Appendix for Chapter 10

Cost Estimation

Appendix 10.1 Cost Function for STP

The cost function which can be used in Syria is examined. The cost function in Japan is used as a base.

The Cost Function in Japan [Source: The Japan Sewege Works Association]

C_J= 327.75Q+854.31 [Million Yen]

Note: 1) Q : 10^3 m^3/day
2) Treatment Method : Oxidation Ditch
3) Including Sludge Thickening and Dewatering Facility
4) Including Overhead costs

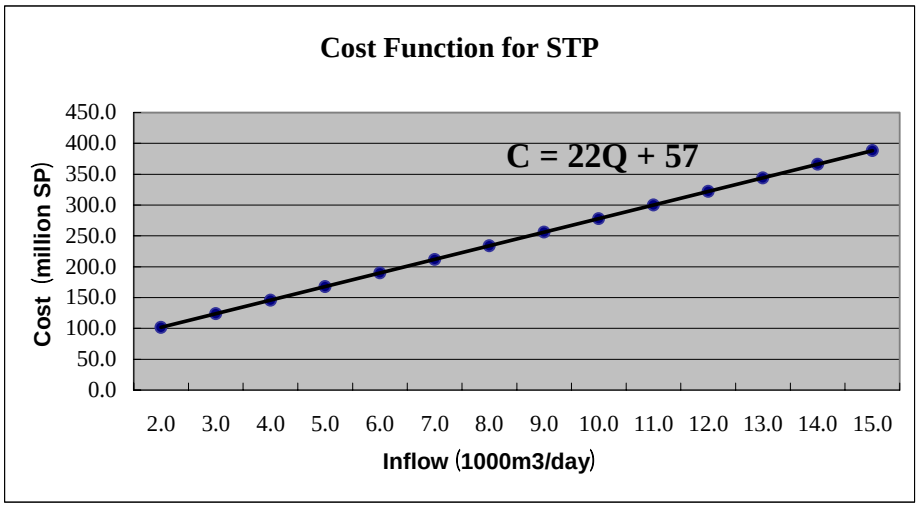
Referring to the above-mentioned function,
As a result of studying the existing track record, the design data in syria and the track record in a developing country,
The compensating rate by which the above-mentioned function is multiplied is set to **0.15**.

Therefore,

C_{SYR}= 0.15× (327.75Q+854.31)
= 49.16Q+128.15 [Million Yen]
= 21.85Q+56.96 [Million SP] (1SP=**2.25**Yen)
say = **22Q + 57** [Million SP]

Note: 1) Q : 10^3 m^3/day [Daily average Flow]
2) Treatment Method : Oxidation Ditch
3) Including Sludge Thickening and Dewatering Facility
4) Including Overhead costs

Inflow(10^3m^3／day)		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Cost	(Million SP)	101.6	123.6	145.6	167.7	189.8	211.8	233.8	255.9	277.9	300.0	322.0	344.1	366.1	388.2



In addition, the Correction factor by the difference in a treatment system was set up in consideration of a treatment process and the existence of equipment as follows.

Correction factor

[Wastewater Treatment]
Oxidation Ditch 1.0 (Basis)
Contact aeration process 0.8
Wet-land process 0.6

[Sludge Treatment]
Thickening
Mechanical Thickening 1.0 (Basis)
Gravel Thickening 0.95
Dewatering
Mechanical Dewatering 1.0 (Basis)
Drying Bed 0.75

The above-mentioned Cost function is multiplied by this Correction factor for every treatment system.

Appendix 10.2 Project Cost Estimation

(1) Slunfeh Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	3	28.17 Mil.SP/set	84,504,000
Q= 610 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 70.42 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Submerged attached methods 0.8				
Sludge treatment				
No Sludge treatment 0.5				
Total 28.168 Mil.SYP			Sub-total	84,504,000
Pipelines				
Dia.100mm PVC	m	1,000	2000 SP/m	2,000,000
Dia.250mm PVC	m	7,900	3000 SP/m	23,700,000
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m		4500 SP/m	0
Dia.500mm HDPE	m		6000 SP/m	0
Dia.600mm HDPE	m		8000 SP/m	0
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m		12500 SP/m	0
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	25,700,000
Pumping Station				
Q= <1m^3/min	set	2	0.7 Mil.SP/set	1,340,000
Q= <3m^3/min	set		1 Mil.SP/set	0
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	1,340,000
Construction Cost (1)				**111,544,000**
Engineering Services Cost (2) = (1)*10%				**11,154,400**
Physical Contingency (3) = (1)*10%				**11,154,400**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	1000	1000 SP/m^2	1,000,000
	m^2	2000	0 SP/m^2	0
Administration Cost (5% of Construction Cost (1))				5,577,200
Institutional Development Cost (3% of Construction Cost (1))				3,346,320
			Sub-total	**9,923,520**
Total Project Cost (1)+(2)+(3)+(4)				**143,776,320**

(2) Banias Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	463 Mil.SP/set	462,954,000
Q= 19,560 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 487.32 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Oxidation Ditch Process 1.0				
Sludge treatment				
Gravity Thickening 0.95				
Mechanical Dewatering 1.0				
Total 462.95 Mil.SYP			Sub-total	462,954,000
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m	4,980	3000 SP/m	14,940,000
Dia.300mm PVC	m	1,680	3500 SP/m	5,880,000
Dia.400mm PVC	m	1,540	4500 SP/m	6,930,000
Dia.500mm HDPE	m	3,640	6000 SP/m	21,840,000
Dia.600mm HDPE	m	4,620	8000 SP/m	36,960,000
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m		12500 SP/m	0
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	86,550,000
Pumping Station				
Q= <1m^3/min	set	10	0.7 Mil.SP/set	6,700,000
Q= <3m^3/min	set	8	1 Mil.SP/set	8,000,000
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	14,700,000
Construction Cost (1)				**564,204,000**
Engineering Services Cost (2) = (1)*10%				**56,420,400**
Physical Contingency (3) = (1)*10%				**56,420,400**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	51,000	2500 SP/m^2	127,500,000
Administration Cost (5% of Construction Cost (1))				28,210,200
Institutional Development Cost (3% of Construction Cost (1))				16,926,120
			Sub-total	**172,636,320**
Total Project Cost (1)+(2)+(3)+(4)				**849,681,120**

(3) Mayadin Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	295.2 Mil.SP/set	295,200,000
Q= 15,300 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 393.6 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Oxidation Ditch Process 1.0				
Sludge treatment				
Mechanical Thickening 1.0				
Drying Bed 0.75				
Total 295.20 Mil.SYP			Sub-total	295,200,000
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m		3000 SP/m	0
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m	3,500	4500 SP/m	15,750,000
Dia.500mm HDPE	m		6000 SP/m	0
Dia.600mm HDPE	m		8000 SP/m	0
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m	1,000	12500 SP/m	12,500,000
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	28,250,000
Pumping Station				
Q= <1m^3/min	set		0.7 Mil.SP/set	0
Q= <3m^3/min	set	2	1 Mil.SP/set	2,000,000
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	2,000,000
Construction Cost (1)				**325,450,000**
Engineering Services Cost (2) = (1)*10%				**32,545,000**
Physical Contingency (3) = (1)*10%				**32,545,000**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	59,000	0 SP/m^2	0
Administration Cost (5% of Construction Cost (1))				16,272,500
Institutional Development Cost (3% of Construction Cost (1))				9,763,500
			Sub-total	**26,036,000**
Total Project Cost (1)+(2)+(3)+(4)				**416,576,000**

(4) Malkieh Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	117.3 Mil.SP/set	117,330,000
Q= 4,520 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 156.44 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Oxidation Ditch Process 1.0				
Sludge treatment				
Mechanical Thickening 1.0				
Drying Bed 0.75				
Total 117.33 Mil.SYP			Sub-total	117,330,000
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m		3000 SP/m	0
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m		4500 SP/m	0
Dia.500mm HDPE	m	100	6000 SP/m	600,000
Dia.600mm HDPE	m		8000 SP/m	0
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m		12500 SP/m	0
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	600,000
Pumping Station				
Q= <1m^3/min	set		0.7 Mil.SP/set	0
Q= <3m^3/min	set		1 Mil.SP/set	0
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	0
Construction Cost (1)				**117,930,000**
Engineering Services Cost (2) = (1)*10%				**11,793,000**
Physical Contingency (3) = (1)*10%				**11,793,000**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	26,000	0 SP/m^2	0
Administration Cost (5% of Construction Cost (1))				5,896,500
Institutional Development Cost (3% of Construction Cost (1))				3,537,900
			Sub-total	**9,434,400**
Total Project Cost (1)+(2)+(3)+(4)				**150,950,400**

(5) Thawra Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	182.5 Mil.SP/set	182,484,900
Q= 17,890 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 450.58 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Wet-land 0.6				
Sludge treatment				
No Thickening 0.90				
Drying Bed 0.75				
Total 182.48 Mil.SYP			Sub-total	182,484,900
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m		3000 SP/m	0
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m		4500 SP/m	0
Dia.500mm HDPE	m	100	6000 SP/m	600,000
Dia.600mm HDPE	m	1,300	8000 SP/m	10,400,000
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m		12500 SP/m	0
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	11,000,000
Pumping Station				
Q= <1m^3/min	set		0.7 Mil.SP/set	0
Q= <3m^3/min	set		1 Mil.SP/set	0
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	0
Construction Cost (1)				**193,484,900**
Engineering Services Cost (2) = (1)*10%				**19,348,490**
Physical Contingency (3) = (1)*10%				**19,348,490**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	24,000	0 SP/m^2	0
Administration Cost (5% of Construction Cost (1))				9,674,245
Institutional Development Cost (3% of Construction Cost (1))				5,804,547
			Sub-total	**15,478,792**
Total Project Cost (1)+(2)+(3)+(4)				**247,660,672**

(6) Muzerib Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	58.64 Mil.SP/set	58,635,900
Q= 3,990 m^3/day				
C= 22Q+57 [Q=10^3m^3/day]				
= 144.78 Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Wet-land 0.6				
Sludge treatment				
No Thickening 0.90				
Drying Bed 0.75				
Total 58.64 Mil.SYP			Sub-total	58,635,900
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m		3000 SP/m	0
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m	5,800	4500 SP/m	26,100,000
Dia.500mm HDPE	m	4,000	6000 SP/m	24,000,000
Dia.600mm HDPE	m		8000 SP/m	0
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m		12500 SP/m	0
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	50,100,000
Pumping Station				
Q= <1m^3/min	set		0.7 Mil.SP/set	0
Q= <3m^3/min	set		1 Mil.SP/set	0
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	0
Construction Cost (1)				**108,735,900**
Engineering Services Cost (2) = (1)*10%				**10,873,590**
Physical Contingency (3) = (1)*10%				**10,873,590**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	49,000	500 SP/m^2	24,500,000
Administration Cost (5% of Construction Cost (1))				5,436,795
Institutional Development Cost (3% of Construction Cost (1))				3,262,077
			Sub-total	**33,198,872**
Total Project Cost (1)+(2)+(3)+(4)				**163,681,952**

(7) Zabadani Project

(Unit : SP)

Description	Unit	Quantity	Unit Price	Amount
Sewerage Treatment Plant	set	1	- Mil.SP/set	509,300,000
Q= 22,200 m^3/day			*Refer to cost estimate in F/S report	
C= 22Q+57 [Q=$10^3 m^3$/day]				
= - Mil.SYP				
[Correction factor] ***Wastewater treatmnent***				
Pumping Station 1.1				
Oxidation Ditch Process 1.0				
Sludge treatment				
Gravity Thickening 0.95				
Mechanical Dewatering 1.0				
Total Mil.SYP			Sub-total	509,300,000
Pipelines				
Dia.100mm PVC	m		2000 SP/m	0
Dia.250mm PVC	m		3000 SP/m	0
Dia.300mm PVC	m		3500 SP/m	0
Dia.400mm PVC	m		4500 SP/m	0
Dia.500mm HDPE	m		6000 SP/m	0
Dia.600mm HDPE	m		8000 SP/m	0
Dia.700mm HDPE	m		10500 SP/m	0
Dia.800mm HDPE	m	100	12500 SP/m	1,250,000
Dia.900mm HDPE	m		15500 SP/m	0
Dia.1000mm HDPE	m		18000 SP/m	0
			Sub-total	1,250,000
Pumping Station				
Q= <1m^3/min	set		0.7 Mil.SP/set	0
Q= <3m^3/min	set		1 Mil.SP/set	0
Q= m^3/min	set		0 Mil.SP/set	0
C= $7.6Q^{0.598}$ [Q=m^3/min]				
= Mil.SYP				
			Sub-total	0
Construction Cost (1)				**510,550,000**
Engineering Services Cost (2) = (1)*10%				**51,055,000**
Physical Contingency (3) = (1)*10%				**51,055,000**
Compensation and Project-related Expense (4)				
Land Acquisition Cost	m^2	55,000	0 SP/m^2	0
Administration Cost (5% of Construction Cost (1))				25,527,500
Institutional Development Cost (3% of Construction Cost (1))				15,316,500
			Sub-total	**40,844,000**
Total Project Cost (1)+(2)+(3)+(4)				**653,504,000**

Appendix for Chapter 11

Economic Analysis for Master Plan Priority Area

(1) Economic Analysis for Master Plan Priority Area in Lattakia

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-6,940	-65,725	-95,891													
O&M costs						-4,841	-3,784	-4,056	-4,348	-4,661	-7,128	-5,357	-5,743	-6,156	-9,015	-12,680	-10,360	-11,105
Economic benefits																		
Tourism development						40,879	43,822	46,977	50,359	53,985	57,872	62,039	66,506	71,294	76,427	81,930	87,829	94,153
Health benefits - productive time lost						886	957	1,033	1,116	1,205	1,301	1,405	1,517	1,626	1,743	1,868	2,003	2,147
Health benefits - medical expenditure						1,235	1,334	1,441	1,556	1,680	1,814	1,959	2,115	2,268	2,431	2,606	2,793	2,995
Treated wastewater use						729	795	866	944	1,029	1,121	1,221	1,329	1,437	1,554	1,680	1,816	1,963
Use of sludge						47	50	53	57	61	66	71	76	81	87	93	100	107
Net economic benefits	**0**	**0**	**-6,940**	**-65,725**	**-95,891**	**38,887**	**43,123**	**46,261**	**49,627**	**53,238**	**54,980**	**61,267**	**65,724**	**70,469**	**73,140**	**75,405**	**84,082**	**90,153**
EIRR =	**25.5%**																	

Assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*2,560*	*2,580*	2,600	*2,620*	*2,640*	*2,660*	*2,680*	2,700	*2,720*	*2,740*	*2,760*	*2,780*	2,800	*2,800*	*2,800*	*2,800*	*2,800*	2,800
Generated wastewater / treated water (m^3/day)	*1,437*	*1,463*	1,489	*1,515*	*1,541*	*1,568*	*1,594*	1,620	*1,647*	*1,675*	*1,702*	*1,730*	1,757	*1,772*	*1,787*	*1,803*	*1,818*	1,833
Total population of Syria (2006)	21,061,000																	
Population as % of the total Syria	0.012%																	
Capital expenditure, total (SP '000)	177,427																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in MP priority area / year	462,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to illness, total in Syria	176,900																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	3.00																	
Sludge produced (m^3/day)	0.9																	

(2) Economic Analysis for Master Plan Priority Area in Tartous

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-164,284	-235,188	-326,921	-281,261												
O&M costs							-17,832	-18,135	-19,441	-20,841	-22,341	-26,234	-25,674	-27,523	-42,944	-46,036	-52,585	-52,904
Economic benefits																		
Tourism development							20,868	22,370	23,981	25,707	27,558	29,542	31,669	33,950	36,394	39,014	41,823	44,835
Health benefits - productive time lost							22,208	24,564	27,194	30,076	33,231	36,685	40,464	44,643	49,214	54,212	59,675	65,644
Health benefits - medical expenditure							30,972	34,259	37,927	41,945	46,346	51,163	56,433	62,261	68,637	75,608	83,226	91,550
Treated wastewater use							6,436	7,177	8,028	8,964	9,994	11,125	12,368	13,779	15,329	17,031	18,899	20,947
Use of sludge							1,219	1,306	1,400	1,501	1,609	1,725	1,849	1,983	2,125	2,278	2,442	2,618
Net economic benefits	**0**	**0**	**-164,284**	**-235,188**	**-326,921**	**-281,261**	**62,652**	**70,235**	**77,689**	**85,852**	**94,788**	**102,281**	**115,259**	**127,110**	**126,630**	**139,829**	**151,039**	**170,072**

EIRR = 3.2%

Assumptions

Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*50,340*	*52,320*	54,300	*56,280*	*58,260*	*60,240*	*62,220*	64,200	*66,300*	*68,400*	*70,500*	*72,600*	74,700	*76,880*	*79,060*	*81,240*	*83,420*	85,600
Generated wastewater / treated water (m^3/day)	*9,796*	*10,315*	10,834	*11,353*	*11,872*	*12,391*	*12,910*	13,429	*14,012*	*14,596*	*15,179*	*15,763*	16,346	*16,988*	*17,630*	*18,272*	*18,914*	19,556
Total population of Syria (2006)	21,061,000																	
Population as % of the total Syria	0.239%																	
Capital expenditure, total (SP '000)	1,060,688																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in MP priority area / year	220,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to illness, total in Syria	176,900																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	3.00																	
Sludge produced (m^3/day)	22.0																	

(3) Economic Analysis for Master Plan Priority Area in Deir-Ez-zor

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-17,168	-137,252	-189,689	-159,223												
O&M costs							-12,010	-11,389	-12,209	-13,088	-14,031	-17,325	-16,124	-17,285	-26,892	-28,828	-34,137	-33,129
Economic benefits																		
Tourism development							1,138	1,220	1,308	1,402	1,503	1,611	1,727	1,852	1,985	2,128	2,281	2,446
Health benefits - productive time lost							32,980	36,502	40,131	44,093	48,418	53,137	58,285	63,585	69,346	75,606	82,409	89,800
Health benefits - medical expenditure							45,995	50,908	55,969	61,495	67,527	74,108	81,287	88,679	96,713	105,445	114,933	125,240
Treated wastewater use							902	1,008	1,120	1,244	1,380	1,528	1,691	1,864	2,053	2,259	2,485	2,731
Use of sludge							526	564	605	648	695	745	799	856	918	984	1,055	1,131
Net economic benefits	**0**	**0**	**-17,168**	**-137,252**	**-189,689**	**-159,223**	**69,005**	**78,249**	**86,320**	**95,147**	**104,797**	**113,061**	**126,867**	**138,695**	**143,205**	**156,611**	**167,971**	**187,087**

EIRR = 14.7%

Assumptions

Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*74,400*	*77,400*	80,400	*83,400*	*86,400*	*89,400*	*92,400*	95,400	*97,840*	*100,280*	*102,720*	*105,160*	107,600	*109,500*	*111,400*	*113,300*	*115,200*	117,100
Generated wastewater / treated water (m^3/day)	*8,105*	*8,563*	9,022	*9,481*	*9,939*	*10,398*	*10,856*	11,315	*11,735*	*12,154*	*12,574*	*12,993*	13,413	*13,790*	*14,166*	*14,543*	*14,919*	15,296

Total population of Syria (2006)	21,061,000
Population as % of the total Syria	0.353%
Capital expenditure, total (SP '000)	529,824
Taxes (overall average)	5%
Economic benefit from one tourist (SP '000)	1.25
Estim. number of tourists in MP priority area / year	12,000
Expected increase of the number of tourists by	5%
Person-years lost due to illness, total in Syria	176,900
Gross domestic income per capita ('SP '000)	70
Achievable reduction of illness	40%
Medical water-related exp. / capita (SP '000)	0.82
Economic value of treated water (SP/m^3)	0.50
Sludge produced (m^3/day)	9.5

(4) Economic Analysis for Master Plan Priority Area in Hassakeh

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-6,189	-49,328	-69,276	-57,623												
O&M costs							-6,211	-4,928	-5,283	-5,664	-6,071	-8,793	-6,977	-7,480	-11,319	-12,134	-16,242	-13,945
Economic benefits																		
Tourism development							569	610	654	701	752	806	864	926	993	1,064	1,141	1,223
Health benefits - productive time lost							10,986	11,938	12,945	14,035	15,216	16,493	17,876	19,337	20,916	22,622	24,465	26,457
Health benefits - medical expenditure							15,322	16,649	18,054	19,574	21,220	23,002	24,930	26,968	29,170	31,550	34,121	36,898
Treated wastewater use							304	334	365	400	437	478	522	570	622	678	740	807
Use of sludge							155	166	178	191	205	220	235	252	271	290	311	333
Net economic benefits	**0**	**0**	**-6,189**	**-49,328**	**-69,276**	**-57,623**	**20,970**	**24,603**	**26,735**	**29,046**	**31,554**	**31,986**	**37,215**	**40,321**	**40,381**	**43,780**	**44,224**	**51,439**

EIRR = 11.4%

Assumptions

Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*28,260*	*28,680*	29,100	*29,520*	*29,940*	*30,360*	*30,780*	31,200	*31,560*	*31,920*	*32,280*	*32,640*	33,000	*33,300*	*33,600*	*33,900*	*34,200*	34,500
Generated wastewater / treated water (m^3/day)	*3,170*	*3,252*	3,334	*3,416*	*3,498*	*3,581*	*3,663*	3,745	*3,824*	*3,903*	*3,983*	*4,062*	4,141	*4,216*	*4,292*	*4,367*	*4,443*	4,518

Total population of Syria (2006)	21,061,000
Population as % of the total Syria	0.134%
Capital expenditure, total (SP '000)	192,017
Taxes (overall average)	5%
Economic benefit from one tourist (SP '000)	1.25
Estim. number of tourists in MP priority area / year	6,000
Expected increase of the number of tourists by	5%
Person-years lost due to illness, total in Syria	176,900
Gross domestic income per capita ('SP '000)	70
Achievable reduction of illness	40%
Medical water-related exp. / capita (SP '000)	0.82
Economic value of treated water (SP/m^3)	0.50
Sludge produced (m^3/day)	2.8

(5) Economic Analysis for Master Plan Priority Area in Raqqa

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-9,626	-77,456	-115,814	-96,875												
O&M costs							-8,397	-7,272	-7,796	-8,357	-8,959	-11,888	-10,295	-11,036	-16,966	-18,187	-22,730	-20,900
Economic benefits																		
Tourism development							569	610	654	701	752	806	864	926	993	1,064	1,141	1,223
Health benefits - productive time lost							31,631	34,704	38,162	41,939	46,062	50,560	55,468	60,995	67,030	73,618	80,807	88,649
Health benefits - medical expenditure							44,114	48,400	53,223	58,490	64,240	70,514	77,359	85,067	93,484	102,671	112,698	123,635
Treated wastewater use							1,036	1,146	1,273	1,412	1,565	1,732	1,915	2,126	2,357	2,611	2,889	3,194
Use of sludge							327	350	376	403	432	463	496	532	570	611	655	702
Net economic benefits	**0**	**0**	**-9,626**	**-77,456**	**-115,814**	**-96,875**	**68,952**	**77,588**	**85,516**	**94,185**	**103,659**	**111,724**	**125,311**	**138,078**	**146,898**	**161,777**	**174,804**	**195,801**

EIRR = 24.1%

Assumptions

Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*76,140*	*78,220*	80,300	*82,380*	*84,460*	*86,540*	*88,620*	90,700	*93,040*	*95,380*	*97,720*	*100,060*	102,400	*105,040*	*107,680*	*110,320*	*112,960*	115,600
Generated wastewater / treated water (m^3/day)	*10,076*	*10,474*	10,873	*11,272*	*11,670*	*12,069*	*12,467*	12,866	*13,330*	*13,794*	*14,258*	*14,722*	15,186	*15,727*	*16,267*	*16,808*	*17,348*	17,889
Total population of Syria (2006)	21,061,000																	
Population as % of the total Syria	0.362%																	
Capital expenditure, total (SP '000)	315,549																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in MP priority area / year	6,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to illness, total in Syria	176,900																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	0.50																	
Sludge produced (m^3/day)	5.9																	

(6) Economic Analysis for Master Plan Priority Area in Dar'aa

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	0	-31,586	-68,008	-89,256													
O&M costs						-4,022	-3,103	-3,326	-3,566	-3,822	-6,228	-4,393	-4,709	-5,048	-7,061	-10,586	-8,115	-8,699
Economic benefits																		
Tourism development						17,696	18,970	20,336	21,801	23,370	25,053	26,857	28,790	30,863	33,085	35,468	38,021	40,759
Health benefits - productive time lost						12,652	13,849	15,152	16,530	18,028	19,656	21,425	23,346	25,387	27,601	30,002	32,606	35,429
Health benefits - medical expenditure						17,645	19,314	21,132	23,054	25,143	27,413	29,880	32,560	35,407	38,494	41,843	45,474	49,411
Treated wastewater use						1,400	1,540	1,693	1,862	2,046	2,247	2,467	2,706	2,969	3,255	3,567	3,907	4,278
Use of sludge						67	72	77	83	89	95	102	109	117	126	135	144	155
Net economic benefits	**0**	**0**	**-31,586**	**-68,008**	**-89,256**	**45,372**	**50,570**	**54,987**	**59,680**	**64,765**	**68,141**	**76,235**	**82,695**	**89,578**	**95,375**	**100,294**	**111,894**	**121,178**
EIRR =	**26.1%**																	

Assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*34,000*	*34,800*	35,600	*36,400*	*37,200*	*38,000*	*38,800*	39,600	*40,300*	*41,000*	*41,700*	*42,400*	43,100	*43,720*	*44,340*	*44,960*	*45,580*	46,200
Generated wastewater / treated water (m^3/day)	*2,615*	*2,694*	2,773	*2,852*	*2,931*	*3,010*	*3,089*	3,168	*3,250*	*3,332*	*3,413*	*3,495*	3,577	*3,660*	*3,744*	*3,827*	*3,911*	3,994
Total population of Syria (2006)	21,061,000																	
Population as % of the total Syria	0.161%																	
Capital expenditure, total (SP '000)	198,789																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in MP priority area / year	200,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to illness, total in Syria	176,900																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	3.00																	
Sludge produced (m^3/day)	1.3																	

(7) Economic Analysis for Master Plan Priority Area in Damascus Rural

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	-24,848	-145,038	-357,740	-204,802				-349	-9,197								
O&M costs						-24,572	-25,276	-27,683	-30,306	-33,163	-38,406	-39,663	-43,350	-47,341	-51,682	-59,418	-61,534	-67,112
Economic benefits																		
Tourism development						100,869	108,132	115,917	124,263	133,210	142,801	153,083	164,105	175,921	188,587	202,165	216,721	232,325
Health benefits - productive time lost						18,918	20,616	22,460	24,405	26,514	28,800	31,278	33,963	36,804	39,877	43,202	46,799	50,690
Health benefits - medical expenditure						26,385	28,752	31,324	34,037	36,978	40,166	43,622	47,367	51,328	55,614	60,252	65,268	70,695
Treated wastewater use						8,096	8,889	9,754	10,685	11,701	12,807	14,012	15,324	16,744	18,288	19,967	21,794	23,780
Use of sludge						1,421	1,523	1,633	1,751	1,877	2,012	2,157	2,312	2,478	2,657	2,848	3,053	3,273
Net economic benefits	**0**	**-24,848**	**-145,038**	**-357,740**	**-204,802**	**129,696**	**141,112**	**151,772**	**162,736**	**166,043**	**186,169**	**202,333**	**217,410**	**233,456**	**250,684**	**266,168**	**289,048**	**310,378**

EIRR = 18.0%

Assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for MP priority area	*52,120*	*53,060*	54,000	*54,940*	*55,880*	*56,820*	*57,760*	58,700	*59,500*	*60,300*	*61,100*	*61,900*	62,700	*63,380*	*64,060*	*64,740*	*65,420*	66,100
Generated wastewater / treated water (m^3/day)	*15,303*	*15,724*	16,145	*16,566*	*16,987*	*17,408*	*17,829*	18,250	*18,651*	*19,052*	*19,452*	*19,853*	20,254	*20,643*	*21,033*	*21,422*	*21,812*	22,201
Total population of Syria (2006)	21,061,000																	
Population as % of the total Syria	0.247%																	
Capital expenditure, total (SP '000)	781,025																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in MP priority area / year	1,140,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to illness, total in Syria	176,900																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	3.00																	
Sludge produced (m^3/day)	27.5																	

(8) Economic Analysis for Master Plan Average

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditure, excl. tax	0	-24,848	-380,832	-990,696	########	-594,982	0	0	-349	-9,197								
O&M costs						-33,435	-76,613	-76,789	-82,949	-89,596	-103,164	-113,653	-112,872	-121,869	-165,879	-187,869	-205,703	-207,794
Economic benefits																		
Tourism development						159,444	194,068	208,041	223,020	239,078	256,291	274,744	294,526	315,731	338,464	362,834	388,958	416,962
Health benefits - productive time lost						32,456	133,225	146,353	160,484	175,890	192,683	210,983	230,919	252,376	275,727	301,131	328,764	358,816
Health benefits - medical expenditure						45,265	185,804	204,112	223,819	245,306	268,727	294,249	322,052	351,978	384,544	419,974	458,513	500,424
Treated wastewater use						10,225	19,902	21,977	24,278	26,796	29,550	32,563	35,856	39,489	43,458	47,795	52,530	57,700
Use of sludge						1,535	3,872	4,151	4,450	4,770	5,113	5,482	5,876	6,299	6,753	7,239	7,760	8,319
Net economic benefits	**0**	**-24,848**	**-380,832**	**-990,696**	########	**-381,027**	**456,386**	**503,694**	**548,303**	**588,277**	**644,088**	**698,886**	**770,481**	**837,706**	**876,314**	**943,864**	**1,023,062**	**1,126,108**
Generated wastewater / treated water ('000 m^3/year)	18,433	19,157	19,882	20,606	21,330	22,055	22,779	23,503	24,254	25,004	25,755	26,505	27,256	28,031	28,806	29,580	30,355	31,130
Unit O&M cost (SP/m^3, in 2008 prices)							2.2	2.0	2.0	1.9	2.0	2.0	1.8	1.8	2.2	2.2	2.2	2.0
NPV for Master Plan Total (at 10%)	**764,641**																	
Average EIRR for Master Plan	**15.0%**																	
Lattakia	25.5%																	
Tartous	3.2%																	
Deir-Ez-zor	14.7%																	
Hasskeh	11.4%																	
Raqqa	24.1%																	
Dar'aa	26.1%																	
Damascus Rural	18.0%																	

Appendix for Chapter 12

Appendix 12.1 Definition of Attribute Data

Table A12.1.1 The Description of Layers

No	Map (Layer) Name	Type	Source	Description
1	ORGAN_PLAN	Polygon	Provided by Regional Planning of Ministry of Housing and Construction	The polygon for organization plan
2	BOUND_VILLAGE	Polygon	Provided by General Organization of Remote Sensing	Boundary for village or small city
3	WR	Point	Prepared by JICA study team from the result for field survey, 2007	The point for water resources
4	WPS_I	Point	Prepared by JICA study team from the result for field survey, 2007	The point for industrial plant
5	WPS_L	Point	Prepared by JICA study team from the result for field survey, 2007	The point for livestock
6	SEWER	Polyline	Prepared by JICA study team from the result for field survey, 2007	Sewer line
7	STP	Point	Prepared by JICA study team from the result for field survey, 2007	The point for sewerage treatment plant
8	PS	Point	Prepared by JICA study team from the result for field survey, 2007	The point for pumping station

Table A12.1.2 The Definition of Attribute Data

No	Map (Layer) Name	No.	Field Name	Type	With	Unit	Description
1	ORGAN_PLAN	1	id	Integer	15	-	Key ID
		2	Name	String	50	-	Name of the area for organization plan
		3	Pop	Integer	15	person	Population of the area for organization plan
		4	Remark	String	50	-	Remark
2	BOUND_VILLAGE	1	id	Integer	15	-	Key ID
		2	Name	String	50	-	Name of the village or small city
		3	Pop	Integer	15	person	Population of the village or small city
		4	Remark	String	50	-	Remark
3	WR (Water Resources)	1	ID	Integer	15	-	Key ID
		2	LAT_DEG	Integer	9	degree	Latitude (degree)
		3	LAT_MIN	Integer	9	minute	Latitude (minute)
		4	LAT_SEC	Integer	9	second	Latitude (second)
		5	LON_DEG	Integer	9	degree	Longitude (degree)
		6	LON_MIN	Integer	9	minute	Longitude (minute)
		7	LON_SEC	Integer	9	second	Longitude (second)
		8	Name	String	50	-	Name of the water resource
		9	I_Method	Integer	1	-	Intake method <Category> 1: Surface water 2: Groundwater 3: Spring 4: Others
		10	Amount_D	Integer	10	m^3/day	Design amount of intake water
		11	Amount_A	Integer	10	m^3/day	Actual amount of intake water
		12	Remark	String	50	-	Remark
4	WPS_I (Industrial Plant)	1	ID	Integer	15	-	Key ID
		2	LAT_DEG	Integer	9	degree	Latitude (degree)
		3	LAT_MIN	Integer	9	minute	Latitude (minute)
		4	LAT_SEC	Integer	9	second	Latitude (second)
		5	LON_DEG	Integer	9	degree	Longitude (degree)
		6	LON_MIN	Integer	9	minute	Longitude (minute)
		7	LON_SEC	Integer	9	second	Longitude (second)
		8	Name	String	50	-	Name of the industrial plant
		9	I_Sector	Integer	2	-	Industry sector <Category> 1: Olive 2: Food 3: Chemical 4: Construction material 5: Fablic 6: Others
		10	Capa_TD	Integer	10	m^3/day	Design capacity of the industrial pretreatment facility
		11	Capa_TA	Integer	10	m^3/day	Actual capacity of the industrial pretreatment facility
		12	Dis_D	Integer	10	m^3/day	Design amount of dischage
		13	Dis_A	Integer	10	m^3/day	Actual amount of dischage
		14	Dis_LAT_DEG	Integer	9	degree	Latitude (degree)
		15	Dis_LAT_MIN	Integer	9	minute	Latitude (minute)

No	Map (Layer) Name	No.	Field Name	Type	With	Unit	Description
		16	Dis_LAT_SEC	Integer	9	second	Latitude (second)
		17	Dis_LON_DEG	Integer	9	degree	Longitude (degree)
		18	Dis_LON_MIN	Integer	9	minute	Longitude (minute)
		19	Dis_LON_SEC	Integer	9	second	Longitude (second)
		20	WQ_BOD	Integer	5	mg/L	Water quality for BOD
		21	Type_Dis	Integer	1	-	Type of discharge <Category> 1: Drainage or river 2: Sewer 3: Utilization for agriculture 4: Others 5: Non discharge 6: Unknown
		22	Remark	String	50	-	Remark
5	WPS_L (Livestock)	1	ID	Integer	15	-	Key ID
		2	LAT_DEG	Integer	9	degree	Latitude (degree)
		3	LAT_MIN	Integer	9	minute	Latitude (minute)
		4	LAT_SEC	Integer	9	second	Latitude (second)
		5	LON_DEG	Integer	9	degree	Longitude (degree)
		6	LON_MIN	Integer	9	minute	Longitude (minute)
		7	LON_SEC	Integer	9	second	Longitude (second)
		8	Name_L	String	50	-	Name of Location
		9	S_Live	Integer	1	-	Species of livestock <Category> 1: Sheep 2: Cow 3: Poulty 4: Others
		10	Num_H	Integer	10	No	Number of heads
		11	Dis_LAT_DEG	Integer	9	degree	Latitude (degree)
		12	Dis_LAT_MIN	Integer	9	minute	Latitude (minute)
		13	Dis_LAT_SEC	Integer	9	second	Latitude (second)
		14	Dis_LON_DEG	Integer	9	degree	Longitude (degree)
		15	Dis_LON_MIN	Integer	9	minute	Longitude (minute)
		16	Dis_LON_SEC	Integer	9	second	Longitude (second)
		17	WQ_BOD	Integer	5	mg/L	Water quality for BOD
		18	Type_Dis	Integer	1	-	Type of discharge <Category> 1: Drainage or river 2: Sewer 3: Utilization for agriculture 4: Others 5: Non discharge 6: Unknown
		19	Remark	String	50	-	Remark
6	SEWER (Sewer)	1	ID	Integer	15	-	Key ID
		2	Name_L	String	50	-	Neme of area
		3	C_Area	Integer	15	m^2	Catchment area of sewer
		4	S_Pop	Integer	15	person	Served population of sewer
		5	Length	Integer	10	meter	Length
		6	Diameter	Integer	5	mm	Diameter

