average daily flow: 98,000 m^3/d Design maximum daily flow: 115,000 m^3/d Design maximum hourly flow: 140,000 m^3/d
3. Wastewater Characteristics	Design influent quality / Design effluent quality / Standard of NTPA 001 BOD_5: 150 mg/l / 20 mg/l / 20 mg/l SS: 180 mg/l / 26 mg/l / 60 mg/l T-N: 25 mg/l / – / 10 mg/l T-P: 4 mg/l / – / 1 mg/l
4. Treatment Method	Treatment method: Conventional activated sludge process Treatment-process flow diagram: Wastewater Flow  Sludge Flow 
5. Sludge Production and Disposal	Dewatered sludge production: 63 m^3/d (22,995 m^3/year) or: 13 ton/d (4,745 ton/year) Disposal method: landfill at Braila Solid Waste Disposal Site
6. Life of Facilities	The lift of facilities: Machinery and equipment – 30 years Civil facilities – 50 years

Source: JICA Study Team

2.2 DESCRIPTION OF THE ENVIRONMENT

2.2.1 CLIMATE, AIR QUALITY (ODOR), NOISE AND VIBRATIONS

(1) Climate

The climate characteristics are summarized in Table AII.7.2.

Table AII.7.2 Summary of climate characteristics in Braila

Item	Description
1. Climate	The climate of Braila City belongs to the continental climate sector.
2. Temperature	The average annual temperature in Braila City: 11℃ The average monthly temperature in July (the hottest month): 23.1℃ The average monthly temperature in Jan. (the coldest month): - 2.3℃
3. Freezing Day	The average number of snowfalls day 15 days The average number of snow covering day: 41.6 days
4. Precipitation	The average annual precipitation: 440 mm The average monthly precipitation in June (the max. month): 65 mm The average monthly precipitation in April (the min. month): 25 mm
5. Wind	The average annual frequency: Prevailing wind direction is NE to SW and the average frequencies are 25.4% to 28.4%

Source: Braila City and ICIM

(2) Air Pollution (Odor)

Sources of air pollution are not very important in this area. The fixed ones consist in dwelling buildings equipped with heating system based on wood or methane as well as in local industry. The road traffic contributes as mobile sources.

Braila is one of the more 50 municipalities of Romania where measurements of the usual air pollutant concentration are systematically performed according to the world-accepted practice.

Measurement results show that the average concentration values of the gaseous pollutants are lower than MAC ones. Maximum values on 24 hours are presented in Table AII.7.3.

Table AII.7.3 Average concentrations of gaseous pollutants

Indicator	Maximum Concentration	Maximum Accepted Concentration (MAC)
NO_2 (μg/m^3)	60	100
SO_2 (μg/m^3)	153	250

Regarding odor, the results of measurements in/around proposed WWTP site are presented in Table AII.7.4. The locations of sampling points are shown in Fig. AII.7.1, and the samples are taken at 2.5 m above the ground level.

Table AII.7.4 Some results of air pollution measurements in the WWTP site (July 1999)

Parameter	Boundary fence	50m from boundary fence	150 m from boundary fence	Limits for 30 minutes sampling period according to RS 12574/1987
H_2S (mg/m^3)	0	0	0	0.015
NH_3 (mg/m^3)	0.105	0.105	0.105	0.3
Odor Level	1	1	1	5

Source: ICIM

The results of survey show that hydrogen sulfide and ammonia concentrations as well as the odor level in/around proposed WWTP site are keeping at a relatively low level.

(3) Traffic, Noise and Vibration

As the proposed plant land is located in the sparsely developed area, therefore, no severe traffic congestion, noise and vibration problems are expected during the plant construction.

2.2.2 GEOLOGY AND TOPOGRAPHY

(1) Geology and Topography

Braila town is located at a joint point of five geographical units: the Danube floodplain, the old Macin Mountains, the Baraganu Plain, the Low Siret Plain and the Covurluiului Plain. Terasa Brailei is the morphological unit that Braila town belongs to. Relief has a monotonous feature with isolated variations in level (Lacu Sarat and Lacu Dulce) presenting a smooth slope from East to West and from North to South. The town average altitude is of 15 up to 30 m the highest points being found in the town center and in Progresu quarter that is situated in the North – East area.

WWTP is planned to be located on the northern zone of Braila town about 5 km far from the center of the City. Presently available land for the Braila WWTP is a farmland of about 16 ha area. This land area is considered sufficient to provide all the facilities required for the preliminary, primary and secondary treatment. There will be a space for any future plant expansion facilities.

