### **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		l TTAL

Sundays in workable period:

9 month x 4 days = 36 days

Part All/Braila: Appendix-5 Construction Plan and Cost Estimate

National holidays in workable period: Rainy days in workable period:

Total work suspension days in workable period:

1 day 10 days (more than 10 mm/day, ave. last 5 years) 47 days

.

275 days - 47 days = 228 days : 225 days

### 1.3.2 WORK TIME

Working days:

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*.

and the second		1. S.	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -			「私社主に「私社」
in the second	Period (Year)	1 <sup>st</sup> year 2000	2 <sup>nd</sup> year 2001	3 <sup>rd</sup> year 2002	4 <sup>th</sup> year 2003	5 <sup>th</sup> year 2004
Wastewater Treatment Plant						
Influent Pumping Station	1.5					
Wastewater Treatment Process	2.5		and the second second second			100 1344
Sludge Treatment Process	2			Concession of the	1 125 miles of a state	
Discharge Pumping Station	1,5				<u>75.5357</u> 53	NERSERVER FOR
Power Receiving Facility	1			n de l'arrète L'arrète	n a den a den Nacional	45-x1-35777-571
Administration Building	1					STREET,
Interceptor a confident of the second	2				1 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

Figure All.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 All.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 All.5.1 Structure	of Project Cost
Item	Remarks
I Construction Cost	
II Equipment Cost	
III Engineering Service Cost	10% of (1 + 11)
IV Government Administration Cost	2% of (1+11)
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.



Part All/Braila: Appendix-5 Construction Plan and Cost Estimate

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

Table All.5.2 Structure of Construction Cost

### (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 All.5.3 to All.5.5*.

Table All.5.3	Unit Costs	s 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

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Item	Unit	Price (Lei)
Sand	m3	100,000
Soil	m3 .	100,000
Crushed stone	m3	200,000
Asphalt contract and a	ton	800,000
tack coat	1	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 n	nm m	100,000
<b>Dia300</b> n	nm	150,000
Dia400 n	nm	175,000
Dia500 n	îm (	215,000
Dia600 n	nm	250,000
Dia700 n	nm	350,000
Dia800 n	nm	450,000
Dia1000	mm	750,000
Dia1500	mm	2,000,000
Dia1650	mm	2,350,000
Dia2000	mm	3,500,000
Dia2200	mm egelen En .	4,500,000
Dia2800	mm	7,000,000
Dia3400	mm	12,000,000
Steel Pipe Dia400 n	າກ	500,000

Table All.5.4 Unit Price of Material



Item		Price (Lei/day)
Dunp Truck	10t	800,000
Truck		800,000
Concrete Transporter		1,200,000
Concrete Pumping Car	-	1,200,000
Bulldozer	ilt	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

Table All.5.5 Unit Price of Equipment Operation

### (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 All.5.6 and All.5.7*.

### 2.3 PROJECT COST

Estimated total project cost is about ROL 837,376 million, and its breakdown is shown in Table All.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 All.5.8

Project Cost (Braila Project)

Item	Cost	FC	LC
ricini	(million Lei)	(million Lei)	(million Lei)
I Construction Cost	679,688	234,431	445,257
Mobilization and Demobilization	24,275	0 1.4	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
	837,376	268,416	568,960

### 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.

	0	

Table All.5.9	Operation and Maintenance Cost for Braila Project

	1			
Item	unit (hageneer)	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
<b>Excess Sludge Disposal</b>	m <sup>3</sup>	20,000	297,990	1,490
Repairing	0.5% of Mechani	cal cost	23,000	460
Ohters	10% of above			845
Total				9,296
		· · · · ·		(unit: million lei)

(unit: million l

### 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 All.5.2.

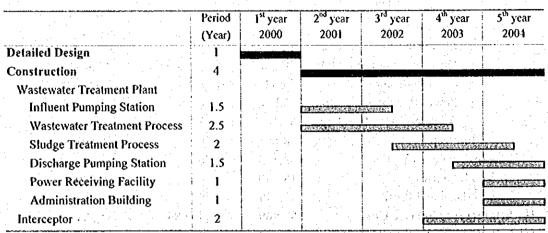


Figure All.5.2 Implementation Schedule (Braila Project)

### 3.2 DISBURSEMENT SCHEDULE

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

### Table All.5.6 Direct Construction Cost of WWTP (Braila)

	ltem		Unit	· (	luantity	Unit Price (Lei)	Amount (million Lei)	FC (million Lei)	LC (million Le
1	Influent Pumping Station								
	1-1 Civil Work				· ·	•			
	1) Earth Work							10 A. 10	
	Excavation		m3		9,044	5,000	45		
	Backfill		m3		6,654	22,000	146	0	1
	2) RC Concrete								
	RC Concrete I	Floorborad	m3		168	1,543,000	259	0	2
	RC Concrete II	Wall	m3		763	1,771,000	1,351	. 0	1.3
	1-2 Architectural Work		m2		658	4,000,000	2,632	0	2.6
ч. <sup>т</sup> .	1-3 Mechanical	the second s						11 A.	1.1
	1) Equipment		ls		1	36,664,000,000	36,664	25,665	10,9
	2) Installaiton		· 5		- 15		5,500	0	5,5
•	1-4 Electorical		ls		1	220,800,000	221	0	2
			1				4	1	
2	Wastewater Treatment Process	in the second second	· .		1	and the second second		1. S.	a da sera
	2-1 Preliminary Treatment Proce	55							
	(1) Civil Work								
	1) Earth Work						· · · · ·	· · · ·	an ga ta tha
1	Excavation		m3		25	5,000		Δ	11.
	2) RC Concrete	1 A A A A A A A A A A A A A A A A A A A		· ·	20	0,000	· ·		t -
	RC Concrete I	Floorborad	m3		2,180	1,543,000	3,364	0	3,3
2.5	RC Concrete II	Wall			840	1,771,000	1,488		
					330	4,810,000			
	3) Pile Work (ave.L=10m, in	CI. UNAINS WORK	pcs		. 330	4,010,000	1,007	. · . · ·	1.0
	(2) Mechanical		·			00 424 400 000	00.424	10.004	ó s
	1) Equipment	in the second	ls		1	28,434,400,000	28,434		
÷.,,	2) Installation				15	101017000	4,265		-,-
1	(3) Electorical		ls	-	1 <b>1</b>	124,617,600	125	0	1
	2-2 Secondary Treatment Proce	\$\$	1 A						
	(1) Civil Work					1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			
· .	1) Earth Work								
1.	Excavation		m3		47,655	5,000			2
	Backfill		m3		8,113	22,000	178	0	L 1
	2) RC Concrete		1.1						
	RC Concrete I	Floorborad	m3	. s	9,328	1,543,000			-
	RC Concrete II	Wall	m3		8,055	1,771,000	14,265		
	<ol><li>Pile Work (ave L=10m, in</li></ol>	cl. driving work)	pcs		1,191	4,810,000	5,726		
	(2) Architectural Work		m2	1.1.1	338	4,000,000	1,352	0	1,3
ŕ	(3) Mechanical	1	· · ·	1.1			1. A. A.	1. State 1.	1.16.4
÷.,	1) Equipment	1 T T	s		1	114,963,200,000			
	2) Installation	1. A.	·		15		17,244		
: .	(4) Electorica!		ls		1	709,861,200	710	0	7
	2-3 Final Treatment Process								1.17
	(1) Civil Work	N				1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		S. 6. 1
	1) Earth Work	1			2		-		
	Excavation		m3		2,625	5,000	13	0	۱. I
	Backfill		m3		1,080	22,000	24	0	
÷	2) RC Concrete	1				1.1.1	· .		
	RC Concrete I	Floorborad			263	1,543,000	406	. 0	· · 4
	RC Concrete II	Wall	т3	·	408	1,771,000		0	1 I I <b>7</b>
	3) Pile Work (ave L=10m, in		pcs		. 48	4,810,000			
	(2) Architectural Work		т2		90	4,000,000			
	(3) Mechanical								· · · · ·
	1) Equipment		is	1.1	1	5,184,800,000	5,185	3,629	1,5
	2) Installaiton	a second a second second	Ň		15	0,101,000,000	778		7
	(4) Electorical		ls		1	6,102,000			
•••	(4) Liectorical		. 13	1.11	. •	0,102,000			
2	Sludge Treatment Process				· · · · · · ·	100 A			· · · ·
3	3-1 Civil Work	the second s				1			
			1. 1. <sup>1</sup>						1.5
	1) Earth Work				01.004	E 000	106		
	Excavation	A CARLES AND A CARLES	m3		21,234	5,000			
	Backfill		m3		13,892	22,000	306	. 0	3
	2) RC Concrete	6				· · · · · · · ·			· · · ·
•	RC Concrete I	Floorborad	m3	eg i t	2,004	1,543,000			
	RC Concrete II	Wa'l	m3		326	1,771,000			
	3) PC Concrete	Sludge digestion tan	m3	_ d	1,272	3,010,700	3,830		
	4) Pile Work (ave.L=10m, in	cl. driving work)	pcs		20	4,810,000			
e e .	3-2 Architectural Work		m2		640	4,000,000	2,560	0	2,5
	3-3 Mechanical		1997 - 1997 -	1999 - 1999 - 1999 1999 - 1999 - 1999 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1	-		a she she a		·
		the second second	ls	1.1	1	112,456,000,000	112,456	78,719	33,7
	1) Equipment								
	1) Equipment 2) Installaiton		Š.	1	15		16,868		

Item	Unit		Qu	antity	Unit Price (Lei)	Amount (million Lei)	FC (miltion Lei)	LC (million Lei)
Discharge Pumping Station								
4-1 Civil Work								1 4 J
1) Earth Work	1.1							
Excavation	m3			1,801	5,000	9	. 0	. 9
Backfill	m3			937	22,000	- 21	0	21
2) RC Concrete			÷.,		1. A. A.			- -
RC Concrete I Floorborad	ണ3			102	1,543,000	. 157	<u> </u>	157
RC Concrete II Wall	m3		1.1	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		· · · · · · · · · · · · · · · · · · ·			1 A. A. A.
1) Equipment	ls			1	36,664,000,000	36,664	25,665	10,999
2) Installation	8	-	1.1	15	· · · · · · · · · · · · · · · · · · ·	5,500		5,500
4-4 Electorical	ls			1	458,328,000	458		458
4-5 Discharge Sewer dia 2000 mm, EC=2m	m			1,100	3,186,000	3,505	0	3,505
over the st	· ·							4 N (
Site Finalization 5-1 Civil Work					1. State 1.			A second second
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		6,49
2) Lindarkinent by Porchased son				00,111	120,000	0,100	•	0,10
Power Receiving Facility	ls			1	231,735,504	232	0	232
				. •				
Administration Building						· · · · ·	· · · · · ·	n an an th
7-1 Architectural Work					en tra constante en	$\lambda_1 = 1/4$	Sec. 198	
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						lei e te e		
1) Labo, and Office Equipment	ls			1	750,000,000	750	375	37
2) Installation	<u>к</u>	1. A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A		0	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	0	· · · · · · · · · · · · · · · · · · ·	
7-3 Electorical	ls	15	12	1	228,000,000	228	0	22
an an an the second states of the second states when	1.1		• •			1.1.1	1	e produce
TOTAL					N	466,596	234,431	232,164

### Table All.5.6 Direct Construction Cost of WWTP (Braila)

361,289

All-5-10

ltern		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 (R	C pipe)	-	e de la composición d	e de la composition			
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 supp		m	15	21,375,900	321	0	321
1-2 Sewer construction by shelld tune	neling method						
1) Dia 1650 mm sewer	sheild tunneling method	'n	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		
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	· · · O	22
6) Manhole	d=3400mm, EC=2m	place	2	43,101,000	86.2	0	8
1-4 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

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### Table All.5.7 Direct Construction Cost of Interceptor (Braila)

14,631

Table All.5.10 Disbursement Schedule of Braila Project

### 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 Financing Organs
 Loan/Grant Interest Rate Repayment Grace Period (Years)

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.

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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

Number of Served Population and Household

### **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

				e a di basa di ba	i e straet	(Unit : 1	,000 m'/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

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	e i sist				Un (Un	it : 1,000 R	OL/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.

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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%
	Ł	<b>.</b>	<b>L</b>				•

Sewerage Charge Collection Rate

### 1.4 FINANCIAL STATEMENTS FOR PROPOSED FINANCIAL PLANS

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

Tl	ie structure of	fapplied	financial	statements is a	s follows.