No	Map (Layer) Name	No.	Field Name	Type	With	Unit	Description
		7	C_Year	String	4	year	Construction year
		8	R_Year	String	50	year	Reparing record (year)
		9	Remark	String	50	-	Remark
7	STP (Sewerage Treatment Plant)	1	ID	Integer	15	-	Key ID
		2	LAT_DEG	Integer	9	degree	Latitude (degree)
		3	LAT_MIN	Integer	9	minute	Latitude (minute)
		4	LAT_SEC	Integer	9	second	Latitude (second)
		5	LON_DEG	Integer	9	degree	Longitude (degree)
		6	LON_MIN	Integer	9	minute	Longitude (minute)
		7	LON_SEC	Integer	9	second	Longitude (second)
		4	Name	String	50	-	Name of sewerage treatment plant
		5	S_Area	Integer	15	m^2	Served area
		6	T_Method	Integer	1	-	Treatment method <Category> 1: Activated Sludge 2: Extended Airation 3: Wet Land 4: Oxidation Ditch 5: Lagoon 6: Others
		7	Capa_D	Integer	10	m^3/day	Design capacity of sewerage treatment plant
		8	Capa_A	Integer	10	m^3/day	Actual capacity of sewerage treatment plant
		9	S_Pop	Integer	15	person	Served population of sewerage treatment plant
		10	C_Year	String	4	year	Construction year
		11	R_Year	String	50	year	Reparing record (year)
		12	Remark	String	50	-	Remark
6	PS (Pumping Station)	1	ID	Integer	15	-	Key ID
		2	LAT_DEG	Integer	9	degree	Latitude (degree)
		3	LAT_MIN	Integer	9	minute	Latitude (minute)
		4	LAT_SEC	Integer	9	second	Latitude (second)
		5	LON_DEG	Integer	9	degree	Longitude (degree)
		6	LON_MIN	Integer	9	minute	Longitude (minute)
		7	LON_SEC	Integer	9	second	Longitude (second)
		4	Name	String	50	-	Name of pumping station
		5	Num_PD	Integer	2	No	Design number of pumps
		6	Num_PA	Integer	2	No	Actual number of pumps
		7	Capa_D	Integer	10	m^3/day	Total design capacity of pumps
		8	Capa_A	Integer	10	m^3/day	Total actual capacity of pumps
		9	C_Year	String	4	year	Construction year
		10	R_Year	String	50	year	Reparing record (year)
		11	Remark	String	50	-	Remark

Table A12.1.3 The GEC's Definition of Attribute Data for the Basic Digital Map and the Ascertainment of Presence for Layers in Seven Governorates

"D" Streams			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
Large rivers	01	1							
Small river from 5-10 meters	02	1				1	1		
River under 5 meters	02	2	1	1	1	1	1	1	1
Seasonal stream dry in summer	03	0	1	1	1	1	1	1	1
Channel wish its width is more than 5 meters	04	1	1				1	1	
Channel wish its width is less than 5 meters	04	2	1	1	1	1	1	1	1
Underground channel	04	3	1	1	1	1	1	1	1
Dam	05	1		1	1		1		
A dam with a serviceable road for vehicles	05	2							
A dam with a path	05	3							
A dam with a (unknown)	05	4							
Waterfalls	06	1							
A dam to narrow a water path	06	2							
Spring	07	1	1	1	1	1	1	1	1
Permanent well	07	2	1	1	1	1	1	1	1
Seasonal well	07	3	1	1	1	1	1	1	1
Factory	07	4	1		1		1		
Circular big tank	08	1	1	1	1	1	1	1	1
Square big tank	08	2	1	1	1	1	1	1	1
Spring	08	3	1	1	1		1		1
Cattle water sources	08	4		1	1		1	1	1
Permanent swamp	09	1	1	1	1	1	1	1	
Seasonal swamp	09	2	1	1	1	1	1	1	1
Fish pool	09	3		1					
Water mill	10	1			1	1	1		1
Fire mill	10	2	1	1	1	1	1	1	1
Wind mill	10	3					1	1	1
Waterwheel	11	1							
Wells in a house	11	2	1			1	1	1	1
Water Pipe line under ground	12	0	1	1	1	1	1	1	1
Water Pipe line above ground	12	2	1	1	1	1	1	1	1
Swimming pool	12	3							
Lakes	13	0		1			1		
Artificial lakes	13	1							
Valleys	13	2							
Marine boarders	13	3			1				

"C" Settlements lines			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
Settlement curves	01	0	1	1	1	1	1	1	1
Intermittent curves	01	1	1	1	1	1	1	1	1
Curves under sea	01	2							
Stony collapse between 1-3 m	02	1		1		1	1	1	
Stony collapse between 3-10 m	02	2	1	1	1	1	1	1	1
Stony collapse more than 10 m	02	3		1	1	1	1	1	1
Rocky sweep	03	0	1	1	1		1	1	1
"P" Communities			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
Stony or asphalts building	01	1	1	1	1	1	1	1	1
(unknown)	01	2						1	
Governmental building	02	1	1	1	1	1	1	1	1
School	02	2	1	1	1	1	1	1	1
A precarious wall	03	1		1		1	1	1	1
A good wall	03	2		1	1	1	1	1	1
Barbed	03	3				1	1	1	1
Airport	04	1		1	1		1	1	
Sailing flying centre	04	2				1	1	1	1
Airstrip	04	3				1			
Barracks	04	4							
Governmental hospital	05	1	1	1				1	1
Governmental hospital	05	2						1	
Playground	05	3					1		
Mosque	06	1		1			1		
Church	06	2							
A small mosque	06	3	1	1	1	1	1	1	1
A small church	06	4	1	1	1	1		1	1
Islamic graveyard	07	1	1	1	1	1	1	1	1
Christian graveyard	07	2			1		1		1
Jewish graveyard	07	3							
Islamic sepulcher	07	4	1	1	1	1	1	1	1
Christian sepulcher	07	5	1	1	1				1
Quarry	08	1	1	1	1	1	1	1	1
Cave	08	2	1	1	1	1	1		
Wreckage	08	3	1	1	1	1	1	1	1
Animal yard	08	4	1	1			1		
Volcano areas	10	0		1					
Stones	10	1	1			1			

"G" Plant cover			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
Olive	01	0							
Cypress	02	0		1					
Citrus fruits	03	0							
Oak	04	0							
Forest	05	0							
Fruitful trees	06	0	1	1	1	1	1	1	1
Palm trees	07	0							
Vine grape	08	0							
Spiny fig	09	0							
High forest and plants	10	0							
Rice farm	11	0							
Low grass	12	0							
Fence of large trees	13	0							
Fence of small trees	14	0							
Boarders between different areas	15	0							
"R" Roads			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
Highway	01	1	1	1	1	1		1	1
First class road	01	2	1	1	1	1	1	1	1
Road in the city	01	3	1	1	1	1	1	1	1
Second class road	01	4	1	1	1	1	1		1
Third class road	01	5	1	1	1	1	1	1	1
Stony road but not asphalt	02	1	1	1	1	1		1	1
Earthy road serviceable in summer	02	2	1	1	1	1	1	1	1
Non serviceable road for vehicles	02	3	1	1	1	1	1	1	1
Impact of Romanian path /1st class	02	4	1	1		1		1	
Digging road	02	5				1	1	1	1
Pavement in the sea	02	6							
Road Supporter wall	03	1							1
Trees road	04	1							
Mineral bridge	05	1	1				1	1	1
Wooden or cement bridge	05	2	1					1	1
Bridge	05	3	1	1	1	1	1	1	1
Small bridge	05	4	1	1	1	1	1	1	1
Normal single Railroad	06	1	1	1	1	1	1	1	1
Tight single Railroad	06	2	1	1	1				1
Railroad near the road	06	3							
A small train station	07	1				1			
Stop station on a normal way	07	2							
Railway in a tunnel	07	3				1			
Impact of a neglectful railroad	07	4		1					

A railway cut the road	07	5							
A railroad passes under the road	07	6							
A railroad passes above the road	07	7							
Impact of an old Romanian arch	08	0							
Under construction road	08	1	1	1					1

"O" Others			Governorates						
Contents	Number		Rural Damascus	Dar'aa	Tartous	Lattakia	Raqqa	Dier-ez-zor	Hassakeh
International boarders	01	1	1	1	1	1	1	1	1
Governorates boarders	01	2		1		1			
Provinces boarders	01	3							
Suburbs boarders	01	4							
Energy transporting line without poles	02	1	1	1	1	1	1	1	1
Energy transporting line with poles	02	2				1	1	1	1
Telephone line above ground	02	3		1		1	1	1	1
Telephone line under ground	02	4					1	1	
Gasoline station	03	1	1	1	1	1	1	1	1
Petrol well	03	2					1	1	1
Petrol tank	03	3	1	1	1	1	1	1	1
Petroleum pipe lines	04	0	1	1	1	1	1	1	1
Reinforce stations	05	1				1	1		1
Sending and receiving stations	05	2	1		1	1	1	1	1
Geodetic points - degrees 1-2 -	06	1							
Geodetic points degree 3 and less	06	2							
Settling place	07	1							
Buoy	07	2							
(unknown)	07	3			1	1			
Gas pipe lines	08	0						1	
International boarders	08	1							
Agricultural arboretum	09	0							

The basic digital map provided from regional planning in the ministry of housing and construction has various layers. JICA Study Team considered the utilization of these layers such as wells and geodetic points. However, attribute data in each layer is encoded and it is impossible to obtain the information for code due to the military secret. Therefore, JICA Study Team determined to utilize the features regarding basic map, such as road, river, channel, drainage, railway, contour, bridge and administrative boundary.

Appendix 12.2 Attendees List of GIS Training

Table A12.2.1 The Attendees List of GIS Training for Introductory Part

Governorate	Name of Participants	Position
Hassakeh	Goraine Mally	Engineer, General establishment of potable water and sewage
Deir-ez-zor	Mazen Abdul Kareem	Director, General establishment of potable water and sewage
Raqqa	Mouhammad AlFandi	Engineer, General Establishment of potable water and sewerage
Rural Damascus	Hassan AlAswad	Engineer, General establishment of potable water and sewage
Lattalia	Naji Ali	GIS Team Manager, General Sewerage Company
Rural Damascus	Bassam Abarid	Engineer of study department, General Establishment of potable water and sewerage
Tartous	Wajdi Abboud	Engineer in general establishment of potable water and sewage
-	Nour elHouda Bilal	Engineer, General company of studying and consulting (GCEC)
Ministry of Housing and Construction	Eyad Ali	Engineer, Department of Sewerage, Ministry of Housing and Construction
Ministry of Housing and Construction	Ghassan Tarboush	Engineer, Department of Sewerage, Ministry of Housing and Construction
Ministry of Housing and Construction	Maher AlKhateeb	Engineer, Department of Sewerage, Ministry of Housing and Construction
Ministry of Housing and Construction	Wessal Khalil	Engineer, Department of Sewerage, Ministry of Housing and Construction

Table A12.2.2 The Attendees List of GIS Training for Application Part

Governorate	Name of Participants	Position
Lattakia	Manal Ibrahim	Mechanical Engineer, General Establishment of potable water and sewerage
Lattakia	Naji Ali	GIS Team Manager, General Sewerage Company
Tartous	Rami Suleiman	Engineer, General Establishment of potable water and sewerage
Tartous	Nadeem yousef	Engineer, General Establishment of potable water and sewerage
Tartous	Dami Momga	Engineer, General Establishment of potable water and sewerage
Tartous	Ali Thabet Ahmad	Engineer, General Establishment of potable water and sewerage
Deir-ez-zor	Wael Al Khalaf	Engineer, General Establishment of potable water and sewerage
Deir-ez-zor	Sami Malla Hammoud	Engineer, General Establishment of potable water and sewerage
Raqqa	Mohammad Al Fandi	Engineer, General Establishment of potable water and sewerage

Governorate	Name of Participants	Position
Raqqa	Mohammad Ahmad Al Khalil	Engineer, General Establishment of potable water and sewerage
Rural Damascus	Yousef Deeb	Supervisor of civil engineering, General Establishment of water and sewerage
Rural Damascus	Sahar AL-Haidar	Mechanical Engineer, General Establishment of potable water and sewerage
Rural Damascus	Rasha Bouhasson	Engineer , General Establishment of potable water and sewerage
Rural Damascus	Hassan Ali Al-Ali	Civil Engineer of Department of study and design, General Establishment of potable water and sewerage
Rural Damascus	Sami Mersal	Head of GIS unit, General Establishment of potable water and sewerage
Rural Damascus	Atef Asaad	Staff of IDM Project
Rural Damascus	Bassam Abarid	Engineer of study department, General Establishment of potable water and sewerage
Da’raa	Mohamad Almasalmeh	Studies Manager, General Establishment of potable water and sewerage
Da’raa	Nasir Salem	Studies Department, General Establishment of water and sewerage
Da’raa	Akram Talib	Studies Department, General Establishment of potable water and sewerage
Da’raa	Khadijeh Khattab	Engineer, General Establishment of potable water and sewerage

Appendix 12.3 The Pictures in the GIS Training

Pic-1 Explanation of GIS database

Pic-2 Explanation of GIS license by MHC

Pic-3 Field survey by using GPS

Pic-4 Explanation of flow of the training

Pic-5 Explanation of definition for GPS

Pic-6 Q & A in the field

Appendix 12.4 Questionnaire of Field Survey regarding the Formulation for Sewerage Database (in Arabic)

Table A12.4.1 The Questionnaire for Water Resources

WR مصادر المياه -1			
	المحافظة:	رقم مصدر المياه:	ID:
	اليوم: / /2007	وقت أخذ البيانات	
	اسم الشخص المسؤول عن المسح:		

نقطة المأخذ	1	الإحداثيات	( )° ( )'( )" N	Y =
			( )° ( )'( )" E	X =
	2	اسم المنطقة		
	3	نوع المأخذ	☐	مياه سطحية
			☐	مياه جوفية
			☐	مسح
			☐	) غير ذلك
	4	غزارة المأخذ		التصميمي (م3/ يوم):
				الفعلي (م3/ يوم):

WGS48 و يجب أن يكون الإسقاط GPS سيتم قياس الإحداثيات بواسطة جهاز

ملاحظات:	
دار التقنية تتحمل مسؤولية جمع البيانات	تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها

Table A12.4.2 The Questionnaire for Industrial Plants

WPS-I (مصادر تلوث المياه (المنشآت الصناعية -2			
	المحافظة:	رقم المنشأة الصناعية: ID:	
	اليوم: / /2007	وقت أخذ البيانات	
	اسم الشخص المسؤول عن المسح:		

المعمل	1	الاحداثيات	Y = ( )° ( )'( )" N	
			X = ( )° ( )'( )" E	
	2	اسم المنطقة		
	3	قطاع الصناعة		زيتون
				غذائية
				كيميائية
				مواد بناء
				مسبح
				) غير ذلك
	4	وحدة المعالجة لمياه الصرف الصناعي		:(التصميمي (م3/ يوم
				:(الفعلي (م3/ يوم
	5	غزارة المصرف		:(التصميمي (م3/ يوم
				:(الفعلي (م3/ يوم
	6	نوعية مياه المصرف	(في حال تم قياسها) BOD mg/l	
	7	إحداثيات المصرف	Y = ( )° ( )'( )" N	
			X = ( )° ( )'( )" E	
				(نهر (الاسم
				(شبكة صرف (الاسم
				للاستخدام في الزراعة والري
				) غير ذلك
				لا يوجد
				غير معروف

WGS48 و يجب أن يكون الإسقاط GPS سوم قياس الإحداثيات بواسطة جهاز

ملاحظات:	
تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها	دار التقنية تتحمل مسؤولية جمع البيانات

Table A12.4.3 The Questionnaire for Livestock

WPS-L (مصادر تلوث المياه (المواشي -2			
	المحافظة:	رقم موقع حظيرة المواشي:	ID:
	اليوم: / /2007	وقت أخذ البيانات	
	اسم الشخص المسؤول عن المسح		

المواشي	1	الاحداثيات	( )° ( )'( )" N	Y =
			( )° ( )'( )" E	X =
	2	اسم المنطقة		
	3	نوع المواشي		غنم
				بقر
				دواجن
				) غير ذلك
	4	عدد المواشي		
	5	إحداثيات المصرف	( )° ( )'( )" N	Y =
			( )° ( )'( )" E	X =
				(نهر (الاسم
				(شبكة صرف (الاسم
				للاستخدام في الزراعة والري
				) غير ذلك
				لا يوجد
				غير معروف

WGS48 و يجب أن يكون الإسقاط GPS سوف قياس الإحداثيات بواسطة جهاز

ملاحظات:	
تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها	دار التقنية تتحمل مسؤولية جمع البيانات

Table A12.4.4 The Questionnaire for Sewer

3- شبكات الصرف الصحي SEWER

	المحافظة:	رقم شبكة الصرف الصحي: ID:
	اليوم: / /2007	وقت أخذ البيانات
	اسم الشخص المسؤول عن المسح:	

نوع المعلومات	الواحدة	بنود المسح الحقلي		
	-	اسم الموقع	1	شبكة الصرف الصحي
	م2	منطقة التخديم	2	
	نسمة	عدد الأشخاص المخدمين	3	
	م	طول الشبكة	4	
	مم	القطر	5	
	-	سنة الإنشاء	6	
	-	سجل تنظيف وترميم شبكة الصرف	7	

WGS48 و يجب أن يكون الإسقاط GPS سيتم قياس الإحداثيات بواسطة جهاز

ملاحظات:	
تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها	دار التقنية تتحمل مسؤولية جمع البيانات

Table A12.4.5 The Questionnaire for Sewerage Treatment Plants

STP محطات معالجة الصرف الصحي -4-1

	المحافظة:	رقم محطة المعالجة: ID:
	اليوم: / /2007	وقت أخذ البيانات
	اسم الشخص المسؤول عن المسح:	

محطة المعالجة	1	الاحداثيات	( )° ( )'( )" N	Y =
			( )° ( )'( )" E	X =
	2	اسم محطة المعالجة		
	3	مساحتها	م2	
	4	طريقة المعالجة	☐ الحمأة النشطة (الترسيب الأولي + حوض التفاعل + الترسيب النهائي	
			☐ التهوية الممطولة (التهوية + الترسيب النهائي	
			☐ الأراضي الرطبة (الترسيب الأولي + استعمال نباتات خضراء	
			☐ خنادق الأكسدة (حوض التفاعل + الترسيب النهائي	
			☐ حوض	
			☐ غير ذلك	
	5	طاقة المعالجة	التصميمية (م3/ يوم):	
			الفعلية (م3/ يوم):	
	6	عدد الأشخاص العاملين		
	7	سنة الإنشاء		
	8	سجل الصيانة		
	9	توفر المخططات	خارطة المكان:	
			الموقع العام:	

WGS48 و يجب أن يكون الإسقاط GPS سيتم قياس الإحداثيات بواسطة جهاز

ملاحظات:	
تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها	دار التقنية تتحمل مسؤولية جمع البيانات

Table A12.4.6 The Questionnaire for Pumping Stations

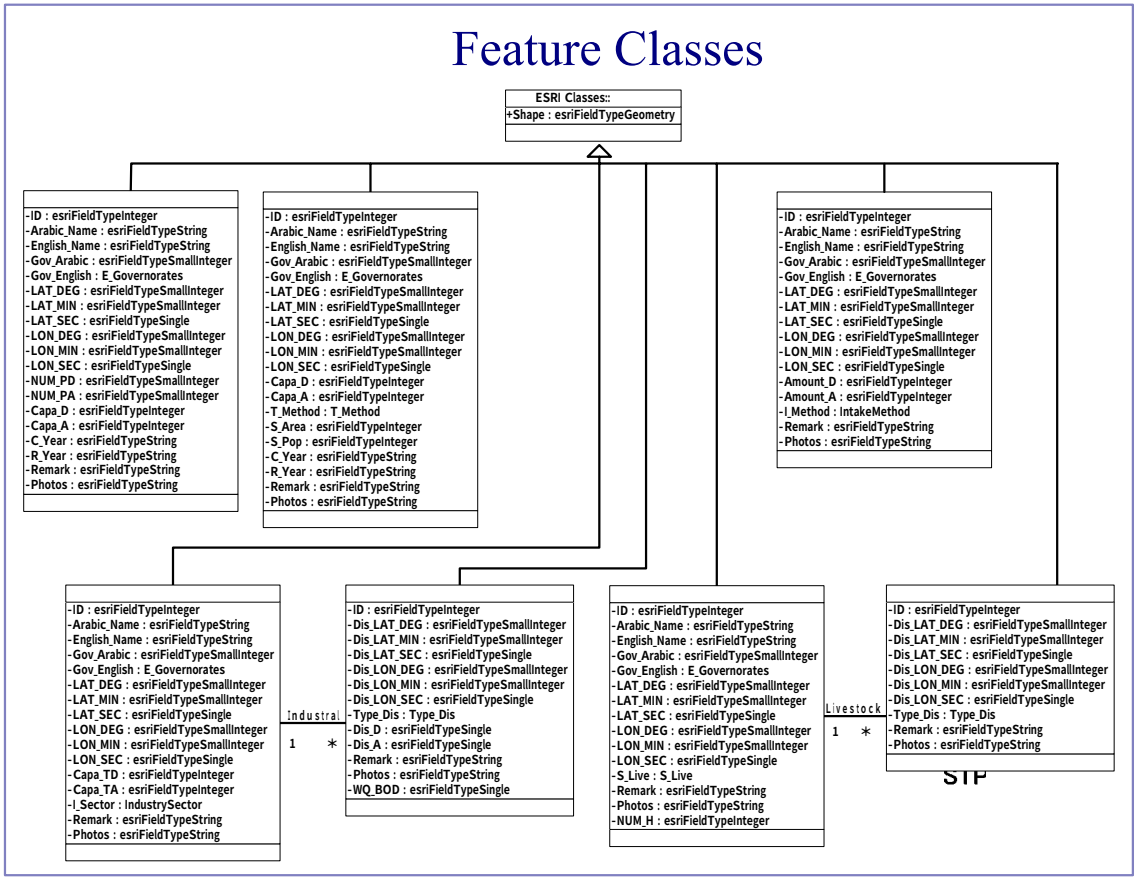
PS محطات ضخ الصرف الصحي -4-1			
	المحافظة:	رقم محطة الضخ:	ID:
	اليوم: / /2007	وقت أخذ البيانات	
	اسم الشخص المسؤول عن المسح:		

محطة الضخ	1	الاحداثيات	( )" ( )'( )" N	Y =
			( )" ( )'( )" E	X =
	2	اسم محطة الضخ		
	3	عدد المضخات	التصميمي:	
			الفعلي:	
	4	غزارتها	التصميمية (م3/ يوم):	
			الفعلية (م3/ يوم):	
	5	سنة الإنشاء		
	6	سجل الصيانة		
	7	توفر المخططات	خارطة المكان:	
			الموقع العام:	

WGS48 و يجب أن يكون الإسقاط GPS سيتم قياس الإحداثيات بواسطة جهاز

ملاحظات:	
تتحمل الوزارة مسؤولية البيانات وتتأكد دار التقنية من صحتها	دار التقنية تتحمل مسؤولية جمع البيانات

Appendix 12.5 Figure of the GIS Data Model



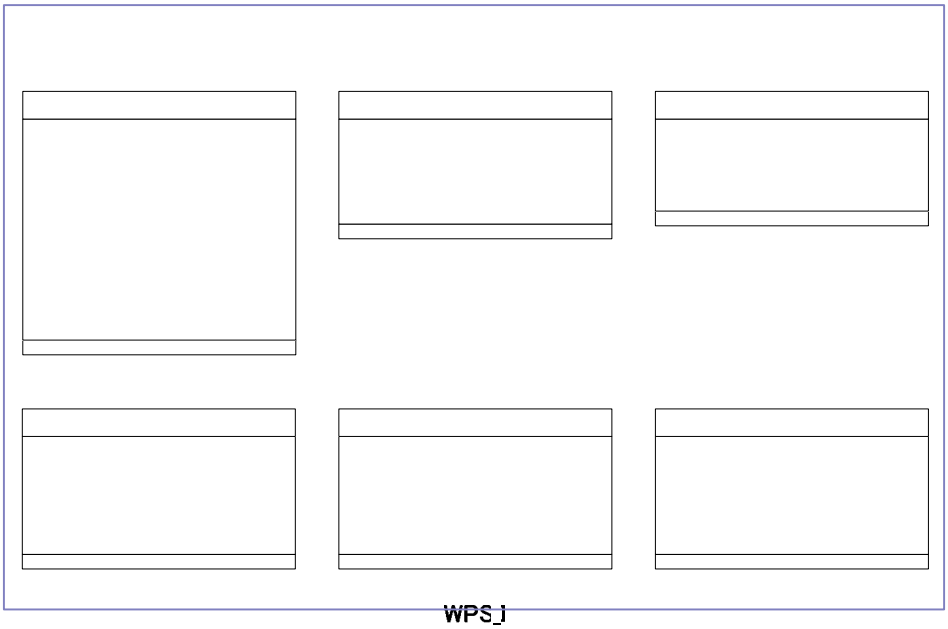


Figure A12.5.1 GIS Data Model

Appendix 12.6

Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Seven (7) Governorates

Table A12.6.1 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Rural Damascus

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Rural Damascus	WR 01	Khan El-Arous	2007/1/21	14:30	Ghassan Naddaf	33	46	38.750	36	34	45.000	33.7774306	36.5791667
2	Rural Damascus	WR 02	Arrhaibeh	2007/1/22	9:00	Ghassan Naddaf	33	48	50.440	36	38	56.930	33.8140111	36.6491472
3	Rural Damascus	WR 03	Deir Attieh	2007/1/22	12:00	Ghassan Naddaf	34	4	36.060	36	46	48.880	34.0766833	36.7802444
4	Rural Damascus	WR 04	Kara	2007/1/22	13:30	Ghassan Naddaf	34	9	11.340	36	36	50.810	34.1531500	36.6141139
5	Rural Damascus	WR 05	Jaramanah	2007/1/23	9:45	Ghassan Naddaf	33	29	23.922	36	20	31.626	33.4899783	36.3421183
6	Rural Damascus	WR 06	Attall	2007/1/24	12:00	Ghassan Naddaf	33	35	33.666	36	19	29.748	33.5926850	36.3249300
7	Rural Damascus	WPS-I 01	SAR Factory for detergents in Adra	2007/1/21	12:00	Ghassan Naddaf	33	35	30.450	36	31	5.550	33.5917917	36.5182083
8	Rural Damascus	WPS-I 02	Kara Slaughterhouse	2007/1/22	14:30	Ghassan Naddaf	34	9	35.740	36	45	51.750	34.1599278	36.7643750
9	Rural Damascus	WPS-I 03	Tamico	2007/1/22	12:00	Ghassan Naddaf	33	29	44.898	36	22	20.420	33.4958050	36.3723389
10	Rural Damascus	WPS-I 04	New Indusrial Co. Al-Mliha	2007/1/23	12:30	Ghassan Naddaf	33	30	1.940	36	20	30.900	33.5005389	36.3419167
11	Rural Damascus	WPS-L 01	Alktaifeh Cow Farmer	2007/1/21	15:15	Ghassan Naddaf	33	45	15.610	36	33	7.000	33.7543361	36.5519444
12	Rural Damascus	WPS-L 02	Arrhaibeh Sheep Farmer	2007/1/22	10:45	Ghassan Naddaf	33	43	35.940	36	43	36.280	33.7266500	36.7267444
13	Rural Damascus	WPS-L 03	Seidnaya Poultry	2007/1/24	11:15	Ghassan Naddaf	33	40	25.416	36	20	10.536	33.6737267	36.3362600
14	Rural Damascus	STP 01	Adra STP	2007/1/21	13:00	Ghassan Naddaf	33	36	49.130	36	30	16.810	33.6136472	36.5046694
15	Rural Damascus	STP 02	Deir Attieh STP	2007/1/22	12:30	Ghassan Naddaf	34	6	21.200	36	47	29.870	34.1058889	36.7916306
16	Rural Damascus	STP 03	Kara STP	2007/1/22	14:45	Ghassan Naddaf	34	10	10.770	36	46	5.190	34.1696583	36.7681083
17	Rural Damascus	STP 04	Attawani	2007/1/24	9:45	Ghassan Naddaf	33	45	54.270	36	29	52.902	33.7650750	36.4980283
18	Rural Damascus	STP 05	Harran Alawameed	2007/1/21	11:00	Ghassan Naddaf	33	26	48.750	36	34	8.460	33.4468750	36.5690167
19	Rural Damascus	PS 01	Adra PS	2007/1/21	10:30	Ghassan Naddaf	33	36	23.720	36	31	29.540	33.6065889	36.5248722
20	Rural Damascus	PS 02	Hattitet Attourkman	2007/1/23	10:20	Ghassan Naddaf	33	26	0.126	36	26	11.340	33.4333683	36.4364833
21	Rural Damascus	PS 03	Alghozlanieh	2007/1/23	11:00	Ghassan Naddaf	33	23	52.500	36	27	34.170	33.3979167	36.4594917

Table A12.6.2 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Dar'aa

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Dar'aa	WR 01	Mezereeb - Swida	2007/2/4	11:35	Ghassan Naddaf	32	42	18.786	36	0	24.930	32.7052183	36.0069250
2	Dar'aa	WR 02	Mezereeb Lake	2007/2/4	11:45	Ghassan Naddaf	32	42	16.632	36	1	22.956	32.7046200	36.0230433
3	Dar'aa	WR 03	Mzereeb - Dar'aa	2007/2/4	11:50	Ghassan Naddaf	32	42	15.204	36	1	23.292	32.7042233	36.0231367
4	Dar'aa	WR 04	Tafas	2007/2/4	12:15	Ghassan Naddaf	32	45	28.332	36	2	14.850	32.7578700	36.0374583
5	Dar'aa	WR 05	Western Dam - Asheikh Meskeen	2007/2/4	13:45	Ghassan Naddaf	32	49	25.746	36	6	59.796	32.8238183	36.1166100
6	Dar'aa	WR 06	Eastern Dam of Dar'aa	2007/2/4	14:00	Ghassan Naddaf	32	36	8.508	36	6	48.330	32.6023633	36.1134250
7	Dar'aa	WPS-I 01	Asheikh Miskeen Olive Oil Factory	2007/2/5	14:00	Ghassan Naddaf	32	52	23.940	36	9	48.840	32.8733167	36.1635667
8	Dar'aa	WPS-I 02	Acmafield Pharmaceutical - A'alkeen	2007/2/5	14:20	Ghassan Naddaf	33	16	27.756	36	13	36.720	33.2743767	36.2268667
9	Dar'aa	WPS-I 03	Aspco Pharmaceutical - A'alkeen	2007/2/5	14:30	Ghassan Naddaf	33	14	13.542	36	13	4.458	33.2370950	36.2179050
10	Dar'aa	WPS-I 04	Alyarmook Macarony	2007/2/5	14:40	Ghassan Naddaf	32	37	36.900	36	7	14.580	32.6269167	36.1207167
11	Dar'aa	WPS-I 05	Al-Issa Olive Oil Factory	2007/2/5	14:50	Ghassan Naddaf	32	37	10.680	36	10	8.520	32.6196333	36.1690333
12	Dar'aa	WPS-L 01	Dar'aa Cows Center	2007/2/5	11:25	Ghassan Naddaf	32	41	28.554	36	2	27.147	32.6912650	36.0408742
13	Dar'aa	WPS-L 02	Syrian-Lybian Company (Mzereeb)	2007/2/5	12:30	Ghassan Naddaf	32	45	47.814	36	0	31.902	32.7632817	36.0088617
14	Dar'aa	STP 01	Dar'aa STP	2007/2/5	10:34	Ghassan Naddaf	32	39	10.500	36	2	30.160	32.6529167	36.0417111
15	Dar'aa	STP 02	Da'el	2007/2/5	14:30	Ghassan Naddaf	32	46	18.796	36	6	22.792	32.7718878	36.1063311
16	Dar'aa	PS 01	Dar'aa PS	2007/2/5	11:00	Ghassan Naddaf	32	39	5.090	36	2	33.490	32.6514139	36.0426361
17	Dar'aa	PS 02	Tafas PS	2007/2/5	12:00	Ghassan Naddaf	32	44	24.780	36	1	44.892	32.7402167	36.0291367
18	Dar'aa	PS 03	Da'el PS	2007/2/5	14:35	Ghassan Naddaf	32	46	16.224	36	6	24.072	32.7711733	36.1066867

Table A12.6.3 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Lattakia

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Lattakia	WR 01	Terjano wells	2007/2/1	14:40	Jamal Al-Ali	35	31	1.740	36	0	11.910	35.5171500	36.0033083
2	Lattakia	WR 02	November 16th Dam	2007/2/2	9:00	Jamal Al-Ali	35	37	21.060	35	55	17.256	35.6225167	35.9214600
3	Lattakia	WR 03	Balloran Dam	2007/2/2	13:45	Jamal Al-Ali	35	45	54.198	35	54	3.492	35.7650550	35.9009700
4	Lattakia	WR 04	Assen Spring	2007/2/2	14:00	Jamal Al-Ali	35	15	19.460	35	58	6.500	35.2554056	35.9684722
5	Lattakia	WPS-L 01	Fedio Farm	2007/2/2	14:10	Jamal Al-Ali	35	29	31.764	35	51	56.184	35.4921567	35.8656067
6	Lattakia	STP 01	Alharra	2007/2/1	13:05	Jamal Al-Ali	35	32	58.632	35	58	48.990	35.5496200	35.9802750
7	Lattakia	STP 02	Habbeet	2007/2/1	14:15	Jamal Al-Ali	35	33	25.728	36	1	48.966	35.5571467	36.0302683
8	Lattakia	STP 03	Marj Me'erban	2007/2/1	15:00	Jamal Al-Ali	35	28	17.010	36	2	26.790	35.4713917	36.0407750
9	Lattakia	STP 04	Bhamra	2007/2/1	16:00	Jamal Al-Ali	35	26	53.946	36	0	31.230	35.4483183	36.0086750
10	Lattakia	PS 01	Lattakia Port Gate	2007/2/1	10:30	Jamal Al-Ali	35	30	39.330	35	46	19.830	35.5109250	35.7721750
11	Lattakia	PS 02	Afamia	2007/2/1	11:00	Jamal Al-Ali	35	32	37.614	35	46	16.722	35.5437817	35.7713117
12	Lattakia	PS 03	Côte d'Azur	2007/2/1	11:30	Jamal Al-Ali	35	35	6.420	35	44	47.550	35.5851167	35.7465417
13	Lattakia	PS 04	Ibn Hani /1/	2007/2/1	11:45	Jamal Al-Ali	35	34	59.580	35	43	37.614	35.5832167	35.7271150
14	Lattakia	PS 05	Ibn Hani /2/	2007/2/1	12:00	Jamal Al-Ali	35	35	5.682	35	44	0.642	35.5849117	35.7335117
15	Lattakia	PS 06	Domserkho	2007/2/1	12:12	Jamal Al-Ali	35	33	16.854	35	46	18.822	35.5546817	35.7718950
16	Lattakia	PS 07	Lattakia Southern Coast	2007/2/2	10:00	Jamal Al-Ali	35	30	7.290	35	46	29.844	35.5020250	35.7749567
17	Lattakia	PS 08	Ala'aeedoun Palestinian Refugee Camp	2007/2/2	10:23	Jamal Al-Ali	35	30	20.526	35	47	56.556	35.5057017	35.7990433
18	Lattakia	PS 09	Al-syaha Southern Part	2007/2/2	11:00	Jamal Al-Ali	35	30	14.448	35	48	43.530	35.5040133	35.8120917