Three levels form lithology of the building foundation terrain in this zone:

1) A loessial level with a thickness of 10 – 11 m that is sensitive at humectation and consists in loessial clay dusts, clay loess and dusty loess;

2) A sandy level that reaches to the depth of 17 – 18 m and contains loose and immersed sandy dusts, dusty sands, clay sands, and fine sands; its permeability coefficient is 10^{-5} m/s, and

3) An impermeable clay level located under the sandy level that contains dusty clay, clay dusts as well as yellow-red and/or ashy clay.

The surrounding areas of the plant site are agricultural lands and presently neither residences nor major structure exists within 300 m from the site.

(2) Seismology

Braila town belongs to a seismic macro-zone of VIII degree according to the Romanian standard STAS 11100/1 – 77. After the other Romanian standard, namely STAS 8879/7 – 1975, the territory of Braila town is divided into two seismic microzones of VII-VIII and VIII degree.

According to the calculation Normativ P100-1992, Braila town territory correspond to the calculation seismic zone "C" with a coefficient K_S=0.2. The corner period is T_C=1.5s.

(3) Soil

The main soil type is the carbonate cernoziom. On small areas there are also alluvial soils. These ones are soils characteristic to the flood plains formed upon recent alluvial sediments, more or less stratified. As a rule these soils are frequently subject to gleization being situated in the valleys that are periodically flooded and have the phreatic layer at low depth. Interruption of their solidification process due to the continuous disposal of new sediments at each flood event is another characteristic of these soils. Also they are usually relatively fertile being well supplied with nutrients from the sediments that primary are soil material from the catchment area.

2.2.3 Flora and Fauna

(1) Terrestrial and Aquatic Vegetation

The natural characteristic vegetation was the steppe type as well as the river meadow and pool type one in the past. This vegetation used to grow in plain areas and in Balta Brailei pool. The steppe vegetation can be found nowadays only on about 460 ha of natural meadows and areas along dykes and irrigation canals being replaced 90% by crop vegetation.

The wild *graminaceae* are predominant species on the natural meadows. Some other floral species such as *shepherd's purse, knot grass, whirlwind, bristle grass, dandelion, wormwood* etc. could be also found.

Wood vegetation species like *sole tree bushes, small wild cherry, small almond tree,* and *black nut tree* could more rarely be met.

Tree vegetation is less represented in this area. There are although some meadow river forests formed primary by *willow* and *poplar* and secondary by *oak* and other species. Lacu Sarat Forest of 450 ha situated near Braila town contains *oak* and *acacia* mainly. In small proportions there grow also *elm, ashtree* and other species. Two *pine* zones have been planted along the drive road that passes through this forest.

Psamophyte vegetation species like *camomile* and *sand willow* grow spontaneously on the sand dunes.

Halophyte vegetation well developed in Braila southern zone is the only one capable to grow in the salty soil. It is disposed in circular zones or patches according with the salinization degree and is represented by some small plants with a thick red and full of water stem.

The aquatic vegetation is represented mainly by a large number of floating and submerse species from hydrophyte group as well as by plankton and macrophyte along pools and irrigation canals banks there grow bulrush, reed, sedge, Dutch rush and so on.

(2) Terrestrial and Aquatic Fauna

Both sedentary and migratory animals live in the area. The human actions like steppe upturning, embankment and draining of Large Island of Braila and realization of irrigation system have been followed by fauna changes:

- some species disappeared;
- individual number of other species decreased: wolf, wild turkey, pelican;
- some species have migrated to other places;
- other species accommodated to life conditions on irrigation canals or cultivated fields: for instance wild ducks feed with sunflower seeds.

The most numerous mammals are the steppe type ones: field mouse, steppe mouse, rabbit, ground squirrel, hamster. Of hunting interest are muskrats that can be found in large number.

Dears, foxes and rabbits could be hunt in the forests. Many water and forest species of birds both sedentary and migratory populate Braila zone.

Around the waters live duck, big geese, seagull, heron, lapwing, white-fronted goose, snipe, moor hen, woodcock, eastern flossy ibis, etc. Swans nestle on the Insula Mica (Small Island) and even on some lakes. Many starlings live in steppe and in some villages. A large part of them migrate in the autumn.

One can meet also quail, partridge, bee eater, sparrow hawk, turtle dove, buzzard, fisher eagle and little owl individuals but not so many of them.

Wild cock, crow, magpie, skylark, nightingale, tit and so on live in forests. Local fishes are carp, crucian carp, sheatfish, pike perch, barbel, tench, pike, lake herring, bleak, roach, pope.

Among the migratory ones some are of economic importance: sterlet, sturgeon and herring. Population individual number of some fish species like pike, sturgeon, sheatfish and zander has decreased during the last two decades.

2.2.4 WATER RESOURCES

(1) Ground Water

Two aquifer layers could be identified.

- The phreatic layer taking refuge in the sandy level placed at the basis of loessial level. The natural water supply source of this layer is the precipitation water infiltrated through the loess grains and stored in here due to the impermeable clay layer found underneath at a depth around 20 m.