R.A. APTERCOL account	
Revenue	Α
Operation and maintenance cost Lease fee	B C
Profit before tax Corporate tax Profit after tax	D = A - B - C $E = D \times 0.38$ F = D - E
Working capital Cumulative working capital	$G = F$ $H = \Sigma G$
City's sewerage service account	
Revenue from lease fee	l = C
Depreciation Payment of interest	J K
Profit Loan Subsidy from general budget Depreciation	L = I - J - K $M$ $N$ $O = I$
Sources	P = L + M + N + O
Investment cost Payment of principal	Q R
Applications	S = Q + R
Working capital Cumulative working capital	$T = P - S$ $U = \Sigma T$
City's general account	
City general revenue Corporate tax from R.A. APTERCOL Revenue from lease fee	V W = E X = 1
Total current revenue	$\mathbf{Y} = \mathbf{V} + \mathbf{W} + \mathbf{X}$
Subsidy	Z = N
Subsidy ratio	AA = Z/Y
Repayment ratio	AB = (K + R)/Y
	L

Structure of Applied Financial Statements

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%	ΝΑ	- 142,401	0.83

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

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

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30.0% 20.0% 0.0%

APTERCOL)

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300.000 250.000 200.000 150.000 100.000 50.000

19.7%

Averaged profit rate

-50,000

35.6%

Highest subsidy ratio

27.2%

Averaged ontena values for guarantee

All-6-5

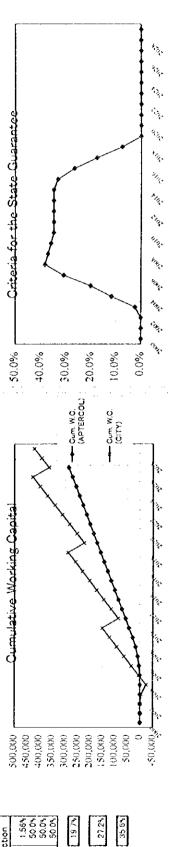
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### Table All.6.1 Financial Statements of Braila Financial Plan (Case IB3)

(A)         Control         Control <thcontrol< th=""> <thcontrol< th=""> <thcont< th=""><th>No.         As a long         As a</th><th>1. Financial Statements of R.A. APTERCOL (million ROL)</th><th>ments of F</th><th>R.A. APTI 2001 2002</th><th>TERCO</th><th>0 1 (m</th><th>nillion RC</th><th>201)</th><th>1007 : 90</th><th>1002</th><th>6002</th><th>0102</th><th>1102</th><th>2102</th><th>2013</th><th>1 102</th><th>500</th><th>2016 2</th><th>2011 20</th><th>8102</th><th>00</th><th>202 8102</th><th>0202</th><th>1202 0202</th><th>2020   2021   2022</th><th>1.802 2021 2021</th><th>2020 2021 2022 2024</th><th>- 9007 - 1007 - 1000 - 1007 - 1000</th><th>2020 2021 2022 2024</th><th>- 9202 - 9202 - 8202 - 8202 - 8202 - 8202 - 8202</th></thcont<></thcontrol<></thcontrol<>	No.         As a long         As a	1. Financial Statements of R.A. APTERCOL (million ROL)	ments of F	R.A. APTI 2001 2002	TERCO	0 1 (m	nillion RC	201)	1007 : 90	1002	6002	0102	1102	2102	2013	1 102	500	2016 2	2011 20	8102	00	202 8102	0202	1202 0202	2020   2021   2022	1.802 2021 2021	2020 2021 2022 2024	- 9007 - 1007 - 1000 - 1007 - 1000	2020 2021 2022 2024	- 9202 - 9202 - 8202 - 8202 - 8202 - 8202 - 8202
ue         33.00         57.90         57	use         8 / 30         1 / 30 <td>Revenue (A)</td> <td>ł</td> <td>┢</td> <td>⊢</td> <td>-</td> <td>44</td> <td>49.0 4K 4</td> <td>1151 52.</td> <td></td> <td>07 61.69</td> <td></td> <td>£</td> <td>66.677</td> <td>-</td> <td></td> <td>66.677 6</td> <td></td> <td></td> <td>56.677</td> <td>50.677 56.677</td> <td>50.677 56.677</td> <td>54.677 56.677 56.677 56.6771 56.677</td> <td>56,677 56,677 56,677; 56,677 56,677</td> <td>54,671 56,617 56,671: 56,617 54 617 64,017</td> <td>54.871 56.617 55.6711 56.617 56.617 56.617 56.577 56.5713</td> <td>56,671 56,617 56,671; 56,617 56,617 66,671 56,672 56,571 58,617</td> <td>66,677 56,677 56,677; 56,677 56,677 56,677 56,577 56,577 56,677; 55,677;</td> <td>64.677 56.677 56.677 56.677 54.677 56.677 56.677 56.677 59.677 56.577</td> <td>64.671 66.617 56.671 56.671 54.671 64.671 66.571 56.571 58.617 55.671 56.577 55.641</td>	Revenue (A)	ł	┢	⊢	-	44	49.0 4K 4	1151 52.		07 61.69		£	66.677	-		66.677 6			56.677	50.677 56.677	50.677 56.677	54.677 56.677 56.677 56.6771 56.677	56,677 56,677 56,677; 56,677 56,677	54,671 56,617 56,671: 56,617 54 617 64,017	54.871 56.617 55.6711 56.617 56.617 56.617 56.577 56.5713	56,671 56,617 56,671; 56,617 56,617 66,671 56,672 56,571 58,617	66,677 56,677 56,677; 56,677 56,677 56,677 56,577 56,577 56,677; 55,677;	64.677 56.677 56.677 56.677 54.677 56.677 56.677 56.677 59.677 56.577	64.671 66.617 56.671 56.671 54.671 64.671 66.571 56.571 58.617 55.671 56.577 55.641
m         35,920         cat 47.2         57,301         12,301 <td>en         335/300         44472         57881 - 37881 - 3180         3671           6         0         965         4,787         8.953         13.300         13.001         3.071           6         0         0         0         0         0         0         0.051         13.001         3.001&lt;</td> <td>Operation and maintenance Leveled lease fue (C)</td> <td></td> <td></td> <td></td> <td></td> <td>97 19 19</td> <td></td> <td>. "</td> <td></td> <td></td> <td></td> <td></td> <td>8,790 34 A37</td> <td>8.790 34.837</td> <td></td> <td></td> <td></td> <td>2 2</td> <td></td> <td>8.750 34.837</td> <td>8.750 8.790 34.837 34.837</td> <td>8.750 8.790 8.790 34.837 34.837 34.837</td> <td>8.750 8.790 8.790 8.790 8.790 34.837</td> <td>8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837</td> <td>34.837 34.837 34.837 34.837 34.837 34.837 34.837</td> <td>8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837 34.837 34.837 34.837 34.837 34.837</td> <td>8.700 8.700 8.700 8.700 8.790 8.790 8.790 8.790 8.790 8.790 34.837 3</td> <td>8.700 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837 35.838 34.837 35</td> <td>8.700 8.700 8.700 8.700 8.790 8.790 8.790 8.790 8.790 8.790 34.837 3</td>	en         335/300         44472         57881 - 37881 - 3180         3671           6         0         965         4,787         8.953         13.300         13.001         3.071           6         0         0         0         0         0         0         0.051         13.001         3.001<	Operation and maintenance Leveled lease fue (C)					97 19 19		. "					8,790 34 A37	8.790 34.837				2 2		8.750 34.837	8.750 8.790 34.837 34.837	8.750 8.790 8.790 34.837 34.837 34.837	8.750 8.790 8.790 8.790 8.790 34.837	8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837	34.837 34.837 34.837 34.837 34.837 34.837 34.837	8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837 34.837 34.837 34.837 34.837 34.837	8.700 8.700 8.700 8.700 8.790 8.790 8.790 8.790 8.790 8.790 34.837 3	8.700 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 8.790 34.837 35.838 34.837 35	8.700 8.700 8.700 8.700 8.790 8.790 8.790 8.790 8.790 8.790 34.837 3
<ul> <li>D)</li> <li>D</li></ul>	<ul> <li>D)</li> <li>D)</li> <li>E05</li> <li>A199</li> <li>B05</li> <li>B05</li></ul>	Lease fee pelouistion base					35	1 87 0.26	172 57.8	101 57.88	11 ~ 57,68			57,801	ł			18251 34	1		23,698	23,898 14,469	23,898 14,489 14,489	23,898 14,489 14,489 14,480	23,898 14,489 14,489 14,489 14,489	23,898 14,489 14,480 14,480 14,489 14,499	23,698 14,469 14,480 14,480 14,489 14,489 14,489	23,898 14,489 14,489 14,489 14,489 14,489 14,489 14,489 14,489	23,898 14,489 14,489 14,489 14,489 14,489 14,489 14,489 14,489 14,489	23,898 14,489 14,489 14,489 14,489 14,489 14,489 14,489 14,489
<ul> <li>C)</li> <lic< td=""><td><ul> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0</li> <li>● 11,15,15</li> <li>■ 11,15</li> <li></li></ul></td><td>Profit before tax (D = A-R-C)</td><td></td><td></td><td></td><td></td><td>—</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>23.050</td><td>23.050</td><td></td><td>2050 2:</td><td>l š</td><td><b>.</b></td><td>23.050</td><td>1050 23 050 23</td><td>23.050 23.050 23.050</td><td>23.050 23.050 23.050 23.050</td><td>23.050 23.050 23.050 23.050</td><td>23 050 23 050 23 050 23 050 23 050</td><td>23.050 23.050 23.050 23.050 23.050</td><td>23 050 23 050 23 050 23 050 23 050 23 050 23 050</td><td>23 050 23 050 23 050 23 050 23 050 23 050 23 050</td><td>23 050 23 050 23 050 23 050 23 050 23 050 23 050 23 050 23 050</td></lic<></ul>	<ul> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0)</li> <li>● 0</li> <li>● 11,15,15</li> <li>■ 11,15</li> <li></li></ul>	Profit before tax (D = A-R-C)					—								23.050	23.050		2050 2:	l š	<b>.</b>	23.050	1050 23 050 23	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 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 23 050 23 050 23 050 23 050
E)       53       7,551       5,551       5,551       5,551       5,550       5,550       1,501       1,250       2,2916       2,2916       2,8936       2,8946       2,8948 <th< td=""><td>E)         S35         F551         F5751         F5751</td><td>Cornorate tax (E = 0.38 + D)</td><td>~</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>8.759</td><td>8,755</td><td></td><td></td><td></td><td>520</td><td></td><td>8.759</td><td>8.759 8.759</td><td>8.759 8.759 8.759</td><td>8.759 8.759 8.759 8.759 8.759</td><td>8.759 8.759 8.759 8.759 8.759</td><td>8.759 8.759 8.759 8.759 8.759 8.759</td><td>8,759 8,759 8,759 8,759 8,759 8,759 8,759</td><td>8.759 8.759 8.759 8.759 8.759 8.759 8.759 8.759 8.759</td><td>8.759 8.759 8.759 8.759 8.759 8.759 8.759 8.759 8.759</td><td>20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000</td></th<>	E)         S35         F551         F5751	Cornorate tax (E = 0.38 + D)	~											8.759	8,755				520		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 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 8.759 8.759 8.759 8.759 8.759 8.759 8.759	20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000 20,000
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Z0001         Z001         Z001 <thz001< th="">         Z001         Z001         <th< td=""><td>Zmon         Zmon         <thzmon< th="">         Zmon         Zmon         <thz< td=""><td>. Braila City Sew</td><td>erage Acc</td><td>ount (n</td><td>nillion</td><td>ROL)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thz<></thzmon<></td></th<></thz001<>	Zmon         Zmon <thzmon< th="">         Zmon         Zmon         <thz< td=""><td>. Braila City Sew</td><td>erage Acc</td><td>ount (n</td><td>nillion</td><td>ROL)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thz<></thzmon<>	. Braila City Sew	erage Acc	ount (n	nillion	ROL)																								
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26:168         100:05         0         -22:305         -22:306         -22:305         -22:306         -22:305         -22:305         -22:305         -22:305         -22:305         -22:305         -1.1/3         -2.1/3         -2	26.00 26.068 100.076 153.773 169.477 127.109 11.215 47.004 55.900 72.016 153.773 169.477 127.109 72.016 69.025 69.025 69.025 89.025 89.025 89.025 72.016 69.025 69.025 89.025 89.025 89.025 89.025 72.045 129.515 24.055 1171.006 44.851 59.927 14.007 169.71 100 74.007 159.515 242.055 111.006 44.851 59.927 14.007 169.71 100 74.007 159.515 242.055 111.006 95.655 70.060 34.025 89.78 28.9799 29.9799 29.9999 29.9999 29.99999 29.9999 29.99999 29.9999 29.99999 29	Depreciation (J) Payment of interest (K)	00	00	00		0 28. 548 72.		178 28.5	15 28.78	19 28.978 16 35.666		28.978 28.804							9/8	8	28.978 28.9 0	28/9/8/ 01	28,978; 28,978 01 01 01	28.978; 28.978 28.978 01 01 0	28/9/8/ 28/9/8/ 28/9/8 28/9/8/ 0	28.9.18; 28.374 28,978 28,978 28,978 01 01 0	28.918; 28.378 28.978 28.978 28.978 28.978 0 0 0 0 0	28,918; 28,974 28,978 28,978 28,978 28,978 28,978 01 01 01 01 0	28.918; 28.378 28.978 28.978 28.978 28.978 0 0 0 0 0
20:368       109.016       134.75       17020       82.00       90.925       80.926       80.957       70.91       20.91       20.91       20.94	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Profit (L = I-J-K)	0	0	0 -2	01- 500	548 - 15,	140 -28.0	396 - 35.k	100 - 32.92	25, -25,800		-22,944	GZ 1'61-	- 15,162 -	_				111/	ñ		5.860	5,860 5,860	5,860 5,860 5,860	5,860 5,860 5,860 5,860	099/C 098/C 099/C 099/C 099/C	5,860 5,860 5,860 5,860 5,860	5,860 5,860 5,860 5,850 5,860 5,860	5,860 5,860 5,860 5,860 5,860
11.215 47,004 65,903 72,616 54,475 37,026 85,258 80,925 86,95 86,95 95 96 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	11.215         47.004         65.903         72.616         54.475         57.020         62.106         80.225         80.926         80.926<	um, idy from city/state	07	9,0,0 134.	601 511	121 124	602.		5		5		<b>.</b>	D	•	<del>-</del>	0		0	ö					 0					
1         37.383         139.584         137.383         139.587         65.578         65.578         65.781         65.783         66.778         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716         50.714         70.716 <td>1         37.383         135.661         219.57         233.961         201.66         201.76<td>budget (N)</td><td>11.215 41</td><td>7,004 65.5</td><td>903 72.</td><td>616 54.</td><td>475 37</td><td>020 62.1</td><td>06 80.5</td><td>25 80.92</td><td></td><td>-</td><td></td><td>80.925</td><td></td><td></td><td></td><td></td><td></td><td>959</td><td>0</td><td>-5,860 -5.8</td><td>-5.860</td><td>-5.860 -5,860</td><td>-5.860 -5,860 -5,860</td><td>-5.860 -5.860 -5.860 -5.860</td><td>-5.860 -5.860 -5.860 -5.860 -5.860</td><td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td><td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td><td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td></td>	1         37.383         135.661         219.57         233.961         201.66         201.76 <td>budget (N)</td> <td>11.215 41</td> <td>7,004 65.5</td> <td>903 72.</td> <td>616 54.</td> <td>475 37</td> <td>020 62.1</td> <td>06 80.5</td> <td>25 80.92</td> <td></td> <td>-</td> <td></td> <td>80.925</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>959</td> <td>0</td> <td>-5,860 -5.8</td> <td>-5.860</td> <td>-5.860 -5,860</td> <td>-5.860 -5,860 -5,860</td> <td>-5.860 -5.860 -5.860 -5.860</td> <td>-5.860 -5.860 -5.860 -5.860 -5.860</td> <td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td> <td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td> <td>-5.860 -5.860 -5.860 -5.860 -5.860 -5.860</td>	budget (N)	11.215 41	7,004 65.5	903 72.	616 54.	475 37	020 62.1	06 80.5	25 80.92		-		80.925						959	0	-5,860 -5.8	-5.860	-5.860 -5,860	-5.860 -5,860 -5,860	-5.860 -5.860 -5.860 -5.860	-5.860 -5.860 -5.860 -5.860 -5.860	-5.860 -5.860 -5.860 -5.860 -5.860 -5.860	-5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860 -5.860	-5.860 -5.860 -5.860 -5.860 -5.860 -5.860
37.343         1960.60         242.052         181.364         0 <th0< th=""></th0<>	31.333         195.001         219.535         242.032         18.534         248.032         18.534         248.032         18.534         248.032         18.534         248.036         18.534         248.036         18.536         25.536         34.050         43.095         11.19         25.536         25.566 <th2< td=""><td>C48 (D = 1 +M+N+O)</td><td>37 30634 3144</td><td>1 RK1 219 F</td><td>226 239</td><td>171 802</td><td>018</td><td>1 6 4 7 1 X</td><td>0 7 1 2 U</td><td></td><td>0 00 00</td><td></td><td></td><td>101 00</td><td></td><td></td><td></td><td></td><td></td><td></td><td>ŧ.</td><td></td><td>1/5 1/2</td><td>202020 101020V</td><td></td><td></td><td></td><td></td><td>2020 01 02 02 01 02 02 02 02 02 02 02 02 02 02 02 02 02</td><td></td></th2<>	C48 (D = 1 +M+N+O)	37 30634 3144	1 RK1 219 F	226 239	171 802	018	1 6 4 7 1 X	0 7 1 2 U		0 00 00			101 00							ŧ.		1/5 1/2	202020 101020V					2020 01 02 02 01 02 02 02 02 02 02 02 02 02 02 02 02 02	
0         0         0         1         1         2         0         6         1         2         0         1         1         0         1         1         0         1         1         0         1         1         0         1         1         0         1         1         0         1	0         0         0         1370         9.555         70.860         34.070         45.070         45.995         51.110           ar         31.383         19.666         741.677         731.61         70.860         34.070         45.975         45.995         51.110           ar         0         0         -3.874         -20.111         28.978         28.	tment cost (Q)	37,383 156	3.681 219.5	576 242	052 181	284	0	0		0					0			-L	C	5		C	0	0 0	0 0 0				
e extremente entremente entrement	as (5 = 0 + 10) (2/34K) (2/94K) (2/9K)	ant of principal (R)	0	0	0	8201 9		- 1	1201 45,C	10 47,99	91 51,115			61 750	55,763	_				67:	2	Ó	0				0			
aptical of the year 0 0 0 -3.874 -20.111 26.978 28.	aural of the year 0 0 0 -3.874 -20.113 28.978 29.001 20.00	Applications ( $S = (2 + H)$	37 383 154	5.681 2191	576 243.	872 191	149 20		020 45 C	101 47,99		1 1	196'041	61 750	65,763	L				671	3	93,0001	93,0001 01		0	0 0	0 01			
e working coptal 0 0 0 -3374 -23387 4.391 33,568 52,346 51,923 120,501 149,678 65,856 114,433 143,811 172,788 201,766 220,743 238,599	• • • • • • • • • • • • • • • • • • •	Working capital of the year (T =P-S)	ø	0										28,978	28,978						3	~64,022 28,5	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	28.976 28.976 28.978 28.978 28.978 28.978	28.978 28.978 28.978 28.978 28.978
		Cumulative working capital (U = ½ T)	•	-0		874 -23								114,833						669.1	274	274.676 253.6	253,654	253,654 282 631	253,654 282 631 311,609	253,654 282 631 311,609 340,586	253,654 282,631 311,609 240,586 369,564	253,654 282,631 311,609 340,586 369,564 398,541	253.654 282.631 311.609 240.586 369.564 398.541 427.519	253,654 282,631 311,609 340,586 369,564 398,541
		Year	2100 21	201 200	12 200	27 20	07 1 70	25 200	6 200	1 2004	2008	1 1	1107	2012	2013	2014	2015 2	10 010	11 20	3	0	202 6102	201 202 6100	2012 1202 0202 6102	Cane 2002 1002 0002 6100	202 Can 200 1600 0602 6100	6202   \$202   6202   2202   1202   6102   6102	9202   6202   7202   6202   2202   1202   0202   6102	1202 9202 6202 9202 6202 2202 2202 1202 0202 6102	8402   1402   9402   6402   7402   6402   6402   1402   6402   6402
Nany 2005 2005 2007 2002 2004 2004 2005 2005 2005 2005 2005			C	2	0	c	d	010 1 010		2 400 5 602	100 2	0 1 50	0 100	0 7 0	0 75.0	0.16.0			0.000	- 7	0.160	0.100	0 100 0 100	0 100 0 100	0 100 0 100 0 100	0 100 0 100 0 100 0 100	0 100 0 100 0 100 0 100 0 100	Cleb Clec Clec Clec Clec Clec		Cleb Clec Clec Clec Clec Clec