Table A12.6.4 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Tartous

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Tartous	WR 01	Alkashfeh	2007/1/30	10:05	Mouhammad Al-Mouhammad	34	49	21.270	36	1	49.446	34.8225750	36.0304017
2	Tartous	WR 02	Ras Alkhshoufeh	2007/1/30	10:54	Mouhammad Al-Mouhammad	34	49	29.934	36	2	49.381	34.8249817	36.0470502
3	Tartous	WR 03	Ba'amra	2007/1/30	12:20	Mouhammad Al-Mouhammad	34	47	4.320	36	7	50.466	34.7845333	36.1306850
4	Tartous	WR 04	Ashmameess	2007/1/30	13:00	Mouhammad Al-Mouhammad	34	52	13.764	36	9	55.140	34.8704900	36.1653167
5	Tartous	WR 05	Assafssafeh	2007/1/30	12:00	Mouhammad Al-Mouhammad	34	43	18.762	36	2	5.652	34.7218783	36.0349033
6	Tartous	WPS-I 01	Tartous Cementary Plant	2007/1/29	10:40	Mouhammad Al-Mouhammad	34	58	4.404	35	53	27.876	34.9678900	35.8910767
7	Tartous	WPS-I 02	Tartous Modern Olive Oil Factory	2007/1/29	14:15	Mouhammad Al-Mouhammad	34	55	49.644	35	53	15.756	34.9304567	35.8877100
8	Tartous	WPS-I 03	Safeeta Slaughterhouse	2007/1/30	12:00	Mouhammad Al-Mouhammad	34	48	39.168	36	7	47.262	34.8108800	36.1297950
9	Tartous	WPS-I 04	Ismael Mahmoud Othman Olive Oil Factory - Almandarah	2007/1/31	9:00	Mouhammad Al-Mouhammad	34	49	9.978	36	5	40.770	34.8194383	36.0946583
10	Tartous	WPS-I 05	Al-Khaleel Olive Oil Factory - Almandarah	2007/1/30	9:30	Mouhammad Al-Mouhammad	34	49	11.340	36	5	33.450	34.8198167	36.0926250
11	Tartous	WPS-I 06	Al-Hassan Olive Oil Factory -Safita	2007/1/30	10:00	Mouhammad Al-Mouhammad	34	50	4.776	36	8	1.950	34.8346600	36.1338750
12	Tartous	WPS-L 01	Zahed Cow Farmer - Ad-Dkika	2007/1/30	11:15	Mouhammad Al-Mouhammad	34	40	54.714	36	5	54.666	34.6818650	36.0985183
13	Tartous	STP 01	Ta'aneeta	2007/1/29	12:31	Jamal Al-Ali	35	7	0.936	36	2	35.622	35.1169267	36.0432283
14	Tartous	STP 02	Areemal Azahabieh	2007/1/29	13:39	Jamal Al-Ali	35	1	37.602	35	53	45.138	35.0271117	35.8958717
15	Tartous	STP 03	Ashera'a	2007/1/29	14:00	Jamal Al-Ali	35	0	14.400	35	54	2.904	35.0040000	35.9008067
16	Tartous	STP 04	Al-Mughra Safita	2007/1/30	9:45	Jamal Al-Ali	34	47	21.600	35	57	39.900	34.7893333	35.9610833
17	Tartous	PS 01	Ala'ajameh	2007/1/29	9:34	Jamal Al-Ali	34	55	53.568	35	52	53.556	34.9315467	35.8815433
18	Tartous	PS 02	Moushwar	2007/1/29	10:00	Jamal Al-Ali	34	53	14.358	35	52	43.716	34.8873217	35.8788100

Table A12.6.5 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Deir-ez-Zor

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Deir-ez-Zor	WR 01	Eupherate Intake 1 - 17 April Station	2007/2/8	9:50	Ghassan Naddaf	35	20	27.354	40	9	28.224	35.3409317	40.1578400
2	Deir-ez-Zor	WR 02	Eupherate Intake 2 - Hatleh Station	2007/2/8	9:55	Ghassan Naddaf	35	20	9.110	40	9	33.060	35.3358639	40.1591833
3	Deir-ez-Zor	WR 03	Eupherate Intake 3 - Othmanyeh	2007/2/8	10:10	Ghassan Naddaf	35	20	25.302	40	9	15.330	35.3403617	40.1542583
4	Deir-ez-Zor	WR 04	Eupherate Intake 4 - Main Water Station	2007/2/8	10:35	Ghassan Naddaf	35	20	46.470	40	7	36.838	35.3462417	40.1268994
5	Deir-ez-Zor	WR 05	Eupherate Intake 5 - Al-Beghelyeh (1)	2007/2/8	11:00	Ghassan Naddaf	35	21	47.472	40	6	14.748	35.3631867	40.1040967
6	Deir-ez-Zor	WR 06	Eupherate Intake 6 - Al-Beghelyeh (2)	2007/2/8	11:05	Ghassan Naddaf	35	21	55.704	40	6	6.376	35.3654733	40.1017711
7	Deir-ez-Zor	WPS-I 01	Deir-ez-zour slaughter house	2007/2/7	10:45	Ghassan Naddaf	35	19	6.768	40	9	43.554	35.3185467	40.1620983
8	Deir-ez-Zor	WPS-I 02	Sugar Factory	2007/2/7	11:40	Ghassan Naddaf	35	22	32.464	40	13	22.040	35.3756844	40.2227889
9	Deir-ez-Zor	WPS-I 03	Texture Factory	2007/2/7	12:30	Ghassan Naddaf	35	22	19.182	40	13	3.204	35.3719950	40.2175567
10	Deir-ez-Zor	WPS-I 04	Paper Factory	2007/2/7	13:30	Ghassan Naddaf	35	22	27.132	40	9	21.984	35.3742033	40.1561067
11	Deir-ez-Zor	WPS-I 05	New Dumping Site - Palmyra Road	2007/2/8	11:30	Ghassan Naddaf	35	9	31.950	39	55	56.976	35.1588750	39.9324933
12	Deir-ez-Zor	WPS-I 06	Old Dumping Site-Deir-ez-zour Damascus Road	2007/2/8	12:00	Ghassan Naddaf	35	16	28.218	40	2	34.824	35.2745050	40.0430067
13	Deir-ez-Zor	WPS-L 01	Deir-ez-zour cow farmer	2007/2/7	10:00	Ghassan Naddaf	35	17	49.176	40	10	54.372	35.2969933	40.1817700
14	Deir-ez-Zor	STP 01	Deir-ez-zour STP	2007/2/7	11:00	Ghassan Naddaf	35	16	4.686	40	10	43.002	35.2679683	40.1786117
15	Deir-ez-Zor	PS 01	Deir-ez-zour Main Pumping Station	2007/2/7	11:00	Ghassan Naddaf	35	18	30.462	40	10	10.206	35.3084617	40.1695017
16	Deir-ez-Zor	PS 02	main dischage point in Deir-ez-zour	2007/2/7	11:45	Ghassan Naddaf	35	18	38.934	40	10	1.878	35.3108150	40.1671883
17	Deir-ez-Zor	PS 03	Othmanyeh Discharge point	2007/2/7	11:20	Ghassan Naddaf	35	19	58.930	40	9	34.968	35.3330361	40.1597133

Table A12.6.7 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Raqqa

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Raqqa	WR 01	Al-Jallab River	2007/2/11	9:30	Ghassan Naddaf	36	41	55.326	38	59	48.882	38.9672050	38.9969117
2	Raqqa	WR 02	Tal As-samen Pumping Station	2007/2/11	12:30	Ghassan Naddaf	36	13	17.562	38	58	1.938	36.2215450	38.9672050
3	Raqqa	WR 03	Al-Mughleh Pumping Station	2007/2/11	15:15	Ghassan Naddaf	35	47	54.600	39	29	32.106	35.7985000	39.4922517
4	Raqqa	WR 04	Raqqa Main Pumping Station	2007/2/12	10:00	Ghassan Naddaf	35	55	51.876	39	0	19.794	35.9310767	39.0054983
5	Raqqa	WPS-I 01	Olive Oil Factory	2007/2/12	13:20	Ghassan Naddaf	36	3	34.218	38	58	35.754	36.0595050	38.9765983
6	Raqqa	WPS-I 02	Raqqa slaughter house	2007/2/12	9:15	Ghassan Naddaf	35	56	12.276	39	1	37.836	35.9367433	39.0271767
7	Raqqa	WPS-I 03	Sugar Factory	2007/2/12	9:30	Ghassan Naddaf	35	58	35.024	39	2	8.910	35.9763956	39.0358083
8	Raqqa	STP 01	Al-Sabkha STP	2007/2/11	14:35	Ghassan Naddaf	35	48	51.906	39	16	25.830	35.8144183	39.2738417
9	Raqqa	STP 02	Al-Karama STP	2207/2/11	16:05	Ghassan Naddaf	35	51	45.732	39	16	46.950	35.8627033	39.2797083
10	Raqqa	STP 03	Al-Mansoura STP	2007/2/12	10:50	Ghassan Naddaf	35	50	7.848	38	44	17.718	35.8355133	38.7382550
11	Raqqa	PS 01	Tal Abyadh Discharge Point	2007/2/12	10:00	Ghassan Naddaf	36	41	6.318	38	58	47.286	36.6850883	38.9798017
12	Raqqa	PS 02	Ein El-Arous Discharge Point	2007/2/12	10:20	Ghassan Naddaf	36	40	14.994	38	56	26.490	36.6708317	38.9406917
13	Raqqa	PS 03	Tal hamam Discharge Point	2007/2/11	11:30	Ghassan Naddaf	36	30	5.708	39	5	6.948	36.5015856	39.0852633
14	Raqqa	PS 04	Hazimeh Discharge Point	2007/2/11	13:00	Ghassan Naddaf	36	12	54.360	38	50	2.400	36.2151000	38.8340000
15	Raqqa	PS 05	Mughleh Kabeereh Discharge Point	2007/2/11	15:30	Ghassan Naddaf	35	47	50.748	39	29	54.480	35.7974300	39.4984667
16	Raqqa	PS 06	City Main Discharge Point	2007/2/11	9:00	Ghassan Naddaf	35	56	9.138	39	1	39.750	35.9358717	39.0277083
17	Raqqa	PS 07	Al-Thawra Discharge Point	2007/2/12	11:40	Ghassan Naddaf	35	50	37.398	38	33	11.754	35.8437217	38.5532650
18	Raqqa	PS 08	Debsy Faraj Discharge Point	2007/2/12	13:20	Ghassan Naddaf	35	52	29.568	38	9	54.744	35.8748800	38.1652067

Table A12.6.8 Schedule and Target Locations of Field Survey regarding the Formulation for Sewerage Database in Hassakeh

No.	Governorate	ID No.	Name	Date	Time	Person	North			East			North	East
							Deg	Min	Sec	Deg	Min	Sec		
1	Hassakeh	WR 01	Eastern Dam	2007/2/9	12:45	Ghassan Naddaf	36	20	51.241	40	46	33.078	36.3475669	40.7758550
2	Hassakeh	WR 02	Ras El-ein	2007/2/9	16:00	Ghassan Naddaf	36	50	51.756	40	3	56.460	36.8477100	40.0656833
3	Hassakeh	WR 03	Al-Kharrabat	2007/2/9	16:30	Ghassan Naddaf	36	51	13.776	40	4	9.318	36.8538267	40.0692550
4	Hassakeh	WR 04	As-Saffan Dam	2007/2/10	10:15	Ghassan Naddaf	37	8	46.938	42	6	22.776	37.1463717	42.1063267
5	Hassakeh	WR 05	Al-Mansoura Dam	2007/2/10	11:00	Ghassan Naddaf	37	11	5.466	42	9	39.954	37.1848517	42.1610983
6	Hassakeh	WR 06	Al-Uijeh wells	2007/2/10	13:30	Ghassan Naddaf	37	2	54.714	41	14	42.720	37.0485317	41.2452000
7	Hassakeh	WR 07	Al-Hilaleyeh Wells (1)	2007/2/10	13:50	Ghassan Naddaf	37	4	10.692	41	10	16.620	37.0696367	41.1712833
8	Hassakeh	WR 08	Al-Hilaleyeh Wells (2)	2007/2/10	14:00	Ghassan Naddaf	37	3	21.696	41	10	58.734	37.0560267	41.1829817
9	Hassakeh	WPS-I 01	Dumping Site	2007/2/9	10:40	Ghassan Naddaf	36	26	5.304	40	42	10.086	36.4348067	40.7028017
10	Hassakeh	WPS-I 02	Ras El-ein slaughter house	2007/2/9	16:00	Ghassan Naddaf	35	50	15.198	40	4	55.530	35.8375550	40.0820917
11	Hassakeh	WPS-I 03	Al-Malikyeh slaughter house	2007/2/10	11:15	Ghassan Naddaf	37	10	58.620	42	8	56.088	37.1829500	42.1489133
12	Hassakeh	WPS-I 04	Al-Kamishli slaughter house	2007/2/10	13:15	Ghassan Naddaf	37	0	44.400	41	15	22.458	37.0123333	41.2562383
13	Hassakeh	WPS-I 05	Al-Kamishli Dumping Site	2007/2/10	14:00	Ghassan Naddaf	37	4	9.882	41	10	14.142	37.0694117	41.1705950
14	Hassakeh	WPS-I 06	Al-Hassakeh slaughter house	2007/2/9	14:30	Ghassan Naddaf	36	30	11.178	40	46	12.984	36.5031050	40.7702733
15	Hassakeh	WPS-L 01	Tal Tamer Cow Farmer	2007/2/9	13:55	Ghassan Naddaf	36	40	25.368	40	22	8.478	36.6737133	40.3690217
16	Hassakeh	WPS-L 02	Arabic Company for raising livestock	2007/2/10	14:30	Ghassan Naddaf	37	0	53.550	41	12	25.608	37.0148750	41.2071133
17	Hassakeh	STP 01	Hassakeh STP	2007/2/9	12:20	Ghassan Naddaf	36	30	20.310	40	49	9.168	36.5056417	40.8192133
18	Hassakeh	STP 02	Ras El-Ein STP	2007/2/9	15:17	Ghassan Naddaf	36	50	17.682	40	4	50.592	36.8382450	40.0807200
19	Hassakeh	PS 01	Al-Khabour discharge points (1)	2007/2/9	11:00	Ghassan Naddaf	36	29	46.914	40	45	12.420	36.4963650	40.7534500
20	Hassakeh	PS 02	Al-Khabour discharge points (2)	2007/2/9	11:05	Ghassan Naddaf	36	29	46.914	40	45	12.420	36.4963650	40.7534500
21	Hassakeh	PS 03	Al-Khabour discharge points (3)	2007/2/9	11:09	Ghassan Naddaf	36	29	45.546	40	45	9.726	36.4959850	40.7527017
22	Hassakeh	PS 04	Jaghjagh River PS	2007/2/9	11:30	Ghassan Naddaf	36	29	59.028	40	45	40.656	36.4997300	40.7612933
23	Hassakeh	PS 05	Hassakeh PS	2007/2/9	12:15	Ghassan Naddaf	36	30	23.150	40	47	42.408	36.5064306	40.7951133
24	Hassakeh	PS 06	Ras El-Ein PS	2007/2/9	15:16	Ghassan Naddaf	36	50	21.270	40	4	50.706	36.8392417	40.0807517
25	Hassakeh	PS 07	Al-Malikyeh discharge point	2007/2/10	10:55	Ghassan Naddaf	37	11	2.496	42	9	56.424	37.1840267	42.1656733
26	Hassakeh	PS 08	Jaghjagh River entrance point	2007/2/10	12:45	Ghassan Naddaf	37	3	47.130	41	13	38.922	37.0630917	41.2274783
27	Hassakeh	PS 09	AL-Kamishli discharge points on Jaghjagh River	2007/2/10	14:00	Ghassan Naddaf	37	2	15.372	41	14	25.050	37.0376033	41.2402917

Appendix for Chapter 13

RESULTS OF THE STAKEHOLDER MEETINGS

13.1 Attendants List of the 1st Stakeholder Meetings at Three Governorates

Table A13.1.1 Attendants List of the 1st Stakeholder Meeting at Lattakia

No.	Name	Organization	Position
1	Zahed Haj Eisa	Lattakia Governorate	Governor
2	Waseem Falloh	MHC	Director of the project
3	Eisam Madani	MHC	Engineer
4	Ghassan Al-tarboush	MHC	Engineer
5	Thaer hatem	MHC	Engineer
6	Sablaa Kafora	Lattakia Sewage Co.	Electrical engineer
7	Miassa Tezini	Lattakia Sewage Co.	Civil engineer
8	Bassem Saeeda	Lattakia Sewage Co.	Civil engineer
9	Rami Tonjal	Lattakia Sewage Co.	Mechanical engineer
10	Ghattfan Al Khory	Technical Service Directorate of Tartous	Civil engineer/studying
11	Reda Abd Alrahman	Technical Service Directorate of Tartous	Civil engineer
12	Wessam Mouhamad Ahmad	Technical Service Directorate of Tartous	Civil engineer/studying
13	Ossama Shaaban Khadour	Technical Service Directorate of Tartous	Civil engineer/studying
14	Mais Samaan	Technical Service Directorate of Tartous	Civil engineer/studying
15	Majd Daooud	Drikesh city concil	Head
16	Aimn Mouhamad	Drikesh city concil	Civil engineer
17	Ahmad Asaad	Drikesh city concil	Civil engineer
18	Attef Laika	Water Resource Directorate of Lattakia	Electrical engineer
19	Rala Abed	Water Resource Directorate of Lattakia	Civil engineer/sanitary
20	Yamen Selman	Directorate of Environment Affairs of Lattakia	Chemical engineer
21	Hossin Ionidy	Environment Search High Institution in Lattakia	Teacher
22	Abd Allah Moustfa	Slenfa municipality	Head
23	Thanaa Badour	Slenfa municipality	Engineer
24	Lama Ahmad	Directorate of Environment Affairs of Lattakia	Engineer/Director
25	Rabab Alkhaeer	Coast Association of Environment Protection (NGO)	Head of association
26	Nabeel Naser	Water Establishment	Civil engineer
27	Jalaal Jdid	Water Establishment	Civil engineer
28	Alaa Aldin Zen	General Company for Remote Sensing	Informatics engineer
29	Dr. Mouhamad Habib	Water Establishment in Lattakia	
30	Nizar Mouhamad Saan	Badder Shikh Council	
31	Ghazeieh Haidar	Lattakia Sewage Co.	Civil engineer
32	Merna Ghaafar	Lattakia Sewage Co.	Technical observer
33	Lara Maiia	Lattakia Sewage Co.	Civil engineer
34	Naji Ali	Lattakia Sewage Co.	Civil engineer
35	Suhail Shaheen	Lattakia Sewage Co.	Civil engineer
36	Osamah Dallol	Technical services in Tartous	Civil engineer
37	Hasan Hussein	Technical services in Tartous	Civil engineer
38	Hasan Barhom	Technical services in Tartous	Civil engineer
39	Faizeh Ismaeel	Technical services in Tartous	Civil engineer
40	Ali Eisa	Technical services in Tartous	Civil engineer
41	Ali Estanboul	Water Resource Directorate in Lattakia	Civil engineer
42	Nazeeh Boreesh	Water Resource Directorate in Lattakia	Civil engineer
43	Kais Hoarrah	Water Resource Directorate in Lattakia	Civil engineer
44	Ibraheem	Water Resource Directorate in Lattakia	Dr. Civil engineer
45	Senan Deeb	Friend Environment Society in Lattakia	EIA Department
46	Dr. Mahmoud Fahoum	Coast Pool	Scientific Research Directorate
47	Rawan Jweim	Al-baath Newspaper	Manager
48	Lbodon Sahyoun	Slenfa Municipality	Technical observer
49	Eisa Fareed Ali	Remote Sensing	Head of coast department
50	Nezar Srour	Water of Lattakia	Engineer of water resources
51	Rana Ibraheem	Remote Sensing	Technician

No.	Name	Organization	Position
52	Seba Hurairah	Remote Sensing	Technician
53	Ahmad Badawi	Baladuna Newspaper	Journalist
54	Abd-alnaser		Engineer
55	Eiva Hour	Lattakia Sewage Co.	Architect engineer
56	Micheel Al-khouri	Slenfa City Council	Head
57	Jaber Hasan Hasan	Tartous services	Head of water and sewage department
58	Dr. Ikbal Al-fadel	Teshreen University, Friend Environment Society	Professor
59	Eid Eisa Hassan		Civil engineer
60	Fahd Joud	Water Resource Directorate	Chemical engineer
61	Haitham Shaheen	High Institute of Environment Research, Teshreen University	Dean
62	Suhair Al-raiies	Coast Association of Environment Protection	Head of association (physician)
63	Layla Othman	Remote Sensing	Geological
64	Omaima Eisa	Al-sheikh Bader City Council in Tartous	Engineer
65	Aatef Afeef	Teshreen Newspaper	Journalist
66	Yehia Masri	Head of services and maintenance in city council	Engineer
67	Mamoud Ahmad		Journalistic photographer
68	Yousef Maiia	Teshreen Newspaper	Journalist
69	Zakareiia Al-eisa	Al- haffeh City Council	Head of council
70	Osamah Jardi	Water Resource Directorate in Lattakia	Engineer of chemistry
71	Emad Ali	Governorate	
72	Sameer Al-ali	Meridien	Manager
73	Adham Jarkas	Panias city council	Head of council
74	Mahn Fawzi	Al-kurdaha city	Head of council
75	Jamal Nassour	Lattakia	Agriculture
76	Hassan Baddour	Lattakia	Manager of agriculture
77	Thaeer Hatem		Engineer
78	Bieer Mousa	Remote sensing	Administrative
79	Waleed Hasan	Technical services directorate	Head of solid waste
80	Louai Hasan	Executive office in Tartous	Engineer
81	Fayez Zaiiat	Jableh city council	Head of council
82	Mustafa	Jableh city	Manager
83	Emad Khaloof	Services Directorate	Head of sewage studies
84	Serar Ez-aldeen Yousef	Technical services directorate in Tartous	Topographical engineer
85	Rudaina Al-ali	Directorate of Environment Affairs of Tartous	Head of lab
86	Lama Harfoush	Directorate of Environment Affairs of Tartous	Chemical engineer
87	Shadi Al-zaza	Water Resources Information Directorate	Mechanical engineer
88	Yamen Mansour	Al-watan Journal	Journalist
89	Muna Ismaeel	Remote Sensing	Administrative
90	Sahar Eisa	Supporting Center of Local Agriculture	Manager of center
91	Deema Mohamad	Television	Announcer
92	Ammar Ali	Television	Cameraman
93	Yousef Saker	Television	Cameraman assistant
94	Alaa Ghadeer	Television	Cameraman assistant
95	Nedal	Television	Cameraman assistant
96	Hirotumi sano	JICA Study Team	Team Leader
97	Ryunan Matsue	JICA Study Team	EIA
98	Nagham Salman	JICA Study Team	Interpreter
99	Louay Khalil	JICA Study Team	Engineer / supporter

Table A13.1.2 Attendants List of the 1st Stakeholder Meeting at Damascus

No.	Name	Organization	Position
1	Mahamad Ali	Sewage Department, MHC	Director
2	Jamal Al-jarad	Sewage Department, MHC	Engineer
3	Ghassan Al-tarboush	MHC	Engineer
4	Eiad Ali	MHC	Engineer
5	Wesal Khalil	MHC	Engineer
6	Maher Al-khateeb	MHC	Engineer
7	Waseem Falloh	MHC	Director of the project
8	Thaer hatem	MHC	Engineer
9	Seham Kiwan	Ministry of Irrigation	Head of study section in water resources directorate in Dar'aa
10	Ammar Al-aasmi	Ministry of Irrigation	Analytic lab/residual effect
11	Ammar Abo Habs	Ministry of Irrigation	Engineer /controlling of water quality department
12	Eisa Al-sulaiman	Ministry of Interior	Engineer
13	Abd-alhakeem Saad Al-deen	Water Resources Directorate of Damascus	Head of execution section
14	Mohamad Raja A-adawi	Water Resources Directorate of Dar'aa	Chemist
15	Sameer Abo Habash	Daed city council	Head of council
16	Ahmad Al-yosef	GCEC	Engineer
17	Ahmad shikhani	GCEC	Treatment plant
18	Asmaa khaled	GCEC	Treatment plant
19	Ghassan al-zeghat	GCEC	Sewage directorate
20	Maisaa Abd-allah	Technical Services Directorate of Dar'aa	Engineer
21	Manal Al-masri	Technical Services Directorate of Dar'aa	Engineer
22	Kefah Al-sharea	Technical Services Directorate of Dar'aa	Engineer
23	Hadeel Al-kuifi	technical services directorate in Dar'aa	Engineer
24	Mohamad Al-zobani	Al-mzereib city council	Head of council
25	Abd-alkareem Al-baridi	Dar'aa services	Engineer in technical matters
26	Mazyed	Dar'aa services	Engineer in sewage section
27	Douraid Al-shaheen	Al-joulan Municipility for Emigrants	Engineer /head of technical office
28	Yehya	Al-zabadani Municipality	Engineering projects department
29	Yosef Deeb	Water Establishment of Rural Damascus	Supervisor engineer
30	Fayrouz Al-krad	Dar'aa Water Establishment	Engineer
31	Galaa Al-farhat	Dar'aa Water Establishment	Engineer
32	Khadeja Erseil	Dar'aa Water Establishment	Engineer
33	Safwan Al-akrad	Dar'aa city council	Engineer/Head of operation section
34	Kenda Al-aswad	Technical Services Directorate of Dar'aa	Engineer
35	Huda Zeid	Directorate of Environment Affairs of Rural Damascus	Engineer
36	Heba Khattab	Directorate of Environment Affairs of Dar'aa	Engineer
37	Mohamad Barakat	Dar'aa Water Establishment	Head of studies section
38	Ibraheem Abbas	Dar'aa city council	Engineer
39	Yousef Al- shehadat	Technical services in Dar'aa	Head of sewage section
40	Ali Al-zoubi	Dar'aa Governorate	Head of association
41	Khaled Fandi	Dar'aa Water Establishment	General manager
42	Mohamad Awwad	Al-zabadani city council	Manager of declaration office
43	Raeifah Abo-zaid	Directorate of Environment Affairs of Dar'aa	Waste section
44	Husam Al-kerad	Directorate of Environment Affairs of Dar'aa	Engineer of EIA
45	Farouk Al-aadli	Damascus University	Professor
46	Bachar Ibrahim	Damascus University	Professor/Agriculture

No.	Name	Organization	Position
47	Shebli Al-shami	Damascus University	Professor / water engineering
48	Madyan Nasra	Directorate of Environment Affairs of Rural Damascus	assistance of environment manager
49	Mazen Yaghi	Rural Damascus Governorate, Environment Pioneer Association	Member of executive office
50	Mohamad Al-masri	Secret office of Dar'aa Governorate	Manage of following
51	Jamal Ayyash	Secret office of Dar'aa Governorate	Technical office
52	Salah Al-omari	Secret office of Dar'aa Governorate	Technical office
53	Ghazi Mousa	Dar'aa Governorate	Head of village council
54	Yasmeen Al-khouli	Al-zabadani Municipality	Projects department
55	Nuha Othman	Dar'aa Eater Establishment	Sewage section
56	Nazeih Sharaf Al-deen	Water Establishment of Rural Damascus	Head of sewage section
57	Mohamad Fadel Wardeh	UNDP	National director in abilities building project
58	Hekmat Abo Hamdan	Environment Pioneer Association (NGO)	Head of administration council
59	Husam Safadi	Local consulting company	Manager
60	Khaled Al-Khateeb	Dar'aa Governorate	Mayor of Yadoda Village
61	Suhail Ali Al-Humsi	Dar'aa Governorate	Baath Party
62	Yomiko Honda	JICA Syrian Office	Project Formulation Advisor
63	Nawras Khaled	JICA Syrian Office	Program office
64	Nada Cat	JICA Study Team for Urban Planning Project	Interpreter
65	Maisaa maasarani	Damascus Governorate	Counterpart of Urban Planning Project
66	Hirotumi sano	JICA Study Team	Team Leader
67	Ryunan Matsue	JICA Study Team	EIA
68	Toshiaki Ruike	JICA Study Team	Sewage Treatment Plant Planning / Water Quality Analysis
69	Seiichi Hanafusa	JICA Study Team	Sewerage Facility Design
70	Atsushi Toyama	JICA Study Team	Mechanical, Electrical Design / Cost Estimation
71	Louay Khalil	JICA Study Team	Engineer / supporter
72	Kawthar Sharab	JICA Study Team	Supporter
73	Amal Hasan	JICA Study Team	Interpreter

Table A13.1.3 Attendants List of the 1st Stakeholder Meeting at Deir-Ez-zor

No.	Name	Organization	Position
1	Dr.Wassim FALOUH	MHC	National Team Leader
2	Ghassan AL-TARBOUSH	MHC	Counterpart Team
3	Eng. Thaer JANIM	MHC	Counterpart Team
4	Eng. Ahmad AL YOUSSIF	GCEC - Damascus	Counterpart Team
5	Eng. Salih IBRAHIM	GCEC - Al Hassakeh	Supervisor Engineer
6	Eng. Nabil JASSSIM	GCEC - Al Hassakeh	Supervisor Engineer
7	Mouaaz AL-MAHMOUD	Technical Services - Deir-Ez-zor	Head of sewerage section
8	Mohamad AL-HASAN	Baladna newspaper	Journalist
9	Mohamad Khalil DAWOD	Deir-Ez-zor city council	Eng .Technical observer
10	Gorge SHAIO	Directorate of Environment Affairs of Al Hassakeh	Vice manager
11	Mahmoud AL-NAJRAS	Volunteers for Environment Association	Administration council member
12	Mouhanad AL MOHAMAD	Water Establishment of Al Hassakeh	Head of sewerage department
13	Dr . Omar ABD AL-RAZAK	Volunteers for Environment Association	The head of the association , AL Furat University
14	Eng. Omar AL MOULLA ALI	Al Furat University - Faculty of Agriculture	Teacher
15	Adnan IBRAHIM	Media	Deir-Ez-zor center
16	Eng . Is Al Din AL IBRAHIM	Al Hassakeh Directorate	Executive Office Member
17	Nihad DRIKY	Al Baath Newspaper	Journalist
18	Aysar BLAT	Al Furat Newspaper	Photographer
19	Eng. Wadah AL OJILY	Technical Services - AL Raqqa	The Head of Topography Department
20	Eng . Talaat TALAA	Al Hassakeh city council	Vice manager sewerage section
21	Mahmoud AL RAHIL	Al Hassakeh city council	Technical Services
22	Eng . Shakhmous MOUHMAD	Technical Services - AL Hassakeh	Engineer
23	Eng. Abd Al latif IBRAHIM	General Establishment of Drinking Water	General Manager
24	Eng. Shamsa AL JASSIM	Directorate of Environment Affairs of Raqqa	Director
25	Hasan AL MOUSTAFA	Euphrates Friends Association	Lawyer
26	Eng. Talal AL HIEJI	Al Hassakeh Agriculture Directorate	Agriculture Engineer
27	Eng. Hasson AL SALIH	Water Establishment at Al Hassakeh	Engineer
28	Eng. Mazin ABD AL KARIM	Water Establishment at Deir-Ez-zor	Head of sewerage section
29	Mohamad Amin RAMADAN	Directorate of Environment Affairs of Deir-Ez-zor	Director
30	Eng. Abd Al Aziz AL ALI	Al Houara City Council	Head the Technical Department
31	Mohamad Adnan ELLAWI	Water Establishment at Deir-Ez-zor	General Manager
32	Mohamad AL HAIO	Deir-Ez-zor city council	The Head of the council
33	Eng. Taha SHLASH	Al Hassakeh Agriculture Directorate	Head Section - Head of Environment Friends Club
34	Eng Sahir ABD ALLAH	Directorate of Environment Affairs of Deir-Ez-zor	Vice Manager - Lab. Chef
35	Abd Allah AL SATOUF	Al Thawra City Council - Raqqa	Head of sewerage department
36	Ibrahim MATTAR	Al Furat Newspaper	Journalist
37	Fouad AL KHALF	Media	Journalist
38	Bassil AL JASSIM	Media	Editor - Journalist
39	Yasser AL ISSA	Al Watan Newspaper	Journalist
40	Adnan AL HOUSEN	Al Kamishly City Council	Sewerage Department
41	Mashaal LOKO	Al Kamishly City Council	Sewerage Department
42	Hirofumi SANO	JICA Study Team	Team Leader
43	Ryunan MATSUE	JICA Study Team	EIA
44	Louay KHALIL	JICA Study Team	Supporter / supporter
45	Amal HASAN	JICA Study Team	Interpreter

13. 2 Photos of the 1st Stakeholder Meetings at Three Governorates

1. Circumstances of the Meeting
Lattakia, Meridien Hotel (2007-02-27）

2. Introduction the projects to local TV
Lattakia, Meridien Hotel (2007-02-27）

3. Circumstances of the Meeting
Damascus, Sheraton Hotel (2007-03-01）

4. Questions and answers
Damascus, Sheraton Hotel (2007-03-01）

5. Circumstances of the Meeting
Deir-Ez-zor, Furat Cham Hotel (2007-03-04）

6. Introduction Environmental and Social Considerations to local TV, Deir-Ez-zor, Furat Cham Hotel (2007-03-04）

13. 3 Newspaper Account of the 1st Stakeholder Consultation Meeting

Baladna Wednesday 28/2/2007

بالتعاون مع وكالة "جايكا"

مؤتمر دراسة تطوير نظم الصرف الصحي في سورية

بلدنا | اللاذقية
من | أحمد بدبوي

عُقد صباح أمس في مريديان اللاذقية مؤتمر دراسة وتطوير نظم الصرف الصحي في الجمهورية العربية السورية، الذي ستقوم به وزارة الإسكان والتعمير بالتعاون مع فريق الوكالة اليابانية للتعاون الدولي" جايكا".

محافظ اللاذقية السيد "زاهد حاج موسى" ذكر أن المساهمات العديدة التي قامت بها وكالة "جايكا" في رفع المستوى البيئي في سورية، من خلال مساهمتها في مشروع إدارة النفايات الصلبة في المحافظة والتي اشتملت على دراسة إعادة تأهيل مكب البصة ودراسة إعادة تأهيل معمل السماد في موقع البصة، ودراسة إنشاء المطمر الصحي المشترك لمدن المحافظة الأربعة في موقع "القاسية"، بالإضافة إلى مشروع إدارة جمع النفايات، ومشروع تحديث وتطوير العمل المرفئي في اللاذقية، وفتح قسم هندسة الميكاترونيك في جامعة تشرين، والعديد من المساهمات الأخرى.

من جانبه قام السيد "هيروفومي سانو" رئيس فريق وكالة جايكا بتقديم عرض موجز عن دراسة الوكالة، حيث شرح الإرشادات البيئية بين الجانب السوري وجايكا، مبيناً أن أهداف الدراسة هي مراجعة خطط التطوير الموجودة في قطاعات الصرف الصحي الوطنية، وصياغة الخطة الرئيسية للمحافظة للمناطق ذات الأولوية والتي تهدف إلى التحكم بتلوث المياه وتحسين الصحة العامة وإجراء دراسة جدوى للمنطقة ذات الأولوية بالتعاون مع الموظفين النظراء السوريين، بالإضافة إلى القيام بنقل المعرفة التقنية إلى الموظفين النظراء السوريين أثناء الدراسة. وقام السيد " سانو " بتقديم برنامج للدراسة ومراحلها التي تضم المسح الاستطلاعي وتحضير الخطة الرئيسية، ودراسة الجدوى الاقتصادية في المنطقة ذات الأولوية.

مراجعة خطط التطوير الموجودة من أهداف الدراسة

ثم قام السيد "ريونان ماتسوي" المسؤول عن تقييم الأثر البيئي ومسح استبيان العلاقات الاجتماعية، بعرض الخطوط الرئيسية بين سورية وجايكا للاهتمامات البيئية والاجتماعية، والتي تضمنت تعريفاً بالبنود الرئيسية، والتي تشمل المفاهيم الأساسية للخطوط الرئيسية لجايكا، وإجراءات الاعتبارات البيئية والاجتماعية.

وتم عرض مخطط اجتماع المعنيين الاستشاري وهدف الفحص البيئي الأول.

تبلغ مدة المشروع 16 شهراً وهو عبارة عن ثلاث مراحل

الدكتور " بسام فلوح " مدير المشروع الوطني لتطوير نظم الصرف الصحي في الجمهورية العربية السورية ، ذكر بأن مدة المشروع 16 شهراً، بدأ في نهاية 2006 وينتهي في شباط 2008، وهو عبارة عن ثلاث مراحل وتقوم الآن بمراجعة الدراسات الإقليمية الشاملة التي جرت في المحافظات وهي درعا وريف دمشق واللاذقية وطرطوس والرقة والحسكة ودير الزور. حضر المؤتمر المهندس " محمد حلمي أزهري " رئيس مجلس محافظة اللاذقية، وأعضاء من الجهات المعنية.

BALADNA

• محافظ اللاذقية خلال المؤتمر

With the Cooperation of JICA:

The Stakeholder Meeting of the Study on Sewerage System Development In the Syrian Arab Republic

(Baladna Newspaper, Wednesday 28/2/2007)

The meeting was held yesterday morning at Le Meridian Hotel of Lattakia, which is cooperated between the Ministry of Housing and Construction and the JICA Study Team.