- The aquifer layer of average depth, of ascending type, in the lower sand and gravel level. Its water supply source is the Danube River that influences the underground water regime of the entire Braila town platform zone.

An important general raising of the phreatic layer level from 10 – 11 m to 3 – 4 m under the terrain surface has been registered in this area in the last 10 – 15 years. The phreatic layer contained initially in the sandy level has gradually raised up immersing the lower part of the loessial level. Some degradation of the dwelling buildings have been noticed although these are founded as a rule on improved terrain and piles of compacted earth or loess pillows.

Systematic research work has been carried out aimed to determine the causes of the hydrostatic level of phreatic layer. These studies delimited three underground water zones/cupolas their hydrostatic levels being the following ones:

Central zone	+ 16.58 m
Penitentiaries zone	+ 12.50 m
Progresu Plant zone	+ 12.50 m

The cupola hydrostatic level reaches a maximum value during spring and a minimum one in autumn especially in October.

The water volume, storage time and yearly rates for the central underground water cupola have been established within the studies. The conclusion was that the phenomenon is stabilized on vertical direction.

The main causes of hydrostatic level increasing in Braila town area are as it follows:

1) raised hydrostatic level in the Braila Plain area together with existence of a underground water fund having a high hydrostatic level in the North-West part of Braila town area generated by leakage from the irrigation system;

2) geological formations of the first aquifer layer are fine and dusty sands the minimum value of their thickness being of 1 m in the Danube flood plain area; these formations reduce very much the hydraulic section of water discharge into the Danube;

3) the permeability coefficient of the same layer is 10^{-5} m/s which indicates a medium that permits only a slow water movement;

4) the highest values of the hydraulic gradients are 1:100 having direct implications on the water retention;

5) underground water retention in cupola form is a phenomenon specific to the large urban settlements located on loessial platform as it is also the case of Braila town;

6) leakage from the urban water supply and sewage system;

7) existence of buildings and asphalt cover of the streets that hinder the evapo-perspiration process;

8) the permeability coefficient of the clay dusts that cover the Braila platform area has a small value of 10^{-5} m/s which does not permit a rapid drainage of the leakage to the underneath sand level.

It is thought that causes 6) and 7) are the main ones of the raising of hydrostatic level in Braila town area.

The Danube River influences mainly the cupola found in the flood plain zone. Other level increases are not expected but a supplementary water contribution could expand the cupola surface.

Underground water quality in the site as resulting from ICIM measurements performed for this study purpose area is presented in the Annex 3.

(2) Surface Water

Main surface watercourses in the area are the two branches of Danube river that frame The Large Island of Braila: Macin on the right and proper Danube on the left. In this area Danube presents the characteristics of a low land river with a smooth slope bigger upstream between Harsova and Braila and smaller downstream from Braila to Braila. Due to the embankment works in Braila Island area that led to the narrowing of the riverbed, the levels during flood periods are now higher than they used to be under natural conditions.

There are also some lakes in the area the most important being Lacu Sarat to the southern limit of the territory. This lake is supplied from precipitation as well as from phreatic layer contribution but these can compensate only partial the very intense evaporation in summer time.

Some springs could be noticed on the high bank of the Danube at different levels. They are covered nowadays by the bank maintenance works and the water is drained.

A surface depression exists to the South-West part of the area. This is filled with water in the long lasting abundant precipitation periods and forms the so-called Lacu Dulce. But gradually evaporation and slow seepage lose water in the underground.

2.3 IMPACTS ON ENVIRONMENT

2.3.1 IMPACTS ON SOCIOECONOMIC CONDITIONS

(1) Water Rights and Rights of Common

As mentioned in previous section, at present all the wastewater used to be discharged directly into the Danube River through several wastewater outfalls without any treatment. According to the F/S Study after WWTP being put into operation the existing outfalls will be closed and all of the wastewater will be collected and treated at WWTP, and the pollution load discharged to the Danube River will be reduced obviously. Therefore, the project implementation will not create the impact on the fishing rights.

Before and after the project implementation, there are no changes about the volume of wastewater discharged to the Danube River. Besides this, the intake for water supply system of Braila City is located in the upstream of 15 km from the center of the City, and the intake for Galati water supply system in the downstream of Braila City is located at more than 10 km as far as Braila WWTP outfall. Therefore, it could be considered that the effect of wastewater on water rights is negligible.

In Braila there is one swimming pool which is located on the left side of the Danube River bank (in the City Hall area) and the unauthorized swimming area on the right side of the Danube River bank in the ferry-boat area. In addition, the inhabitants usually swim along the Danube River bank where are unauthorized areas by the local health authorities. However, as mentioned above in the future the existing outfalls will be closed and all of the wastewater will be collected and treated at WWTP, then discharged at the downstream of the City. It is estimated that the rights of common will be improved by the project implementation.