6.755 249.893 249.893 249.893 -5.860 -5.860 -5.860 -2.3 00 34,837 34,837 6,7591 -2.3 60 6,755 34,837 34,837 Š - 2.3 8,759 249 893 249,893 249,893 1 -5,860 -5,850 -5,860 -2.3 00 8,759 34,837 34,837 -2.3 00 6.759 - 23 0.0 8.759 34,837 - 20 249,893 6 -5.860 8.759 34,837; 34,837 34,837 -2.3 00 8,759 -2.3 30 8.759 -00 0 6.759 34,837; 34,837 6.-00 8,759 22 15 8.759 34,837 15 2 17.6% 8,759 34,837 34,837 34,837 34,837 34,837 34,837 26.7 24.31 8,759 8,759. 30.8% 33 24 32.441 34 7 8,759 8,759 8,759 34.7% 32 4% 34 74 32 41 32.4% 34.74 34 71 8,759 34,837 32 41 6,867 34,837 33 44 36.90 5,084 34,837 34.5% 37.0 3,402 34,837 35.6% 38.24 1,819 34,837 219,948 28.25 30.9% 62,106 329 34,837 17 4 172,770 213,119 2011 37.020 õ ö 9 9 š 153,504 158,109 162,852 167,738 2.3% 5.3 1974 00 00 00 00 0 00 60 for State Guarantee Total current revenue (Y=V+W+X) Subardy (Z=I+K+R-M) Ortena for subaidy lavei APTERCOL (W=E) Revenue from lease fee (Y-R)/Y) Ē



Parameter Input Section Hato of Severate Charge to income (N) 51.56 Coverage to Interest (N) 50.04 Coverage to principal (N) 50.04 Coverage to principal (N) 50.04

Averaçed onteria values for guarantue Mignest subsidy ratio

AII-6-5

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

All-6-6

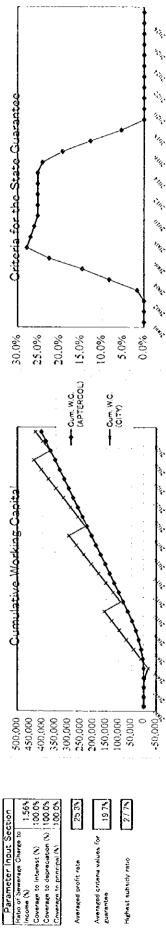
# Table All.6.2 Financial Statements of Braila Financial Plan (Case IIB3)