During the opening statement, Mr. Zahid Haj Mousa, the governor of Lattakia, mentioned the various contribution of JICA in the fields of ascending the environmental level in Syria such as; the management of solid wastes project in Lattakia, the study of rehabilitation of *Al Bassa* dumpster, the study of rehabilitation of *Al Bassa* fertilizers facility, the study of initiating the joint sanitary dumpster of the governorate four cities in *Al Kassiya* zone, the management of wastes gathering of Lattakia, the project of developing and modernizing the work in Lattakia

port, inaugurating the mechatronics department in *Tishreen* University, and many others.

Mr. Hirofumi Sano, the team leader of the JICA Study Team gave a summary of the study, and explained the environmental instructions between the Syrian and JICA sides showing that the targets of the study are the revision of the existing development plans in the national sanitary sewerage sections, the formation of the Master Plan in accordance to the prioritized areas which aims to control the water pollution, the improvement of the public health status, and the implementation of the feasibility study concerning the prioritized areas with the coordination of the Syrian counterparts, including the technical knowledge conveying to them during the study period as well. After that, Mr. Sano showed the outline and the progress of the JICA study phases which include the field study task, the preparation of the Master Plan, and the preparation of the Feasibility Study for the prioritized areas.

Dr. Ryunan Matsue, Environmental Impact Assessment and the Social Relations Questionnaire Survey expert, showed Syrian and JICA guidelines for the Environmental and Social Considerations, which includes a definition of the main terms consisting of the JICA guidelines and the Environmental and Social Considerations procedures.

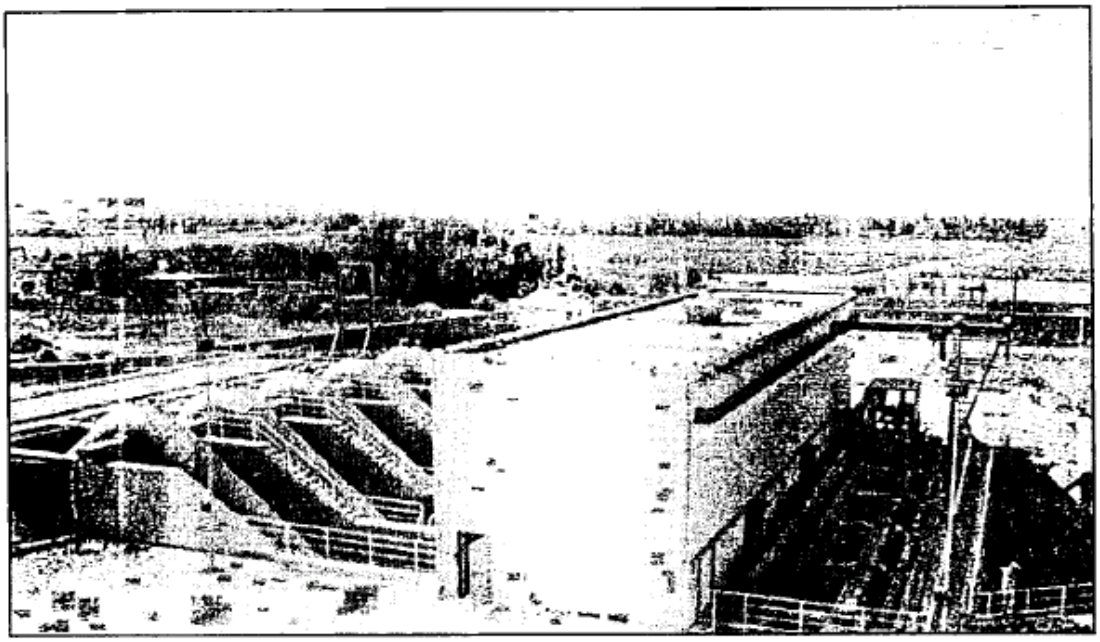
A presentation of the Stakeholder Meeting and the target of the 1st environmental questionnaire survey have been shown.

In closing address, Dr. Wassim Fallouh, the manager of the national sewerage development project in the Syrian Arab Republic, mentioned that the period of the project is 16 months, started in the end of 2006 and ends in March 2008, which consists of three phases, the first one we are executing is to review all the regional studies that have taken a place in Dar'aa, Rural Damascus, Lattakia, Tartous, Raqqa, Hassakeh and Deir-Ez-zor governorates.

Mouhamad Helmi Al Azhari, the chief of Lattakia Governorate Council and the members of the concerned sides also attended the Meeting.

Al Ba'ath Monday 3/5/2007

جايكا تدرس تطوير نظم الصرف الصحي في دير الزور والرقة تستعد لتلزيم محطة المعالجة لشركة إسبانية



دير الزور- نهاد دريعي/ الرقة- حمود العجاج:

بحث فريق جايكا الياباني في فندق فرات الشام بدير الزور مع الجهات المعنية أمس تطوير نظم الصرف الصحي بمحافظة دير الزور بهدف مراجعة خطط التطوير الموجودة في قطاعات الصرف الصحي الوطنية وصياغة الخطة الرئيسية للمحافظة ذات الاولوية والتي تهدف الى التحكم بتلوث المياه وتحسين الصحة العامة واجراء دراسة جدوى للمنطقة ذات الاولوية بالتعاون مع الموظفين النظراء السوريين والقيام بنقل المعرفة التقنية إليهم اثناء الدراسة. هذا وتحدث السيد هيروفومي سانو رئيس فريق جايكا عن هذه الدراسة والتي تاتي ضمن ثلاث مراحل في المسح الاستطلاعي للتحقق من الوضع الحالي لقطاعات الصرف الصحي والخطة العلاجية ضمن الخطة الرئيسية لتطوير نظام الصرف في سبع محافظات أما دراسة الجدوى فهي من خلال اختيار مشروع تجريبي وتعاقد ثانوي مع استشاريين محليين. في الرقة... وفي اطار التعاون الفني بين الحكومة السورية والإسبانية تقدم الجانب الاسباني بقرض لتمويل محطة معالجة لمجاري مدينة الرقة. وذكر مدير الصرف الصحي في وزارة الاسكان بانه تمت موافاة الجانب الاسباني بالاضبارة الخاصة بالمشروع ودراستها وتدقيقها واعتمادها وفقاً للواقع الحالي لمدينة الرقة ومن خلال لحظ عدد السكان والغزارات مشيراً الى ان الشركات الخمس التي تقدمت بالعروض للمرة الاولى لم تتاهل اي منها لتنفيذ المشروع وفق الشروط المطلوبة. علماً ان الوزارة تقوم حالياً باستبدال الخطوط الرئيسية للصرف الصحي في مدينة الرقة كما باشرت بتنفيذ محطة الضخ التي ستضخ المياه الى محطة المعالجة. يذكر ان محطة المعالجة المقرر تنفيذها لمدينة الرقة تفوق كلفتها الـ /مليار/ ل.س وتتوضع بالقرب من معمل القرميد وعلى بعد نحو ١٢ كيلو متراً شرق الرقة، وستضع عند استثمارها حداً لتلوث مياه نهر الفرات حيث ان معظم مجارير الصرف الصحي تصب فيه.

JICA Studies the Sewerage System Development in Deir-Ez-zor Governorate
(Al Ba'ath Newspaper; Monday 5/3/2007)

Yesterday, JICA Study Team and the concerned sides held the 1st Stakeholder Meeting in Furat

Cham Hotel in Deir-Ez-zor about the development of the sewerage system for the targets of the revision of the existing development plans in the national sanitary sewerage sections, the formation of the Master Plan in accordance to the prioritized areas, which aims to control the water pollution, to improve the public health status, and to implement the Feasibility Study concerning the prioritized areas with the coordination of the Syrian counterparts, including the technical knowledge transfer to them during the study period as well.

Mr. Mr. Hirofumi Sano, the team leader of the JICA Study Team, appointed that this study consists of three phases of the field surveying to examine the current status of the sanitary sewerage sections, and the amendment plan in accordance of the Master Plan of the sewerage systems development in the seven governorates of (Rural Damascus, Dar'aa, Tartous, Lattakia, Raqqa, Deir-Ez-zor, Hassakeh). The Feasibility Study is going to be executed through a choosing an experimental project and contracting with local consultants.

13. 4 Minutes of the 1st Stakeholder Meeting at Three Governorates

Based on the agreement between Ministry of Housing and Construction (hereafter called as MHC) and Japan International Cooperation Agency (hereafter called as JICA), MHC in collaboration with the JICA Study Team organized a Stakeholder Consultation Meeting from 27 February to 4 March 2007 at Lattakia, Damascus and Deir-Ez-zor, respectively. The place and timing of the Meetings are showed as **Table A13.4.1**.

Table A13.4.1 Place and Timing of the 1st Stakeholder Consultation Meeting

Items	Lattakia	Damascus	Deir-Ez-zor
Timing	10:00 – 12:50 27 February 2007	10:00 – 13:00 1 March 2007	10:00 – 12:30 4 March 2007
Place	Meridien Hotel	Sheraton Hotel	Furat Cham Hotel
Target Areas	Lattakia and Tartous Governorates	Rural Damascus and Dar'aa Governorates	Deir-Ez-zor, Raqqa and Hassakeh Governorates

13.4.1 1st Stakeholder Meeting at Lattakia

(1) Opening Address, by Mr. Zahed Haj Eisa, Lattakia Director

The Meeting was started by an opening address by Governor of Lattakia Governorate, Mr. Zahed Haj Eisa, who introduced the situation of various JICA's projects in Lattakia and emphasized the importance of this essential project to reach the total integrated management of sanitary sewerage system. He also thanked the government of Japan and JICA for the efforts in the field of environment.

(2) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target area, outline and the progress of the Study. He also explained that supporting on Stakeholder Meeting is one of important contents as the JICA Study Team.

(3) Presentation Part II, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the objectives and basic concepts of the JICA Guidelines for Environmental and Social Considerations. Then, he explained the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Finally, He mentioned that an IEE (Initial Environmental Examination) level study will be conducted by MHC in collaboration with the JICA Study Team.

(4) Presentation Part III, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

In this part, Dr. MATSUE explained the plan Stakeholder Consultation Meeting during the implementing period of the Study and informed that there will be 2 stakeholder meetings for the M/P target governorates, and additional stakeholder meeting will be held only for F/S target governorate. He also explained the results of scoping and study methods in IEE level study in detail.

(5) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Eng. Ghatfan KHOURY, Chief of the Technical Services – Tartous

What is the JICA's vision and procedures about the benefits of this study according to the characteristics of the coastal area? (such as the heavy population growth, the heavy rainfall, special geological and topographical features and the faults the water flats in this area.)

Mr. SANO

We will review local master plan and then after we finish JICA's master plan we can compare the results and maybe we will modify it or not but we will considerate the results of local master plan and the characteristics of coastal area.

Dr. MATSUE

During M/P, we will take consideration into the special situation of the coastal area, however the scale of the STP project is not so big so there are not serious impacts of the construction of the STP on the environment such as geological and topographical. On the other hand, implementation of STP project will improve sea water quality.

2) Dr. Eng. Mohamad HABIB, Establishment of Drinking Water - Lattakia

There is a local master plan for sewerage projects in the coastal area, the question is what is your suggestions about construction separated STPs or one central STP?

The basic future problem of the STP project in the coastal area is the odor problem with which four existing STPs in Lattakia is faced. How can we deal with these problems?

Mr. SANO

We will decide separated STP or central one based on the examination of geographical conditions, economic, financial, social and environmental.

Dr. MATSUE

To solve the odor problem we should think about this matter in the study stage not after the construction of STP. This odor problem would be minimal or neglected If we had conducted an effective environmental and social considerations such as selecting proposed STP location far from residential area.

However, as countermeasures to solve existing problems, planting around STP or using soil filter beds to treat the collected odor from covered wastewater and sludge treatment facilities may be recommended.

3) Mr. Michael AL-KHOURY, The Chief of the City Council of Safita

We have a sewerage network which is mixed with rainfall drainage. What is the impact of this sewerage system on the STP's performance and what are the appreciated measures?

Mr. SANO

We should evaluate this system and maybe we should modify it such as using combined sewer overflow (CSO) control measures or using separate system. We can send you the Japanese

measures for CSO control by e-mail.

4) Dr. Suheir RAIES, The Syrian Coast Society for Environmental Protection – NGO

We have no medical wastes treatment plant in Lattakia and other cities of coastal area. Would you take into consideration the special situation of medical wastes and other harmful substances generated from factories in this project?

There is no future vision for medical wastes (like medical drugs, cancer treatment, etc...) treatment before throwing it into sewerage system

Mr. SANO

We have an expert taking in charge of Industrial Wastewater Treatment Planning in our team and he will give some recommendations and suggestions on the treatment of industrial wastewater or medical wastewater.

Dr. Wassim, MHC

There are many EIA committees for monitoring the private sector industries and the hospitals and there is a suggested plan for pre-treatment and monitoring system.

5) Eng. Jaber HASAN, Technical Services – Tartous

Does the JICA's study take into consideration the olive mill wastes that have high concentrations of COD and BOD which are about more than ten times of domestic wastewater?

What is affected distance range of the offensive odor?

Mr. SANO

We will take the olive mill wastes into our consideration and we will suggest a pre-treatment process before discharging it into the sewerage system.

Dr. MATSUE

The affected area of offensive odor varies with the climate conditions in different season and odor strength. In this project we have a plan to conduct a questionnaire survey on residents near existing STP in Syria to estimate the affected area of offensive odor.

6) Eng. Rabab AL-KHIER, The Syrian Coast Society for Environmental Protection – NGO

There are no any executive instructions to force the industries and the hospitals to make a pre-treatment for their wastes. Also, government (such MHC) should provide the pre-treatment facilities for hospitals and factories.

In our region we have a very old and bad sewerage system. How can we use it in the future? Does JICA side carry out follow-up activities after the Study?

Dr. MATSUE

We should firstly evaluate its condition and capacity and then make a decision to restore or replace it. Basically, we should use existing sewerage system as possible.

According to JICA guidelines, MHC should confirm the implementing situation of environmental and social considerations during construction and operation stages after this development study is terminated. If necessary, JICA may offer another cooperation project to follow-up the Study.

7) ENG.Eid HASSAN, Technical Services – Tartous

Does the JICA's study take into consideration on the impacts of construction work of pipelines system on existing infrastructures, and take into consideration on reusing the treated water and sludge.

Dr. MATSUE

This is a very important point and we will pay attention on this matter by IEE level study, and the results of IEE level study will be showed in 2nd Stakeholder Meeting.

(6) Closing Address, by Dr. Wassim Fallouh, MHC

Dr. Wassim thanked stakeholders for their participation and their valuable comments to the Study.

Annex I: Attendants List

13.4.2 1st Stakeholder Meeting at Damascus

(1) Opening Address, by Mr. Mohamad Ahmad Al-Gradatt, Director of Sewerage Department of MHC

The Meeting was started by an opening address by Director of Sewerage Department of MHC, Mr. Mohamad Ahmad Al-Gradatt, who welcomed and thanked attendants for their participation, and mentioned that the Stakeholder Meeting is organized by MHC in collaboration with the JICA Study Team. He also thanked JICA for their cooperation in many fields especially in training our staff. Finally, he hoped stakeholders could give useful comments and suggestions.

(2) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target area, outline and the progress of the Study. He also explained that supporting on Stakeholder Meeting is one of important contents as the JICA Study Team.

(3) Presentation Part II, Mr. Maher Al-khateeb, MHC

Mr. Maher explained briefly the reason why EIA knowledge is necessary for sanitary engineer and what items have been taken into consideration in an EIA study for a sewerage project.

(4) Presentation Part III, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the objectives and basic concepts of the JICA Guidelines for Environmental and Social Considerations. Then, he explained the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Finally, He mentioned that an IEE (Initial Environmental Examination) level study will be conducted by MHC in collaboration with the JICA Study Team.

(5) Presentation Part IV, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

In this part, Dr. MATSUE explained the plan Stakeholder Consultation Meeting during the implementing period of the Study and informed that there will be 2 stakeholder meetings for the M/P target governorates, and additional stakeholder meeting will be held only for F/S target governorate. He also explained the results of scoping and study methods in IEE level study in

detail.

(6) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Eng. Housam AL-SAFADI, Consultant Engineer

In Syria, existing sewerage system is combined system. In JICA study, whether a separated system will be proposed? And is there any economical feasibility study for the selection?

For the item No. 23 which is facility design of sewerage system including sewage treatment plant, are you going to design only one STP in each governorate or more? And for the item No. 34 which is the technology transfer, are you going to transfer the technology and the information to other governorates which are not included in this study? I suggest making training courses to local staff about 20 persons at each governorate.

What is correlation between JICA Guidelines for Environmental and Social Considerations and other International Organizations' guidelines (such as EU Guidelines, ADB Guidelines)? When and where can I have the final results of this study, and maybe it is better to present this study and its results on special website.

Mr. SANO

For the first question, it is dependent on the climate conditions in the studied area for example the coastal area has rainfall more than 1,000 mm per year so it is suitable to design separated system, however, for the area like Damascus which has rainfall less than 300 mm so it is preferred to design combined system and a feasibility study will be made for the priority area which is only located in the Rural Damascus according to MHC.

And we will prepare a report which includes all details about feasibility study and the all recommendations etc…

For another point, the time is very limited so the priority is to finish the study and maybe later we will discuss the training courses but now we have counter-partners staff from MHC who can follow up the project in the future because these staffs will have enough experience through technology transfer of this study.

Dr. MATSUE

New JICA Guidelines are modified in 2004 by referring EU Guidelines, World Band Environmental Sourcebook, ADB Environmental Assessment Guidelines etc.

According to JICA Guidelines, JICA encourage the recipient government to disclose and present information about environmental and social consideration to local stakeholders. For the acquisition of final results of this study, we hope you could have soft or hard copies of reports from MHC.

2) Dr. Eng. Farouk AL-ADLI, University of Damascus – Civil Engineering Faculty

Do you take into consideration the characteristics of each area in your study like topographical features? Because sometimes we have to design many pumping stations to pump wastewater, therefore, I suggest that several separated (or small) STPs not one central STP should be designed.

Mr. SANO

Both central STP and small STPs will be discussed in the study, and we know that the small STP is easier for the management, but there are many other considerations we should take such as topographical, economic and financial conditions.

Dr. MATSUE

On the other hand, environmental and social also should be considered, for example, we have to make examination to compare reuse and discharge of treated wastewater and sludge, and odor problem.

3) Dr. Eng. Bashar EBRAHIM, University of Damascus – Agriculture Engineering Faculty

My question is about the sludge and how can we reuse it? For example, is there any decision to use it in the agriculture directly or we need secondary sludge treatment in order to reuse it?

I suggest that if it is possible to make long term training courses to our local staff like another JICA's technical cooperation projects.

Also I suggest a pilot project, to transfer the JOKASOW technology to Syria if it possible.

Dr. MATSUE

The sludge reuse for agriculture is one of our considerations in this study but we should make

examination on heavy metals in STP sludge and soil in agricultural land in order to evaluate whether we can apply the STP sludge for agriculture or not. In the IEE level study, we will collect the related information and also hope stakeholders to give us your supports.

For second question, although our project is a development project, we will conduct training as much as possible to C/Ps. Actually, every day JICA Study Team is working with C/P team from MHC and GCEC, technology transfer has been carried out during our daily works. We also hope in the future another JICA's technical cooperation project will be conducted in the field of sewerage.

Mr. SANO

In Master Plan study, JOHKASOU technology will be examined as one of alternatives for treatment method selection. For the details, we will send you JOHKASOU information if necessary.

4) Expert from GCEC

In many of our villages there are not any sewerage systems. Do you take into consideration on Syrian economical ability when you prepare M/P?

Why did you put (D) for air pollution item and (C) for odor item and why did you separate these two items for IEE level study?

Mr. SANO

The time is limited to cover all Syria so we will put a master plan to sewerage system include the proposed STPs and then in the future the local specialists should take the decision about the local problems. In master plan study we will pay our attention on Syrian economical ability when we selection treatment method.

Dr. MATSUE

In general, we can say that odor item is included in air pollution item. However, here air pollution means total suspended particulate (TSP) matter, NOx, SOx, lead (Pb) and so on. On the other hand, for sewerage system odor problem is a common and important item because for almost STPs the offensive may emitted from wastewater and sludge treatment facilities. Therefore, we separated odor and air pollution.

5) Hekmat ABOU MOHAMD, The Environmental Avant-Garde – Rural Damascus Area –

NGO

Are you going to take into consideration the loss of water quantities after the treatment process in the proposed STP? Because bad water quality is better than no water.

Dr. MATSUE

We understood some people used to use raw wastewater for irrigation. However, if you use raw wastewater that is not meet water quality standard for irrigation use, some damage may occur in the future. We prefer to use treated wastewater with good quality rather than to loss a little water quantity.

6) Mr. Ali AL-ZOUABI, The Agriculture Association of Dar'aa

What are the impacts of STP on human and groundwater etc. and what is affected rang of odor?

Dr. MATSUE

Actually, there is a positive impact of the sewerage project on public health condition because the water environment will be improved after implementation of the project. However, some adverse impacts may generated by the project such as groundwater pollution at sludge disposal site, odor problem around STP area. Affected rang of odor is normally from few hundred meters to few kilometers depending on climate conditions and odor strength. In this project we have a plan to conduct a questionnaire survey on residents near existing STP in Syria to estimate the affected area of offensive odor.

(7) Closing Address, by Ms. Yomiko HONDA, Project Formulation Advisor, JICA Syrian Office

Ms. Honda thanked stakeholders for their participation and explained that the time is limited for the Study, therefore, it is difficult to cover whole Syria and other related fields. She expected that sustainable development for sewerage system in Syria could be achieved through the implementation of the projects.

Annex II: Attendants List

13.4.3 1st Stakeholder Meeting at Deir-Ez-zor

(1) Opening Address, by Dr. Wassim Fallouh, MHC

The Meeting was started by an opening address by Dr. Wassim Fallouh, who welcomed and thanked attendants for their participation and mentioned that the Stakeholder Meeting is organized by MHC in collaboration with the JICA Study Team. He also thanked JICA for their cooperation in many fields especially in training our staff. Finally, he hoped stakeholders could give useful comments and suggestions.

(2) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target area, outline and the progress of the Study. He also explained that supporting on Stakeholder Meeting is one of important contents as the JICA Study Team.

(3) Presentation Part II, Mr. Thaer Hatem, MHC

Mr. Thaer explained briefly the reason why EIA knowledge is necessary for sanitary engineer and what items have been taken into consideration in an EIA study for a sewerage project.

(4) Presentation Part III, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the objectives and basic concepts of the JICA Guidelines for Environmental and Social Considerations. Then, he explained the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Finally, He mentioned that an IEE (Initial Environmental Examination) level study will be conducted by MHC in collaboration with the JICA Study Team.

(5) Presentation Part IV, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

In this part, Dr. MATSUE explained the plan Stakeholder Consultation Meeting during the implementing period of the Study and informed that there will be 2 stakeholder meetings for the M/P target governorates, and additional stakeholder meeting will be held only for F/S target governorate. He also explained the results of scoping and study methods in IEE level study in detail.

(6) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Eng. Abd Al Latif IBRAHIM, General Manager of the General Establishment of Drinking Water- Raqqa

Can we know the priority area from the preliminary stage?

Mr. SANO

Our study includes examination on the current status of sewerage sector and review of existing development plan for whole Syria (phase I) and establishment of Master Plan for prioritized areas (4 Areas, 7 Governorates) Rural Damascus, Dar'aa, Tartous, Lattakia, Raqqa, Dier-Ez-zor, Hassakeh (phase II), and the Feasibility Study as a pilot project in selected priority area (phase III).

2) Eng. Taha SHLASH, Al Hassakeh Agriculture Directorate, Head of Environment Friends Club – NGO

Is it possible to apply anaerobic treatment method for domestic wastewater treatment? Whether the situation of shortage of water in Hassakeh is taken into consideration in your study?

Dr. MATSUE

We will take into consideration on reusing treated water for irrigation. And there are some advantages for anaerobic treatment such as no energy consumption for oxygen transfer, energy being produced in the form of methane which can be used as fuel. However generally speaking, anaerobic treatment is usually used for industrial wastewater containing high concentration of organic matters, while aerobic treatment is usually used for sewerage treatment because of following reasons:

- The effluent from an anaerobic treatment system usually requires post-treatment for removal of remaining BOD or COD and ammonia before the effluent can be discharged into receiving water body.
- Little practical experience has been gained with the application of the process to the sewerage treatment.
- Sensitivity of anaerobic bacteria to environmental factors (temperature, pH, and some physical parameters etc.)

3) Dr. Omar ABD AL-RAZAK, AL Furat University, The Head of the Association Volunteers for Environment – NGO

What kind of technology that will be used in STP, considering the fact that the wastewater sometime contains toxic components?

Mr. SANO

We will take into consideration on what you have mentioned during the study.

4) Mouhanad AL MOHAMAD, Al Hassakeh Water Establishment, Head of the Sewerage Department

I want to know if you will offer us only a study in this project or you will execute it (including construction).

Mr. SANO

Unfortunately, we will only conduct a study on sewerage system development, but as next step, Syrian side may request other donors including Japan to execute it.

5) Eng. Is Al Din AL IBRAHIM, Al Hassakeh Directorate - Executive Office Member

How can we know about the results of your study?

Mr.SANO

We will submit a lot of reports to MHC, moreover, we will introduce the results of our Master Plan study.

6) Mr. Hasan AL MOUSTAFA, Euphrates Friends Association – NGO

Did you take into consideration the agricultural wastes in your study, as you know it is very dangerous especially in our area?

Dr. MATSUE

We understood you are talking about no-point source control. However, the purpose of this study is to formulate Master Plan for sewerage system in prioritized area, and maybe the agricultural wastes should be included by another study.

(7) Closing Address, by Mr. Ghassan Al-tarboush, MHC

Mr. Ghassan thanked stakeholders for their participation and their valuable comments to the Study.

Annex III: Attendants List

13.5 Attendants List of the 2nd Stakeholder Meetings at Three Governorates

Table A13.5.1 Attendants List of the 2nd Stakeholder Meeting at Deir-Ez-zor

No.	Name	Organization	Position
1	Kusay Al-Sarraj	Deir-Ez-zor (DZR) Executive Bureau	Member
2	Wassim Fallouh	MHC	Director of the project
3	Ghassan Al-tarboush	MHC	Engineer
4	Thaer Janem	MHC	Engineer
5	Sami Malla Hammoud	Water Establishment of DZR	Engineer
6	Ahmad Manba'a	Water Establishment of DZR	Technical Observer
7	Ali Kalash	Water Establishment of DZR	Technical Observer
8	Suleiman Al-Ali	Water Establishment of DZR	Supervisor
9	Mahmoud Al-Hanat	Water Establishment of DZR	Technical Observer
10	Mazen Alabed Alkarim	Water Establishment of DZR	Head of sewerage Dept.
11	Muhammad Amin Ramadan Al-Khalaf	Directorate of Environment Affairs of DZR	Director
12	Wassim Al-Mahmoud	Environment Directorate	Engineer
13	Ahmad Faqeer	DZR-Sugar Company	Head of Planning and Statistics Dept.
14	Faysal Othman	DFEA	Engineer
15	Raed Mandil	DZR-Planning Directorate	Head of Section
16	Bassil Khallouf	DZR- City Council	Head of Sewerage Dept.
17	Yaser Al-Husein Al-Mazzan	DZR-City Council	Technical Affairs Manager
18	Abd Al-Naser Sultan	DZR-Planning Directorate	Economist
19	Lazikin Khalil	A'mouda City	
20	Mahmoud Alrahil	Al Hasaka city council- Technical Services	Assistant Manager
21	Dulkhosh Abd-Allah	Hassakeh-Technical Services Directorate	Head of Solid waste Dep.
22	Isameel Al-Darwish	Al-Hassakeh Municipality	Eng./Head of Sewerage Office
23	Abd Al-Baset Misto	A'mouda City	
24	Dr.Azad Ali	GCEC-Hassakeh	Chairman of Hassakeh Center
25	Ahmad AL yousef	GCEC - Damascus	Engineer
26	Ma'ad Al-Madlaji	GCEC	Director of North-eastern Branch
27	Ali Akkur	GCEC-Aleppo	Engineer
28	Muhammad Jalal Alhayyo	DZR City council	Head of the council
29	Mahmoud Jasem Alnajras	Volunteers for Environment Association NGO	Administration council member
30	hasan Al-Mustafa Al-Hasan	Euphrates Friends Association NGO	Chairman
31	Idmon Isaak	Countryside Knowledge Network NGO	Al-Bawwabeh-Site Manager/Malkieh
32	Raed alnaqeshbandi	Volunteers for Environment Association	Journalist

No.	Name	Organization	Position
33	Ahmad Al-Yousufi	Private sector	
34	Bashir Al-Yousufi	Private sector	
35	Fouad Khalaf Almuhammad	Syrian TV	Editor
36	Adnan Ibrahim	Syrian TV	Photographer
37	Mayumi Murakami	JICA Syria Office	Assistant Resident Representative
38	Nawras Khaled	JICA Syria Office	
39	Hirofumi Sano	JICA Study Team	Team Leader
40	Ryunan Matsue	JICA Study Team	EIA
41	Amal Hasan	JICA Study Team	Interpreter
42	Issa Mahmoud	JICA Study Team	Dr. Engineer/Interpreter
43	Louay Khalil	JICA Study Team	Engineer/supporter

Table A13.5.2 Attendants List of the 2nd Stakeholder Meeting at Lattakia

No.	Name	Organization	Position
1	Nabil Abu Kaf	Lattakia Governorate	Vice Governor
2	Waseem Falloh	MHC	Director of the project
3	Rafiq Fuddah	Lattakia Sewerage Co.	Engineer
4	Ghassan Al-tarboush	MHC	Engineer
5	Thaer Janem	MHC	Engineer
6	Sablaa Kafora	Lattakia Sewerage Co.	Electrical engineer
7	Miassa Tezini	Lattakia Sewerage Co.	Civil engineer
8	Fadel Habseh	Lattakia Sewerage Co.	Technical observer
9	Imad Khalluf	Technical Service Directorate of Tartous	head of sewerage studies section
10	Usama Khaddur	Technical Service Directorate of Tartous	Civil engineer/ Sewerage studies section
11	Isam Jouni	Water establishment	General manager
12	Aasef Ibrahim	Tartous Sewerage Co.	Civil engineer
13	Kamal muhanna	Tartous Sewerage Co.	Civil engineer
14	Mais Samaan	Technical Service Directorate of Tartous	Civil engineer/ sewerage studies section
15	Fadia qarah Falah	Lattakia Water Establishment	Electrical engineer
16	Nahla Khuri	Lattakia Water Establishment	Electrical engineer
17	Shadi Abdo	Lattakia Water Establishment	Civil engineer
18	Nadim Yousef	Tartous Water Establishment	Civil engineer
19	Arwa Ghanem	Tartous Water Establishment	Mechanical engineer
20	Souhel Sallum	Water Resources Directorate	Agricultural Engineer
21	Muhammad Qassab	Jableh city council	Head of Services Dept.
22	Hamed Husein	Tartous city council	Head of Sewerage Section
23	Mazhar Hasan	Tartous city council	Head of Services Dept.
24	Samer Ahmad	Lattakia Sewerage Co.	General Director
25	Souher Alrayyes	Coast Association of Environment Protection (NGO)	Head of association
26	Haitham Gharib	Coast Association of Environment Protection (NGO)	Member
27	Mahmud Hamdan Musa	Technical Service Directorate of Tartous	Civil engineer
28	Maisaa Ramadan	Technical Service Directorate of Tartous	Civil engineer
29	Mais Hasan	Technical Service Directorate of Tartous	Engineer
30	Mazen Ghannum	Tartous Water Establishment	Engineer
31	Rihab Saliha	Lattakia Sewerage Co.	Eng./Head of Sewerage Dept.
32	Muhammad Habib	Lattakia Water Establishment	Dr. Engineer
33	Munther Aljabiri	General Co.for Building and Construction	Civil engineer
34	Bader Istivan	Lattakia Water Establishment	Mechanical engineer
35	Faruq Alqasiri	Water resources Directorate	Civil engineer
36	Muhammad Abed Alrazzaq	Water resources Directorate	Engineer Assistant
37	Ibrahim dib	Water resources Directorate	Eng./Head of Water Quality Section
38	Ahmad Zugheb	Homs Sewerage Co.	Assistant General manager
39	Ranim Shuhadeh	Lattakia Sewerage Co.	Technical observer
40	Nisreen Rae`d	Lattakia Sewerage Co.	Engineer
41	Rami Tonjal	Lattakia Sewerage Co.	Engineer
42	Ahmad Alyousef	GCEC	Civil engineer
43	Ghatfan Alkhuri	Technical Service Directorate of Banias	Engineer
44	Hasan Hasan	Technical Service Directorate of Banias	Engineer

No.	Name	Organization	Position
45	Rida Abed Alrahman	Technical Service Directorate of Banias	Engineer
46	Fayizeh Ismae`el	Technical Service Directorate of Tartous	Engineer
47	Ula Sulaiman	Technical Service Directorate of Tartous	Engineer
48	Muhammad Uthman	Technical Service Directorate of Tartous	Engineer
49	Imad Aldin Issa	Lattakia Water Establishment	Environmental Eng.
50	Ahmad Qasir	Tishreen University	PhD/Professor
51	Bassam Qasir	Lattakia Water Establishment	Engineer
52	Linda Ibrahim	Lattakia Water Establishment	Civil engineer
53	Fadwa Ghanem	Tartous Water Establishment	Engineer
54	Hala Hasan	Tartous Water Establishment	Civil engineer
55	Lara Darweesh	Lattakia Sewerage Co.	Technical observer
56	Tamara U`qbor	Lattakia Sewerage Co.	Administrative Affairs
57	Naji Ali	Tartous Sewerage Co.	Civil engineer
58	Waddah Sulaiman	Technical Service Directorate of Tartous	Civil engineer
59	Nabil Naser	Lattakia Water Establishment	Studies Manager
60	Ahmad Wazzan	Tishreen University	PhD/Professor
61	Haitham Jinad	Tishreen University	PhD/Professor
62	Badia Abed Alhadi	Lattakia Water Establishment	Engineer
63	Maisaa Dayyoub	Lattakia Water Establishment	Engineer
64	Nahed Aashur	Lattakia Water Establishment	Engineer
65	Ahmad Asa`d	Durekish city council	Engineer
66	Reem Issa	Lattakia Sewerage Co.	Technical observer
67	Ali Hilal rustom	Technical Service Directorate of Tartous	Engineer
68	Wisam muhammad Ahmad	Technical Service Directorate of Tartous	Civil engineer
69	Widad Saeed	Lattakia Water Establishment	Engineer
70	Suzan Daher	Lattakia Water Establishment	Engineer
71	Nariman Alhajji	Lattakia Water Establishment	Engineer
72	Louay Alkhatib	Lattakia Water Establishment	Engineer/Head of Coordinating Dept.
73	Mamduh Haj Hasan	Lattakia city council	Engineer
74	Mustafa Darwish	Jableh city council	Engineer/Sewerage Dept.
75	Abd Alrahman Fattuh	Banias city council	Engineer/Head of information Dept.
76	Mohammad Khadam	Banias city council	Engineer/Sewerage system
77	Dawood Almani	"www.allforsyria.org" website	Journalist
79	Ahmad Alyusofi	Private sector	
80	Bashir Alyusofi	Private sector	
81	Hirotumi Sano	JICA Study Team	Team Leader
82	Matsue Ryunan	JICA Study Team	EIA
83	Louay Khalil	JICA Study Team	Engineer/supporter
84	Amal Hasan	JICA Study Team	Interpreter

Table A13.5.3 Attendants List of the 2nd Stakeholder Meeting at Damascus

No.	Name	Organization	Position
1	Kamal Al-Shiekha	MHS	Vice Minister
2	Waseem Falloh	MHC	Director of the project
3	Ghassan Al-tarboush	MHC	Engineer
4	Eiad Ali	MHC	Engineer
5	Wesal Khalil	MHC	Engineer
6	Maher Al-khateeb	MHC	Engineer
7	Thaer Janem	MHC	Engineer
8	Hanan Shawki	MHC	Head of studies Dept.
9	Ali Abdulmalek	MHC	
10	Mohammad Alhaj	MHC	
11	Shahir Abu Azan	MHC	
12	Jamal Aljarad	MHC	Engineer /Sewerage Treatment
13	Muhammad Aljaradat	MHC	Engineer/ head of Sewerage Department
14	Abeer Muhammad	MHC	Dr. engineer/ Sewerage Department
15	Hasan Lahham	MHC	Eng./Sewerage Department
16	Ahmad Al-yosef	GCEC	Engineer
17	Luai Kharita	Technical Services Directorate of Rural Dam	Eng./Director
18	Fatima Deeb	Technical Services Directorate of Rural Dam	Eng./Head of planning Section
19	Younes Albeiton	Rural Damascus Governorate	Deputy Governorate
20	Sameer Laqteena	Rural Damascus Governorate	Eng./Regional planning Manager
21	Farouq Altabba`	Rural Damascus Governorate	Eng./Public relations
22	Madyan Nasra	Directorate of Environment Affairs of Rural Damascus	Eng./Deputy Director
23	Muna Juma`	Directorate of Environment Affairs of Damascus	Eng./Lab Chief
24	Wadeea` Jiha	Directorate of Environment Affairs of Rural Damascus	Eng./Deputy Director
25	Nazeeh Sharaf Aldin	water Establishment of Rural Damascus	Eng./Head of Sewerage Dept.
26	Fares Uthman	Dar'aa Water Establishment	Eng./Head of Sewerage Dept.
27	Muhammad Barakat	Dar'aa Water Establishment	Engineer
28	Khadiija Arhil	Dar'aa Water Establishment	Engineer
29	Bassam Aba Zeid	Dar'aa Water Establishment	Engineer
30	Jala`a Alfarhan	Dar'aa Water Establishment	Engineer
31	Ayyoub Alsharif	Technical Services Directorate of Dar'aa	Engineer
32	Fida` Alaini	Technical Services Directorate of Dar'aa	Engineer
33	Yousef Al- shehadat	Technical Services Directorate of Dar'aa	Engineer
34	Radwan Alayyash	Technical Services Directorate of Dar'aa	Engineer
35	Yousef Alshadaideh	Directorate of Environment Affairs of Dara'a	Engineer
36	Muhammad Aba zeid	Directorate of Environment Affairs of Dar'aa	Engineer
37	Shebli Al-shami	Damascus University	Professor/water engineering
38	Farouk Al-aadli	Damascus University	Professor
39	Mah Huey Fong	Renuxey Weida (Malaysia Sewerage Project)	Engineer
40	Muhammad Adnan	Renuxey Weida (Malaysia Sewerage Project)	Coordinator
41	Najwa Issa	Renuxey Weida (Malaysia Sewerage	Project Eng.