(2) Public Health Condition

Treated Wastewater

The results of wastewater characteristics survey at existing outfalls along the Danube River reach of Braila City revealed that the number of total Coliform Group in raw wastewater, which now is discharged directly into The Danube River, is about 2.4×10^6 no./100ml to 2.4×10^8 no./100ml. While the number of total Coliform Group in The Danube River (1 km downstream from the outfall of proposed WWTP, Aug. 1999) is 2.8×10^3 no./100ml to 3.5×10^3 no./100ml, which has exceeded the standard (1×10^2 no./100ml, STAS 12585/1987) of water for swimming purposes.

According to the F/S Study after WWTP being put into operation all of the existing outfalls will be closed and all of the wastewater will be collected and treated at WWTP. The number of total Coliform Group in WWTP effluent will be meet the standard (1×10^6 no./100ml, NTPA 001) of wastewater discharged in water resources. Hence, during WWTP operation stage the public health condition will be improved certainly.

Sludge

The excess sludge generated from WWTP will be transported and disposed at the Solid Waste Disposal Site (SWDS) located in the northwest of the City about 4.5 km from the center of the City. The impacts of excess sludge will be discussed in following paragraph.

(3) Waste

According to the City's estimate, the existing SWDS is capable of receiving the present level of solid wastes until 2002. A construction plan of new SWDS is now under consideration, which will be provided with polyethylene liners at the bottom. The collected leachate will be brought with trucks to the public wastewater system for the final treatment. The results of wastewater characteristics of leachate from SWDS in Braila indicated that the concentrations of the organic substances (BOD_5: 3,824 mg/l, COD_{Mn}: 7,742 mg/l), NH_4-N (592 mg/l) and oil (528 mg/l) have exceeded the standard (NTPA 002/1997) of wastewater discharged into municipal sewage system substantially. Meanwhile, the number of total Coliform Group in the leachate is also relative high (3.5×10^8 no./100ml). All of these may contribute a negative impact on groundwater. Therefore, it is necessary to complete the new SWDS that will be properly designed and managed from the environmental viewpoint before Braila WWTP is put into operation, taking into account the groundwater pollution problem and the volume of excess sludge (63 m^3/d or 13 t/d) generated from WWTP.

(4) Hazards

The results of geological survey indicated that the surface (0 to 1m) at WWTP site is vegetable soil and the bottom (1 to 10 m) is plastic black and grey clay, and N-value of WWTP site ranges from 10 to 40. Taking into consideration the WWTP site locates in the seismic region, a careful aseismatic structure design will be considered in the planning and design of the wastewater treatment facilities.

Biogas resulting from sludge digester is a potential explosive fuel. So in some conditions there exists the possibility of producing accidents with major effects both on facility operation and maintenance staff (such as burning, different physical or mental injuries sometimes even lethal) and on technological objectives. Receiver water and/or soil and subsoil in the area might be affected by spillage of liquids following the breaking or destruction of technological objectives.

These events may appear in case of the incorrect operation and maintenance of sludge fermentation tanks and/or of biogas tanks.

In addition, the chlorination process is to be carefully controlled, avoiding overdosing of chlorine and by respecting the operation and maintenance instructions.

2.3.2 IMPACTS ON NATURAL CONDITIONS

(1) Topography and Geology

No significant changing of the existing topographic condition in/around the WWTP site is identified. Based on the results of geological survey, soil in the WWTP site may be considered to be soft at some extent for supporting the structures, thus appropriate types of foundation should be considered for the structural plan.

(2) Groundwater

As shown in Table AII.7.5, the results of groundwater survey at/around the SWDS indicated that the number of Coliform Group ranged from 1.6×10^2 no./100ml (upstream) to 2.4×10^4 no./100ml (downstream), which already exceeded the standard (under 10 no./100ml, STAS 1342/1991) for drinking water, and the groundwater around the SWDS has been polluted at some extent, especially for the Coliform Group. Hence some countermeasures for protecting groundwater from pollution should be considered.

Table AII.7.5 Quality parameters of the groundwater in the Braila solid waste disposal site

Parameters	Max. Desirable-Max. Permissible	Upstream Of SWDS	Downstream 1 Of SWDS	Downstream 2 Of SWDS
Color	2-2	1.2	9.1	8.5
pH	6.5～7.4-8.5	7.34	7.8	7.28
SS (mg/l)	-	34.55	97	115.15
Potassium permanganate consumption (mg/l)	10-12	10.12	12.32	20.54
Iron (mg/l)	0.1-0.3	0.28	0.33	1.48
Magnesium (mg/l)	50-80	54.68	82.27	84.3
Turbidity	5-10	15.3	19	25.3
Total number of bacteria at 37^oC UFC/cm^3	Under 300	Over 300	Over 300	Over 300
Coliform bacteria/100 cm^3	Under 10	1,609	24,000	5,420
Fecal Coliforms/100 cm^3	Under 2	22	180	27
Fecal streptococcus/100 cm^3	Under 2	7	79	7

(3) Hydrological Situation

According to F/S Study the flow rate (1.62 m^3/s, maximum hourly flow) of effluent from WWTP is insignificant comparing with the flow rate of the Danube River (1,350 m^3/s, drought-period flow). The effects of treated wastewater on hydrological situation of Danube

River are negligible.