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

														ļ															٢
YAR	0002	1000	1002 1007 1007 0002	2007	1 1002	4 GANA.	1007 9002 4 400	C 100	201 1 10116	0106 1007	1102 101	100 1	2107	2014	5002	2014 2015 2016	1107	2018	2152	2020	2020 2021 2022 2022 2022 2022 2020	0.07	020 20	110 210	201 20	20.11 1.111 1.02	1 100	1 2020	
Hevenue (A)	ľ			<b>†</b> -		64.6	22 22 23 24 24 24 24 24 24 24 24 24 24 24 24 24	2.580 5.	10071 614	60 1608	11 66 6	111. 1641	1 66.61	11464 1	119.84	11449	66.677	114.48	66 6.77	66.677 6	11 11 19 11	4 11 1 10	0 11 N	35111 46	611 561	11 10 1	111 664	11 64 6	
Operation and maintenance			-	ſ		× /90	X 790 H, 750 H 790 H, 790 H, 750	4 790 F	4 067.8	150 8.	1067.8 1067.8	1901.8 1961	067 H 10	06/ H _ G	8.790	8790 8790 8790 8790 8790 8790 8790 8790	8,730	067.8	0C/.H	B.790	H. 7901 - H	8 /30 7	4.750 1	3.730 H	750 H.	1.1 06	90; B.F	06/ N 06/ R	ċ
I avaiari laasa faa (C)						24 024	29024 24024 29924 29024 29024	1 224 24	9 024 291		004 200	20 29 24 02	1 29 02	4 29.024	29 094	I 24024 24024 24024 24024 24024 24024 24024 24024 24024 24024 24024 24022 24024 24024 24024 24024 24024 24024 2	100 64	20 025	29.074	2 2004	24.024 24	6 024 24	2 200 5	1 024 24	0.24 24 0	24 200	200 200	24 29 02	
Lease fee celculation been						59,803	29,803 39,762 45,483 45,463 45,483	5,483 41	5,463 45.	48.3 45,483	48.2 45.4	83 45,4B.	3 45 40	3 45,483	44 100	23,453, 45,453, 45,463, 45,463, 44,100, 38,001 30,169, 21,210, 14,489, 14,469, 14,489, 14,469, 14,469, 14,469, 14,469, 14,469, 14,469, 14,469, 14,469	30,169	21,210	14 449	14 465 1	1 2.443	4,4,80 1	4 4891 14	469 14	7831 14/1	14,439	1	14,409 14,489	œ.
Protit before tax	-						-										-		-		_	-				_	-		[ <b>-</b>
(D = A - B - C)					•	6.679	5.579 10.501 14 755 19,194 23,885	4 766 15	9,194, 23,4		28,854 28,854	154 28.854	4 28,864	4 23.864	1 29.854	20.8641 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	29.864	28 964	28.864 2	28.H64 21	8,964 28	8.864 24	J.864 2H.	864 28F	154 28 HI	54 2H 8	28.864 28.864 28.864	X
Corporate tax (E = 0.38 = D)						2.538	4.0281 5	5,511	7.294 9.076	,	10,968 10,968	10.958	8 10.968		10,958 10,568	10.058 10.358 10.368 10.968	0.558	10.368	10.968	10,968 10.968	11 89600	10,958 10	10,068 10,068 10,568 10,968	0.068 10.	368] 10.5	HE 10.96B	50 49	10.968 10.968	÷
Profit attar tar (E = D - F )					•••	141	6,573 9	9 1551 10	9155 1:900 4809		17 896 17 896	17.906	6 17 856	51 : 7895	17,896	17896 17896 17896 17896 17896 17896 17896 17896	3896	17,846	17,896	17 856 1	17.496 +7.896 17.896 17.896 17.896 17.896	7.896 1.	7896 15	1 896 17	8961 178	196 17896	96 17 A	17 ACH 17 RUG	Ξ.
Working capital (G = F)		[			-	2.538	6.066	7.178 1.	6,555 2,178 19,471 2H,548		5.16 50.4	84 61.45	31 12 42	1 83,389	16.39	215/10/25/266/02/21/252/26/26/26/26/26/26/26/26/26/26/26/26/26	116,294	21262 1	38,231 14	49, 199, 16	0.167 17:	1135114	2.:04,150	\$ 072 204	040 215.0	5,677 1:00	11 2369	19.141 61	~
Cumulative W.C (H = 2 G)						141.7	4 141 10.714 :0.860 21 769 46.578	1.869 3.1	1 769 463		173 87.3	169 100 26	5 18.160	1 136 056	153.952	64.473 82.369 100 265 116.166 136.656 153.357 171 847 189 743 207.639 275.534 243 430 261 375 279.271 247 117 145 012 332 2081 350.804 388.594 388 545 404.401	189 743 2	07.530 2	75.534 24	43 430 26	51 375 275	9.221 29.	7 117 215	0.2 302	308 350.F	104 36B.6	09 386 51	15 404 49	-
2 Bentha Oity Samanara Account (million DOU)	0.000		(min) -																										ļ
E. UTANA ULY UCWEI		2000			Ĺ																								1
YAAr	2000	1002	2002	1007	2004	1007	2000   2001   2002   2004   2004   2006   2006   2007   2004   2009	12 100	00H 200	0. 0.	10. 01	2010 2010 2013	2013	\$100	2011	2014 2015 2016 2017 2018 2018 2020 2020 2021 2022 2022 2023 2023 2024	1100	2018	1010	2020	16 1640	1022 2	0.77 21	174 20	25 20	1 202 N	2021 2028	1000 1	
Hevenue from lease hee	-				 	-			_		 							-		-							~		
[(i = C)	¢	ċ	c	C	0	29.074	0 29.024 24.024 29.024 29.024 29.024	1.024 24	162 200	024 29.0	0.95 1540	20 52 100	4 29 024	29 024	29 024	29,024	29 024	29 07 6	29.024	2 20 22	20 0241 24	9 024 25	4 024 25	024 29	024 240	74 29.00	0 56 1 76 0	04 29.02	4
Depreciation (J)	ō	G	0	0	0	28,978	0 28,978 28,978 28,978 28,978 28,978 28,978	12 8261	3.07H 28.	-	0.81 28.0	18, 2H,S I	1 2H, 5 /	H/ 6.82 1	28.578	1975 1975 2019 2019 2019 2019 2019 2019 2019 2019	28,978	28.978	28/5/18	28,978 2	15 1816.00	17. H H	12 181 21	C978 28.	9.18 ZH,	18 28.9	CH2 182	16787 H	x
Payment of interest (K)	C	Ċ	C	1 2 6 8	1524	15,714	1 26R 7 534 15 714 24 247 24 767 97 708 24 475	2 797 95	7 70.6 25.4		300 201	74 17 82	15.015	11962	8 710	5 427	2686	H20	c	¢	c	C	c	ç	c	c	c	c	c

YAAL	2000	2001   2002   2004   2004   2005   2006   2007   2004	2002	1007	2004	1007	2006	1007	2004	2009	0100	1100	C106 2100	Η	1014	10.1	2018	2017	2018	1013	2020	2021 1	1002 2002		2024	2025	2026	20.27	1.02	heur'
Hevenue from lease hee	-	-							-	-					_	_	-		_		-	 	h		-					
(1 = C)	c	ċ	c	C	0	29.074	24.074	20.024	0 29.074 24.024 29.024 29.024 29.024		29 074	29,024	29.024	29 024	29 024	29.024 2	20,024	29 024	29 074	29 024	25 074 7	29.0241 2	29 024 3	29 024	29 024	29 024	24 024	29.024	29.024	29.024
Depreciation (J)	ō	G	0	0	ò	BL 6'82	0 28,978 28,978 28,978 28,578	28.978	28.57H	L	87.0.82	28,978	2H,9 /H	2H, 5 / 8	B/ 6.82	28.978 2	28.978	28,978	28.978	28,578,	28,978 2	2.1412.85	HI HI	2×.978	28.97B	28,978	2H,978	28.978	HI G'HZ	116.82
Payment of interest (K)	c	ò	c	1 468	1534	15.714	24 247	797 29	1 468 7 5341 15 714 24 247 29 797 27 704 25 475		23 102	20.574	17.827	15.015	11 962	8 710	5 427	2 6.94	H20	Ċ	0	c	c	c	ç	c	C	c	c	
Profit (L = HJ-K) I	0	ō	0	-1.468	-1.5341-	8:0.6	-24.201	2.0.751	0 -1.468 -7.5341-15.608 -24.201 -29.751 -27.6581 -25.4291-	25,421	23.056 -20.528		596'21- 928'71-	- 696.51	-11,916,11-	-8.064	-0.381	-2.638	-114	46	46	40	49	44	\$	46	46	44	1614	4
Loan (M)	26,166	26.166 109.676 153.773 169 437 127.105	53.773 1-	59 4.3.7	27.105		0	0	0	0	0	0	¢	0	0	0	0	0	0	0	0	0	0	0	0	0	0	o	0	
Subsidy from city/stato															• • •	- ~						•				_			-	
budget (N)	0.211	11.215 47.004 65.903 72.616 54.475 30.5821 48.501 61.9431 61.943 61.943	35,903	72.616	54.475	30.582	48,501	61,9435	61.943		61.943	61.943 6	61.943 61.943	_	61,943	59.176 4	47.577	31.315	13,3961	- 45	-46	-45	-46	-45-	-46	-45	-46	-46	0.1	94-
Depression $(0 = 1)$	-	c	¢	c	0	24.978	2H.078	28,978	0 0 28.978 24.078 28.078 28.078 24.078 28.978		24.0.7A	24 97A	28 978	PA 974	28,974	28.978 2	78,978 3	24.574	2H 17A	98.978	28.978 2	28 978 2	28.978	PR 078	2A 97A	28.9781	28.978	24.978	28.978	74 97
Sources (P = L+M+N+O)	3.1 3H3	37 3H3 156 6H1 219 676 240 5H5 174 050 43 H92 50 277 61 120 63 263 65 491	19 675 2.	1 444.01	14 050	4.1 H 17	50.277	11/01	63.262	i	67 865	10 302	13 004	75-151	1000 11	19 480 2	71174	57654	4159915	241974	2 H 4 / M	2411/8 2	28.128	28,978	HILHO	2N.978	28.078	H(5 H(	28.9.11	2RTHI 2R' I'H
Investment cost (Q)	37 383	37 383 [156.641 219.676] 242,052 [181,584	19.6/6 2	42,052	81,584	0	0	ō	0	•	•	000.56	0	0	ö	ō	ō	ō	0	93,000	0	0	0	0	0	5	0	000.54	0	
Payment of principal (9)	c	0 0 1300 6832 14414 24300 32.1931 34285 36514	¢	1 300	6 H32	14414	24 300	32,1931	34 285		<b>38 HR7</b>	41 415 4	44,107 46 974		50 0271	50.512 42.196		28 677	12 627	С	c	c	с	c	ç	c	Ċ	c	¢	
Applications (S = Q + H)	37 383	: 37 383 [15h 681 219 676] 263 352 (18k 416] 14 914 24 300 32 193 36 285 36 514	19 6/6 2	1200.65	88.416	14,914	24,300	32,193	34,285		CH HH 7	134 415 2	44.107	45,974	11 20 04	20.12	42:96	24.677i	1269 61	000'V	0	0	0	0	Ċ	Ô	Ċ	93.0001	0	
Working capital of the year			-	-	-							-	-			-	-	-		-		-		-						
(T = P=S)	°	0	0	-2,767	-14.366	28.978	28,978	29.978	-2,767 -14,366 28,978 28,978 28,978 28,978 28,978	28.978	28,978	-64.022	879,82	28.97.0	28,978	2.A.078	2A,97A	28,978	28.378 -64,022		24.978	28.978	28,978	2A.978.	28.978	28.978	2A.97H	-64.022	87.6 B.	28,974
Cumulative working capital								_						-	•														• •	
(Fig=0)	0	0	ō	-2.767	-17134	11.844	40.822	007.00	0 -2.767 -17.134 11.844 40.822 69.799 94.777 127.754	-	156 732	92.709	121687 1	150.554	179 642 2	20A.019 2	237 597 2	266.574 2	296,552 2	231.529 2	250.507 2	249.485	318.462 3	347440	376417	405.345	434.372	370.350	396.327	428,305

3. Criteria for State Guarantee (million ROL)	Guan	antee (r	nillion	ROL	~																								
Yaar	0002	2000 2001 2002 2004 2004 2004 2005 2001 2001	2002	2002	1004	1007	2008	: 7007	2004	1 1002	1102 0102	2011 1	2100	6104	1 10.	4012 NOV 12012 NOV 1402 12012 1202 2202 1202 2002 1402 140	16 10	11 20	18 20.	1112 1 11	101 0	1 202	1202	0.0	5000	107	1606	HAR	8702
Canaral Ravenue (≈V)	153,504	153,504 158.109 162,852 167,738 172,770 177,953 183,252 158,791 194,454 200,288	62,852 1	167,738	1/2.7/0	506771	163,292	186,791	194,454 2	•••	06.297-2	05.297 20	10.297 20	10.297 20	6.297 200	06.291 206.291 206.291 206.291 206.291 206.291 206.291 206.291 206.291 206.291 206.291 205.291 205.291 205.291 205.291 205.291	297 206.	2.17 200	297 205.	29712062	91 206.2	11 206.25	11 200.29	11 206.24	1 205.25	11 205.25	1 206 29	206 237 206,2571 205 251	122 107
Corporate tax from R.A. APTERCOL (W=E)	¢	0	. 0	0	0	2.538	4.028	5.611	2.538 4.028 5.611 7.294 9.076		890.04	10.968 10.968 10.968	0.968	0.968	10.968 10.968	01 8960	10.958 10.	968 10.	968 10.	968 10.9	58 10.4	10,968 10,968 10,968 10,968 10,968	10:01 IR	10.96	10.568 10.568 10.968 10.968	10.96	8 10.96	10,958 10,958	10.064
Revenue from lease foe X=1)	0		0	0	0	29.024	29.024	29.024	0 25.024 29.024 29.024 29.024 29.024		29,024	29,024 29,024 29,024	9.024	9.024 2	0.024 20	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	024 29,	024 29	024 29.0	124, 25.0	24 29.0	24 25.02	'4, 29.02	20,02	4 29,02	20.02	4 25.02	23.021	29 02 4
Total current revenue (Y=V+W+X)	153,504	153,504 158,100 162,852 167,738 172,770 209,515 216,344 223,425 230,771 238,388	62.852 1	67.738	172.770	209,515	216.344	223,425	30,771 2;	38,388 2,	46.288 2.	46.288 24	6.288 24	6 288 24	6.288 246	246.288 246.288 246.288 246.288 246.288 246.288 246.284 245.289 245.288 245.288 245.288 245.288 245.288 245.288 245.288 245.288 245.288	288 246.	288 246	288 246.	246.2	88 246,2.	88 246.28	18 246.28	18 246.25	8 246,28	IR 246.28	8 246.28	8 246,286	246 288
(M-8+K+K-M)	ò	c	c	7.767	14,366	30 587	48 501	61 943	0 0 2 767 14,366 30,582 48 501 51 943 51,943 61 943	51 942	61 943	51 943 E	0.943 6	11.543 <sup>1</sup> 6	1 943 Sr	61 943 61 943 61 943 61 943 61 943 50 176 47 577 21 315 13 396 - 46 - 46 - 46 - 46 - 46 - 46 - 46	577 31	315 13.	396	-46	46 -	46 - 4	16	16 - 4	19 - d	16.	6 -46	- 11	-46, -46
Criteria for subsidy level (7./Y)	100	001 001 000 161 A.M. 1461 22.44 27.74 26.94 25.04	00	1	ъ.	14 61	22 45	11 12	26 A.	25.01	25.25	25.24	25 22	25 24	25.24	25 24 25 24 25 24 25 24 24 24 10 34 10 34 12 74 5 44 000	131	X	2		°	00 00 00 00	00	00	00 00 00	0 2	00	00	600
Criteria for State Guarantee	00	00 000 000 140 835 1460 2240 2770 2600 2600	600	4	934	14 6	22.41	27.75	26.01	26.05	25.25	25.24	25.25	20.22	25.25	25.21 25.21 25.21 25.21 24.00 19.31 12.21			0	0 6	e e	00 00 00 00 00 00	00	00	00	60	101	100	οU
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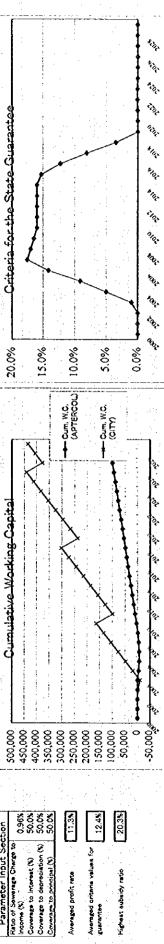