No.	Name	Organization	Position
		Project)	
42	Edwin Thong	Renuxey Weida (Malaysia Sewerage Project)	Project Manager
43	Mohamad Wardeh	UNDP	
44	Hekmat Abo Hamdan	Environment Pioneer Association NGO	Plastic Artist
45	Uthman Awad	Zamalka society for Environmental Development NGO	Head of the society
46	Iman Alhourani	Zamalka society for Environmental Development NGO	Member
47	Sufian Yaseen	Environment Pioneer Association NGO	Member
48	Husam Safadi	Private Sector	Manager/Consultant
49	Mahmud Daghmash	Lokos Project NGO	
50	Tayseer Saleh	Cham Hotel	Security
51	Imad Abu Hubeish	Water Resources Directorate in Dara'a	Eng./Water Quality Monitoring
52	Ahmad Sulaiman	SANA news Agency	Editor
53	Ziad Falah	Althawra Newspaper	Photographer
54	Saleh Hamidah	Alwatan and Althawra Newspaper	Journalist
55	Badia Alwannous	Tishreen Newspaper	Editor
56	Muhammad Aljamal	Alba'ath Newspaper	Journalist
57	Mahjoub Alraqsha	Althawra Newspaper	Journalist
58	Isam Mahmoud	TV	Correspondent
59	Issa Malous	SANA news Agency	Photographer
60	Fadi Aashuri	General Commission of TV and Radio	TV Photographer
61	Nawras Salman	General Commission of TV and Radio	TV Photographer
62	Tomita Akiko	JICA Syria Office	Resident Representative
63	Higashi Kaori	JICA Syria Office	
64	Nawras Khaled	JICA Syria Office	Program office
65	Hirofumi Sano	JICA Study Team	Team Leader
66	Ryunan Matsue	JICA Study Team	EIA
67	Masasshi Kawamura	JICA Study Team	Sewerage Database
68	Victor Kupriyanov	JICA Study Team	Economist
69	Toshiaki Ruike	JICA Study Team	Sewage Treatment Plant Planning / Water Quality Analysis
70	Seiichi Hanafusa	JICA Study Team	Sewerage Facility Design
71	Atsushi Toyama	JICA Study Team	Mechanical, Electrical Design / Cost Estimation
72	Louay Khalil	JICA Study Team	Engineer / supporter
73	Aiman Roumieh	JICA Study Team	Translator
74	Issa Mahmoud	JICA Study Team	Dr. Engineer/Interpreter
75	Amal Hasan	JICA Study Team	Interpreter

13. 6 Photos of the 2nd Stakeholder Meetings at Three Governorates

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. Circumstances of the Meeting at Deir-Ez-zor, Furat Cham Hotel (2007-09-09）</td><td>2. Introduction the projects to local media,
Deir-Ez-zor, Furat Cham Hotel (2007-09-09）</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. Opening Statement by Vice Governor,
Lattakia, Meridien Hotel (2007-09-11）</td><td>4. Circumstances of the Meeting,
Lattakia, Meridien Hotel (2007-09-11）</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>5. Opening Statement by Dr. Kamal , Vice Minister of Ministry of Housing and Construction,
Damascus, Cham Palace Hotel (2007-09-16)</td><td>6. Opening Statement by Ms. Tomita, Resident Representative of JICA Syrian Office,
Damascus, Cham Palace Hotel (2007-09-16)</td></tr>
</table>

13. 7 Photos of STP Sites and IEE Level Survey

1. Candidate site of Slunfeh STP

2. Candidate site of Banias STP

3. Candidate site of Mayadin STP

4. Candidate site of Malkieh STP

5. Candidate site of Thawra STP

6. Candidate site of Muzerib STP

7. Candidate site of Zabadani STP

8. IEE level survey with C/Ps

13.8 Newspaper Account of the 2nd Stakeholder Meeting

بالتعاون مع جايكا :
خطة للصرف الصحي في ٧ محافظات

دمشق ـ محجوب الرفاعة:

اكد د. كمال الشيخة معاون وزير الاسكان والتعمير على قيام وزارة الإسكان باتخاذ الاجراءات اللازمة لمواجهة العجز المائي وتلوث المصادر المائية من خلال رصد الاعتمادات لتنفيذ مشاريع الصرف الصحي في مختلف المحافظات وخاصة في المناطق الحرجة المؤثرة على المصادر المائية ، موضحا في اجتماع المعنيين الاستشاري الثاني لتطوير نظم الصرف الصحي الذي حضرته الممثلة المقيمة للوكالة اليابانية جايكا الجهة الدارسة وعدد من المعنيين إعداد دراسة توجيهية للصرف الصحي في سورية حيث بلغت في الخطة الخمسية العاشرة ٨٩ مليار ل.س منها ٣٧ مليارا لمشاريع الصرف الصحي و ٥٢ مليارا لمشاريع مياه الشرب.

واعتبر الشيخة ان تبني وكالة جايكا دراسة تطوير انظمة الصرف الصحي في سورية على ثلاث مراحل عبر دراسة الدراسات الإقليمية للصرف الصحي ووضع خطة رئيسية لسبع محافظات وهي ريف دمشق ودرعا واللاذقية وطرطوس ودير الزور والرقة والحسكة وإعداد دراسة جدوى اقتصادية لمشروع واحد نموذجي في ريف دمشق من شأنها ان تساهم في وضع اسس واولويات تنفيذ مشاريع الصرف الصحي في سورية حتى فترة تمتد إلى عام ٢٠٢٥.

فيما اوضحت السيدة تومبتا اكيكو ممثلة جايكا اهمية دراسة تطوير نظم الصرف الصحي في سورية امام الاستماع لافكار وطروحات السادة المشاركين في الاجتماع بما ينعكس إيجابا على حياة المواطنين السوريين.

تصوير زياد فلاح

Through Cooperation with JICA: Sewerage Plan at 7 Governorates
(Al-Thawra Newspaper, Monday17/9/2007)

Dr. Kamal Al Sheikha, the Vice Minister of Ministry of Housing and Construction (MHC), has mentioned that the Ministry is taking the necessary measures to handle the problem of water shortage and the contamination of water resources by earmarking the funds for executing the sewerage projects in several governorates particularly in the prioritized areas that affect the water resources. He declared that the 2nd Stakeholder Consultation Meeting for the sewerage system development projects was attended by the resident representative of JICA, the JICA Study Team and a number of stakeholders, and also explained that according to the 10th five-year plan of sewerage guide study in Syria, 89 billion SP will be invested for water sector, 37 billion SP of which were devoted for sewerage projects, and 52 billion SP for drinking water projects.

Dr. Al Sheikha has also mentioned that the JICA Study on sewerage system development in Syria contains three phases including review of the regional sewerage studies and the Master Plan studies for 7 governorates, (i.e. Rural Damascus, Dar'aa, Lattakia, Tartous, Deir-Ez-zor, Raqqa, and Hassakeh), and Feasibility Study for one pilot project in Rural Damascus. The projects will certainly contribute in setting the priorities in implementing the sewerage projects in Syria up to the year 2025.

For her part Ms. Tomita Akiko, the Resident Representative of JICA Syrian Office, has clarified the importance of sewerage development study in Syria, and expressed her wishes to hear the ideas and discussions of the participants in the meeting in a way that would reflect positively on the life of the Syrian citizens.

13. 9 Minutes of the 2nd Stakeholder Meeting at Three Governorates

Based on the agreement between Ministry of Housing and Construction (hereafter called as MHC) and Japan International Cooperation Agency (hereafter called as JICA), MHC in collaboration with the JICA Study Team organized the 2nd Stakeholder Consultation Meeting from 9 September to 16 September 2007 at Deir-Ez-zor, Lattakia and Damascus, respectively. The place and timing of the Meetings are showed as **Table A13.9.1**.

Table A13.9.1 Place and Timing of the 2ed Stakeholder Consultation Meeting

Items	Deir-Ez-zor	Lattakia	Damascus
Timing	11:00 – 15:00 9 September 2007	11:00 – 15:00 11 September 2007	11:00 – 13:30 16 September 2007
Place	Furat Cham Hotel	Meridien Hotel	Cham Palace Hotel
Target Areas	Mayadin, Malkieh and Thawra	Slunfeh and Banias	Zabadani and Muzerib

13.9.1 2nd Stakeholder Meeting at Deir-Ez-zor

(1) Opening Address, by Dr. Wassim Fallouh, Ministry of Housing and Construction

The Meeting was started by an opening address by Dr. Wassim Fallouh from Ministry of Housing and Construction, who introduced the current situation of water resources and sewerage sectors in Syrian Arab Republic and the future challenges which will face the authorities in charge of these sectors and explained briefly the essential topics of the Master Plan (M/P) Study and the importance of the cooperation of between JICA Study Team and the MHC side.

(2) Welcome Speech by Mr. Koussai Al SARAJ, Deir-Ez-zor City Executive Council Member

Mr. Koussai welcomed the JICA Study Team and the Ministry of Housing and Construction Team and hoped to have best results of the Master Plan Study and emphasized the important between the JICA and Syrian Arab Republic Government.

(3) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target areas, selection of sanitation system and proposed sewage treatment methods and the location of proposed Sewage Treatment Plant (STP). He also explained that supporting on Stakeholder Consultation Meeting is one of important contents as the JICA Study Team.

(4) Presentation Part II, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the benefits of proposed sewerage system. Then, he reviewed the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Then, he explained the scope of Initial Environmental Examination (IEE) level study, the results of IEE level studies on the M/P of sewerage systems at Mayadin, Malkieh and Thawra. Finally, He explained the recommendations on mitigation measures for some negative impacts.

(5) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Engineer from Al Hassakeh Governorate

What is the JICA image for the sewerage system in Syrian Arab Republic and do you take into consideration to cover whole Al Hassakeh Areas in the M/P Study?
And did you make some quality tests on the wastewater and water in Al Hassakeh Governorate?

Mr. SANO

Water quality will be improved especially after treatment in STP. Furthermore, and in very limit time and budget conditions; the M/P Study covers seven governorates by choosing one target area in each governorate, so, as I explained in my presentation, Malkieh is the target area in Al Hassakeh Governorate.

Dr. MATSUE

We made many water quality tests to the surface water (Lake) and groundwater in Al Malkieh area (the proposed STP location is very near to the Mansoura Dam) and we found that the water quality is very bad after we made (COD, PO_4, NH_3, NO_3, Coliform) tests.

2) Engineer from Al Hassakeh Governorate

Did the JICA Study Team have an idea about the current situation in Al Malkieh area (the sewer system, pipelines network …). Also, I suggest that it is better to install new individual sewer system in this area because we have heavy precipitation levels in winter.

Mr. SANO

As I have already mentioned in my presentation that we had made a reconnaissance survey in the target areas in M/P Study and Al Malkieh was included in this survey and we collect the existing data and visited this area many times to get real image about the current situation of the sewer network. We will take into our consideration your suggestion about the individual system which depends in our opinion on the pipelines capacity and the engineering characteristics of the network and the topographical and climate condition in the target area.

3) Eng. Abed Al Naser SOULTASN, Head of Planning Section, Deir-Ez-zor Governorate

Did you notice in your study the future human activities in Deir-Ez-zor Governorate especially the new industrial city which locates around 13 km and what are your recommendations and suggestions about the industrial wastewater?

Dr. Wassim FALLOUH, MHC

In Syria, we have a national plan of solid waste management which notices the industrial wastes. In each industrial city, we have special pre-treatment plant in order to treat the industrial wastes before we throw it into the sewer network.

Mr. SANO

We notice the industrial wastewater in our M/P Study and we put some proposed pre-treatment methods depend upon the industry type and we will present our recommendations and suggestions in Interim Report which will submit to the Ministry of Housing and Construction.

4) Eng. Ali Akour, GCEC, Aleppo

I want to suggest a solution to the Malkieh sewer system; we can use the old sewer system as rainfall drainage and in the same time we can install another system for sewerage. Also, I want to ask you about the connection between the proposed STP in Mayadin and the surrounding villages.

Mr. SANO

It is very good suggestion but it depends on the current situation of the old network (leakage points, leakage rate, flow rate capacity, engineering dimensions), the topographical and climate condition. For the second question, we studied Mayadin as the target area in Dier-Ez-zor Governorate but we can suggest some solution for the surrounding area like on-site treatment in

some cases and maybe it is better to connect the local network with proposed STP in other cases.

5) Mr. Edmon ISHAK, NGO, Malkieh

What are the proper procedures which we have to apply to avoid the pollution which results from the dumping site in Malkieh.

Dr. Matsue

We visited solid waste dumping site which locates upstream the dam and it is highly recommended that the Al Malkieh municipality should close this site to protect the groundwater and the dam from leachate pollution because there is no isolation system in the dumping site.

(6) Closing Address, by Ms. Murakamy, Assistant Residential Representative of JICA Syria Office

Ms. Murakamy thanked stakeholders for their participation and explained the importance of the cooperation between JICA and national authorities in Syria especially in water and environment sectors which are vital issues. She expected that sustainable development for sewerage system in Syria could be achieved through the implementation of the projects.

Annex I: Attendants List

13.9.2 2nd Stakeholder Meeting at Lattakia

(1) Opening Address, by Mr. Nabil Abou KAF, Vice Governor of Lattakia Governorate

The Meeting was started by an opening address by Vice Governor of Lattakia Governorate Mr. Nabil Abou KAF, who welcomed and thanked the attendants, and mentioned that the Stakeholder Consultation Meeting is organized by MHC in collaboration with the JICA Study Team. He also thanked JICA for their cooperation in many fields especially in environment sector and the important effort in developing the sewerage system in Syrian. Finally, he hoped stakeholders could give useful comments and suggestions.

(2) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target areas, selection of sanitation system and proposed sewage treatment methods and the location of proposed Sewage Treatment Plant (STP). He also explained that supporting on Stakeholder Consultation

Meeting is one of important contents as the JICA Study Team.

(3) Presentation Part II, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the benefits of proposed sewerage system. Then, he reviewed the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Then, he explained the scope of Initial Environmental Examination (IEE) level study, the results of IEE level studies on the M/P of sewerage systems at Slunfeh and Banias. Finally, He explained the recommendations on mitigation measures for some negative impacts.

(4) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Eng. Ghatfan KHOURY, Head of Technical Services, Tartous

How did you chose the proper STP locations and why don't you put another alternatives? Also, how can you take the sludge test results of Adraa STP and put it in coastal area study because we know that there is different situation between Damascus which has many industrial activities, and the coastal area which depends on the agricultural activities?

Dr. MATSUE

We know the different nature of the Adra'a sludge and other places because it contains heavy metals concentration more than other places, depending on the industrial activities in Damascus and Rural Damascus areas. On the other hand, we can not find the existing STP which is similar to Banias and Slunfeh STP, thus we have to use existing data (Adraa STP) in the IEE level study to evaluate the impacts of sludge from STP on the environment. In the future, we have to monitor heavy metals concentrations in sludge and soil at Banias and Slunfeh.

Mr. SANO

We depend upon the topographical conditions and demographical situation in the target area in choosing the STP location, because we prefer using the natural gravity to avoid using the pumping stations which have high cost during O/M period. We present only the M/P Study results in this presentation and we will put all details related to the M/P Study in the Interim Report which will submit to Ministry of Housing and Construction.

2) Dr. Haitham Jnad, Tishreen University, Lattakia

I know the importance of this study in vital sector like sewerage system and wastewater and water resources in Syrian Arab Republic. So, I want to suggest some notes and comments as followings:

- JICA Study Team should have real information about the water resources and drinking water consumptions.
- The existing water and wastewater drainage methods
- The demographical distribution in the target areas (especially the difference between summer and winter in some places in coastal areas).
- Using national treated wastewater standards.
- Put solutions for the odor and sludge problems.
- JICA Study Team should involve the advanced studies in the M/P Study if it is possible.

3) Dr. Suheir RAIES, The Syrian Coast Society for Environmental Protection – NGO

We have no medical wastes treatment plant in Lattakia and other cities of coastal area. Would you take into consideration the special situation of medical wastes and other harmful substances generated from factories in this project?

Mr. SANO

Ministry of Health is the responsible of the medical wastes treatment, but in our M/P Study we have some recommendations and suggested pre-treatment methods to treat the medical wastes before throw it into the sewerage system.

The main topics were included in the Comment Sheets are summarized as below:

- The wind direction is very important factor in choosing the STP location especially in Banias.
- After 2025, we will reach at high concentration levels of Heavy Metals in soil by using the sludge in agriculture. How can we use solve this problem in the future.
- Maybe it is better to divide the M/P study into two phases; first one is the comprehensive study, and the second phase is the detailed local study.

(5) Closing Address, by Mr. Ghassan TARBOUSH, Ministry of Housing and Construction

Mr. Ghassan insisted in his speech about the importance of the Sewerage System Development Project which is considered as an essential and important step on the way of developing the

sewerage system in Syria which requires also the unification of all the efforts of the concerned authorities in Syria. Then, he thanked stakeholders for their participation.

Annex I: Attendants List

13.9.3 2nd Stakeholder Meeting at Damascus

(1) Opening Address, by Dr. Kamal Al-Sheikha, Vice Minister of Housing and Construction, MHC

The Meeting was started by an opening address by Dr. Kamal Al-Sheikha, who welcomed and thanked attendants for their participation and mentioned that the Ministry of Housing and Construction has started taking the necessary measures for solving the problem of the water shortage and the contamination of the water resources by earmarking the necessary funds to implement the sewerage projects in all governorates. He also thanked JICA for their cooperation in many fields especially in water and environment sectors. Finally, he hoped stakeholders could give useful comments and suggestions.

(2) Speech by Ms. Akiko TOMITA, JICA Resident Representative in Syrian Arab Republic

Ms. Tomita talked about the importance of the cooperation between Syrian Government and JICA in achieving very valuable studies like the development study of the sewerage system in Syria and hoped to share the information and to discuss the outlines of the study with the stakeholders to get the expected benefits from this cooperation.

(3) Presentation Part I, by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and objectives of the Study, study target areas, selection of sanitation system and proposed sewage treatment methods and the location of proposed Sewage Treatment Plant (STP). He also explained that supporting on Stakeholder Consultation Meeting is one of important contents as the JICA Study Team.

(4) Presentation Part II, by Dr. Ryunan MATSUE, Environmental Impacts Assessment Expert, JICA Study Team

Dr. MATSUE firstly explained the benefits of proposed sewerage system. Then, he reviewed the procedures of environmental and social considerations after introducing some key words used in the JICA's Guidelines. He informed that this meeting is held according to the JICA's Guidelines in order to disclose information of the Study to the public. Then, he explained the

scope of Initial Environmental Examination (IEE) level study, the results of IEE level studies on the M/P of sewerage systems at Muzerib and Zabadani. Finally, He explained the recommendations on mitigation measures for some negative impacts.

(5) Questions & Answers

The main topics discussed in the Meeting are summarized as below:

1) Eng. Housam Al SAFADI, Consultant, Ex-Minister

We have previous experience in dealing with wetland treatment and oxidation ditch in Syria, did you make an evaluation (performance, effluent results..) for these two treatment methods and what were your results if you made this evaluation
We have cooperation with international organizations in achieving a study for developing the sewerage system in Zabadani Area and this study was funded by World Bank, did you have an idea about this study a what is your opinion.
Can you explain why you evaluated the odor problem as C for Zabadani STP.

Mr. SANO

We visited Al Thawra City (Target Area in Raqqa) and we found good results from the natural treatment which occurred in this area and we found many advantages in using this method, so, by our opinion we found that we can use this treatment methods in Muzerib area because it has same conditions.
We have an idea about all studies which were achieved in Syria about the sewerage system and we make small evaluation about some topics and the results are included in the Interim Report which will be submitted to Ministry of Housing and Construction.
About Muzerib STP, in our viewpoint, we can cover all surrounding area especially Yadoda and after treatment we can throw the treated water to the river (good quality).

Dr. MATSUE

Zabadani is very important tourism city, so the odor problem from STP has to be considered. At Zabadani STP, Oxidation Ditch system is selected, and in order to reduce the odor, a mechanical dewatering system will be used for sludge treatment. In addition, we recommended some mitigation measures like planting a tree belt and establishing buffer zone around the STP location (200-300) m. Therefore we gave C (light impact) to odor item. We also recommended that during O/M period, a monitoring system should be established to check odor level around the STP site, and additional counter measures should be taken if it is necessary.

2) Eng. Jamal JALAL, MHC

What is the water and wastewater standards did you use it in your study?
How can we make the resident who produces the wastewater, gets benefits from the treated water?
Can we suggest another treatment method in Zabadani area?

Mr. SANO

We use the Syrian standards in our M/P study, and for the Zabadani STP we suggest Oxidation Ditch (OD) method because it is the best method and it doesn't emit much odor and we take into our consideration the population difference between Summer and Winter, so we suggest to put one or two units in use in winter and six to eight units in summer (high season) .

Dr. MATSUE

It is difficult to let each resident who discharge wastewater to get direct benefits from the treated water. We have to consider the economical factor in choosing sewerage system.

3) Eng. Wadeah JIHA, Deputy Director of Damascus Environment Affaires Directorate

Do you have collaboration with the Malaysian side in choosing the STPs locations?
In Damascus, we have many problems related to the sewerage system, maybe it is better to cover Damascus in the future study.

Mr. SANO

We started our study before the Malaysian side but in general we have cooperation in sharing the information with Malaysian team. Also, unfortunately, Damascus is not included in the M/P Study.

(6) Closing Address, Dr. Wassim Fallouh, **MHC**

Dr. Wassim thanked stakeholders for their participation and their valuable comments to the Study.

Annex I: Attendants List

PART II : FEASIBILITY STUDY

Appendix for Chapter 1

Appendix 1.1 Offensive Odor Management on STP

1. Objective and Methodology

Syrians are very much concerned about the Offensive odor. Therefore, the JICA Study Team will make, exceptionally, suggestion to control offensive odor.

Offensive odor problem is one of the risks that could occur at STP. We can avoid this risk by carrying out the processes on Risk Management.

The approach to Risk Management is appropriate to evaluate the risks and formulate measures systematically for particular case considering various conditions. Risk Management aims risk control as the ultimate goal. The procedure comprises three steps as follows.

In addition, offensive odor issue is one of issues related to Sewerage system and also important for Syrian case. However, for evaluating project components, other factors, for example financial aspect also become critical issue for sustainability of project. So .we should never evaluate the project only considering offensive odor hazard. Therefore, the JICA Study Team has considered proposing countermeasure against offensive odor only as Appendix.

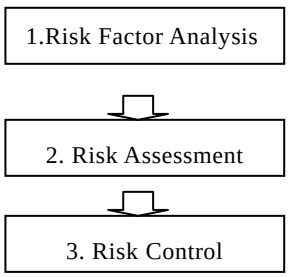


Figure A1.1.1 Flowchart of Risk Management

a To start with, the Risk Factor Analysis which is the most important step, is performed for clarification of offensive odor including what and where the possible risks are. Generally, it is resolved through fact finding survey, Japanese experience or sometimes through brainstorming of some inexperienced rare risk. Regarding offensive odor risk, it can be sorted out using Japanese experience.

.b Risk Assessment viz. estimation of the degree of offensive odor is performed considering major offensive odor risk factors. Evaluation of major offensive

odor risks can be performed by comparison of several treatment processes.

c Risk Control viz. avoidance of the offensive odor will be proposed for every odor risk, and the risk control which must be carried out as high-priority measures, is determined.

1. Risk factor analysis

Risk Factors about offensive odor at STP are defined as presented in **Table A1.1.1**, corresponding to various treatment processes.

Table A1.1.1 Risk Factor Analysis

Processes of treatment	Risk factor (Reason of offensive odor)
Inlet channel	Odor generated in pipe where the wastewater conveyed by long pipe, as detention time is long, wastewater become anaerobic in nature, and hydrogen sulfide would be generated.
Grit removal channel	
Outlet of Pump	De-aerated offensive odor at outlet is dispersed in the air.
Primary settling tank	Odor would be generated in tank where the wastewater is stored for long time.
Reactor	On the process with primary settling tank, de-aerated offensive odor is dispersed in the air.
Final sedimentation tank	No odor
Disinfection channel	No odor
Gravel thickening tank	Odor would be generated in tank where the sludge is stored for long time.
Anaerobic digestion tank	Odor would be generated in tank where the sludge is stored for very long time.
Sludge Drying Bed	Odor would be generated in beds where the sludge is stored for very long time.
Mechanical thickening	Less odor
Mechanical dewatering	Less odor

2. Risk assessment

As Risk factor has been defined, each treatment method could be evaluated.

Conventional Extended Aeration, OD, small Wet land, Submerged Attached Growth, and Conventional Activated Sludge are compared in **Table A1.1.2**. As could be observed in the Table, Conventional Activated Sludge process of treatment would be worst with respect to conditions of offensive odor.

Table A1.1.2 Risk Assessment (relative odor intensity)

Processes of treatment	Evaluations for two processes (Risk assessment)				
	Conventional Extended Aeration	OD	Wet-land on small STP	Submerged Attached Growth	Conventional Activated Sludge
Inlet channel	+	+	+	+	+

Grit removal channel	+	+	+	+	+
Outlet of Pump	++	++	++	++	++
Primary settling tank			+		+
Reactor/ reed beds	+	+	+	+	++
Final sedimentation tank					
Disinfection channel					
Gravel thickening tank	+	+		+	++
Anaerobic digestion tank					++
Sludge Drying Bed	+++	+++	+++++	+++	+++++
offensive odor grade	9 points	9 points	11 points	9 points	16 points

Note; - Submerged Attached Growth is the case of without primary settling tank.
- Only on primary sludge of Wet-land, concentration of it is high, so thickener is omitted

3. Risk control

1) Proposed countermeasures

After risk assessment, countermeasure has been studied.

Countermeasures are studied for each risk factors, and are categorized into two phases, one is for the planning phase, the other is for the design and O&M phase, and are listed in **Table A1.1.3**.

Table A1.1.3 Risk Control

Risk factor	Countermeasure of offensive odor	
	Planning Phase	Design and O&M Phase
Odor generated in pipe is discharged in Inlet channel, Grit removal channel, and Outlet of Pump	- To secure appropriate velocity of wastewater in pipe and locate a STP site near town so that the detention time becomes short and to keep wastewater fresh. - To select decentralized sewage system, that makes the pipe line short.	- To cover the tank and use deodorization method - Well and immediate removal of the solid remaining
Odor generated in Primary settling tank, discharge and dispersed in Reactor.	- To select the processes which can omit primary settling tank, like OD, Conventional Extended Aeration, etc.	- To cover the tank and use deodorization method
Odor generated in Gravel sludge thickening tank	- To omit Thickening process	- To cover the tank and apply deodorization method
Odor generated in Anaerobic digestion tank, leak.	To select the sewage treatment method which has long aeration time on reactor, let the sludge stabilize, to neglect this process	To check the leakage of odor, prevent emission of offensive odor.
Odor generated in Sludge Drying Bed is dispersed in the air.	- To select Mechanical dewatering system. - To consider sufficient area that facilitates small depth of sludge in drying beds and could have sufficient contact with air.	- To apply covered drying bed and deodorization method - To surround with plantation taking enough space. - To maintain a shallow sludge layer evenly in every beds for proper contact with air.
Odor in whole Sludge Treatment Processes	To establish the Wide area Sludge Treatment facility, remove the offensive odor from each STP, as sludge is conveyed to facility.	

2) Evaluation of countermeasures for planning phase

Two countermeasures are important to be considered in the planning phase

(Corresponding to the case of M/P on Zabadani) ;

a) Countermeasure of sewage network ; short pipe line, and to secure the appropriate velocity
b) Mechanical dewatering should be applied

The risk of offensive odor would dramatically decrease as presented in the Table A1.1.4 ;

a) Conventional extended aeration, OD and Submerged Attached Growth are almost able to reduce the offensive odor at the boundary of STP.
b) Wet-land would result into small offensive odor, the grade is expected to reduce to 5 point from 11 points by relative odor intensity, but the odor is practically not so strong at the boundary of STP.
c) Conventional Activated Sludge also improves on the grade of generation of offensive odor, 10 points from 16 points before countermeasures.

Extended Aeration or OD is better in terms of offensive odor, but for project evaluation, financial aspect is more important considering sustainability of project. Therefore, in general, the JICA Study Team would never evaluate the project only considering offensive odor problem.

Table A1.1.4 Re-Assessment after Application of Countermeasures in Planning Phase (relative odor intensity)

Processes of treatment	Evaluations for five processes (Risk assessment)				
	Conventional Extended Aeration	OD	Wet-land on small STP	Submerged Attached Growth	Conventional Activated Sludge
Inlet channel					
Grit removal channel					
Outlet of Pump	+	+	+	+	+
Primary settling tank			+		+
Reactor/ reed beds	+	+	+	+	++
Final sedimentation tank					
Disinfection channel					
Gravel thickening tank	+	+		+	++
Anaerobic digestion tank					++
Mechanical dewatering	+	+	++	+	++
offensive odor grade	4 point	4 point	5 point	4 point	10 points

2) Evaluations of countermeasures in Design and O&M Phase

After implementing the countermeasures to be considered in the design phase, which include covering the structure, using deodorization method, well cleaning, etc., risk of offensive odor would decrease. However, other risks, such as deterioration of concrete, power consumption, and so on, would still have chance to occur.

Regarding deterioration of concrete, as the concrete is structurally important, anticorrosion paint must be applied.

4) Conclusion

Overall, it is expensive to implement the countermeasure such cover and deodorization carrying out at the design and O&M phase, so it should be applied cover and deodorization cautiously after odor intense was examined at actual target treatment facilities.