In addition, based on the design effluent flow in F/S Study, the pollutant diffusion and dilution characteristics are analyzed by using "MIKE 11" model, created by Danish Hydraulic Institute-November 1992, Version 3.01. The calculation results indicated that complete mixing is achieved at a distance of 2 km downstream of WWTP outfall in all cases studied here.

(4) Fauna and Flora

Braila town WWTP is provided to be located on a site belonging at the present to Vadeni Commune. The site land is now used for agricultural purposes. Obviously the type of land use will be changed so the crop plants and the associated little fauna will disappear.

Since Danube River water is of first quality category after the total mixing length one could appreciate that no negative consequences on the aquatic flora and fauna within Danube River and/or Danube Delta area are to be expected.

2.3.3 ENVIRONMENTAL POLLUTION

(1) Water Pollution

In the period of July 1999 ICIM carried out an industrial wastewater survey and analyzed for the wastewater discharged from 3 typical factories. The results (Annex 5) revealed that the concentrations of toxic materials, which may effect biological process for wastewater treatment, are under the standard of NTPA 002/1997. This can leads the conclusion that industrial wastewater will don't contribute a significant impact on WWTP influent characteristics.

Environmental Impact during Construction Period

During construction period the sanitary wastewater generated from site administration house may affect environment temporarily. Therefore, this part of wastewater should be collected and treated by some appropriate.

During the construction stage, every precaution shall be taken to prevent the spillage of waste form construction sites to the nearby waterways. There will be no major facility applied during construction that may affect the surface or the ground water. Routes, directions and hydraulic conditions of the streams and stormwater drains, presently discharging water to the Danube River, need not to be changed due to the construction works. The construction of all the different elements of the interceptor sewers has no direct impact on the quality of the surface water. There will be no major construction activities in streams or drains, except outfall structures. Although the works in the streams or drains could be minimized to the extent practicable, unavoidable activity may take place in the riverbed during the low-flow season.

The effluent outfall structure should be of such that can divert and disperse surface water flows to prevent erosion and to protect slopes of the riverbank. The structure should be lined and provided with energy dissipaters at discharge points to avoid erosion.

Storm water runoffs from the construction site should be collected and drained through properly designed drainage ditches to the nearby streams or other waterways.

Overall, during the construction period no appreciable adverse impacts to the surface water or ground water in/around the construction site are identified.

Environmental Impact during Operation Period

The quantities of pollutant load reduction by the project implementation are estimated in Table AII.7.6 based on the F/S Study. From this Table 2,651 tons of BOD_5 and 5,509 tons of SS per year (in target year, 2010) will be no more discharged into Danube River, so the impacts on the water quality during WWTP operation will be a positive one.

Table AII.7.6 Estimated pollutant load generation and reduction (2010)

Effluent Characteristics	Without Project	With Project	Reduction
Average Flow Rate (m^3/d)	98,000	98,000	0
BOD Concentration (mg/l)	150	20	130
BOD Load (ton/year)	5,366	715	4,651
SS Concentration (mg/l)	180	26	154
SS Load (ton/year)	6,439	930	5,509

Moreover, 715 tons of BOD_5 and 930 tons of SS per year (2010) will be discharged into the Danube River with WWTP effluent. In order to assess the impacts of effluent on the receiving water – the Danube River, pollutant concentrations in the mixture formed by the Danube River and WWTP Effluent have been simulated, taking into account river self-purification process and especially phenomena like pollutant diffusion, dilution and dispersion that contribute to this process. The results of simulation are presented in the Table AII.7.7, which shown that the maximum concentrations of BOD_5 and SS at downstream of complete mixing section (about 2 km downstream from the outfall of proposed WWTP) will be under the Maximum Allowable Concentration (MAC) of first quality category in STAS 4706/1998 (surface water quality).