# Table All.6.3 Financial Statements of Braila Financial Plan (Case IIIB2)

### ocial Statements of B A APTERCOL (million BOL)

1. Financial Statements of R.A. APTERCOL (million ROL)	ents o	F R.A. AF	PTERC	S 20L	million	ROL)							•															
YABE	2000	2001 20	2002 20	2003 20	2004 20		2006 200	97 200	6002 H	_	2011	2012	2013	2014	_	-	2017 2					-	_	1	_		20.28	2028
Revenue (A)	14 - A.A.			H	12:		1	11	Ľ	Ĩ			41,0321		41 032	4	Γ.	012		4		ľ	×	4	Ľ	1	41 032	1 03.7
Operation and maintanance						8,790 8	06/,8 06/,8		8,790 8,790	90 8.790	0 8,790	8,/30	067.8	8,790	8,790	8,790	8,790	8,790 8,	8,790 8,	05/.8 01010	90 8,790	00 8,790	8,790	8,790	8,790	8,790	8,790	8,790
	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Constant Soft and Tax	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	and we find a manufa	and the Contract of the Contra			103	18	- 12	Ľ	5	- 18		1	1	- 1	E č	E×.	1.	1	1.0	Ŀ	L.	£	1	14 065	1.40
Profit before tax				-						J .	1	Ł	1	1_	<b>I</b>				1		1		1			1		1
(0 = A-B-C)					1	-4.620 -2	-2,206		2		0.033	_	ę.	6,033				9,033		9,033 9,033		000'6		9,033	9,003	0.030	9,033	9,003
Corporate tax (E = 0.38 = D)    Profit after tax (E = D = E)				;	1	-4.620 -2	-2.206	222 1.9	1,171 2,268	5,500		5,600	2,000	5,600	5,600				2477 5,000		22 009 2 000		5,600		-0 K C	2,600	5,500	000
Working capital (G = F) Cumulative W.C. (H = 2 C)		 		╞			۴	'	1.307 3.575	i	22	177	- ~	1		27.602 3	31,034 3- 43,809 4:			41,332 44,754 60.510 66,210	4.0	96 51,629 10 77,411	190,00 1 83,061	1 58,494	94,211	0.0		72,223
2. Braila City Sewerage Account (million ROL)	rare A	ccount (i	million	Ro	- C									J		 	{											
Yaar	2000	2001 20	2002 20	2007 2	Н	2005 20	2006 9002	8007 10	NO07 M	2010	1102	2012	2013	1100	2015	2010 2	2017 2	2018 20	0002 6102	202 00	1 2022	1 2027	2024	2025	2026	2027	8002	1000
Revenue from lease fee (I = C)		0	0	0	0	23,210 23	23,210 23,210	210 23.210	23,210	10 23.210	0 23,210	23,210	23,210	23,210	23,210	23,210 2	23,210 2:		23,210 23.	23,210 23,2	0122210	10 23,210	0 23,210	0 23,210	23,210	23,210	23,210	23,210
Depreciation (J) Permant of interest (K)	00	00	00	AB1 0	0 28,978	<u> </u>	28,978 28, 12,548 17,	28,978 28,978 17,878 16,622		78 28,978 35 13,861	8 28,978		L.	28,978	28.978	3,256		28,978 28	28,978 20, 0	20,978 28,978	178 28,978 0 0 0	78 28.976 0 0	16 28,978 0	0 28,378 0	1 28,978	28,278	28,978	970,85 0
Profit (L= i=J=K) Loan (M)	0 26,168	0 0 0 -4,520 26,168 109,676 153.773 169,437 127,109	0 773 169	-881	4,520 -1;	5,196 -20	1316 -23,	646 -22.		<u> </u>	•	1	-14,777	-12,945		F .	<u> </u>	-6,200 -5		-5,768 -5,768	0 -5,768	585,766 0	80/'C- 0	0 0 0	5-5.768	-5,768	-5.768 0	-5,768
Subaidy from oity/atate budget (N)	11,215	47,004 65.	903 72	2 210		24,145 34	34,896 42,961	361 42.961						42,961	41.301												5.768	5.768
Onpresistion (0 = 1)		0 0 0	0	•			28.978 28.		078 28,978	2	- 1				. 1			_	_ 1	- 1		1	- 1	٦ľ	٦ľ	- 1	28.978	2H 97B
Sourcess (P = - W+N+O)	0H2/2	156.681 219.676 24:172	6/0 4		_1	37,926 41	41.557 4H	48,293 49,549	04/9 DO.BI	16 52,310	1	35.442	21.16	58,994	29.7H4	54,295 A	46,183 30	_	-1	2H 6 9Z 18 6 HZ	79.97	18.87	2H 37	S'RA	16.42	8/68/	24.978	N/ 6 HZ
Invatment cost (Q) Payment of principal (R)	01,363	37,383 156,681 219,676 242,052 0 0 780	0,676 242	~	181,584 4,099 B	8.948 14	14,580 19.	0 0 0 19,316, 20,571	21.90	0 23,332	24,849	26,464	28,184	30,016	30,207	25,318 1	0	7,573 33,	33,000	00	00	00	00	00	••	93,000	00	<u>, o</u>
Applications (5 = Q + R)	37,003	37,083 156,681 219,676 242,832	676 242	832 18	185,683 8	8.94H 14	14,580 19.	19,316 20,571	571 21,908		2 117,849	26,464	28.184	30,016	1	25,318 1	17,206	1,573 93	93,000	0		0		0	0	000'86	¢	ò
Working capital of the year (T =P-S)	0	•	0	-1,660	-8,620	25,978 28	28.978 23.	28,976 28,	28,978 28,078	78 28,078	8 -64,022	28,978	28,978	28,978	28,078	28,978	28,078 2	26,97864	-64,022 28,	28,978 28,9	28,978 28,978	78 28,978	87 23,478	5 26,976	1 26.978	-64,022	28,978	H28,82
Cumulative working capital (U = 2 T)	0	0	1	-1.660 -10.280	1	18,697 47	47,675 76.	76,652 105,630	630 134,60B	08 163.585	5 99,543	128,540	157,518	186,405	215,473 2	244,450 21	273,428 30	302,405 236	236,383 267,	267,380 206,338	338 325,316	10 354,293	12, 383,271	1 412,248	441,276	202 772	406.181	435,158
3. Criteria for State Guarantee (million ROL	Guar	antee (mi	ilion F	SoL)				-							-								-			:		
Yaar	2000	2001 20	2002 20	2002 24	2004 20	2002 20	2006 2:00	01 2004	0002 H	1-1	1102	2101	2013	101	2015	2016	2 110.	02 810	2019 202	107 0.	1 202	202.1	2024	20%	2028	1000		10201
Ceneral Revenue (=V)	153,504	133,304 138,109 162,052 167,738 172,770 177,955 183,292 186,791 194,454 200,288	.052 167	1,738 17.	2,770 17	081 095'	292 188	191 194	54 200.25		206,297 206,297	206,297	206,297	206,297 206,297 206,297 206,297 206,297	206,297 2	06,297 20		206,297 206	297 204.	206,297 206,297 206,297	1.62,002,793	17 206.29	1 206.29	206.297 206.297 206.297	206,297	206,297 206,297		206,297
APTERCOL (WEE)	°	0	0	0	; 0 ;	•	•	136 1	136 - 1,171 2,268	58 3,432	2 3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432 3,	3,432 3,4	3,432 3.4	3,432 3,432	32 3,432	2 3,432	2 3.432	3,432	3,432	3,432	3,432
Revenue from lease fee (X=I)	0	0	0	0	0 33	23,210 23	23,210 23.	23.210 23.210	23,210	10 23,210	0 23,210	23,210	23.210	23,210	23,210	23,210 2	23,210 2:	23,210 23,	23,210 23,2	23,210 23,210	10 23.210	10 23,210	0 23210	0 23,210	23.210	23,210	23,210	23,210
Total ourrent revenue	167 604	160 100 100	7.01 1.01	101 002 TA				0000			000000000000	000 000	000000	0000000	10,000,000		100 000			000000		000000000000000000000000000000000000000	000000000000000000000000000000000000000	000 000		000000	060 666	.000 026

	200.24	1004	10.02			200		100		S	100		5	200					-		2									
Concert Revolves (=V) [155,504] 155,706] 155,706] 155,706] 155,726 [157,726] 155,726 [156,721] [194,464 [206,297] 206,297] 205,297] 206,29	153,504	158,109	162,052	167,738	172,770	096'//1	183 292	188,791	194,454	200,288	206,297	206.297	206,297	206.291	206,297 2	06.297 20	16,297 24	6 297 20	6,297120	6,297 20	0.297120	6,297 20	6,231 20	6.297 20	6.297 20	6,297 20	6.297 20	6,297 200	297 20	6.297
Corporate tax from R.A. APTERCOL (W#E)	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	• •	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 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	1	3,432
Revenue from isaas fee (X≐l)	•	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 23,210 23,210 23,210 23,210 23,210 23,210 23,210 23,210 23,210	3,210 2	3,210 2	3,210 2	3,210 2	3,210 2	3,210 2:	3.210 2	3,210 2	3210 2	3,210 2	3.210 2.	3,210 25	1210 2	3,210
Total ourrant revenue (Y=V+W+X)	153,504	158,109	162.852	107,738	• 153.504 158,109 162.862 167.738 172.770 201.163 206.501 212,136 218.835 225,766 2	201,163	206,501	212,136	218,835	225,766	232,939	232,939	232,939	232,939	32,939 2.	232,333 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339 232,339	12,939 23	2,939 23	2,939 23	2,939 23	2,939 23	2,939 231	2,939 23	2,939 23	2,939 23	2.939 23	2,939 23	2339 232	23 23	2,339
Subsidy (Z=I+K+R-M)	•	0	0	1,660	0 0 0 1,660 8,620 24,145 34,896 42,941 42,941 42,941	24,145,	34,896	42,961	42,941	42,961	42,961	42,961	42,961	42,961	42,961	42,961 42,961 42,961 42,961 41,301 34,342 24,585 13,333 5,768 5,768 5,768 5,768 5,768 5,768 5,768 5,768 5,768 5,768 5,768	4,342 5	4,585	3,8,33	5,768	5.768	5,768	5,768	5,764	5,769	5,764	5,768	5,768	768	5,768
Criteria for subsidy level (7,/Y)	0.0	60	<b>%</b> 0	6	2004 0.004 1.005 5.004 12.005 10.0 2000 200 200	12.0%	16.91	20.34	19.65	<b>8</b> 61	18.4%	19 4%	18 4%	18.4%	18.4%	19.4% 19.4% 19.4% 18.4% 18.4% 17.7% 10.6% 5.0% 2.5% 2.5% 2.5% 2.5% 2.5% 2.5% 2.5% 2.5	14.74	10.6%	5 9K	2.5%	2.5	2.5%	2.5%	2.5%	2.5%	25%	2.5%	2.5%	251	2.5%
Criteria for State Guarantee ( (K+R)/Y)	00	. 0 OK	0.0%	6	004 004 0.04 1.04 5.04 9.14 14.14 17.54 17.04 16.54	9.1%	1414	17.54	17.0%	16.5%	E . I	69	16.0	16.0	16.00	16.00 16.00 16.00 16.00 15.30 12.30 8.14 3.55 0.00 0.00 0.00 0.00 0.00 0.00 0.00	12.3%	815	3.5%	60	00	0.01	60	80	200	60	<b>N</b> 00	200	00	00
-					но технологията или тими стал во при може или торов и именало с тиминало и была сталоналога на нами же стало в живает				*****				** ***								-							-		
Parameter Input Section	ction			000		í	C	in de la constant	141	يد ما ترامی	ç	j e v			-			11.	Ċ	7	44	0.10	Ċ							
Ratio of Severare Charge to			3	200					ł	t	ł			ſ			ι δ		<b>{</b>	1			1					Ī		