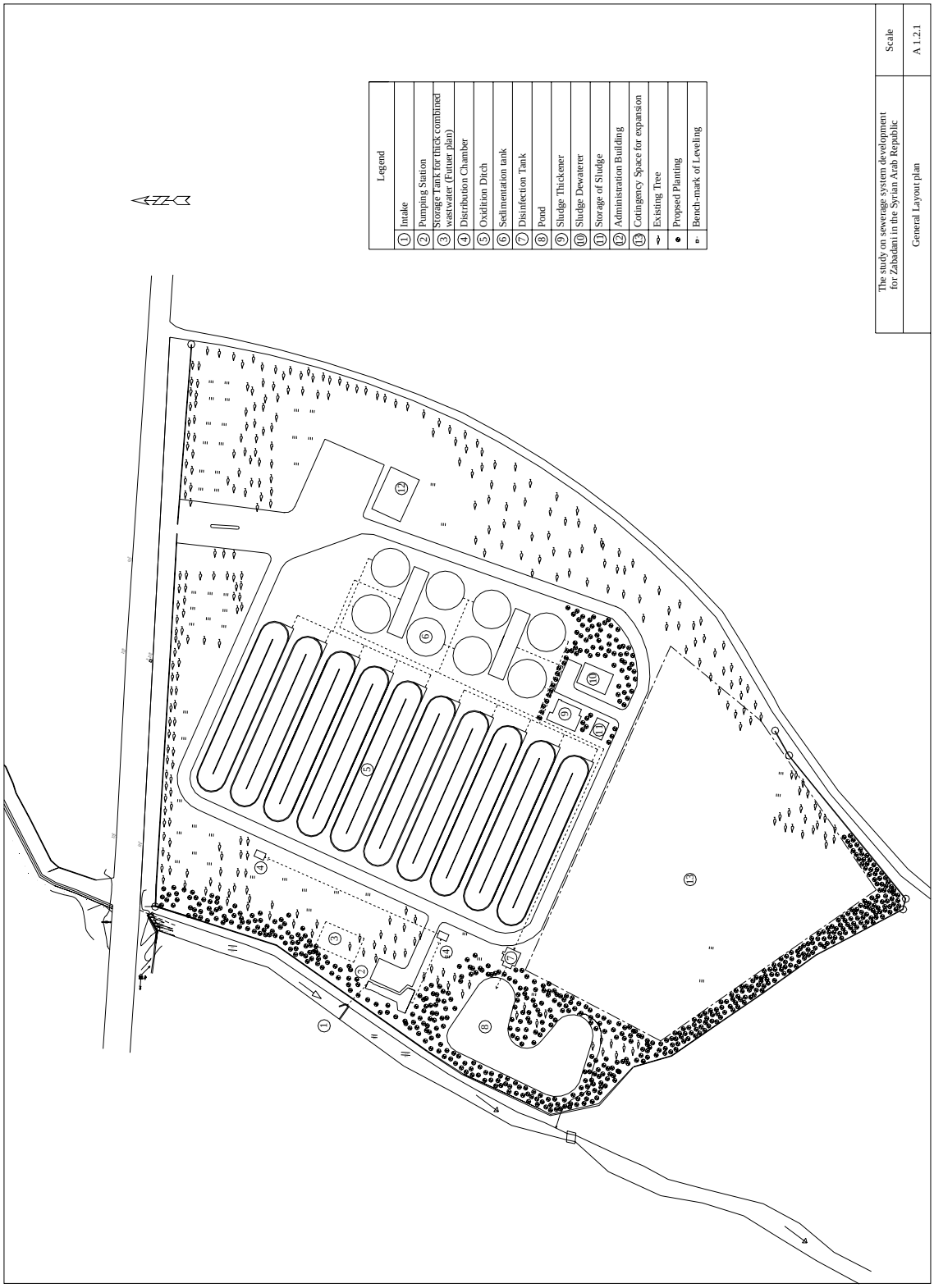
Therefore, countermeasure would be summarized as follow;

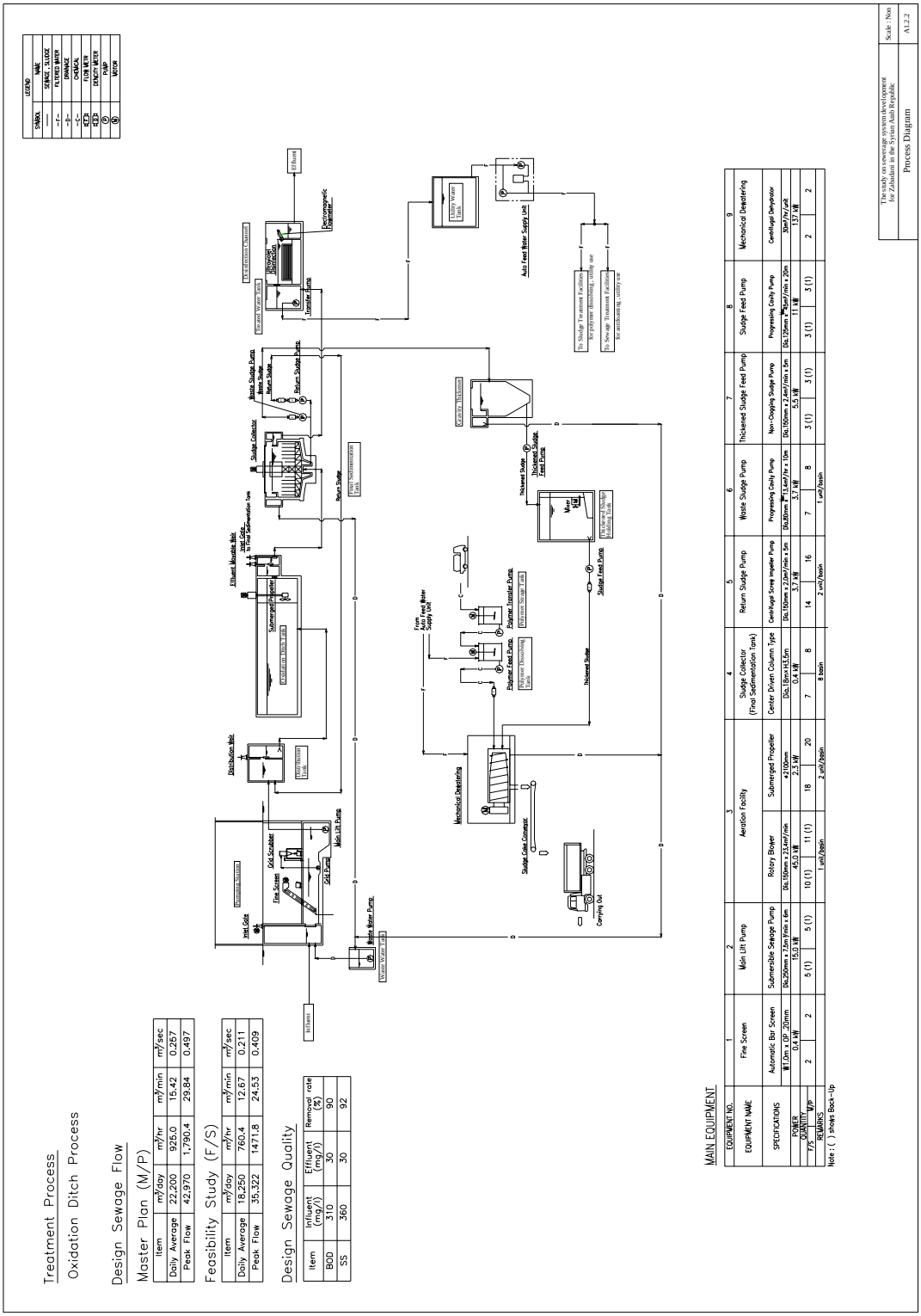
- At the planning phase, following countermeasures are proposed
  a) to select the treatment method to generate the less offensive odor
  b) shortening the main trunk to keep wastewater fresh
  c) to layout odor generated facilities appropriately to not disperse the odor to outside of STP
  d) to prepare for the land of future deodorization facility

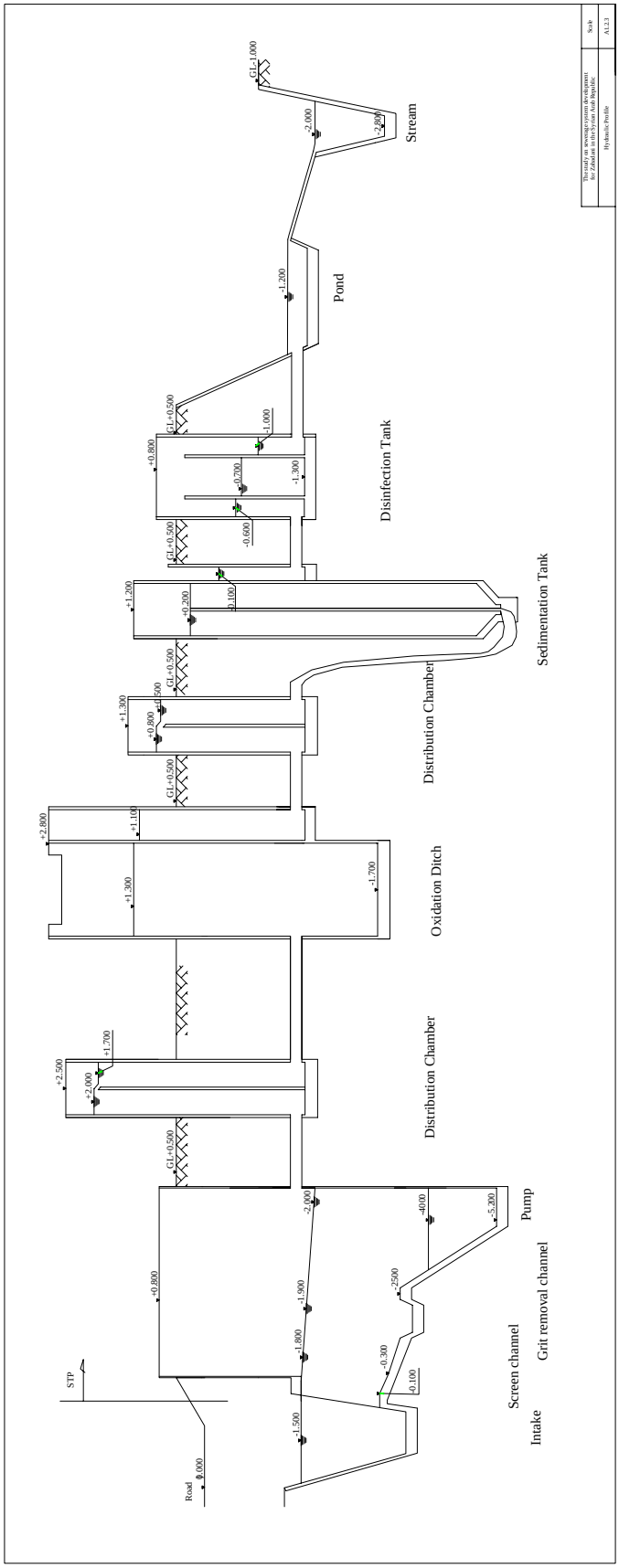
- At the O&M phase, to apply deodorization method after odor intense was examined at actual treatment facilities.

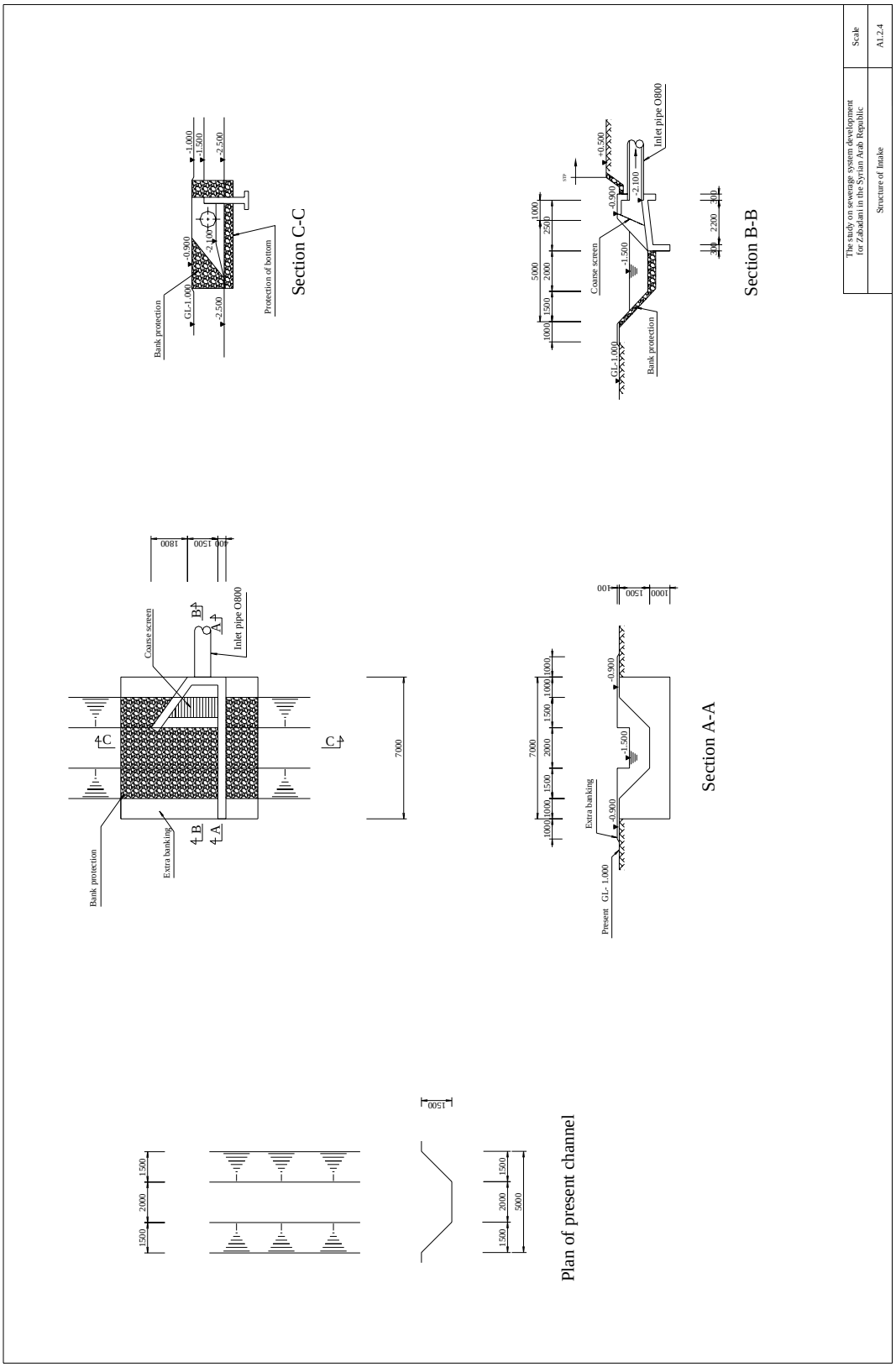
Appendix 1.2 Drawings

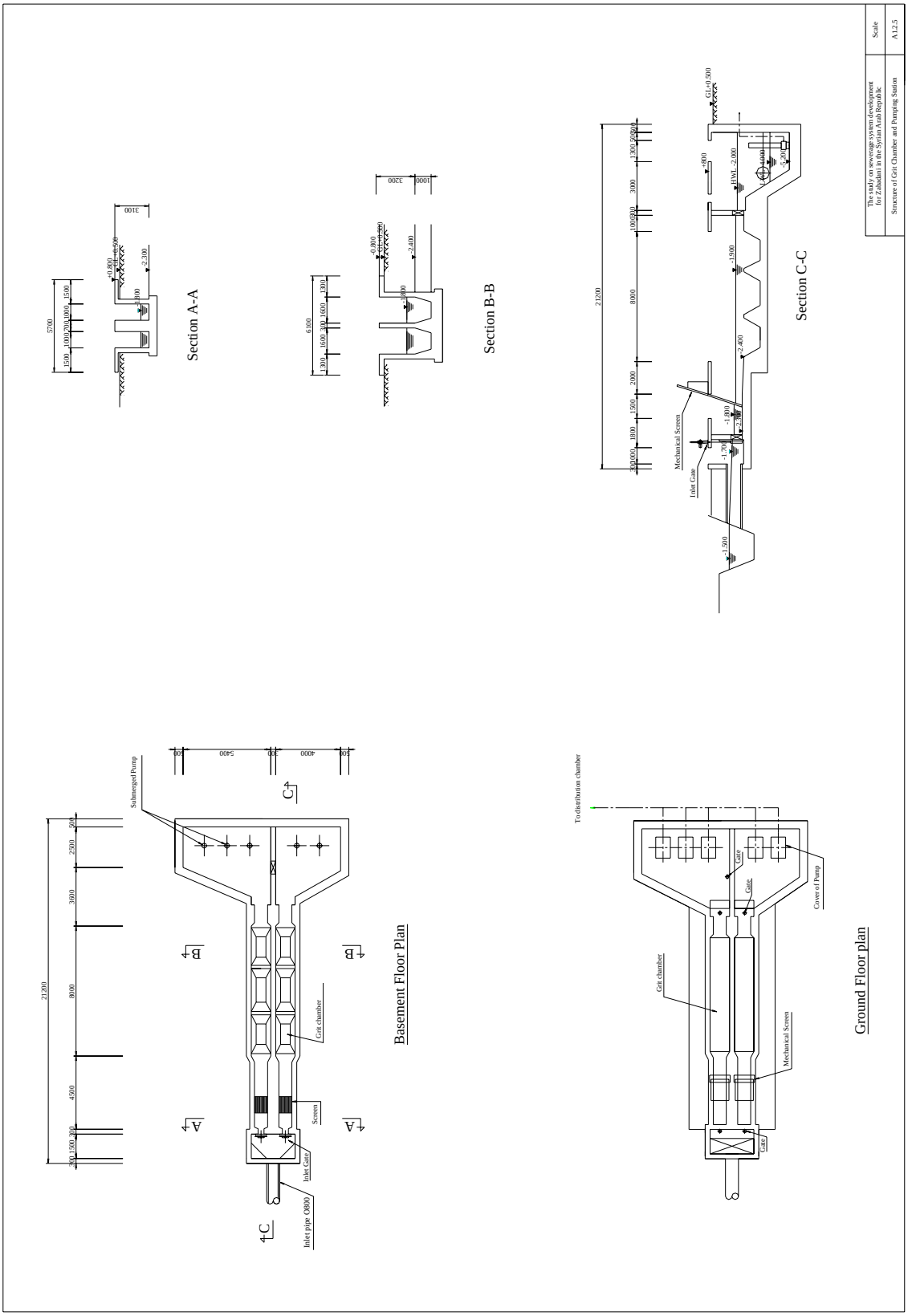
Drawing List for Zabadani STP	
A1.2.1	General Layout Plan
A1.2.2	Process Diagram
A1.2.3	Hydraulic Profile
A1.2.4	Structure of Intake
A1.2.5	Structure of Pumping Station
A1.2.6	Structure of Oxidation Ditch
A1.2.7	Structure of Sedimentation Tank
A1.2.8	Structure of Disinfection Tank
A1.2.9	Structure of Sludge Thickener
A1.2.10	Structure of Sludge Dewatering

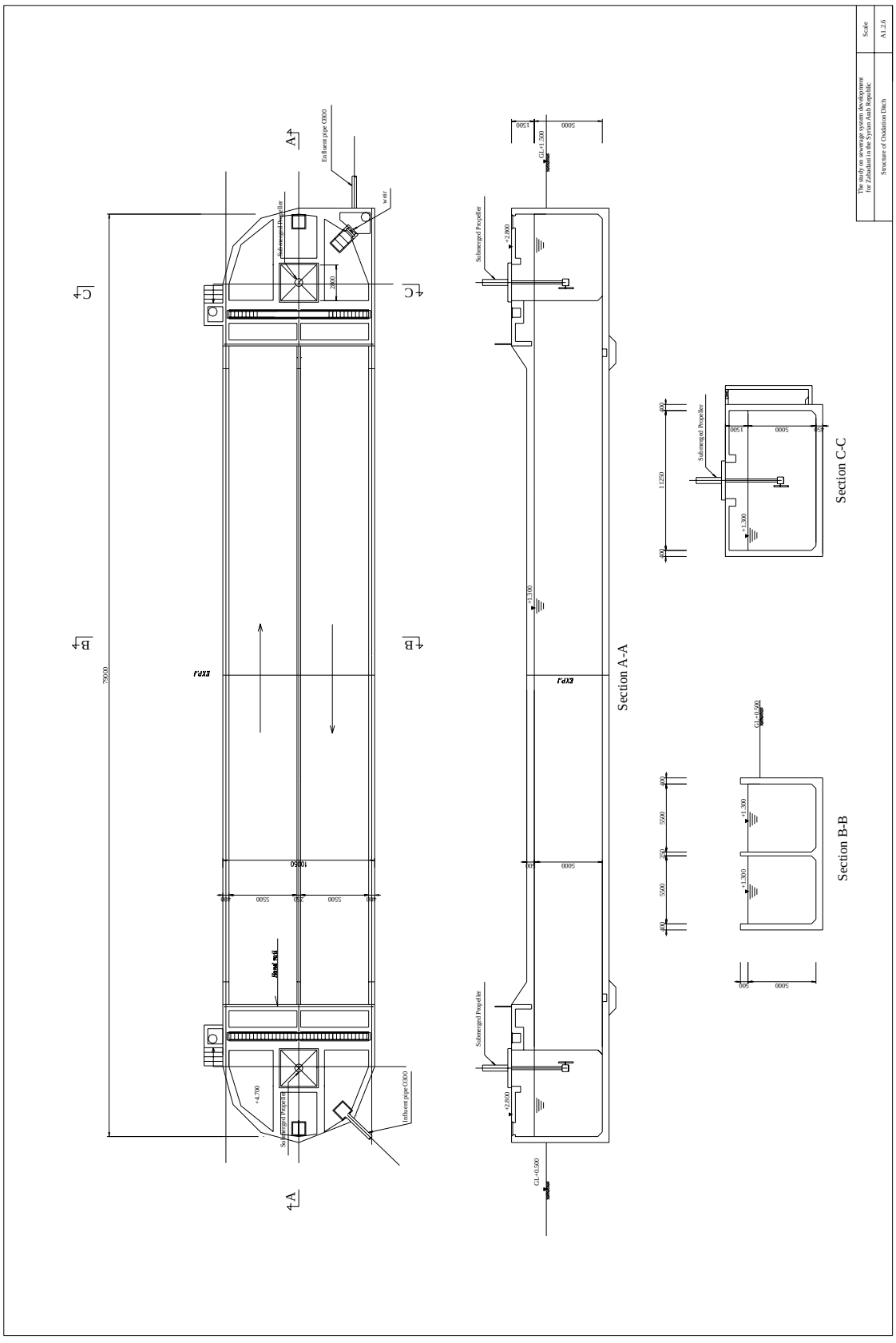

Legend
① Intake
② Pumping Station
③ Storage Tank for thick combined wastwater (Future plan)
④ Distribution Chamber
⑤ Oxidition Ditch
⑥ Sedimentation tank
⑦ Disinfection Tank
⑧ Pond
⑨ Sludge Thickener
⑩ Sludge Dewaterer
⑪ Storage of Sludge
⑫ Administration Building
⑬ Cotingency Space for expansion
Existing Tree
Propsed Planting
Bench-mark of Leveling
The study on sewerage system development for Zabadani in the Syrian Arab Republic
General Layout plan
Scale
A 1:2.1

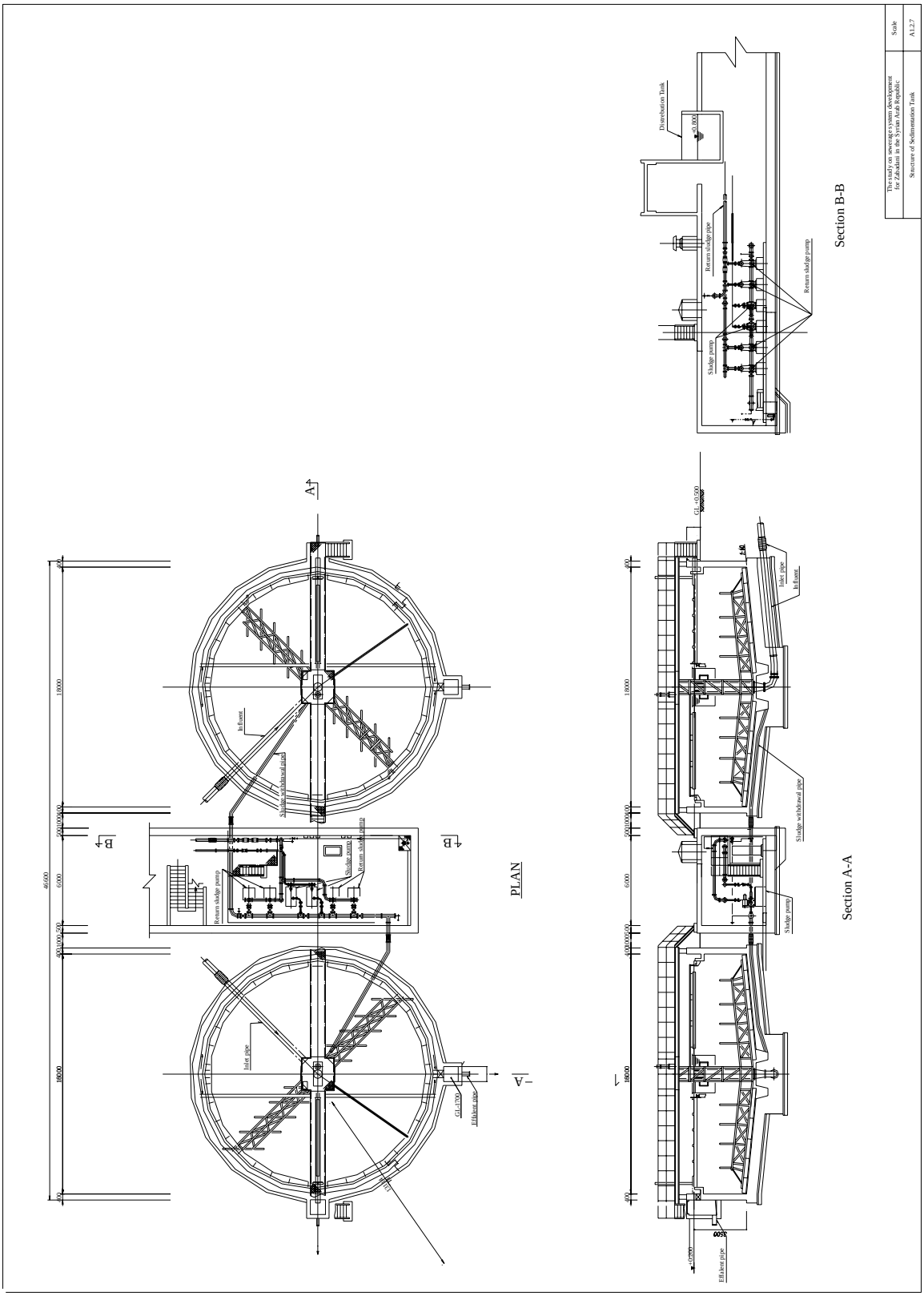

Treatment Process
Oxidation Ditch Process
Design Sewage Flow
Master Plan (M/P)
Item | m³/day | m³/hr | m³/min | m³/sec
Daily Average | 22,200 | 925.0 | 15.42 | 0.257
Peak Flow | 42,970 | 1,790.4 | 29.84 | 0.497
Feasibility Study (F/S)
Item | m³/day | m³/hr | m³/min | m³/sec
Daily Average | 18,250 | 760.4 | 12.67 | 0.211
Peak Flow | 35,322 | 1471.8 | 24.53 | 0.409
Design Sewage Quality
Item | Influent (mg/l) | Effluent (mg/l) | Removal rate (%)
BOD | 310 | 30 | 90
SS | 360 | 30 | 92
LEGEND
SYMBOL | NAME
SEWAGE , SLUDGE
FILTERED WATER
DRAINAGE
AIR
FLOW METER
DEPOSITH METER
PUMP
MOTOR
Inlet Gate
Grit Scrubber
Fine Screen
Grit Pump
Main Lift Pump
Distribution Box
Submerged Propeller
Oxidation Ditch Tank
Effluent Measuring Box
Final Sedimentation Tank
Sludge Collector
Waste Sludge Pump
Return Sludge Pump
Mechanical Dewatering
Sludge Cake Conveyor
Carrying Out
Polymer Feed Pump
Polymer Dissolving Tank
Polymer Storage Tank
Thickened Sludge Feeding Tank
Sludge Feed Pump
Gravity Thickener
Utility Water Tank
Auto Feed Water Supply Unit
To Sludge Treatment Facilities for polymer dissolving, cutting use
To Sewage Treatment Facilities for ventilation fan, cutting use
Effluent
Disinfection Chamber
Effluent Water Pump
Transfer Pump
Electromagnetic Flowmeter
MAIN EQUIPMENT
EQUIPMENT NO.
EQUIPMENT NAME
SPECIFICATIONS
POWER
QUANTITY
TYP
REMARKS
Fine Screen
Automatic Bar Screen
W: 1m , clP: 20mm
0.4 kW
2
Main Lift Pump
Submersible Sewage Pump
Dia.250mm × 1.5m³/min × 6m
15.0 kW
5 (1)
Aeration Facility
Rotary Blower
Dia.150mm × 23 cmd/min
45.0 kW
10 (1) | 11 (1)
1 unit/basin
Submerged Propeller
×2100mm
2.5 kW
18 | 20
2 unit/basin
Sludge Collector (Final Sedimentation Tank)
Center Driven Column Type
Dia.18mm×4.5.0m
0.4 kW
7 | 8
8 basin
Return Sludge Pump
Centrifugal Screw Impeller Pump
Dia.150mm × 2.2m³/min × 5m
3.7 kW
14 | 16
2 unit/basin
Waste Sludge Pump
Progressing Cavity Pump
Dia.80mm × 0.3 cmd/hr × 10m
3.7 kW
7 | 8
1 unit/basin
Thickened Sludge Feed Pump
Non-Clogging Sludge Pump
Dia.150mm × 2.4m³/min × 5m
5.5 kW
3 (1) | 3 (1)
Sludge Feed Pump
Progressing Cavity Pump
Dia.125mm × 1.0m³/min × 10m
11 kW
3 (1) | 3 (1)
Mechanical Dewatering
Centrifugal Dehydrator
30m³/hr/unit
137 kW
2 | 2
Note : ( ) shows Back-Up
The study on sewerage system development for Zabadani in the Syrian Arab Republic
Process Diagram
Scale : Non
A1.2.2

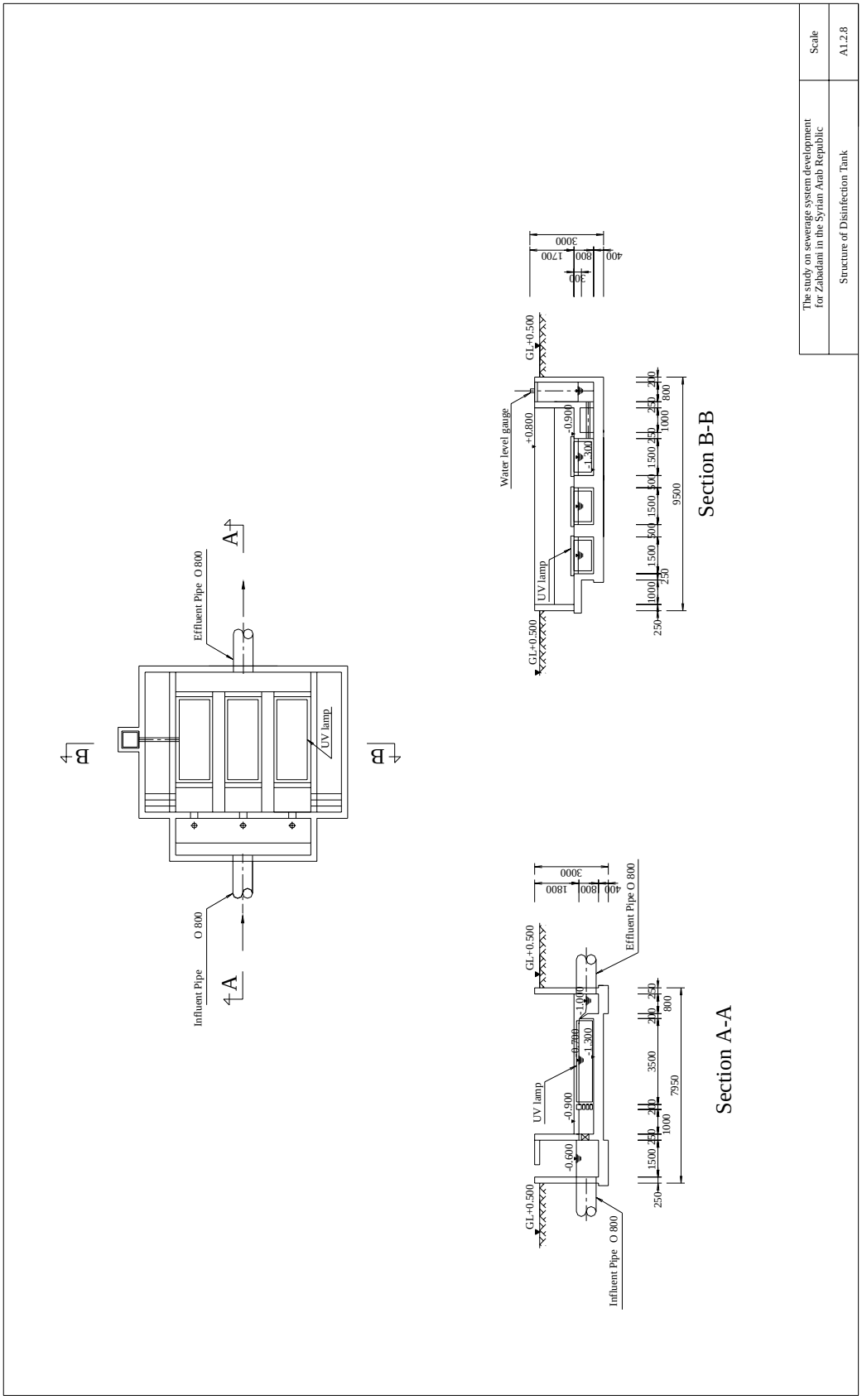

Stream
Pond
Disinfection Tank
Sedimentation Tank
Distribution Chamber
Oxidation Ditch
Distribution Chamber
Pump
Grit removal channel
Screen channel
Intake
STP
Road

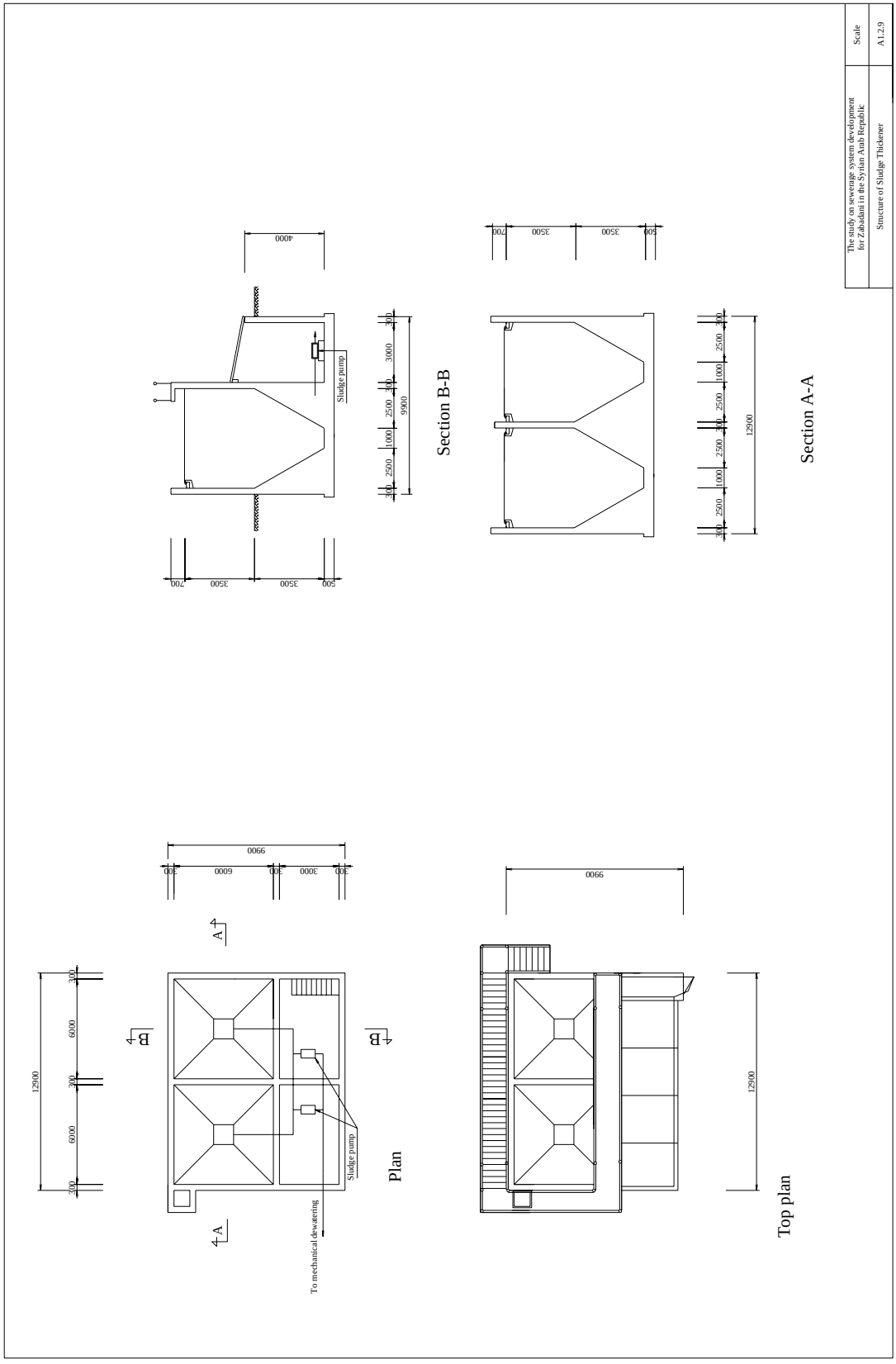

The study on sewerage system development for Zabadani in the Syrian Arab Republic
Scale
A1:2.4
Structure of Intake
Section C-C
Section B-B
Section A-A
Plan of present channel
Inlet pipe O800
Coarse screen
Bank protection
Extra banking
Protection of bottom
Present GL- 1.000

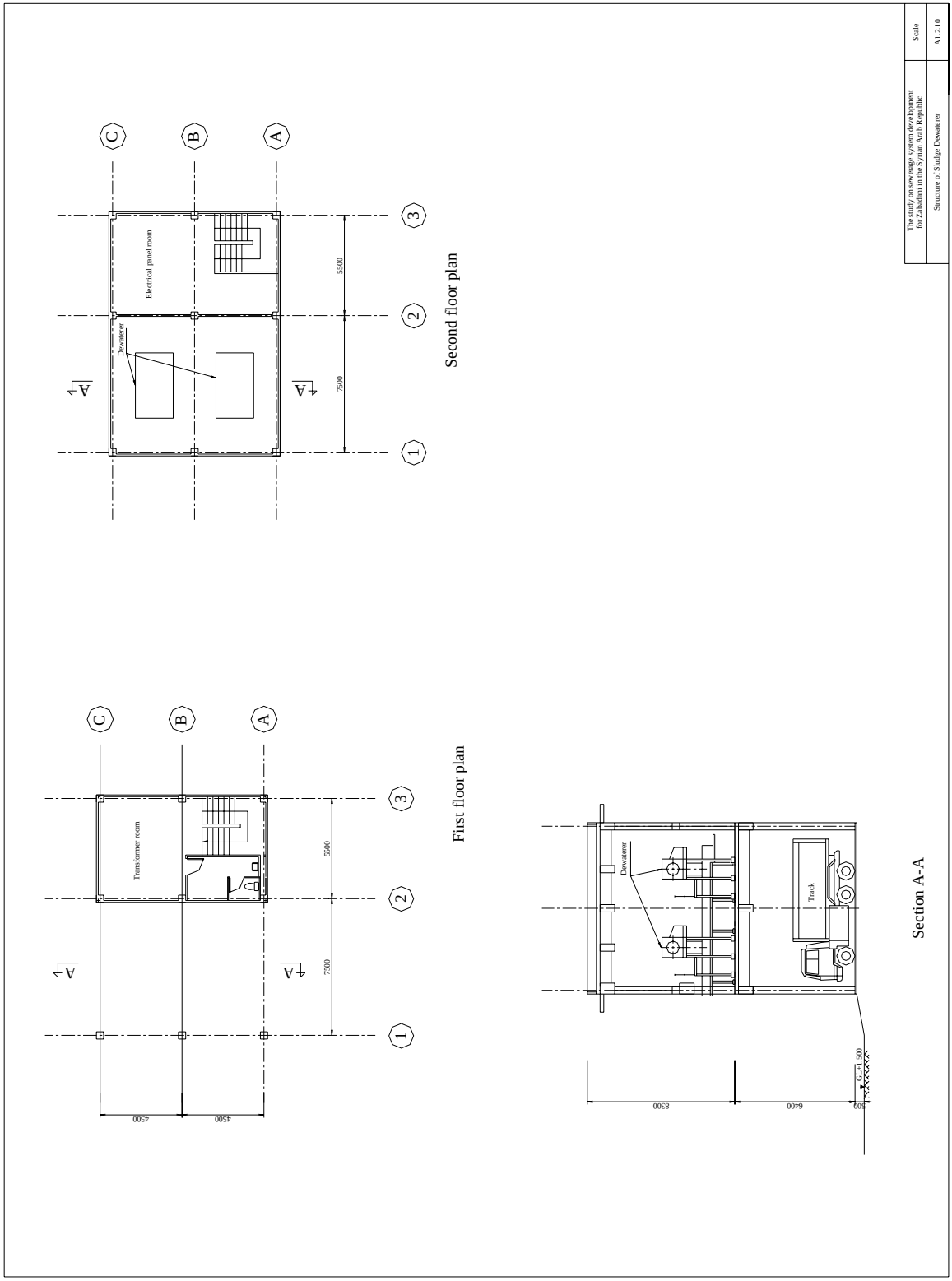

The study on sewerage system development for Zabadani in the Syrian Arab Republic
Structure of Grit Chamber and Pumping Station
Scale
A1:2.5
Section A-A
Section B-B
Section C-C
Basement Floor Plan
Ground Floor plan
Submerged Pump
Grit chamber
Screen
Inlet Gate
Inlet pipe ϕ800
Mechanical Screen
Cover of Pump
Gate
To distribution chamber