Table AII.7.7 Maximum concentration of pollutant in the mixture

Receive Flow (m^3/s)		Q_{min}=1,350		Q_{avg}=6,000	
Effluent Flow (m^3/s)		$Q_{d\ avg}$=1.14	$Q_{h\ max}$=1.62	$Q_{d\ avg}$=1.14	$Q_{h\ max}$=1.62
Item	MAC for I - Category	Maximum concentration on the complete mixing section (2 km downstream from the outfall of WWTP)			
BOD (mg/l)	5	4.84	4.85	4.80	4.81
SS (mg/l)	60	60	60	60	60
NH_4 (mg/l)	0.1	0.091	0.093	0.074	0.075

It should be pointed that the total nitrogen and phosphorous concentrations of the effluent exceed the MAVs mentioned in NTPA 001 as shown in Table AII.7.1. There are three aspects which must be considered:

1) The Danube River has a high capacity of uptaking these elements by dilution (in drought-period the dilution factor is more then 800:1), so the change of water quality is an out of the question issue.

2) Dilution principle is accepted in special courses (GD 730/1997, Art.4, para.7)

3) Providing denitrification and phosphorous removal unit operations in the treatment process appears to be unrealistic to the following reasons:

- The investment cost will be almost doubled for achieving negligible results as for as environmental protection is concerned;
- Risks to get bad effects on environmental due to complicated operation of denitrification process, and
- The implementation of denitrification and phosphorous removal processes looks too ambitious for not stringent requirements (there is no denitrification process applied in any WWTP in the country, nor in the other riparian countries).

Nevertheless, these steps of treatment are to be considered in the next stage of design.

In conclusion the impact on the water environmental during WWTP operation will be a positive one, if the plant will operate on the designed conditions.

(2) Soil Pollution

To estimate the concentrations of typical heavy metals in excess sludge from proposed WWTP and to evaluate the concentrations of heavy metals in the soil in/around the WWTP site and sludge disposal site, a survey on soil and sludge from existing WWTP of Roman and Constanta is carried out. The results are summarized in Table AII.7.8.

Table AII.7.8 Summary of heavy metals in soil (Braila) and sludge (Roman and Constanta)

Item	Soil (Braila)				Sludge in existing WWTP			
	WWTP	Sludge Disposal site (Inside)	Sludge Disposal site (outside)	Max. Desirable - Max. Permissible	Min.	Max.	Average	Max. Permissible Values of Standard
C_d (mg/l)	0	1.5	0	1-5	0	0	0	10
C_r (mg/l)	0	6.8	6	30-300	0	0	0	500
C_u (mg/l)	5.75	40.75	7.4	20-250	28	137	66	500
M_n (mg/l)	435	475	380	900-2,000	-	-	-	-
N_i (mg/l)	17	24.75	4.5	20-200	0	0	0	100
P_b (mg/l)	8.2	44.6	7.5	20-250	8	102	53	300
Z_n (mg/l)	270	420	210	100-700	243	1,600	645	2,000

The analysis results indicated that the concentrations of heavy metals in the soil (WWTP site, solid waste disposal site and agricultural field) and sludge generated in existing WWTP of Roman and Constanta are under the Romania Standard. This creates a possibility to utilize digested and dewatered sludge in agriculture. In present there are not standards concerning the quality of the sludge that could be deposited on the agricultural field as fertilizer, but there is a proposal that will be approved in the near future. The proposal has been taken into consideration the present study, and all the results obtained from the sludge analysis are compared with the values from the proposal (the proposal is based on EU regulations).

(3) Offensive Odor

According to the results of measurements for odor in/around the WWTP site as shown in Table AII.7.4, the concentrations of H_2S (0 mg/m^3), NH_3 (0.105 mg/m^3) and odor level (Level 1) on the WWTP boundary fence are under Romania Standard 12574/1987 (H_2S: 0.015 mg/m^3, NH_3: 0.3 mg/m^3 and odor level: Level 5). These results show that hydrogen sulfide and ammonia concentrations as well as the odor level in/around the WWTP site are keeping at a relatively low level.

In WWTP the odor may be emitted from wastewater treatment units, but the majority of it comes from the sludge handling system such as digesters, sludge gas facilities and dewatering equipment. At this stage it is difficult to predict exactly the odor levels in/around Braila WWTP site, however, the survey of odor levels from existing WWTP site in other cities may deserve reference. Table AII.7.9 presented the results of measurements for odor in/around existing WWTP site.

Table AII.7.9 Analysis results of odor in existing WWTP site (July 1999)

City	Parameter	Boundary fence	50m from boundary fence	150 m from boundary fence	Limits for 30 minutes sampling period according to RS 12574/1987
Roman	H_2S (mg/m^3)	0.45	0.48	0.42	0.015
	NH_3 (mg/m^3)	0.33	0.35	0.35	0.3
	Odor Level	4	4	4	5
Constanta	H_2S (mg/m^3)	0.35	0.05	0.033	0.015
	NH_3 (mg/m^3)	0.3	0.11	0.10	0.3
	Odor Level	4	3	3	5

Source: ICIM

The values in Roman WWTP exceed the Romania Standard and that not only due to the sludge treatment in the plant but also to the activity of a carcass animal disposal factory (animal feeding meal) located near the plant. While there are not other odor sources around Constanta WWTP. Therefore, it is feasible to assess and predict the impacts of odor in Tulcea WWTP using the results of Constanta WWTP.