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i	(	1		μ	ble /	Table All.6.3 Financial S	3 Fir	anc	ial S	tatei	tatements of Braila Financial Plan (Case IIIB2)	s of	Brai	la Fi	nanc	a la	lan (	Casi	e MB	5								
1. Financial Statements of K.A. AP LEKCOL (million KOL,	Pents of K.F	A. APT				7L)	100.	HORE	2004	10100	6 1100	10 2100	10 10	02 1100	0102 1 2010	106 91	RIDE 1	6102 8	odod -	1.00	6606	1797	Faud	1020	9.02	1 1606	20.78	$h_{\mu} \theta_{\nu}$
Hevenye (A)		╞	ł-		0HI: 77	201 194	1760.61	35.081 37.964		41,032	41 0.32 4	1 032 4	0.02 41	~	41 032 41 032	282 21 032	32 41,032	32 41 032	21 41 032	41 032	41.0321	41.032	41 032	41.0321 41.032	L I	41.032	61.022	41.032
Operation and maintenance		-		_	8.790	1	8.790	8.750	B.790	9,790	9.790 v	8 06/'8	8, 790 8	8 057.8	8.750 8.750	150 8,150	30 H.190	90 8.790	06/18 0	_			0 <i>F1</i> 'H		067 R	8.790	9.790	0.7.9
L avaised lagsa fee (C)		_			23,210	1 23,210	23,2101, 23,216		23.210	23,210	23.2:0 2:			23.210 23	23.210 23.2			101 23,210	0, 23,210		_	23.210			23.2101	i	_1	23,216
Lease fee calculation base					23,677	23,677 29,063 33,096	33,096	33,0961 33,0961		33,086	33,080 3.	33,096 33	33,086 33	33,986 32,255	255 28,776	776 23,897	97 18,521	21 14,489	9 14,489	14,489	14,489	14 499	14 469	14,433	14,489	14,489	14 485	24
Profit before tax										0000												0.044	1000		0000	0000	0.047	1000
Corporate tex (E = 0.38 + D)					720.4-	0	136	2.062	2,268	3.432		0,050 0 0,432	3,432			3,432 3,432	32 3,432			3,432	3,432		3,432	3.437.	3,432		3 432	3,452
Profit after tas (F = O - F )					-4 620	206				5 500	9 600			5 600 5	5 500 5 6	5 600 5 600	00	00 5 600	0 5.500			5.600	5 600	5 600.	5 600			UU4 5
Working capital (C = F)				_		0		1	3.575		L_		-		I							620'I C	140,66	58,404; 61576	61.576	HORICO	1 16/ 89	872.41
Cumulative W.C. ( $H = \Sigma G$ )		_			-4.620	-4.620 -6.826	-6.6C4	-4.693	-993	4.608	:0.208 1	15.808 21	21.408 27	27,009 32.	32,609 38,209		05 49.410	10 55 010	0 60.610		71,810	112 62	R3 011	H8611 94.211	94.211	99.812 105 112	541212	1/1011
2. Braila City Sewerage Account (million ROL)	irage Acco	unt (mi	llion R	0																								
Ynar	1002 : 0007		POUC 2002 2002	1000	5007	9000	1000	8007	5000	0100	2 1100	10 6106	2013 20	00 1100	2015 2016	100 0	1 2018		0707 6107	170.	1000	1.620	10/24	Sell. 2018	-	1/200	Rin	11/16
Revenue From lease toe /1 ≂ C}	0	0	0		23210	0 23.210 23.210 23.210 23.210	23.210	23.210		23.210	23210 23210 23210 23210 23210 23210 23210 23210 23210 22210 22210 23210 23210 23210	3 2 0 23	1 210 23	1210 23	210 23.5	10 23.2	10 232	10 23.21	0 22 210	23 210	016 26	23,210	23.210	23,210		23,710 23,210		23,210
Depreciation (J)	0	0			26,978	0 28,9/8 28,9/8 28,9/8 28,9/8 28,9/8 28,9/8	28.978	24.578	L		2 H16 H2	8.978 26	4.978 28	197H 28	28.978 28.978 28.978 28.978 28.978	1 B 28.0	/H 2H.0	28,918 28,078 28,078 28,078 78,078 28,078 28,078 28,078 28,078 28,978 28,978 28,078	8 28.97	110.87	28.978	BL 0, HZ	28.974	181 (1,81	4/5/82	2 11 12 11 2	28.976 2K.578	N.5.18
Payment of interest (K)	0	0	O AR1	4.520	9.428	281 4.520 9.428 14.5481 17.878 16.622 15.285	17,878	16.622	15,285	13.861	12 345 10	0 229 0	9 009 7	7177 5.	5.726 3.25.6	56 1 F	11 492	10	0	0	c	0	c	ċ	¢	0	c	c
Profit (L = I-J-K)	0	0	1148- 0	-4.52	101 01-10	-20,316	-23.646	-22,350	- 21,053 -	- 629.61	-19.629 -18 113 -16.697 -14,777 -12.945 -10.994 -9.024 -1.379	6.497 -14	21-1111.	345 -10	384 -9.0	21- 120	19 -0.260		-5./68+ -5 /68	HU/C	-5.756	HC / C-	Hal. C- 1001.C- 201.C-	-5.756r		- 8c'/.c-	-5.164	-b, Hid
Loan (M)	26,168 109,676 153,773 169 437 127,109	76 153,77.	3 169 437	127,109		0	0	0	0	0	0	0	0	0	ò	0	0			0	0	0	ō	0	0	0	c	0
Subsidy from city/state	_	-		-																								
budget (N) Characterion (O = D)	1.215 47.004 65.903 72.616 54.475 24.145 34.896 42.951	04 65.90	3 72.516	04.47	24.145	0 34,896	22.951	22,961	42,961 28.678	42.961 28.078	42,56	42.961 42 28 919 28	42.961 42 28.018 28	42,961 41, 24,079 28	41,301 34,342	CHC, NZ 245	45 13 833 74 74 57 676	33 5.76H; 28 29.078.	Н; 5./68 А. 94-97н		24.07K	867.C	26.02	1807.C	25.978	28.978	0.70A	5.70% 24.5.7A
Notices (P. c. + M+N+O)	1 37,3631156 6811 219 676 241 522 127 0641	11 21967	5 241 5 72	177 064	37.976	40.0%		44.549	Ł	L .	Ł.	1_	L .		462 44 - 286 69		1	1			HLN HC 1875 HC	1	24 978		L	1_	ł_	H/ 6 H/
Investment cost (Q)	37.383: 156 6H1 219,675 242,052 181,584	11 219.67	51242.052	8C.181		0	0	C	0	0	93,000	0	0	0	5	0		0 93,000;			3	0	ō	ō		000.00	1	्र
Payment of procipal (P)	°0	0	o! 780	4,099.0		8.948 14.580 19.316 20.571 21.908	19.3.6	20.571		25.332	24 849 24	25 454 2H	4 184 30	0.016 30	28.184 30.016 30.307 25.318 17.206	11.2	06 7573	_	0 10		Ċ	C	0	ç	ç	c	¢	¢
Applications ( $S = Q + R$ )	[ 37 383 156 681 219 676 242 832 185 683	41 21967	51 2 42 835	145 683	1 8 94H	14 5HO	19.3.6	20.571	80616	23 339 1	112.849 24	26.464 28	281841 30	30.0161 30	30,3071 25,318	318 - 17 206		1573 93 000	01 0	.0	0	0	0	0	- 0	10,000	0	0
Working capital of the year (7 ±D-S)		c	1 +1 660	- 4620	28.078	810 80 91 018 018 018 018 018 018 018 018 018 01	28.07s	28 G78	91 ù 76	6 CU PY- 820 86		28.078	420 MG 1470 46		1 28 57 8 C	28 6 78 2H G7H		87.0 HC 52.0.23 85.92	42.6 HC 2		58 0.78 26 0.78	28 1738	2H 97R	2H 47.B	87.0 HC	875 86 022 1 28 028		2M 478
Cumulative working capital	<del>,</del>								A. 470			-	-															-

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215.472 244.450 273.424 302.405 238.343 247.360 295.334 375.316 334.293 382.271 472.248 441.226

157,518 186 495

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99.563

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18.6971

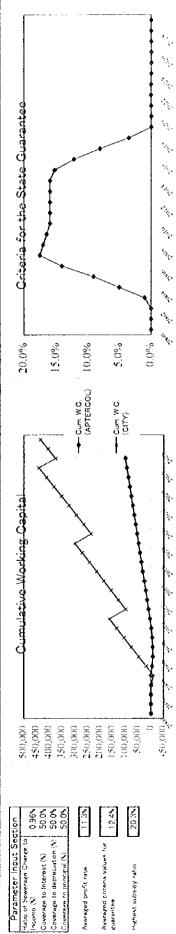
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0 0																				_	
		136	1.171 2.268	8 3,432	3,432	3,432	3,432	3,432 3,432	3,432 3,432	432 3.4	3,432 3.43	2 3.43.	3.437 3.432 3.432 3.432 3.437 3.432	3.437	3 432	3.432	3.432	3.432	3,432	3.432 3.432	1432 0 432
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25.564 [158.168] [157.265] [157.768] [157.765] [27.766] [27.766] [27.766] [225.959] [22	53 206.501	212.136 216	1,835 225,76	6 232.939	232,539	232.939 2	32,939 2.	32,939 23;	2.939 232.	339 232.5	39 232.90	9 232.93:	232,939	232.939	232, 130	232.939	22, 339 2	32,939 2	32,9351 20	2,909/ 23	5.09 2.32.5
0 0 0 1560 8520 24 145 34 H9H 42 361 42 951 42 951	45 34 H <sup>0</sup> H	42.961 42	963 42.96	_	42 961	42 961	42.961	42 561 4	22961 22961 22961 22961 22961 22961 2301 32320 23585 13433 5768 5768 5768 5764 5764 5768 5764 5768 5769	342 245	85 T3 HC	3 5.765	1 5 76 A	5 7661	5 768	5 76H	5 76H	5.768	6. 7GH	5 76R	764 4 Total
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0 00 × 00 × 00	<b>*</b> 1 51 <b>*</b> 1	17.5%	7.0% 16.5		16.01	16.0	<b>  </b>	16 0 1	1600 1600	1600 1600 1530 12	160N 160N 153N 123N 8	1600 1600 1600 1600 1530 1230 810 35	3.54	3.54	3.54	3.54	100 100 000 100 100 15E	255 200 000 000 000 000 000 VSE	3.54 2.04 0.04 0.04 0.04 0.04 0.04	255 200 000 000 000 000 000 VSE	<u> </u>