The study on sewerage system development for Aleppo in the Syrian Arab Republic
Structure of Oxidation Ditch
Scale
A1 2.6
Section A-A
Section B-B
Section C-C
Submerged Propeller
Influent pipe Ø800
Influent pipe Ø300
weir
Sluice gate
Submerged Propeller
GL+1.500
GL-0.500
+2.800
+1.300
79000
10850
5500
5000
1250
400
500


The study on sewerage system development for Zabadani in the Syrian Arab Republic
Structure of Sedimentation Tank
Scale
A1,2,7
Section B-B
Distribution Tank
Return sludge pipe
Sludge pump
Return sludge pump
Section A-A
Inlet pipe
Influent
Sludge withdrawal pipe
Sludge pump
Effluent pipe
PLAN
Influent
Sludge withdrawal pipe
Return sludge pump
Sludge pump
Return sludge pump
Inlet pipe
Effluent pipe
A
B
46000
18000
6000
18000
400


The study on sewerage system development for Zabadani in the Syrian Arab Republic
Structure of Disinfection Tank
Scale
A1:2.8
Effluent Pipe O 800
Influent Pipe O 800
UV lamp
A
B
Section B-B
Water level gauge
GL+0.500
+0.800
-0.900
-1.300
UV lamp
GL+0.500
3000
400
800
1700
300
250
1000
250
1500
500
1500
500
1500
250
250
200
800
9500
Section A-A
Effluent Pipe O 800
GL+0.500
-0.200
-1.300
1000
UV lamp
-0.900
-0.600
GL+0.500
Influent Pipe O 800
3000
400
800
1800
250
200
800
3500
200
250
1000
1500
250
7950


The study on sewerage system development for Zabadani in the Syrian Arab Republic
Scale
A1:2.9
Structure of Sludge Thickener
Section B-B
Section A-A
Plan
Top plan
Sludge pump
To mechanical dewatering
4000
3500
9900
12900
6000
3000


The study on sewerage system development for Zabadani in the Syrian Arab Republic
Structure of Sludge Dewaterer
Scale
A1,2,10
Second floor plan
Electrical panel room
Dewaterer
5500
7500
First floor plan
Transformer room
4500
4500
Section A-A
Track
8300
6400
500
GL+1,500

Appendix 1.3 Capacity Calculation

1 BASIC CONDITIONS

1-1 Basic Items

(1) Name : **Zabadani Sewage Treatment Plant**

(2) Land Area : Approximately 5,500 m^2

(3) Elevation : + 1200.50 m (Plan)

(4) Inlet Pipe Level : + 1197.90 m

(5) Pipe Diameter : 800 mm

(6) Land Use : —

(7) Collection System : (Combined System) Separate System

(8) Treatment Process :
Sewage ; Grit chamber + Oxidation ditch + Final sedimentation tank
+ Disinfection channel (+Qualizing basin : future)
Sludge ; Thickening + Dewatering

(9) Effluent Point : Barada River through existing channel

(10) Water Level at the Effluent Poir :
High water leve = 1198.00 m
Low water level = — m

(11) Target Year : **2015 (F/S Stage) , 2025 (M/P Stage)**

1-2 Design Population and Service Area

Item		Year 2015	Year 2025
Design Population	person	48,300	53,500
Service Area	ha	—	—

1-3 Design Sewage Flow

(Year 2015)

Item	m^3/day	m^3/hr	m^3/min	m^3/sec	Remarks
Daily Average	18,250	760.4	12.67	0.211	
Peak Flow	35,322	1,471.8	24.53	0.409	

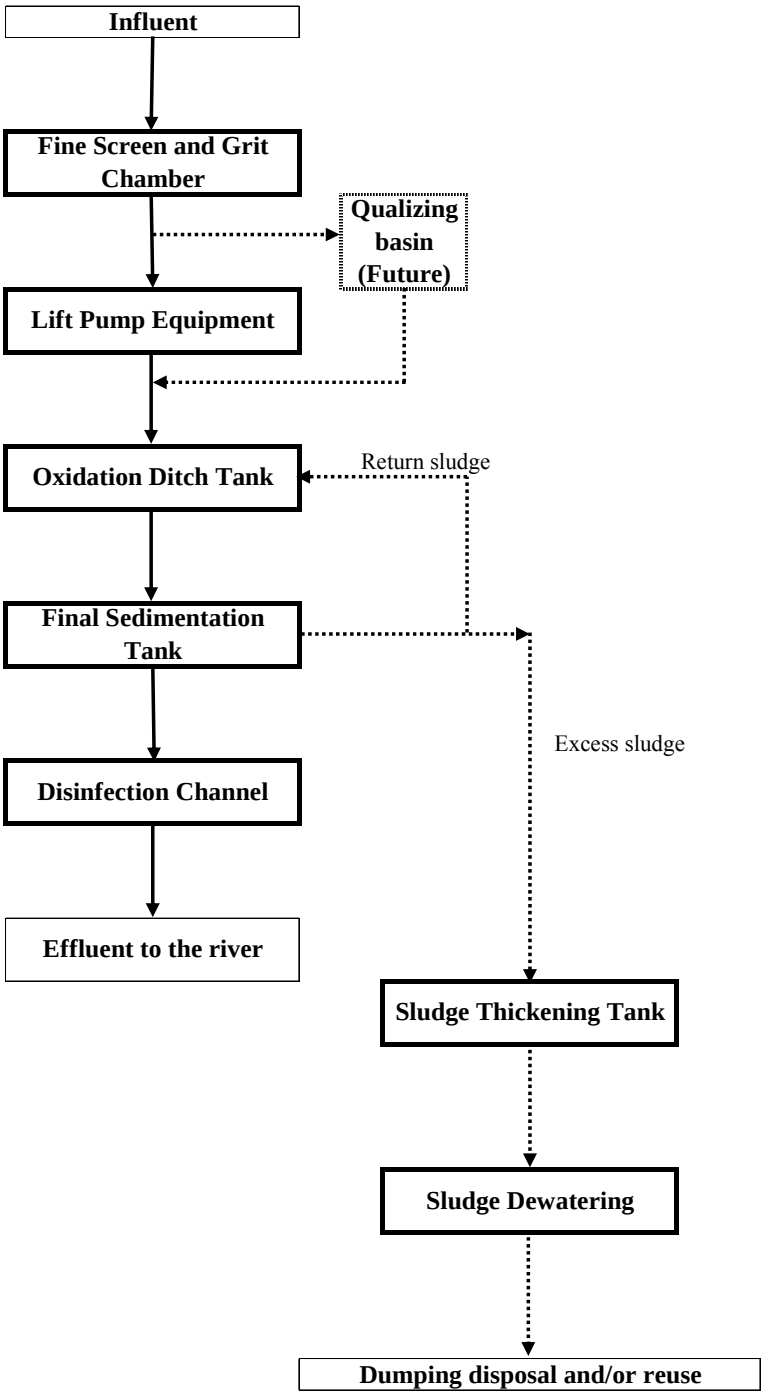
(Year 2025)

Item	m^3/day	m^3/hr	m^3/min	m^3/sec	Remarks
Daily Average	22,200	925.0	15.42	0.257	
Peak Flow	42,970	1,790.4	29.84	0.497	

1-4 Design Sewage Quality

Item	Influent (mg/l)	Removal rat (%)	Effluent (mg/l)	Remarks
BOD	310	90.3	30	Effluent quality regulati 30 mg/l
SS	360	91.7	30	Effluent quality regulati 30 mg/l

1-5 Flow Chart (Oxidation Ditch Process)



1-6 Design Criteria for Oxidation Ditch

Items	Unit	Formula or Value*1	Adoption
1-6-1 Grit Chamber			
(1) Water Surface Load	m3/m2/sec	1,800	1,800
(2) Average Velocity	m/sec	0.3	0.3
1-6-2 Lifting Pump Station			
(1) Retention Time	min.	-	4.0
1-6-3 Oxidation Ditch			
(1) BOD-SS Load	kgBOD/kgSS・day	0.03 - 0.05	0.04
(2) MLSS Concentration	mg/L	3,000 - 4,000	4,000
(3) Hydraulic Retention Time	hour	24 - 48	16
(4) Return Sludge Ratio	%	100 - 200	150
(5) Oxygen Requirement	$kgO_2/kgBOD$	1.4 - 2.2	1.8
(6) Water Depth	m	1.0 - 3.0	5.0
(7) Width	m	2.0 - 6.0	5.5
1-6-4 Final Sedimentation Tank			
(1) Water Surface Load	$m^3/m^2/day$	8 - 12	10
(2) Retention(Settling) Time	hour	6 - 12	10
(3) Water Depth	m	3.0 - 4.0	3.5
(4) Overflow Weir Load	$m^3/m/day$	150	150
1-6-5 Disinfection Tank			
(1) Ultraviolet radiation dose	J/m^2	300 - 500	300
(2) Ultraviolet Intencity	W/m^2	175	175
(3) Effective Volume per Lamp	L	7.6	7.6
1-6-6 Sludge Thickening Tank			
(1) Solid Matter Load	$kg/m^2/day$	60 - 90	75
(2) Water Depth	m	4	3.5

*1: Design Criteria in Japan

2-1 Screen and Grit Chamber

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Parallel Flow Type		
Design Sewage Flow	Q1	m^3/day	Peak Flow	35,322	42,970
	Q2	m^3/sec	Peak Flow	0.409	0.497
Water Surface Load	WSL	m^3/m^2/day		1,800	1,800
Required Surface Area	RSA	m^2	Q1/WSL	19.62	23.87
Basin Number	BN	basin		2	2
Average Velocity	AV	m/sec		0.3	0.3
Depth	H	m		0.5	0.5
Width	W1	m	Q2/(AV×H×BN)	1.36	1.66
Therefore	W2	m		1.6	1.6
Length	L1	m	RSA/(W2×BN)	6.13	7.46
Therefore	L2	m		8.0	8.0
Dimension (Width)	W	m		**1.6**	**1.6**
(Depth)	L	m	L2	**8.0**	**8.0**
(Length)	H	m	H	**0.5**	**0.5**
(Basin Number)	N	basin		**2**	**2**
(Check)					
Water Surface Load		m^3/m^2/day	Q1/(W×L×N)	1,380	1,679
Average Velocity		m/sec	Q2/(W×H×N)	0.256	0.311
Equipment (1) Fine Screen					
Type	-	-	Automatic Bar Screen		
Set Number	SSN	set		2	2
Screen Opening	-	mm	15 to 25	20	20
Screen face Velocity	Fv	m/sec	0.45 to 0.6 m/sec	0.5	0.5
Dimention Depth	H2	m	= H	0.5	0.5
Width	W	m	Q2/(Fv ×H×SSN)	0.8	1.0
		m	*Therefore*	1.6	1.6
Specification	-	-	**W1.0m×H0.6m×SO20mm×0.4kW×2sets**		
			(Based on Manufacturer's Information)		
(2) Grit discharge Pump					
Type	-	-	Submerged Type Sand Pump		
Set Number	PSN	set	Operation / Stand-by / Total	2	2
			2 / - / 2		
Sand Pit Volume	Pv	m^3		1.0	1.0
Operation Time	T	min		5.0	5.0
Discharge Flow Per Unit	Qd	m^3/min	Pv / T	0.2	0.2
		m^3/min	*Therefore*	0.2	0.2
Total Pump Head	PH	m		10.0	10.0
Specification	-	-	**Dia.100mm×0.2m^3/min×10m×2sets**		

2-2 Lifting Pump Station

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Submersible Pump Type		
Design Sewage Flow	Q1	m^3/day	Peak Flow	35,322	42,970
	Q2	m^3/min	Peak Flow	24.53	29.84
Retention Time	RT	min		4	4
Required Volume	RV	m^3	Q2×RT	98.1	119.4
Pump Pit (Width)	W	m		**6.0**	**6.0**
(Length)	L	m		**10.0**	**10.0**
(Depth)	H	m		**2.0**	**2.0**
(Volume)	V	m^3	W×L×H	**120.0**	**120.0**
Equipment					
Pump Unit Number(Total)	UN1	unit	1/4×Q, including 1 stand-by	5	5
Discharge per Unit	DU1	m^3/min		6.13	7.46
Pump Diameter(V=1.5~3.0m/s	$D1_{(V=3.0)}$	mm	$146\times(DU2/3.0)^{0.5}$	209	230
	$D1_{(V=1.5)}$	mm	$146\times(DU2/1.5)^{0.5}$	295	326
Therefore	D1	mm		250	250
Total Pump Head	PH	m		6.0	6.0
Pump Efficiency	PE	-		0.6	0.6
Axis Power	AP1	kw	0.163×DU1×PH/PE	10.0	12.2
Motor Allowance	MA	-		0.15	0.15
Pump Power	P1	kw	AP1×(1+MA)	11.49	13.98
Therefore				15	15
Specification		-	**Dia.250mm×7.5m^3/min×6m×15kW×5(1)units**		

2-3 Oxidation Ditch

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Re-circulation Flow Type		
Design Sewage Flow	Q1	m^3/day	Average Flow	18250	22,200
	Q2	m^3/hr	Average Flow	760.4167	925.0
Basin Number	BN	basin		9	10
Inlet BOD Quality	INB	mg/L		310	310
Inlet SS Quality	INS	mg/L		360	360
Return Sludge Concentration	RSC	mg/L		6000	6,000
Return Sludge Ratio	RSR	%		150	150
MLSS Concentration	ML	mg/L	(INS+RSC*RSR/100)/(1+RSR/100)	3,744	3,744
BOD-SS load	BS	kgBOD/kgSS/d		0.04	0.04
Required Volume per basin	RV	m^3/basin	Q1×INB/BN/(ML*BS)	4,197	4,595
Width	W	m		5.5	5.5
Water Depth	H	m		5.0	5.0
Length	L1	m	RV/(W×H)	152.6	167.1
Therefore	L2	m		150.0	150.0
Dimension (Width)	W	m		**5.5**	**5.5**
(Depth)	H	m		**5.0**	**5.0**
(Length)	L	m		**150.0**	**150.0**
(Basin Number)	N	basin		**9**	**10**
(Check)					
BOD-SS load	BS	kgBOD/kgSS/d	Q1×INB/(W×H×L×N)*ML	0.041	0.045
Hydraulic Retention Time	HRT	hour	W×H×L×N/Q2	48.8	44.6
BOD Volmetric Loading	BL	kgBOD/m^3/d	Q1×INB*10^{-3}/(W×H×L×N)	0.152	0.167
Equipment					
Aerator Type	-		Diffused aeration		
Oxygen Requirement	OR	kgO_2/kgBOD		1.8	1.8
Standard Oxygen Requirement	SOR	kgO_2/day	Q1×INB×10^{-3}×OR	10,184	12,388
			per basin	1,132	1,239
Blower Number	AN	unit/basin		1	1
Blower Operation Time	OT	hr		12	12
Oxygen Transfer Requirement	SOTR	kgO_2/hr·unit	(SOR/24)×(24/OT)×(1/AN)	94.29	103.23
Unit Number(Total)	UN1	unit		9	10
Specification	-	-	**Rotary Blower**		
			Dia.150mm×23.4m^3/min×5,600mmAq×45kW		
			Submerged propeller		
			Dia.2.0m×2.3kW×2units/basin		
			(Based on Manufacturer's Information)		

2-4 Final Sedimentation Tank

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Radial flow circular type		
Design Sewage Flow	Q1	m^3/day	Average Flow	18250	22,200
	Q2	m^3/hr	Average Flow	760.4167	925.0
Basin Number	BN	basin		7	8
Water Surface Load	WSL	m^3/m^2/day		10.0	10.0
Required Surface Area	A1	m^2	Q1/WSL	1,825	2,220
	A2	m^2/basin	A1/BN	261	278
Water Depth	WD	m		3.5	3.5
Diameter	D1	m	$(4\times A2/3.14)^{0.5}$	18.22	18.80
Therefore	D2	m		18.0	18.0
Dimension (Diameter)	D	m	D2	**18.0**	**18.0**
(Depth)	H	m	WD	**3.5**	**3.5**
(Basin Number)	N	basin	BN	**7**	**8**
Overflow Weir Load	OWL	m^3/m/day		150	150
Required Weir Length	WL1	m/basin	Q1/(BN×OWL)	17.38	18.50
Therefore	WL2	m/basin		19.0	19.0
(Check)					
Water Surface Load	WSL	m^3/m^2/day	$4\times Q1/(D^2\times 3.14\times N)$	10.25	10.91
Retention(Settling) Time	T	hour	$D^2\times\pi\times H\times N/(4\times Q2)$	8.19	7.70
Equipment					
(1) Sludge Collector					
Type	-		Center Driven Column Type		
Reduction Gears Torque	T	kg･m	$(P/4)\times D^2\times \alpha$	1944	1944
Fixed Number	P	kg/m		20	20
Allowance	α	-		1.2	1.2
Motor Power	P	kw	$(T\times n)*\alpha/(974\times\eta)$	0.12	0.12
Therefore				0.4	0.4
Rotation Number	n	rpm	$v/(\pi\times D)$	0.04	0.04
Rake velocity	v	m/min		2.0	2.0
Total Efficiency	η	-		0.7	0.7
Unit Number(Total)	UN1	unit		7	8
Specification	-	-	**Dia.18m×H3.5m×0.4kW**		

Continue of Final Sedimentation Tank

Item	Sign	Unit	Calculation	F/S	M/P
Equipment					
(2) Return Sludge Pump					
Type	-		Centrifugal Screw Impeller Pump		
Return Sludge Volume Ratio	RR	%	Min.	100	100
		%	Max.	200	200
Pump Unit Number	UN	unit	2 units per basin	14	16
Discharge per Unit	DU	m^3/min	Q2*(RR_{MAX}/100)/UN/60	1.811	1.927
Pump Diameter(V=1.5~3.0m/	$D1_{(V=3.0)}$	mm	$146\times(DU2/3.0)^{0.5}$	113	117
	$D1_{(V=1.5)}$	mm	$146\times(DU2/1.5)^{0.5}$	160	165
Therefore	D1	mm		150	150
Total Pump Head	PH	m		5.0	5.0
Pump Power	P1	kw	Based on Pump Characteristic	3.7	3.7
Specification		-	**Dia.150mm×2.0m^3/min×5m×3.7kW**		
(3) Waste Sludge Pump					
Type	-		Progressing Cavity Pump		
Waste Sludge Volume	WS	t-DS/day	Refer to Mass Balance Cal.	5.283	6.426
Pump Unit Number	UN	unit	1 units per basin	7	8
Discharge per Unit	DU	m^3/hr	WS/UN*(100/100-SMR)/24	3.931	4.184
Waste Sludge Moisture Ratio	SMR	%	Considering a margin	99.2	99.2
Pump Diameter	D1	mm	More than 80mm	80	80
Total Pump Head	PH	m		10.0	10.0
Pump Power	P1	kw	Based on Pump Characteristic	3.7	3.7
Specification		-	**Dia.80mm×13.4m^3/min×10m×3.7kW**		
			(Based on Manufacturer's Information)		

2-5 Disinfection Channel

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Ultraviolet Disinfection		
Design Sewage Flow	Q1	m^3/day	Peak Flow	35322	42,970
UV radiation dose	D	J/m^2		300	300
UV Intencity	I	W/m^2		175	175
UV Dosing Time	T	sec	D/I	1.71	1.71
Effective Lolume per Lamp	V	L		7.6	7.6
Treatment Capacity per Lamp	q	m^3/day	(V/T)*10^{-3}*(24*60*60)	383.0	383.0
Required Number of Lamp	n	No.	Q1/q	92.2	112.2
Therefore	n1	No.		120	120
Module Number	M	No.	n1/4	30	30
Dimension (Width)	W	m		**1.5**	**1.5**
(Depth)	H	m		**3.5**	**3.5**
(Length)	L	m		**0.8**	**0.8**
(Basin Number)	N	basin		**3**	**3**
			(Based on Manufacturer's Information to install UV facilities)		

2-6 Sludge Thickening Tank

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Rectangular Type		
Design Sewage Flow	Q1	m^3/day	Average Flow	18250	22,200
	Q2	m^3/hr	Average Flow	760.4	925.0
Basin Number	BN	basin		2	2
Generated Sludge Solids	GS	t-Ds/day	Refer to Mass Balance Cal.	5.28	6.43
Generated Sludge Volume	GSV	m^3/day	Refer to Mass Balance Cal.	528.3	642.6
Solid Matter Load	SML	kg/m^2/day		75	75
Required Surface Area	SA1	m^2	(GS*10^3)/SML	70.4	85.7
	SA2	m^2/basin	SA1/BN	35.2	42.8
Length (=Width)	LW	m	*SQRT*(SA2)	5.93	6.55
		m	*Therefore*	6.0	6.0
Water Depth	H	m		3.5	3.5
Dimension (Length)	L	m/basin		**6.0**	**6.0**
(Width)	W	m/basin		**6.0**	**6.0**
(Depth)	H	m		**3.5**	**3.5**
(Basin Number)	BN	basin		**2**	**2**
(Check)					
Solid Matter Load	SML	kg/m^2/day	GS×10^3/(L×W×BN)	73.4	89.3
Sludge Thickened Time	T	hr	(L×W×D×BN)×24/GSV	11.4	9.4

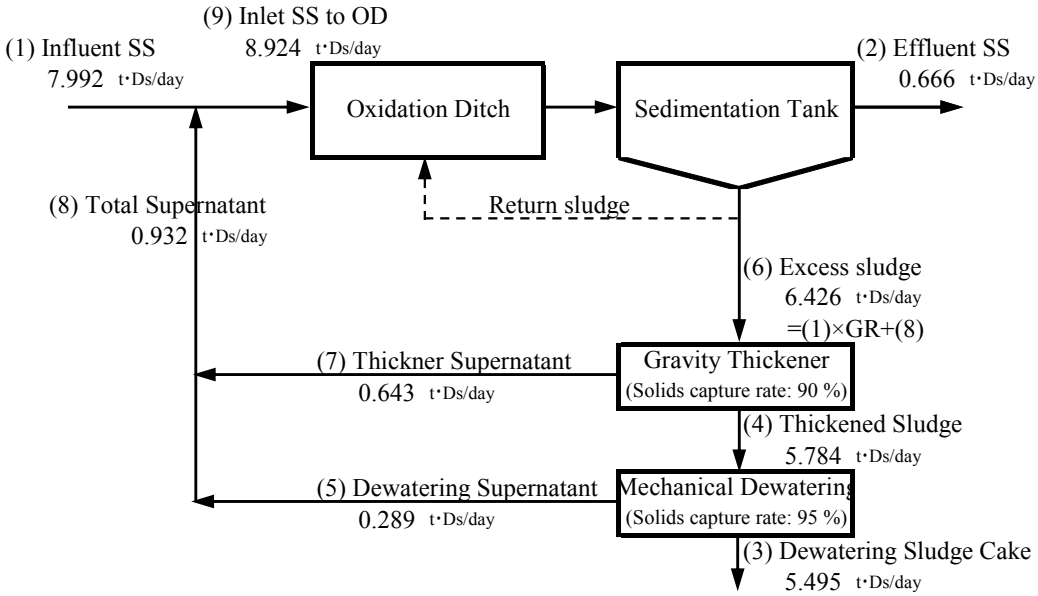
Continuation of Sludge Thickening Tank

Item	Sign	Unit	Calculation	F/S	M/P
Equipment					
(1) Thickened Sludge Feed Pu					
Type	-		Non-Clogging Sludge Pump		
Thickened Sludge Solids	TS	t-DS/day	Refer to Mass Balance Cal.	4.755	5.784
Pump Unit Number	UN	unit	1 units per Line	2	2
Thickened Sludge Moisture Ra	SMR	%	Considering a fluctuatio Min.	98.5	98.5
		%	Max.	99	99
Pump Operation Time	OT	hr/day		2	2
Discharge per Unit	DU	m^3/min	TS*(100/100-SMR)/UN/OT/6	1.981	2.410
Pump Diameter(V=1.5~3.0m/s	$D1_{(V=3.0)}$	mm	$146\times(DU2/3.0)^{0.5}$	119	131
	$D1_{(V=1.5)}$	mm	$146\times(DU2/1.5)^{0.5}$	168	185
Therefore	D1	mm		150	150
Total Pump Head	PH	m		5.0	5.0
Pump Power	P1	kw	Based on Pump Characteristic	5.5	5.5
Specification		-	**Dia.150mm×2.4m^3/min×5m×5.5kW×3(1)units**		
(2) Sludge Feed Pump					
Type	-		Progressing Cavity Pump		
Capacity of Centrifugal Dehydrato	CD	m^3/hr/unit		30.0	30.0
Pump Unit Number	UN	unit	1 units per Dehydrator	2	2
Discharge Volume Ratio	DR	%	Min.	50	50
		%	Max.	150	150
Discharge per Unit	DU	m^3/hr	$CD/UN*DR_{Min}$	15.00	15.00
			$CD/UN*DR_{Max}$	45.00	45.00
Pump Diameter	D1	mm		125	125
Total Pump Head	PH	m		20	20
Pump Power	P1	kw		3.7	3.7
Specification		-	**Dia.125mm×5.6~44.0m^3/hr×11kW×3(1)units**		
			(Based on Manufacturer's Information)		

2-7 Sludge Dewatering

Item	Sign	Unit	Calculation	F/S	M/P
Type	-	-	Centrifugal Dehydrator		
Thickened Sludge Solids	TS	t-DS/day	Refer to Material Balance	4.755	5.784
Thickened Sludge Volume	TV	m^3/day	Refer to Material Balance	317.0	385.6
Chemical Dosage	CD	%	For Sludge Solids	1.5	1.5
Chemical Dissolve Concentrati	DC	%		0.2	0.2
Chemical Specific Gravity	SG	t / m^3		1.0	1.0
Inlet Chemical Volume	CV	m^3/day	TS*CD/DC/SG	35.7	43.4
Inlet Sludge Volume	V1	m^3/day	TV+CV	352.6	429.0
Unit Number	UN	Unit		2	2
Operating Day	T1	day/week		6.0	6.0
Operating Time	T2	hour/day		8.0	8.0
Required Dewatering Capacity	RDC	m^3/hour	V1×7/(T1×T2×UN)	25.7	31.3
Therefore	P	m^3/hour		30.0	30.0
Dimension (unit)	N	Unit		**2**	**2**
(Capacity)	P	m^3/hour		**30.0**	**30.0**
(Check)					
Operating Time	T	hour/day	V1×7/(T1×N×P)	6.9	8.3

3-1 Solids Mass Balance Calculation



Basic Condition

Item	Sign	Unit	F/S	M/P
Inlet Flow	Q	m^3/day	18,250	22,200
Inlet Quality (SS)	Si	mg/l	360	360
Effluent Quality (SS)	Se	mg/l	30	30
Sludge Generation Ratio per removal SS	GR	%	75	75
Excess Sludge Moisture Content	M_E	%	99	99
Gravity Thickener Solids Capture Rate	CR_T	%	90	90
Thickened Sludge Moisture Content	M_T	%	98.5	98.5
Mechanical Dewatering Solids Capture Rate	CR_D	%	95	95
Dewatering Sludge Moisture Content	M_D	%	85	85

(1) Influent SS			
Sludge Solids : $Q \times Si \times 10^{-6}$	t･Ds/day	6.570	7.992
(2) Effluent SS			
Sludge Solids : $Q \times Se \times 10^{-6}$	t･Ds/day	0.548	0.666
(3) Dewatering Sludge Cake			
Sludge Solids : {(1)-(2)}×GR	t･Ds/day	4.517	5.495
Sludge Volume : (Sludge Solids)×(100/100-M_D)	m^3/day	30.11	36.63
(4) Thickened Sludge			
Sludge Solids : (3)/CR_D	t･Ds/day	4.755	5.784
Sludge Volume : (Sludge Solids)×(100/100-M_T)	m^3/day	316.97	385.58
(5) Dewatering Supernatant			
Sludge Solids : (4)-(3)	t･Ds/day	0.238	0.289
(6) Excess sludge			
Sludge Solids : (4)/CR_T	t･Ds/day	5.283	6.426
Sludge Volume : (Sludge Solids)×(100/100-M_E)	m^3/day	528.29	642.63
(7) Thickner Supernatant			
Sludge Solids : (6)-(4)	t･Ds/day	0.528	0.643
(8) Total Supernatant			
Sludge Solids : (5)+(7)	t･Ds/day	0.766	0.932
(9) Inlet SS to OD			
Sludge Solids : (1)+(8)	t･Ds/day	7.336	8.924

Appendix 1.4 Separation of Rain Water

1. Outline of Zabadani Valley

The outline of Zabadani valley is shown on **Figure A1.4.7** together with proposed sewerage area. Total area of the basin of the waterway which flows nearby the proposed Zabadani STP is about 10,000 ha. The proposed sewerage area occupies about 1,400 ha of the basin. Concerning outside of the proposed sewerage area, rain water is not mixed with sewage and only rain water flows to downstream. It is absolutely essential that sewage from the proposed sewerage area should not be mixed with the rain water from the outside of the sewerage area. This separation of rain water from sewage will contribute to increasing treatment efficiency at STP and will avoid over sizing trunk sewers.

The rain water is relatively clean and it can be directly used for agricultural or gardening sprinkling. The rain water is also valuable water source by penetrating into ground and natural treatment by soil. From these point of views, the rain water should be separately considered from the sewage and treated as water source by planning underground penetration. In the following sections, method of separation of rain water is described.

2. Evaluation of Existing Trunk Sewer Capacity

There is only one waterway in a Zabadani valley and wastewater flows into the waterway. Originally the waterway is open channel, and in order to prevent diffusion of bad odor, it is replaced by box culvert. The dimension of the culvert is 2m in width and 1.5m in depth near the STP site. All rain water which falls in a valley flows into the culvert. This culvert section is considered as too small taking account of size of the basin and quantity of rain water.

Although annual rail fall is very small, in range of 400mm to 500mm, it sometimes happens that hourly rain fall in winter season reaches 20mm. Based on these conditions and assumption of runoff coefficient as of 0.1, rain water outflow can be calculated as 28 m^3/s. In the case that flow rate in the culvert is 2 m/s, required section of the culvert will be 14 m^2 (2 m in depth and 7 m in width).

Comparing to the required section of the culvert, section of existing culvert is too small. It is considered that the existing culvert was designed to accommodate only wastewater without rain water, and other reasons for such small section of the existing culvert are as follows.

- The nature of the soil of Zabadani has very high water permeability, and most of rain water has permeated underground. Therefore, it seems that the actual runoff coefficient is smaller than 0.1.
- Although the quantity of rain water is exceeding the capacity of the culvert and overflow

occurs, there will be no damage to human life since the culvert is constructed in farmland.

- Since rain days are very little and amount of rain is very small, it is thought that the rain does not need to be considered.

Calculation conditions (Rational method)

Valley area A (ha) 10,000 ha

Intensity of rainfall I (mm/hr) 10 mm/hr

Coefficient of discharge 0.1

The amount of outflows Q (m^3/s)

$$Q = \frac{1}{360} \times C \times I \times A = \frac{1}{360} \times 0.1 \times 10 \times 10{,}000 = 28 m^3/s$$

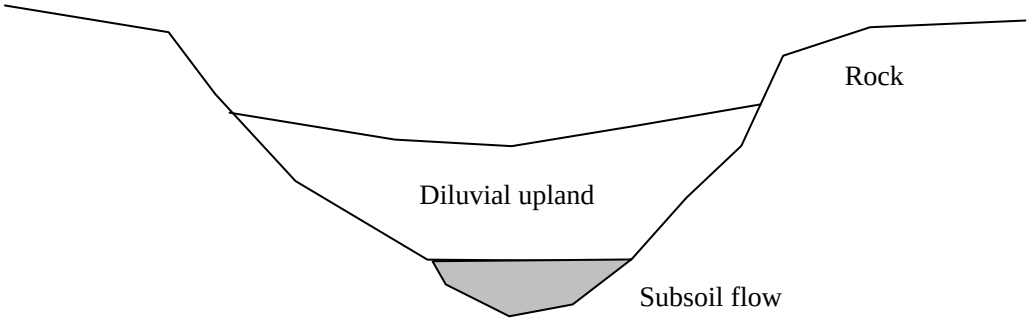


Fig. A1.4.1 Stratum Presumption Figure of Zabadani

3. Measures for Separation of Rain Water

(1) Separation of rain water from mountain and green area

Prevention of rain water inflow to sewer pipe will be achieved by installation of rain water drain pipe in the following three zones, Zones A, B, and C as shown on **Figure A1.4.7**.

1) Zone A: Zabadani upper stream area

Ain Hour and Serghaya are located upstream of Zabadani and these basin area is about 2.600 ha. There is a natural waterway in these areas. Water in the waterway is comparatively clean since basin area is large comparing to population size in the area. The waterway continues to the farm land, crossing the urban area in the west of Zabadani near the mountain. Major part of the waterway is open channel.

This waterway will play an important role to separate rain water from upstream of Zabadani. The capacity of the waterway should be reconsidered since the existing capacity of the waterway seems too small comparing its basin area.

There is an option to construct small-scale dam at south end of the Zone A just before entering the Zabadani area. Potential effects of the dam will be as follows.

- To regulate rain water outflows to Zabadani
- To store rain water
- To accelerate rain water infiltration

There will be a possibility to avoid expansion of the existing waterway to increase its capacity by construction of the dam.

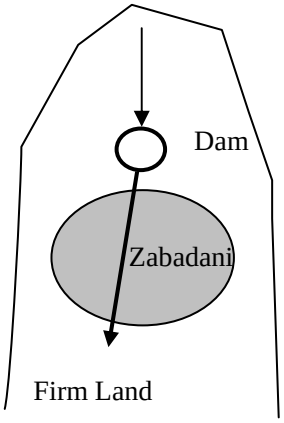


Figure A1.4.2 Schematic Drawing of Zone A

2) Zone B: Farm and mountain land located western part of Zabadani

Vast farmland spreads out in the western part of Zabadani and becomes mountainous area beyond the farmland. Basin area of this zone is about 1,900 ha and quantity of rain water will be significant. Since there is no residence in this zone, sewage is not included in outflow from this area. Under the current situation, all of rain water is flowing into the sewer pipe.

To separate rain water from this area, construction of new waterway in the west side of the sewer pipe will be considered.

It is planned that new trunk sewer will be installed along old abandoned railway. In that case, existing waterway can be used for the drainage for rain water.

A schematic drawing is shown in **Figure A1.4.3**:

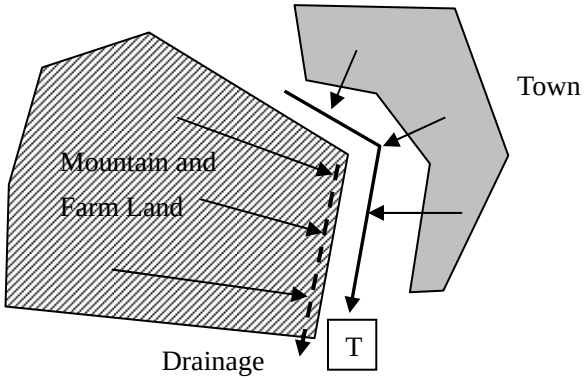


Figure A1.4.3 Schematic Drawing of Zone B

It is desirable that the water way should be open channel and gravel bottom is recommended to accelerate rain water infiltration.