According to Table AII.7.9, although the concentrations of H_2S (0.35 mg/m^3), NH_3 (0.3 mg/m^3) and odor level (Level 4) on Constanta WWTP boundary fence exceed the Romania Standard, the odor levels at 150 m from boundary fence would generally be within acceptable levels. In addition, considering the facts that the distance from Braila WWTP site to the housing areas is more than 300 m, there are no inhabitants on the leeward of WWTP site, and following countermeasures will be taken, therefore no serious impacts are identified.

1) A particular attention will be given to prevent emission of such odors from dewatering equipment rooms by providing efficient forced ventilation system, and to ensure against the escape of sludge gas from digesters.

2) Appropriate type of scrubbers will be provided for the removal of hydrogen sulfide from the digester gas. In addition, a waste gas burner for the digester gas control system will prevent any direct emission of sludge gas into the atmosphere. All the waste gas will be burned.

2.4 RECOMMENDATIONS FOR MITIGATING ACTIONS AND MONITORING PLAN

2.4.1 GROUNDWATER AND WASTE

1) Groundwater insulation-type landfill disposal plant is recommended to protect groundwater from polluting. In this case it is recommended to install the leachate collecting system and to discharge leachate after to be treated, especially disinfection treatment.

2) The groundwater quality (at least Cl^-, COD_{Mn}, Coliform Group and typical heavy metals) should be checked 2 to 4 times per year in order to understand the change of groundwater quality.

3) With the background that an increase in agricultural utilization and incineration and a reduction of landfill for sewage sludge is forecast, it will be recommended to consider incineration or the utilization of sewage sludge in agriculture. In this case the load limiting values of EU Sewage Sludge Directive can be applied as alternative to sewage sludge limiting values in order to maintain the soil limiting values of heavy metals.

4) The characteristics (Cd, Cr, Cu, Pb, Hg, Ni and Zn) of dewatered sludge from WWTP should be checked at least 4 times per year.

2.4.2 WATER POLLUTION AND PUBLIC HEALTH CONDITION

1) It is recommended to establish a monitoring system to check the water quality of Danube River at main swimming area, intake for water supply as well as the downstream and upstream reaches of WWTP outfall.

2) The detail plan (such as monitoring point, analysis items and sampling frequency etc.) should be made in cooperation with the Braila Municipality.

3. ANNEXES

3.1 REFERENCIES

[1] - EPA Tulcea, Report on the State of Environment in the County of Tulcea, 1995

[2] – SETA, Geological Survey of the location of WWTP of Tulcea, 1999

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[4] - DSP of the County of Tulcea, Analysis Bulletins in 1997, 1998, 1999

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[8] – JICA Study Team, Planning Basis for WWTP Tulcea, August 1999

[9] – Jorgensen, S.E, "Lake Management", Pergamon Press, 1980

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[14] – Romanian Academy, "Geographical Encyclopedia", 1974

3.2 ABBERVIATIONS

AF	= Average Flow
APM	= Agentia de Protectia Mediului
BOD	= Biochemical Oxygen Demand
CNAR	= Compania Nationala "Apele Romane" (National Company "Romania Waters")
DAF	= Daily Average Flow
DMF	= Daily Maximum Flow
DSP	= Directia de Sanatate Publica (Public Health Directorate)
EEA	= European Environment Agency
EPA	= Environmental Protection Agency
GD	= Government Decision
ICIM	= Institutul National de Cercetare Dezvoltare pentru Protectia Mediului Bucuresti (Research and Development National Institute for Environmental Protection)
JICA	= Japan International Cooperation Agency
MAC	= Maximum Allowable Concentration
MAF	= Multi-annual Average Flow
MAV	= Maximum Allowable Value
MO	= Ministerial Order
MWFEP	= Ministry of Water Forest and Environmental Protection
NCS	= National Commission for Statistics
NMVOC	= NON Methane Volatile Organic Compound
NTPA	= Norme tehnice pentru protectia apei
SA	= Societate pe Actiuni (Economic Unit by Shares)
SC	= Societate Comerciala (Commercial Unit)
SC ACET SA	= Societatea Comerciala Apa Canal Tulcea
SS	= Suspended Solids
STP	= Standard Temperature Pressure
SWDS	= Solid Waste Disposal Site

T-N	= Total Nitrogen
TNWP	= Technical works for Water Protection)
T-P	= Total Phosphorous
VOC	= Volatile Organic Compound
WWTP	= Wastewater Treatment Plant

3.3 RESULTS OF SURVEY

Results of EIA survey, such as soil, sludge, groundwater, leachate from existing solid disposal site, industrial wastewater and air, are summarized in Table AII.7.10 to AII.7.15.