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

18,393 219,196 39,495 39,495 39,495 39,495 28.978 28.976 6.389 252,760 252,780 150 13.8% P27,074 206.297 18,393 346,232 39,495 44,445 28.978 6.389 39,495 39,495 19.9% 566 **28** 88 28.978 15 6% 416.461 11,404 4,951 ę 8 205,217 39,495 18,393 6,989 28,978 -64,022 587,483 39,495 252,780 252,780 39,495 19.8% 8.8 39,495 15.6% 3,783 6,983 2. Q. 29,495 28,978 18,393 6,989 11 404 228 28,978 151.508 39,495 19.8% 8 33,495 6.089 15.0% 2,645 42.139 206.297 206.297 323 900-6,989 6,989 39,495] 39,495 39,495. 28,978 422.528 252,780 252,780 9.8% 636'9 15.6% 41,031 39,495 3. 205.297 206.297 · 75. 7023 39,495 28.978 39,435 18,393 6,389 39,953 393.551 ĊŎ, 39,495 19.8% Criteria for the State Guarantee 206 297 6,989 39,495 15.6% 30 10.06 26 275 8 2.0. 19.8% 18,393. 6,989 39,495 30,495 26,978 252,780 289.214 28.978 38,902 364,573 6,989 39,495 39,495 15.6% 62 g 2023 208.297 20 8102 19.8% 8,790 39,493 18,393 6,985 11,404 267,000 39,495 15.6% 9102 28.978 12.132 28,078 2022 267 61 37,840 335,596 6,989 252,780 39.495 206.297 -1,615 510 \*102 39,495 28,078 28,978 13.8% 18,293 6,989 163,281 266,406 39,495 252,780 39,495 28,978 15.6% 790 36,884 306.61.8 636'9 206.297 495 202 -2,01 ė. 20,978 39.495 28.978 19,8% 8,790 39,495 18,393 156.292 39,495 39,495 24,978 35,914 6,989 15.6% 277.641 252,780 -3.580 206,297 39,495 0000 0102 18,393 6,989 11,404 39,495 19.8% \*3)<sub>2</sub> 243,503 8,790 39,495 28,978 4,525 39,495 249.418 252,780 252,780 252,780 252,780 252,780 252,780 252,780 2405 39,495 39,495 39,495 39,495 39,495 39,495 39,495 -64,022 248,665 6,989 15.0% 206.297 ·0, 18,393 39,495. 28,978 20,076 39,495 39,495 6,790 33,495 28,978 312,685 19,8% 96 -0.444 6,989 34.050 15.0% 206 297 232. 4 39,495 28 9 78 6,989 6,989 39,495 28,978 19.8% 39,495 283,708 39.495 135,324 28,9781 33,155 6,989 15.5% -6,0,39 206.297 ίą. and . 18,393 6,389 11,404 39.495 29.978 19.8% 067.8 128,335 39.495 28.978 32.284 254,730 15,6 39.495 1771 6,989 25.0% 20.0% 15.0% 10.0% 5.0% 0:0% 18.393 6.989 39,495 26,978 667-80 39-495 197.985 28,978 28,978 19.6% 39.495 31,435 225,753 39,495 2014 2015 6,989 15.6% Cum, W.C. (APTERCOL) 18,393 6,589 404 114,356 39,495 28,978 19.6% 8,790 39,495 30.608 6,989 15.6% 28.978 608.8-28,978 196,775 39,495 39.495 -Cum W.C. (CITY) 20,815 9,050 34,072 15 7% 8,790 34.072 107.367 28,978 167,798 34,072 34.072 9,050 13.7% 23,606 28.978 10,456 808 ł 31,044 11,797 19,247 26,644 £02. 6,790 26,844 11,797 10.1% 26,844 26.978 28,978 26,844 214,414 221,760 229,376 237,369 240,870 244,307 14,489 14,489 14,499 15,605 20,294 26,844 8 4,723 130,820 100 206,29 98,3 0.0 37,604 14,289 23,314 6,790 20,284 20,284 28,978 20,284 14,285 20.978 64.022 109,843 20,284 4.84 6,838 8.4% 403 206.297 2011 <u> Cumulative Working Capital</u> trop . 42,282 15,605 66.677 8.790 15.605 28.978 16,067 15.605 173,865 0.9% 72,231 15,605 28,978 6.6% -14,295 0.01 38,420 14,500 23,820 61,699 8,790 14,489 56,164 14,489 28,97H 14,600 28,978 28,978. 14,489 144,086 \$10. 0.0% 14.499 6.3 000 4.469 2102 33,728 12,817 20 017 14,489 57,007 8,790 14,489 12,817 14,489 14,489 28,079 28,078 115,010 2008 194,454 2008 6.5% 0.01 10 22,540 8,790 14,449 29,301 11,134 18,167 14,489 11,134 28,747 14.489 86,933 ilo: 8 26,978 28,978 2007 14,489 6.8% 0.0 9.<sub>02</sub> 25.136 9.552 15.584 8, 790 14,489 14,489 29,978 57,055 2006 183,292 9,552 1004 2005 2006 14,489 28,978 14,489 207,332 6 60 14 489 4003 28.9) (million ROL) 1.001 1.53 8,790 21,214 8,061 13,153 AUX. 14,489 28,978 14,489 14,489 28,978 28,978 2005 8.061 200 153,504 158,109 162,852 167,738 172,770 200,503 7.2% 14,449 C.6.4. 4 489 3 100 54.475 0 8 127,109 0 1002 APTERCOL ( (million ROI ana 72,616 (million ROL) 169,437 0.0 800 350,000 150,000 500,000 450,000 400,000 300,000 250,000 200,000 100,000 50,000 Ò 150,773 65,903 80 00 Account ( of R.A. / 26,168 109,676 47,004 0.0% Criteria for State Guarantee 0.0% 158,109 11,215 50.0% / Sewerage A 60 0.0 0.96% 22.4% 17.4% Financial Statements 15.6% Input Section Someter tax (E = 0.38 = D) is even to (E = D = F) Coverage to depreciation (%) Sewerage Charge to 0 11 8 for State Guarantee Averaged oriteria values for working capital capital of the yea Coverage to Interest (N) \* g unrage to principal (V) from lease fee Ŷ from oity/atate ŝ and for subsidy level ate tax from R.A. ourset revenue Ibeidy (Zal+K+R-M) Braila City Highest subsidy ratio Averaged profit rate. from lease SHO. Ĭ Parameter Operation and Lense fee (C) fter tex before X+M+A=L income (X). ц Ч ĝ

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All-6-8

 Table All.6.5 Cost Benefit Stream for Braila WWTP Project

111.24	1111	DOIN	
(Unit:	million	KOLJ	1

Year         Investment         O&M cost (B)         benefit (C)         Benefit (C-A-B)         Cost         Benefit           2000         36,785         0         -36,785         36,785         36,785           2001         154,174         0         -154,174         140,158           2002         216,161         0         -216,161         178,645           2003         238,180         0         -238,180         178,948           2004         178,679         0         -178,679         122,040           2005         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,101         151,86           2008         0         8,790         325,529         316,739         4,101         151,86           2009         0         8,790         325,529         316,739         4,101         151,86           2009         0         8,790         3,289         3,728         138,05           2010         0         8,790         -205,590         65,507           2011         0         8,790         -205,590         65,507 </th <th></th> <th colspan="2">Project cost</th> <th>Economic</th> <th></th> <th></th> <th>ach floutt</th>		Project cost		Economic			ach floutt
Root* (A)         (B)         (C)         (C-A-B)         Cost         Benefit           2000         36,785         0         -36,785         36,785         36,785           2001         154,174         0         -154,174         140,158         36,785           2002         216,161         0         -216,161         178,645         36,785           2003         238,180         0         -238,180         178,948         202,112           2006         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,511         167,04           2008         0         8,790         325,529         316,739         4,511         167,04           2008         0         8,790         325,529         316,739         4,511         167,04           2008         0         8,790         325,529         316,739         4,511         167,04           2009         0         8,790         3,728         138,05         3,681           2010         0         8,790         -205,590         65,507         2013         0         8,790	Vaar				Benefit - Cost	Discounted t	ash now · ·
$\cos(*(A))$ (B)(C)2000 $36,785$ 0 $-36,785$ $36,785$ 2001 $154,174$ 0 $-154,174$ $140,158$ 2002 $216,161$ 0 $-216,161$ $178,645$ 2003 $238,180$ 0 $-238,180$ $178,948$ 2004 $178,679$ 0 $-178,679$ $122,040$ 20050 $8,790$ $325,529$ $316,739$ $4,962$ 20060 $8,790$ $325,529$ $316,739$ $4,962$ 20070 $8,790$ $325,529$ $316,739$ $4,511$ 20080 $8,790$ $325,529$ $316,739$ $4,101$ 20090 $8,790$ $325,529$ $316,739$ $4,101$ 20100 $8,790$ $-8,790$ $3,389$ 20110 $8,790$ $-8,790$ $3,389$ 2012 $196,800$ $8,790$ $-8,790$ $2,315$ 20130 $8,790$ $-8,790$ $2,315$ 20140 $8,790$ $-8,790$ $1,913$ 20150 $8,790$ $-8,790$ $1,739$ 20180 $8,790$ $-8,790$ $1,581$ 20190 $8,790$ $-8,790$ $1,882$ 20210 $8,790$ $-8,790$ $1,882$ 20220 $8,790$ $-8,790$ $1,881$ 20140 $8,790$ $-8,790$ $1,882$ 20150 $8,790$ $-8,790$ $1,882$ 20240 $8,790$ $-8,790$ $8,790$ <td>Tear</td> <td></td> <td></td> <td></td> <td>(C-A-B)</td> <td>Cost</td> <td>Benefit</td>	Tear				(C-A-B)	Cost	Benefit
2001         154,174         0         -154,174         140,158           2002         216,161         0         -216,161         178,645           2003         238,180         0         -238,180         178,948           2004         178,679         0         -178,679         122,040           2005         0         8,790         325,529         316,739         5,458         202,12           2006         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,101         151,86           2008         0         8,790         325,529         316,739         4,101         151,86           2009         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         3,899         2011         0         8,790         3,389           2011         0         8,790         -205,590         65,507         2013         2,546           2014         0         8,790         -8,790         2,315         2014         2,04         2,104           2016				(0)			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $					the second se		0
2003         238,180         0         -238,180         178,948           2004         178,679         0         -178,679         122,040           2005         0         8,790         325,529         316,739         5,458         202,12           2006         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,101         151,860           2008         0         8,790         325,529         316,739         4,101         151,860           2009         0         8,790         325,529         316,739         3,728         138,055           2010         0         8,790         -8,790         3,889         3,889           2011         0         8,790         -8,790         3,081         3,081           2012         196,800         8,790         -205,590         65,507           2013         0         8,790         -8,790         2,315           2014         0         8,790         -8,790         1,913           2015         0         8,790         -8,790         1,581           2016				·	and the second s		0
2004         178,679         0         .178,679         122,040           2005         0         8,790         325,529         316,739         5,458         202,12           2006         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,511         167,04           2008         0         8,790         325,529         316,739         4,101         151,86           2009         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         -8,790         3,389         2011         0         8,790         -8,790         3,389           2011         0         8,790         -8,790         3,081         205,590         65,507           2013         0         8,790         -8,790         2,315         2014         2,014         2,014         2,014         2,014         2,014         2,014         2,014         2,014         2,014         2,014         2,014         2							0
2005         0         8,790         325,529         316,739         5,458         202,12           2006         0         8,790         325,529         316,739         4,962         183,75           2007         0         8,790         325,529         316,739         4,511         167,04           2008         0         8,790         325,529         316,739         4,101         151,86           2009         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         -8,790         3,889         2011         0         8,790         3,081           2012         196,800         8,790         -8,790         3,081         205,590         65,507           2013         0         8,790         -205,590         65,507         2013         2,315           2014         0         8,790         -8,790         2,315         2014         20,8790         8,790         1,739           2018         0         8,790         -8,790         1,881         2020         196,800		and the second se	0	~~~~~~			0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		178,679			-178,679	122,040	0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		0		325,529	316,739		202,128
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							183,753
2009         0         8,790         325,529         316,739         3,728         138,05           2010         0         8,790         -8,790         3,389           2011         0         8,790         -8,790         3,081           2012         196,800         8,790         -205,590         65,507           2013         0         8,790         -8,790         2,546           2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,913           2018         0         8,790         -8,790         1,581           2019         0         8,790         -205,590         30,560           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         892           2023         0         8,790         -8,790         892           2024 </td <td>2007</td> <td>0</td> <td>8,790</td> <td>325,529</td> <td>316,739</td> <td>4,511</td> <td>167,048</td>	2007	0	8,790	325,529	316,739	4,511	167,048
2010         0         8,790         -8,790         3,389           2011         0         8,790         -8,790         3,081           2012         196,800         8,790         -205,590         65,507           2013         0         8,790         -8,790         2,546           2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,739           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -8,790         1,437           2020         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         811           2025         0         8,790 <t< td=""><td>2008</td><td>0</td><td>8,790</td><td>325,529</td><td>316,739</td><td>4,101</td><td>151,862</td></t<>	2008	0	8,790	325,529	316,739	4,101	151,862
2011         0         8,790         -8,790         3,081           2012         196,800         8,790         -205,590         65,507           2013         0         8,790         -8,790         2,546           2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,739           2019         0         8,790         -8,790         1,739           2020         196,800         8,790         -8,790         1,437           2020         196,800         8,790         -8,790         1,437           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         811           2025         0         8,790	2009	0	8,790	325,529	316,739	3,728	138,056
2012         196,800         8,790         -205,590         65,507           2013         0         8,790         -8,790         2,546           2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         2,104           2017         0         8,790         -8,790         1,913           2018         0         8,790         -8,790         1,739           2019         0         8,790         -8,790         1,581           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         738           2026         0         8,790	2010	0	8,790		-8,790	3,389	0
2013         0         8,790         -8,790         2,546           2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,581           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         1,080           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -2	2011	0	8,790		-8,790	3,081	0
2014         0         8,790         -8,790         2,315           2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,739           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,188           2023         0         8,790         -8,790         1,080           2024         0         8,790         -8,790         982           2025         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -205,590         14,256           2029         0         8,790         -8,79	2012	196,800	8,790		-205,590	65,507	0
2015         0         8,790         -8,790         2,104           2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,739           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -	2013	0	8,790		-8,790	2,546	0
2016         0         8,790         -8,790         1,913           2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,581           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         1,080           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2014	0	8,790		-8,790	2,315	0
2017         0         8,790         -8,790         1,739           2018         0         8,790         -8,790         1,581           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         1,080           2024         0         8,790         -8,790         982           2025         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2015	. 0	8,790		-8,790	2,104	0
2018         0         8,790         -8,790         1,581           2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,188           2023         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         738           2027         0         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2016	0	8,790		-8,790	1,913	0
2019         0         8,790         -8,790         1,437           2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         811           2025         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2017	• • • • •	8,790		-8,790	1,739	0
2020         196,800         8,790         -205,590         30,560           2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2018	0	8,790		-8,790	1,581	0
2021         0         8,790         -8,790         1,188           2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2019	0	8,790		-8,790	1,437	0
2022         0         8,790         -8,790         1,080           2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2020	196,800	8,790		-205,590	30,560	0
2023         0         8,790         -8,790         982           2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2021	0	8,790		-8,790	1,188	0
2024         0         8,790         -8,790         892           2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2022	0	8,790		-8,790	1,080	0
2025         0         8,790         -8,790         811           2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2023	0	8,790		-8,790	982	Ō
2026         0         8,790         -8,790         738           2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2024	0	8,790		-8,790	892	0
2027         0         8,790         -8,790         670           2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2025	0	8,790		-8,790	811	0
2028         196,800         8,790         -205,590         14,256           2029         0         8,790         -8,790         554	2026	0	8,790		-8,790	738	0
2029 0 8,790 -8,790 554	2027	0	8,790		-8,790	670	. 0
	2028	196,800	8,790		-205,590	14,256	0
Total 1 414 378 219 750 1 627 6451 -6 483 816 678 842 84	2029	0	8,790		-8,790	554	0
042,04 סועלים ובטיעיים דייני וייייין איייייין איייייייייייייייייייי	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

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### **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

Part All/Braila: Appendix-7 Environmental Impact Assessment Survey

(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; distance

- (12) The Order of Health Ministry, No. 1935/1996 Hygiene at Working Places;
- (13) The Work Protection Law, No. 90/1996; and the Market Area reference
- (14) The Order of Health Ministry, No. 536/1997 Noise Admissible Level at the Limit of the Developed Location;

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- (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.