Table AII.7.10 Summary of Analysis Results for Soil

Parameters	Analysis Method	Braila			Galati				Tulcea			Min.	Max.	Average	Max. Desirable (MD) - Max. Permissible (MP)
		Braila WWTP	Braila Sludge Disposal Site (Inside)	Braila Sludge Disposal Site (Outside)	Galati WWTP No.1 (Free Zone)	Galati WWTP Pumping Station No.3 Area	Galati Sludge Disposal Site (Inside)	Galati Sludge Disposal Site (Outside)	Tulcea WWTP	Tulcea Sludge Disposal Site (Inside)	Tulcea Sludge Disposal Site (Outside)				
pH	R.S. 7184/13-79	8.26	8.49	8.01	7.42	8.02	8.42	8.18	7.94	7.89	7.8	7.42	8.49	8.04	-
Electrical Conductivity (µS/cm)	R.S. 7184/7-87	246	480	170	190	208	1500	230	143	548	355	143	1,500	407	-
Cadmium - Cd (ppm)	AAS Method	0	1.5	0	0	0	3.25	0	0	1.75	0	0	3.25	0.65	1 - 5
Chromium - Cr (ppm)	AAS Method	0	6.8	0	12.5	13.8	140	6	13	65	12.5	0	140	27	30 - 300
Copper - Cu (ppm)	AAS Method	5.75	40.75	7.4	3.5	2.8	134.25	3	0	40.25	3.5	0	134.25	24	20 - 250
Manganese - Mn (ppm)	AAS Method	435	475	380	210	254	280	155	365	400	280	155	475	323	900 - 2,000
Nickel - Ni (ppm)	AAS Method	17	24.75	4.5	11.5	14.25	34.25	16.5	8.25	21.75	15.25	4.5	34.25	17	20 - 200
Lead - Pb (ppm)	AAS Method	8.2	44.6	7.5	29.5	17.5	180	7.9	21.25	79	20.95	7.5	180	42	20 - 250
Zinc - Zn (ppm)	AAS Method	270	420	210	415	380	580	290	205	465	312	205	580	355	100 - 700
Total hydrocarbons in oil (ppm)	R.S. 7877/87	21.18	82.6	10.4	11.48	10.21	429.2	16.4	31	168.8	46	10	429.20	83	100 - 1,000

Table AII.7.11 Summary of Analysis Results for Sludge from Existing WWTPs

Parameters	Roman Wastewater Treatment Plant				Constanta Wastewater Treatment Plant				Min.	Max.	Average	Max. Permissible Values Proposed in Romania Standard 1988 (MP)
	Crude Sludge from Mechanical System	Crude Sludge from Biological System (Activited Sludge)	Digested Sludge	Dewatered Sludge	Crude Sludge from Mechanical System	Crude Sludge from Biological System (Activited Sludge)	Digested Sludge	Dewatered Sludge				
pH	6.22	6.41	6.67	6.75	6.8	6.5	7.5	6.99	6.22	7.5	6.73	-
Total Nitrogen (% of weight rel. to TS)	2.68	2.41	1.71	1.52	5.73	4.93	2.29	2.18	1.52	5.73	2.93	-
Total Phosphorus (% of weight rel. to TS)	1.08	1.06	0.51	0.36	2.03	1.33	0.67	0.58	0.36	2.03	0.95	-
Water content (105 C) (% of weight)	91.25	99.55	95.24	74.24	89.2	95.53	99.89	58.48	58.48	99.89	87.92	-
Solids – TS (% of weight)	8.75	0.45	4.76	25.76	10.8	4.47	0.11	41.52	0.11	41.52	12.08	-
Organic Substances (550 C) (% of weight rel. to TS)	64.96	65.27	55.96	25.73	72.47	70.52	48.66	21.26	21.26	72.47	53.10	-
Mineral Substances (550 C) (% of weight rel. to TS)	35.04	34.73	44.04	74.27	27.53	29.48	51.34	78.74	27.53	78.74	46.90	-
Cadmium - Cd (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	10
Chromium - Cr (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	500
Copper - Cu (mg/kg TS)	60.37	28.09	32.24	88.05	137.41	58.34	48.18	71.42	28	137	66	500
Nickel - Ni (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	100
Lead - Pb (mg/kg TS)	48.45	12.7	8.45	80.82	93.31	43.31	38.54	101.52	8	102	53	300
Zinc - Zn (mg/kg TS)	666.75	243.4	247.2	1,157.23	1007.64	307.69	294.64	1,600.35	243	1,600	645	2,000
Calorific Value (kJ/g TS)	17.2	16.8	16.2	-	18.7	19.2	17.3	-	16	19	18	-