Address: Spl. Independentei nr. 194, sector 6, cod 77703, Bucharest 78, Romania

Tel: 40-(0) 1-637-3060 Fax: 40-(0) 1- 312-1393

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. Gabricla 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 All.7.1





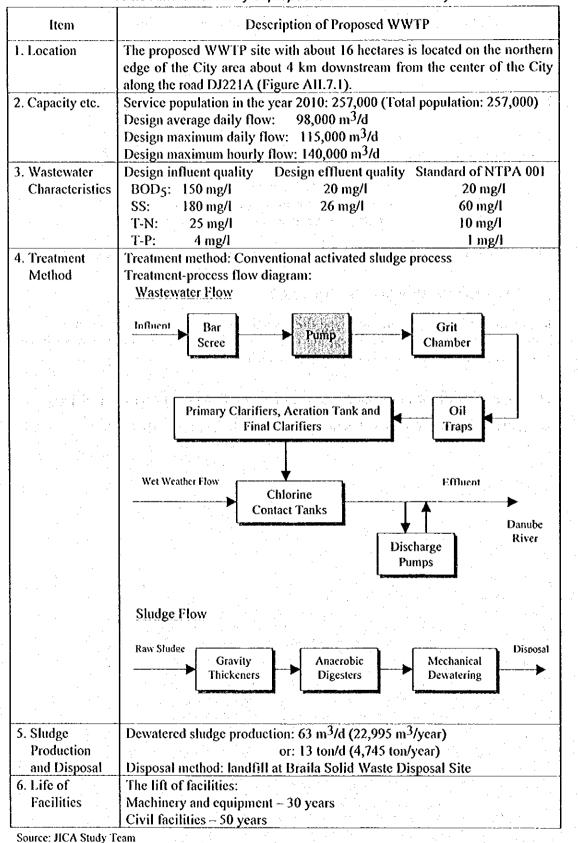


Table All.7.1 Summary of proposed WWTP in Braila City

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### 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 All.7.2.

ltem	Description	
1. Climate	The climate of Braila City belongs to the continental climate sector	г. ,
2. Temperature	The average annual temperature in Braila City:	11°C
	The average monthly temperature in July (the hottest month):	23.1°C
	The average monthly temperature in Jan. (the coldest month):	- 2.3°C
3. Freezing Day	The average number of snowfalls day	15 days
	The average number of snow covering day: days	41.6
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 frequencie to 28.4%	s are 25.4%

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.

Indicator	Maximum Concentration	Maximum Accepted Concentratio
		(MAC)
NO <sub>2</sub> (μg/m <sup>3</sup> )	60	100
SO <sub>2</sub> (μg/m <sup>3</sup> )	153	250

Table All.7.3 Average concentrations of gaseous pollutants

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

Parameter	Boundary fence	50m from boundary fence	150 m from boundary fence	Limits for 30 minutes sampling period according to RS 12574/1987
H <sub>2</sub> S (mg/m <sup>3</sup> )	0	0	0	0.015
NH3 (mg/m <sup>3</sup> )	0.105	0.105	0.105	0.3
Odor Level	1	1	1	5

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

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:

- A locssial level with a thickness of 10 11 m that is sensitive at humectation and consists in locssial clay dusts, clay locss and dusty locss;
- 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<sup>-5</sup> 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<sub>s</sub>=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

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### (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.

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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 cater, sparrow hawk, turtle dove, buzzard, fisher eagle and little owl individuals but not so many of them. And the design of the sector and the sector

(1) The provide most of the completence of the providence of th 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**

### **Ground Water** (1) 🗄

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. as the loss assessed on the benchmark and a weather and a specific pair

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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. 1. 注意的 化合合合金 化合合金 化合合金 化合合金 化合合金

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:

- 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;
- 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;
- the permeability coefficient of the same layer is 10<sup>-5</sup> 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.

Part All/Braila: Appendix-7 Environmental Impact Assessment Survey

### (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  $2.4 \times 10^6$  no./100ml to  $2.4 \times 10^8$  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  $2.8 \times 10^3$  no./100ml to  $3.5 \times 10^3$  no./100ml, which has exceeded the standard ( $1 \times 10^2$  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 ( $1 \times 10^6$  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<sub>5</sub>: 3,824 mg/l, COD<sub>Mn</sub>: 7,742 mg/l), NH<sub>4</sub>-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  $(3.5 \times 10^8 \text{ no}/100\text{ ml})$ . 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<sup>3</sup>/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 All.7.5, the results of groundwater survey at/around the SWDS indicated that the number of Coliform Group ranged from  $1.6 \times 10^2$  no./100ml (upstream) to  $2.4 \times 10^4$  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.

Parameters	Max.	Upstream	Downstream 1	Downstream 2
	Desirable-	OF SWDS	Of SWDS	OfSWDS
	Max. Permissible			
Color	2-2	1.2	9.1	8.5
$pH_{\rm production} = \frac{1}{2} $	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 and 5	1 <b>9</b> - Same Adams	25,3 March 1996
Total number of bacteria at 37°C UFC/cm <sup>3</sup>	Under 300	Over 300	Over 300	Over 300
Coliform bacteria/100 cm <sup>3</sup>	Under 10	1,609	24,000	5,420
Fecal Coliforms/100 cm <sup>3</sup>	Under 2	22	180	<b>27</b> (1) (1) (1)
Fecal streptococcus/100	Under 2	7	79	<b>7</b> .
cm <sup>3</sup> and the second second				

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

### (3) Hydrological Situation

According to F/S Study the flow rate  $(1.62 \text{ m}^3/\text{s}, \text{maximum hourly flow})$  of effluent from WWTP is insignificant comparing with the flow rate of the Danube River  $(1,350 \text{ m}^3/\text{s}, \text{drought-period flow})$ . 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 All.7.6 based on the F/S Study. From this Table 2,651 tons of BOD5 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.

Effluent Characteristics	Without Project	With Project	Reduction
Average Flow Rate (m <sup>3</sup> /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

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

Moreover, 715 tons of BOD5 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 BOD5 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).

Receive Flow (1	n <sup>3</sup> /s)	Q <sub>min</sub> =1,350	terre grade de	Q <sub>avg</sub> =6,000		
Effluent Flow (	m <sup>3</sup> /s)	Qd avg=1.14	Q <sub>h max</sub> =1.62	$Q_{d avg} = 1.14$	Q <sub>h max</sub> =1.62	
ltem		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	
NH4 (mg/l)	0.1	0.091	0.093	0.074	0.075	

Table All.7.7 Maximum concentration of pollutant in the mixture

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:

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- 1) The Danube River has a high capacity of uptaking these elements by dilution (in droughtperiod 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 All.7.8.

	Soil (Bra	uila)			Sludge	in existi	ng WWTI	>
ltem	WWTP	Sludge Dispósal site (Inside)	Słudge Disposał site (outside)	Max. Desirable - Max. Permissible	Min.	Max.	Averag e	Max. Permissible Values of Standard
C <sub>d</sub> (mg/l)	0	1.5	0	1-5	0	0	0	10
C <sub>r</sub> (mg/l)	0	6.8	6	30-300	0	0	0	500
C <sub>u</sub> (mg/l)	5.75	40.75	7.4	20-250	28	137	66	500
M <sub>n</sub> (mg/l)	435	475	380	900-2,000	-	-	• •	
N, (mg/l)	17	24.75	4.5	20-200	0	0	0	100
P <sub>b</sub> (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

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

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<sub>2</sub>S (0 mg/m<sup>3</sup>), NH<sub>3</sub> (0.105 mg/m<sup>3</sup>) and odor level (Level 1) on the WWTP boundary fence are under Romania Standard 12574/1987 (H<sub>2</sub>S: 0.015 mg/m<sup>3</sup>, NH<sub>3</sub>: 0.3 mg/m<sup>3</sup> and odor level: Level 5). These results show that hydrogen sulfide and

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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 All.7.9 presented the results of measurements for odor in/around existing WWTP site.

City	Parameter	Boundary fence	50m from boundary fence	150 m from boundary fence	Limits for 30 minutes sampling period according to RS 12574/1987
	H <sub>2</sub> S (mg/m <sup>3</sup> )	0.45	0.48	0.42	0.015
Roman	NH3 (mg/m <sup>3</sup> )	0.33	0.35	0.35	0.3
	Odor Level	4	4	4	5
	H2S (mg/m <sup>3</sup> )	0.35	0.05	0.033	0,015
Constant a	NH3 (mg/m <sup>3</sup> )	0.3	0.11	0.10	<b>0.3</b>
	Odor Level	4	3	3	5

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

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<sup>3</sup>), NH<sub>3</sub> (0.3 mg/m<sup>3</sup>) 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.

- 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<sup>-</sup>, COD<sub>Mn</sub>, 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

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### 3.2 ABBERVIATIONS

AF	= Average Flow
АРМ	= 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
МАС	= Maximum Allowable Concentration
MAF	= Multi-annual Average Flow
ΜΑΥ	= Maximum Allowable Value
МО	= 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.



	Max. Desirable (MD) - Max. Permissible (MP)								
	M Average (1	8.04	407	0.65	27 - 2	24	323 9	17	:
	VV .XeW	8.49 8	1.500	3.25 0	140	134.25	475 3	34.25	
	Min	7.42 8.	143 1.4	0 3	0	0 134	155 4'	4.5 34	7 5 1 80
7		7.8 7.	355 1	0	12.5	3.5	280	15.25	20.95
Tulcea	Tulcea Sludge Tulcea Sludge Disposal Site Disposal Site (Inside) (Outside)	7 89	- 548	1 75	65	40.25	400	21.75	-04
	Tulcea WWTP	7.94	143	0	13	0	365	8.25	21.25
	Galati Sludge Disposal Site (Outside)	8.18	230	0	6	3	155	16.5	- 19
ati	Galati Sludge Disposal Site (insiuc) (Outside)	8.42	1500	3.25	140	134.25	280	34.25	180
Galati	Braila Studge Braila Studge Gatati WWTP Gatati WWTP Disposal Site Disposal Site No.1 (Free Pumping Station (Inside) Zone) Zone) No.3 Area	8.02	208	0	13.8	2.8	254	14.25	17.5
	Galati WWTP No.1 (Free Zone)	7.42	190	0	12.5	3.5	210	11.5	29.5
	Braila Sludge Galati W Disposal Site No.1 (Outside) Zone	8.01	170	0	0	7,4	380	4.5	7.5
Braila	Braila Sludge Disposal Site (Inside)	8.49	480	1.5	6.8	40:75	. 475	24.75	44.6
	Braila WWTP	8.26	246	0	0	5.75	435	17	. 8.2
- -	Analysis Method	R.S. 7184/13-79	R.S. 7184/7-87	AAS Method	AAS Method	AAS Method	AAS Method	AAS Method	AAS Method
	Parameters	Hd	Electrical Conductivity (µS/cm) R.S. 7184/7-87	Cadmium - Cd (ppm)	Chromium - Cr (ppm)	Copper - Cu (ppin)	Manganese - Ma (ppm)	Nickel - Ni (ppm)	Lead - Pb (com)

Table All.7.10 Summary of Analysis Results for Soil

AII-7-20

1,000

3

429.20

<u>0</u>

9

168.8

E

6.4

429.2

10.21

11 48

10,4

82.6

21.18

Total hydrocarbons in oil (ppm) | R.S. 7877/87



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

	Ron	Roman Wastewater Treatment Plant	tment Plant		Const	Constanta Wastewater Treatment Plunt	atment Plan			 -		
Parameters	Crude Sludge from Mechanical System	Crude Sludge from Biologian System (Activited Sludge)	Digosted Sludge	Dewatered Sludge	Crude Sludge from Mechanical System	Crude Sludge from Biologiaul Syxtem (Activited Sludge)	Digested Sludge	Dewatered Sludge	Min.	Max.	Average	Max. Permissible Values Proposed in Romania Stundard 1988 (MP)
and the second	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	1
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)	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	S1.34	78.74	27.53	78.74	46.90	
Cadmium - Cd (mg/kg TS)	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
Leud - Pb (mg/kg TS)	48.45	12.7	8.45	80.82	93.31	43,31	38.54	101.52	~	102	53	300
Zine - Zn (møkg 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	

All-7-21