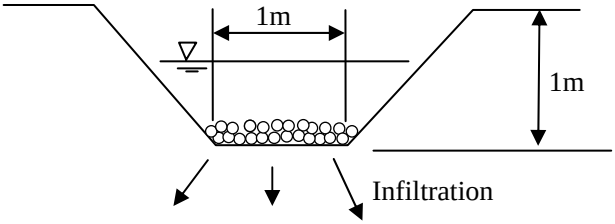


Figure A1.4.4 Schematic Drawing of Drainage

It is also recommended to construct a reservoir in the middle of the waterway expecting the following effects.

- To regulate rain water outflows to down stream
- To store rain water and use rain water for irrigation
- To accelerate rain water infiltration

3) Zone C: Mountain land located eastern part of Zabadani

The mountain land with bare hillside is located in the eastern part of Zabadani, and the rain water flows into a residential area, and is being mixed with sewage. For sake of avoiding such phenomenon, it is possible to separate rainwater and sewage by installation of a waterway on boundary of the residential area. Rain water is intercepted by the new waterway and it passes to Barada River directly.

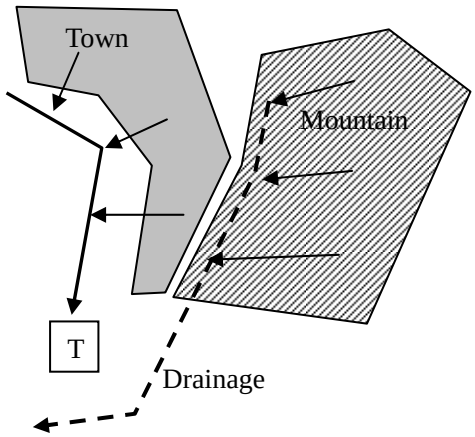


Figure A1.4.5 Schematic Drawing of Zone C

(2) Installation of a road sewer

Generally in Syria, the road sewer is not established because of little precipitation. Rain water flows surface of a road and finally is flowing into the sewer pipe. In order to avoid such situation, construction of a road sewer is recommended to separate rain water on road. Holes will be bored in the bottom of road sewer and rain water enables to permeate underground. Although the rain water which flowed into the road sewer finally flows into a sewer pipe, the amount of inflow decreases by such permeation.

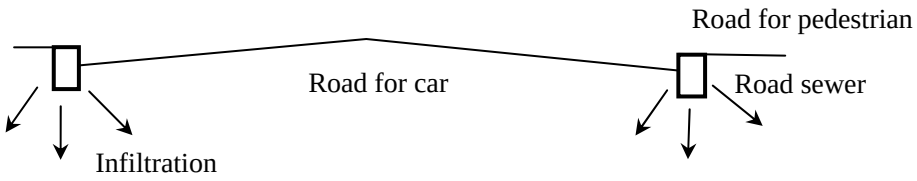


Figure A1.4.6 Schematic Drawing of the Street Gutter

4. Other Measures for Separation

The other measures for rain water separation which are studied and implemented in Japan are described below. Although these measures cannot be applied to Syria immediately and directly, it can be considered as reference in future.

(1) Infiltration facilities

- The infiltration facilities installed in a school, a park, etc.
- The pedestrian road that has water permeability.

(2) Facilities for rain water use

- The facility installed near by the house which stores the rain water from the roof.

- The facility installed under the road which stores the rain water that can be used for many purpose, for example pouring and water supply for fire fighting.

5. Meteorological data

Meteorological data in Zabadani is shown in **Table A1.4.1**:

Table A1.4.1 Meteorological data in Zabadani

Item	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total	Period
Zabadani															
Mean Temperature	C	3.8	5.3	8.9	13.6	17.9	22.1	24.8	24.1	25.6	16.0	10.1	6.1	14.9	74-90
Mean Maximum Temperature	C	8.7	10.3	14.4	19.8	24.9	29.6	32.5	32.3	30.2	24.1	18.1	11.4	21.4	74-91
Mean Minimum Temperature	C	0.0	0.7	3.4	6.7	9.5	13.5	16.3	15.4	12.6	8.2	4.3	1.5	7.6	74-92
Absolute maximum Temperature	C	18.6	22.0	25.0	30.6	35.0	38.0	41.0	40.0	38.0	32.5	27.0	22.5	41.0	74-93
Absolute Minimum Temperature	C	-12.6	-13.5	-7.0	-2.5	0.6	6.3	8.8	7.5	6.0	-0.7	-5.0	-6.0	-13.5	74-94
Mean Relative Humidity	%	73.0	66.0	57.0	46.0	41.0	34.0	31.0	33.0	39.0	52.0	67.0	72.0	46.0	74-95
Mean of the Total Precipitation	mm	93.0	100.3	78.0	27.0	9.7	0.3	0.0	0.0	0.0	23.6	53.2	89.2	474.3	78-92
Madaya															
Mean Temperature	C	3.6	5.1	7.8	11.9	16.1	20.2	22.4	21.3	18.4	12.5	7.4	4.9	12.6	75-89
Mean Maximum Temperature	C	9.2	11.5	13.9	19.4	25.6	28.2	22.6	30.8	29.3	23.3	16.5	11.4	20.7	74-89
Mean Minimum Temperature	C	-0.1	0.0	1.6	4.2	5.7	8.6	10.3	8.8	5.5	3.7	0.7	-0.5	4.0	74-89
Absolute maximum Temperature	C	20.5	23.0	26.2	31.0	33.0	36.0	40.5	40.0	36.4	32.6	25.0	21.5	40.5	76-89
Absolute Minimum Temperature	C	-10.0	-15.5	-12.0	-3.5	-3.0	-0.7	1.5	1.0	0.0	-7.0	-8.5	-9.5	-15.5	76-89
Mean Relative Humidity	%	7.9	74.0	6.9	60.0	47.0	48.0	77.0	52.0	59.0	67.0	77.0	81.0	53.0	75-89
Mean of the Total Precipitation	mm	96.4	85.0	92.4	30.0	10.8	0.5	0.0	0.0	0.0	22.5	55.4	80.8	473.8	76-90
Mean Wind Spead	m/s	13.0	16.0	13.0	16.0	10.0	10.0	13.0	10.0	10.0	10.0	16.0	13.0	13.0	65-85
Wind Direction		W	W	W	W	W	W	W	W	W	S	S	S	W	65-85

Source: Ministry of defense meteorological department

Proposed drainage plan is shown in **Figure A1.4.7**.

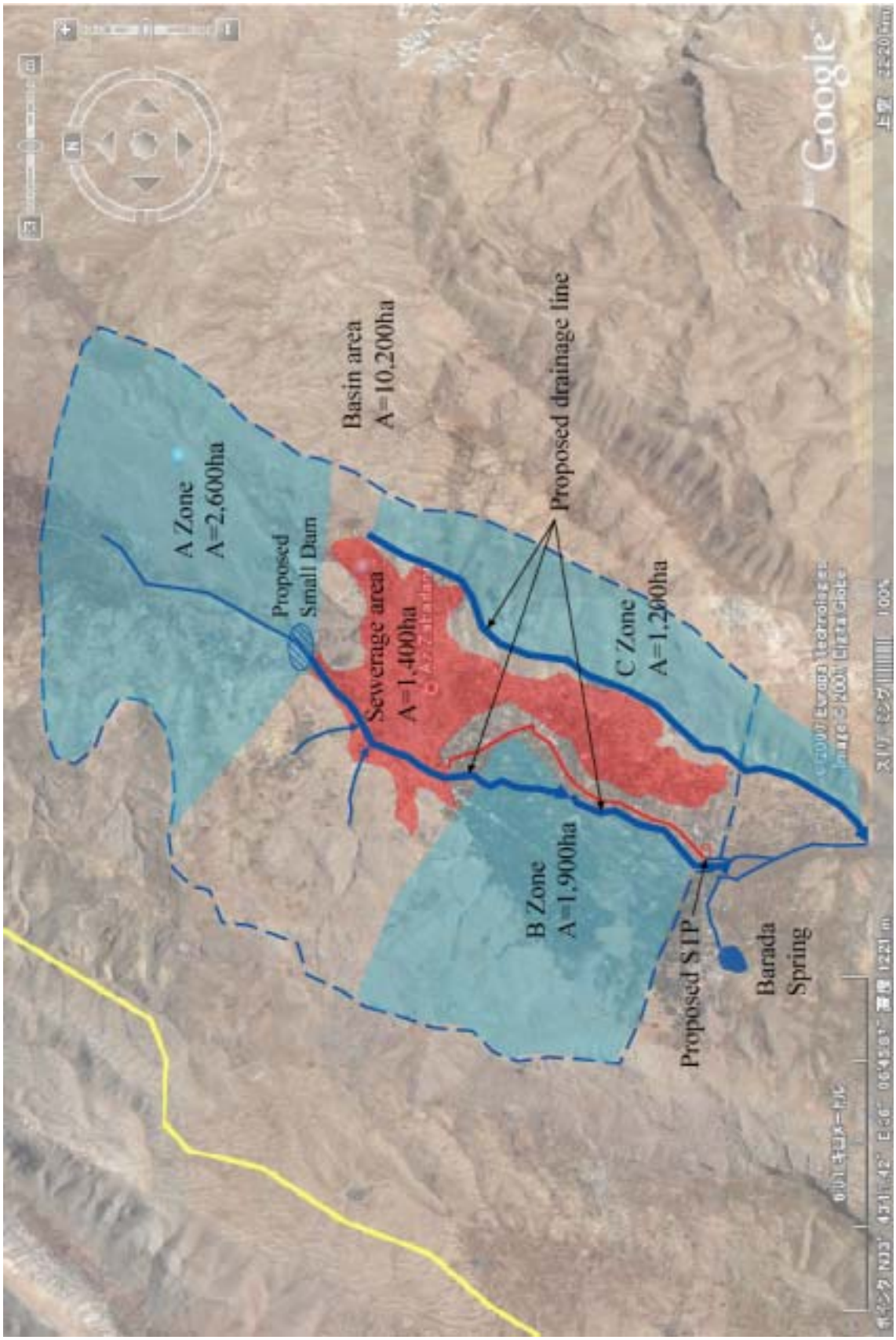


Figure A1.4.7 Proposed Drainage Plan

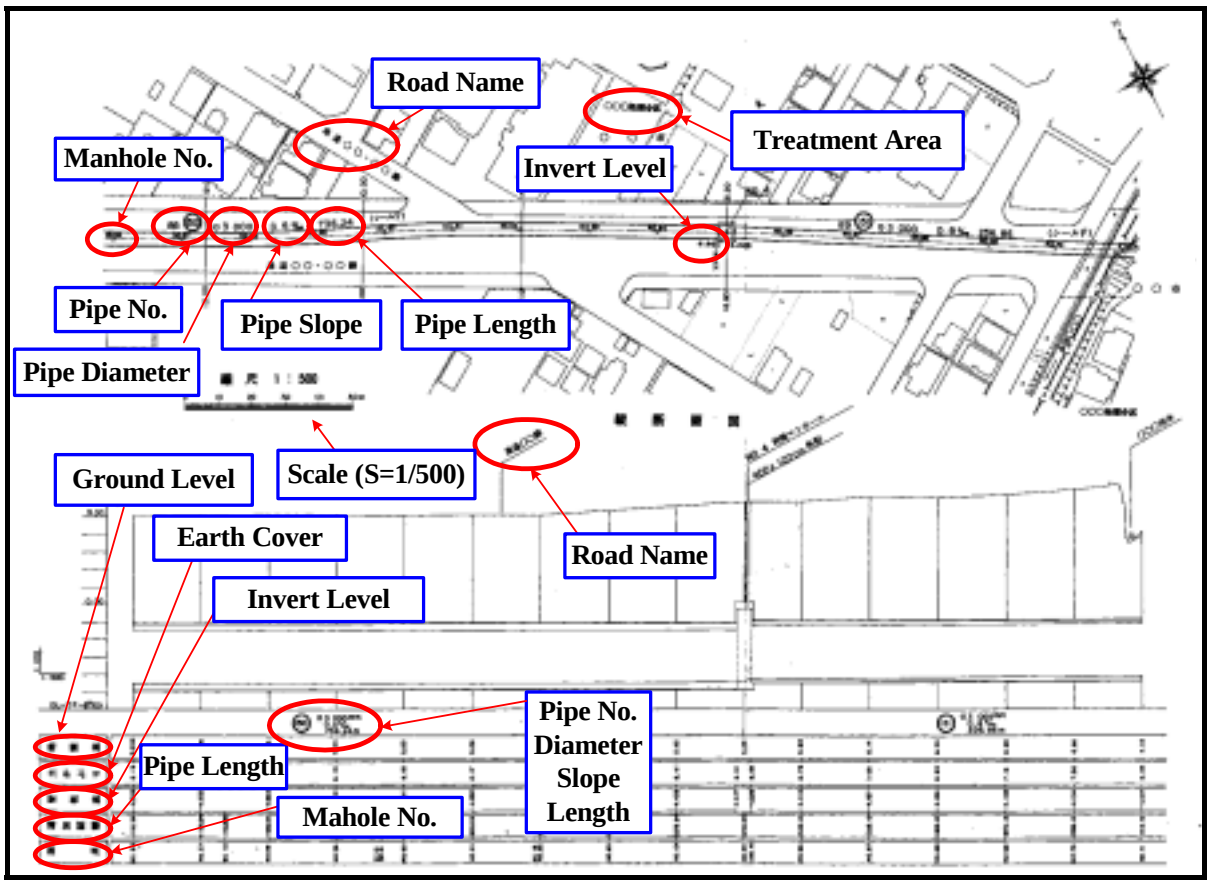
Appendix for Chapter 3

Sample of sewerage ledgers and records

Sample of Sewer Record

Pipe No.	Diameter (mm)	Pipe Length (m)	Material	Manhole No.		Road Name	Construction Year	Effluent Pump Station	Sewer Cleanig Record	
				Upstreem	Downstreem				Date	Condition
BP-01-001	225	108.63	Clay	BP-01-M001	BP-01-M002	De Zoysa St	1920	Sala Island PS	14/01/2006	Sand 30%

Sample of Sewer Network Plan & Profile



Appendix for Chapter 4

Appendix 4.1 Construction Cost

Construction Cost

Items	Specification	Unit	Qty	FC Portion (SP)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
[Stage-I]								
STP								
Civil/Building work		Ls	1		16,227,354		260,370,308	
Mechanical/Electrical work		Ls	1		217,980,262		10,365,000	
Pipe		Ls	1		0		1,250,000	
Total					234,207,616		271,985,308	
Total Cost (roundup) [SP]					234,208,000		271,986,000	
Total Cost (FC+LC) [SP]				506,194,000				
[Stage-II]								
STP								
Mechanical/Electrical work		Ls	1		4,157,367		197,680	
Total					4,157,367		197,680	
Total Cost (roundup) [SP]					4,158,000		198,000	
Total Cost (FC+LC) [SP]				4,356,000				
Grand Total Cost [SP]				**510,550,000**				

(1) Sewerage Treatment Plant Q= 18,250 m^3/day for Stage-I (2015)

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
<Civil/Building work>								
[Direct Cost]								
Pumping station		pc	1		3,410		4,595,988	
Oxidation ditch tank		pc	1		126,500		128,785,800	
Final sedimentation tank		pc	1		30,800		34,694,560	
Disinfection channel		pc	1		770		1,097,788	
Sludge treatment building		pc	1		0		15,000,000	
Administration building		pc	1		0		4,500,000	
Others (land improvement etc.)		pc	1		24,222		28,301,120	Above of 15%
[Indirect Cost]		Ls	1		37,140		43,395,051	Above of 20%
Sub-Total					**222,842**		**260,370,308**	
<Mechanical/Erectrical work>								
[Direct Cost]								
Mechanical works		pc	1		1,303,210		4,512,500	
Electrical works		pc	1		1,191,300		4,125,000	
[Indirect Cost]		Ls	1		498,902		1,727,500	Above of 20%
Sub-Total					**2,993,412**		**10,365,000**	
Total Cost					3,216,254		270,735,308	
Total Cost (roundup) [SP]	1 Euro=72.82 SP				234,208,000		270,736,000	1,000 roundup
Total Cost (FC+LC) [SP]				504,944,000				

1) Pumping Station

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Excavation		m^3	1,400		0	120	168,000	including surplus soil transport
Backfilling		m^3	600		0	300	180,000	
Gravel		m^3	28		0	360	10,080	
Concrete for leveling		m^3	14		0	2,000	28,000	
Reinforced concrete		m^3	310	10	3,100	9,300	2,883,000	FC portion =R-bar material 10,000*7% = 700sp = 10Euro
including formwork, rebar fabrication and assembly								
miscellaneous work		Ls	1		310		326,908	Above of 10%
Building work		m^2	100		0	10,000	1,000,000	
Total Cost					3,410		4,595,988	

2) Oxidation ditch tank

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Excavation		m^3	44,000		0	120	5,280,000	including surplus soil transport
Backfilling		m^3	8,000		0	300	2,400,000	
Gravel		m^3	1,800		0	360	648,000	
Concrete for leveling		m^3	900		0	2,000	1,800,000	
Reinforced concrete		m^3	11,500	10	115,000	9,300	106,950,000	FC portion =R-bar material 10,000*7% = 700sp = 10Euro
including formwork, rebar fabrication and assembly								
miscellaneous work		Ls	1		11,500		11,707,800	Above of 10%
Total Cost					126,500		128,785,800	

3) Final sedimentation tank

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Excavation		m^3	16,400		0	120	1,968,000	including surplus soil transport
Backfilling		m^3	5,600		0	300	1,680,000	
Gravel		m^3	560		0	360	201,600	
Concrete for leveling		m^3	280		0	2,000	560,000	
Reinforced concrete		m^3	2,800	10	28,000	9,300	26,040,000	FC portion =R-bar material 10,000*7% = 700sp = 10Euro
including formwork, rebar fabrication and assembly								
miscellaneous work		Ls	1		2,800		3,044,960	Above of 10%
Building work		m^2	120		0	10,000	1,200,000	
Total Cost					30,800		34,694,560	

4) Disinfection channel

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Excavation		m^3	170		0	120	20,400	including surplus soil transport
Backfilling		m^3	60		0	300	18,000	
Gravel		m^3	13		0	360	4,680	
Concrete for leveling		m^3	6.5		0	2,000	13,000	
Reinforced concrete		m^3	70	10	700	9,300	651,000	FC portion =R-bar material 10,000*7% = 700sp = 10Euro
including formwork, rebar fabrication and assembly								
miscellaneous work		Ls	1		70		70,708	Above of 10%
Building work		m^2	32		0	10,000	320,000	
Total Cost					770		1,097,788	

5) Sludge treatment building

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Building work		m^2	750		0	20,000	15,000,000	
Total Cost					0		15,000,000	

6) Administration building

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Building work		m^2	300		0	15,000	4,500,000	
Total Cost					0		4,500,000	

7) Mechanical works

Items	Specification	Unit	Qty	FC Portion (US$)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Pumping station facility		Ls	1		300,000		750,000	
Oxidation ditch tank facility		Ls	1		200,000		500,000	
Final sedimentation tank facility		Ls	1		225,000		562,500	
Dinsinfection channel facility		Ls	1		225,000		562,500	
Sludge thickener facility		Ls	1		180,000		450,000	
Sludge dewatering facility		Ls	1		450,000		1,125,000	
Miscellaneous Facility		Ls	1		225,000		562,500	
* based on the contractors approximate estimate								
Total Cost				US$	1,805,000		4,512,500	
	1 US$=0.722 Euro			Euro	1,303,210			

8) Electrical works

Items	Specification	Unit	Qty	FC Portion (US$)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Power receiving , Transforming equipment		Ls	1		150,000		375,000	
Operating facility (control center, relay)		Ls	1		375,000		937,500	
Instrumentation facility		Ls	1		225,000		562,500	
Standby generator		Ls	1		300,000		750,000	
Supervisory control facility		Ls	1		225,000		562,500	
Miscellaneous Facility		Ls	1		375,000		937,500	
* based on the contractors approximate estimate								
Total Cost				US$	1,650,000		4,125,000	
	1 US$=0.722 Euro			Euro	1,191,300			

(2) Sewerage Treatment Plant **Q= 22,200 m^3/day for Stage-II (2025)**

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
<Civil/Building work>								
[Direct Cost]								
Pumping station		pc	1		0		0	
Oxidation ditch tank		pc	1		0		0	
Final sedimentation tank		pc	1		0		0	
Disinfection channel		pc	1		0		0	
Sludge treatment building		pc	1		0		0	
Administration building		pc	1		0		0	
Others (land improvement etc.)		pc	1		0		0	Above of 15%
[Indirect Cost]		Ls	1		0		0	Above of 20%
Sub-Total					**0**		**0**	
<Mechanical/Erectrical work>								
[Direct Cost]								
Mechanical works		pc	1		36,100		125,000	
Electrical works		pc	1		11,476		39,733	
[Indirect Cost]		Ls	1		9,515		32,947	Above of 20%
Sub-Total					**57,091**		**197,680**	
Total Cost					57,091		197,680	
Total Cost (roundup) [SP]	1 Euro=72.82 SP				4,158,000		198,000	1,000 roundup
Total Cost (FC+LC) [SP]				4,356,000				

1) Mechanical works

Items	Specification	Unit	Qty	FC Portion (US$)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Pumping station facility		Ls	1					
Oxidation ditch tank facility		Ls	1		20,000		50,000	
Final sedimentation tank facility		Ls	1		30,000		75,000	
Dinsinfection channel facility		Ls	1					
Sludge thickener facility		Ls	1					
Sludge dewatering facility		Ls	1					
Miscellaneous Facility		Ls	1					
* based on the contractors approximate estimate								
Total Cost				US$	50,000		125,000	
	1 US$=0.722 Euro			Euro	36,100			

2) Electrical works

Items	Specification	Unit	Qty	FC Portion (US$)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Power receiving , Transforming equipment		Ls	1					
Operating facility (control center, relay)		Ls	1		8,830		22,074	
Instrumentation facility		Ls	1		7,064		17,659	
Standby generator		Ls	1					
Supervisory control facility		Ls	1					
Miscellaneous Facility		Ls	1					
* based on the contractors approximate estimate								
Total Cost				US$	15,894		39,733	
	1 US$=0.722 Euro			Euro	11,476			

(3) Pipe

Items	Specification	Unit	Qty	FC Portion (Euro €)		LC Portion (SP)		Reference
				Unit Price	Amount	Unit Price	Amount	
Dia.800mm	HDPE	m	100		0	12,500	1,250,000	
including Indirect Cost								
Total Cost					0		1,250,000	
Total Cost (roundup) [SP]	1 Euro=72.82 SP				0		1,250,000	1,000 roundup
Total Cost (FC+LC) [SP]				1,250,000				

Appendix 4.2 Annual Running Cost for STP

It is assumed that it increases according to the amount of inflow.

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
inflow(m3/d)	17,450	17,850	18,250	18,650	19,050	19,450	19,850	20,250	20,640	21,030	21,420	21,810	22,200
ratio	79%	80%	82%	84%	86%	88%	89%	91%	93%	95%	96%	98%	100%
Running Cost (10^3SP/year)	14,821	15,160	15,500	15,840	16,180	16,519	16,859	17,199	17,530	17,861	18,193	18,524	18,855

Runnnig Cost of 2025 (Q=22,200m^3/day =design capacity) Unit : SP

(1) Manpower Cost

Qualifications	Number	Unit price (SP/month)	Amount monthly	Amount Yearly
Manager	1	18,000	18,000	216,000
Engineer	1	13,500	13,500	162,000
Supervisor	1	9,000	9,000	108,000
Skilled labor for O&M	12 (4×3shift)	6,500	78,000	936,000
Laboratory	3	9,000	27,000	324,000
Administrator	1	7,000	7,000	84,000
Driver	2	9,000	18,000	216,000
Gurd	3 (1×3shift)	9,000	27,000	324,000
Total	24		197,500	**2,370,000**

(2) Power Cost

Main Equipment	Number	Power (kW)	Operation time (hr)	Power comsumption (kWh/day)	Annual power cost
Fine Screen	2	0.4	24	19	
Lift Pump	4	15	12	720	
(Operation time is equivalent of daily					
Rotary Blower	10	45	12	5,400	
Submerged Propeller	20	2.3	24	1,104	
Sludge Collector	8	0.4	24	77	13,410
Return Sludge Pump	16	3.7	24	1,421	× 2.5 sp/kW
Waste Sludge Pump	8	3.7	4	118	× 31day/month
Thickened Sludge Feed Pump	2	5.5	2	22	× 12 month
Sludge Feed Pump	2	11	5	110	
Mechanical Dewatering (unit)	2	137	8	2,192	
Ultraviolet Disinfection Unit	3	14	24	1,008	
Others (10% of above)				1,219	
Total		238		13,410	**12,471,393**

(3) Chemical Cost

Polymer for mechanical dewatering			
Consumpton of chemical (kg/day)	V=22,200×(360-30)/1000×75%	82.4 kg/day	82.4
design flow (m^3/day)	22,200		× 75 sp/kg
design sewege quality :SS influent(mg/l)	360		× 31day/month
design sewege quality :SS effluent(mg/l)	30		× 12 month
Sludge generation ratio per removal SS(%)	75%		
Chemical dosage rate (%) [to dry solids]	1.5%		
Total			**2,299,448**

(4) Others

10% of above mentioned items (Repair and Maintenance, Laboratory materials, Spare parts etc.)	**1,714,084**
Total (SP)	**18,854,925**

Appendix for Chapter 5

Appendix 5.1 Economic Analysis of F/S Project

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Economic costs																		
Capital expenditures, excl. tax	0	-24,848	-145,038	-357,740	-204,803													
O&M costs						-24,574	-25,276	-27,683	-29,676	-31,813	-34,103	-36,559	-39,191	-42,013	-45,038	-48,280	-51,757	-55,483
Economic benefits																		
Tourism development						72,024	77,210	82,769	88,728	95,117	101,965	109,307	117,177	125,614	134,658	144,353	154,747	165,888
Health benefits - productive time lost						15,775	17,148	18,638	20,211	21,915	23,759	25,755	27,915	30,206	32,682	35,358	38,250	41,375
Health benefits - medical expenditure						21,815	23,715	25,774	27,950	30,306	32,856	35,617	38,604	41,772	45,197	48,897	52,897	57,219
Treated wastewater use						8,096	8,889	9,754	10,456	11,209	12,016	12,881	13,808	14,802	15,868	17,011	18,235	19,548
Use of sludge						2,842	3,047	3,266	3,501	3,753	4,023	4,313	4,624	4,957	5,314	5,696	6,106	6,546
Net economic benefits	**0**	**-24,848**	**-145,038**	**-357,740**	**-204,803**	**93,136**	**101,685**	**109,251**	**117,669**	**126,733**	**136,492**	**147,000**	**158,313**	**170,381**	**183,367**	**197,339**	**212,372**	**228,548**
EIRR =	**12.9%**																	
NPV (at 10%) =	**108,841**																	
Assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for F/S area	*43,680*	*44,340*	45,000	*45,660*	*46,320*	*46,980*	*47,640*	48,300	*48,860*	*49,420*	*49,980*	*50,540*	51,100	*51,580*	*52,060*	*52,540*	*53,020*	53,500
Generated wastewater / treated water (m^3/day)	*15,303*	*15,724*	*16,145*	*16,566*	*16,987*	*17,408*	*17,829*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*
Population as % of the total Syria	0.2%																	
Economic capital cost (SP '000)	732,429																	
Taxes (overall average)	5%																	
Economic benefit from one tourist (SP '000)	1.25																	
Estim. number of tourists in F/S area	814,000																	
Expected increase of the number of tourists by	5%																	
Person-years lost due to water-related diseases	370																	
Gross domestic income per capita ('SP '000)	70																	
Achievable reduction of illness	40%																	
Medical water-related exp. / capita (SP '000)	0.82																	
Economic value of treated water (SP/m^3)	3.00																	
Sludge produced (m^3/day)	27.5																	
Price of sludge (SP/m^3)	200																	

Note: only incremental costs and benefits that are relevant to Phase 1 included

Appendix 5.2 Financial Analysis of F/S Project (Baseline Scenario)

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Cash outflows																		
Capital expenditures	0	-26,156	-152,672	-376,568	-215,582													
O&M costs						-24,574	-25,276	-27,683	-29,676	-31,813	-34,103	-36,559	-39,191	-42,013	-45,038	-48,280	-51,757	-55,483
Cash inflows																		
Fixed charges						1,596	1,735	1,886	2,045	2,218	2,404	2,606	2,825	3,057	3,307	3,578	3,871	4,187
Volume-based charges						1,979	2,173	2,384	2,556	2,740	2,937	3,149	3,375	3,618	3,879	4,158	4,458	4,778
Net cash flows excluding financing	**0**	**-26,156**	**-152,672**	**-376,568**	**-215,582**	**-20,999**	**-21,368**	**-23,413**	**-25,075**	**-26,855**	**-28,762**	**-30,804**	**-32,991**	**-35,338**	**-37,852**	**-40,544**	**-43,429**	**-46,518**
Funding by Government (subsidy)	100%	26,156	152,672	376,568	215,582													
Funding by loan (loan repayment)	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outstanding loan principal balance		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Interest (% p.a.)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash flows		**0**	**0**	**0**	**0**	**-20,999**	**-21,368**	**-23,413**	**-25,075**	**-26,855**	**-28,762**	**-30,804**	**-32,991**	**-35,338**	**-37,852**	**-40,544**	**-43,429**	**-46,518**
Cumulative cash flows		*0*	*0*	*0*	*0*	*-20,999*	*-42,367*	*-65,780*	*-90,855*	*-117,710*	*-146,472*	*-177,277*	*-210,268*	*-245,606*	*-283,457*	*-324,002*	*-367,431*	*-413,948*
Other assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for F/S area	43,680	44,340	45,000	45,660	46,320	46,980	47,640	48,300	48,860	49,420	49,980	50,540	51,100	51,580	52,060	52,540	53,020	53,500
Number of households (@ 5.5 persons)	7,942	8,062	8,182	8,302	8,422	8,542	8,662	8,782	8,884	8,985	9,087	9,189	9,291	9,378	9,465	9,553	9,640	9,727
Generated wastewater / treated water (m^3/day)	15,303	15,724	16,145	16,566	16,987	17,408	17,829	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Capital expenditure, total (SP '000)	770,978																	
Domesctic sewerage fixed fee (SP/household/year)	120																	
Domestic sewerage volume-based fee (SP/m^3)	**0.2**																	
Calculated NPV (SP thousand)	**-655,700**																	

Note: only incremental cash flows that are relevant to Phase 1 included

Appendix 5.3 Financial Analysis of F/S Project (O&M Cost Recovery Scenario)

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
(SP thousands)																		
Cash outflows																		
Capital expenditures	0	-26,156	-152,672	-376,568	-215,582													
O&M costs						-24,574	-25,276	-27,683	-29,676	-31,813	-34,103	-36,559	-39,191	-42,013	-45,038	-48,280	-51,757	-55,483
Cash inflows																		
Fixed charges						0	0	0	0	0	0	0	0	0	0	0	0	0
Volume-based charges						23,253	25,530	28,014	30,031	32,194	34,512	36,996	39,660	42,516	45,577	48,858	52,376	56,147
Net cash flows excluding financing	**0**	**-26,156**	**-152,672**	**-376,568**	**-215,582**	**-1,321**	**254**	**331**	**355**	**381**	**408**	**438**	**469**	**503**	**539**	**578**	**619**	**664**
Funding by Government (subsidy)	100%	26,156	152,672	376,568	215,582													
Funding by loan (loan repayment)	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outstanding loan principal balance		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Interest (% p.a.)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash flows		**0**	**0**	**0**	**0**	**-1,321**	**254**	**331**	**355**	**381**	**408**	**438**	**469**	**503**	**539**	**578**	**619**	**664**
Cumulative cash flows		*0*	*0*	*0*	*0*	*-1,321*	*-1,067*	*-736*	*-381*	*-0*	*408*	*846*	*1,315*	*1,817*	*2,356*	*2,934*	*3,554*	*4,218*
Other assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for F/S area	*43,680*	*44,340*	45,000	*45,660*	*46,320*	*46,980*	*47,640*	48,300	*48,860*	*49,420*	*49,980*	*50,540*	51,100	*51,580*	*52,060*	*52,540*	*53,020*	53,500
Number of households (@ 5.5 persons)	*7,942*	*8,062*	*8,182*	*8,302*	*8,422*	*8,542*	*8,662*	*8,782*	*8,884*	*8,985*	*9,087*	*9,189*	*9,291*	*9,378*	*9,465*	*9,553*	*9,640*	*9,727*
Generated wastewater / treated water (m^3/day)	*15,303*	*15,724*	*16,145*	*16,566*	*16,987*	*17,408*	*17,829*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*
Capital expenditure, total (SP '000)	770,978																	
Domesctic sewerage fixed fee (SP/household/year)	0																	
Domestic sewerage volume-based fee (SP/m^3)	**2.4**																	
Calculated NPV (SP thousand)	**-526,500**																	

Note: only incremental cash flows that are relevant to Phase 1 included

Appendix 5.4 Financial Analysis of F/S Project (50% Capital Cost Recovery Scenario)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(SP thousands)																		
Cash outflows																		
Capital expenditures	0	-26,156	-152,672	-376,568	-215,582													
O&M costs						-24,574	-25,276	-27,683	-29,676	-31,813	-34,103	-36,559	-39,191	-42,013	-45,038	-48,280	-51,757	-55,483
Cash inflows																		
Fixed charges						0	0	0	0	0	0	0	0	0	0	0	0	0
Volume-based charges						55,609	61,054	66,996	71,820	76,991	82,534	88,476	94,847	101,676	108,996	116,844	125,257	134,275
Net cash flows excluding financing	**0**	**-26,156**	**-152,672**	**-376,568**	**-215,582**	**31,035**	**35,778**	**39,313**	**42,143**	**45,178**	**48,431**	**51,918**	**55,656**	**59,663**	**63,959**	**68,564**	**73,500**	**78,792**
Funding by Government (subsidy)	50%	13,078	76,336	188,284	107,791													
Funding by loan (loan repayment)	50%	13,078	76,336	188,284	107,791	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653	-29,653
Outstanding loan principal balance		*13,078*	*89,414*	*277,698*	*385,489*	*355,836*	*326,183*	*296,530*	*266,877*	*237,224*	*207,571*	*177,918*	*148,265*	*118,612*	*88,959*	*59,306*	*29,653*	*0*
Interest (% p.a.)	10%	-654	-5,125	-18,356	-33,159	-37,066	-34,101	-31,136	-28,170	-25,205	-22,240	-19,274	-16,309	-13,344	-10,379	-7,413	-4,448	-1,483
Net cash flows		**-654**	**-5,125**	**-18,356**	**-33,159**	**-35,684**	**-27,975**	**-21,476**	**-15,680**	**-9,680**	**-3,462**	**2,990**	**9,693**	**16,666**	**23,927**	**31,497**	**39,399**	**47,656**
Cumulative cash flows		*-654*	*-5,779*	*-24,134*	*-57,293*	*-92,978*	*-120,953*	*-142,429*	*-158,109*	*-167,789*	*-171,251*	*-168,261*	*-158,568*	*-141,902*	*-117,975*	*-86,478*	*-47,078*	*578*
Other assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for F/S area	*43,680*	*44,340*	45,000	*45,660*	*46,320*	*46,980*	*47,640*	48,300	*48,860*	*49,420*	*49,980*	*50,540*	51,100	*51,580*	*52,060*	*52,540*	*53,020*	53,500
Number of households (@ 5.5 persons)	*7,942*	*8,062*	*8,182*	*8,302*	*8,422*	*8,542*	*8,662*	*8,782*	*8,884*	*8,985*	*9,087*	*9,189*	*9,291*	*9,378*	*9,465*	*9,553*	*9,640*	*9,727*
Generated wastewater / treated water (m^3/day)	*15,303*	*15,724*	*16,145*	*16,566*	*16,987*	*17,408*	*17,829*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*
Capital expenditure, total (SP '000)	770,978																	
Domesctic sewerage fixed fee (SP/household/year)	0																	
Domestic sewerage volume-based fee (SP/m^3)	**5.6**																	
Calculated NPV (SP thousand)	**-313,600**																	

Note: only incremental cash flows that are relevant to Phase 1 included

Appendix 5.5 Financial Analysis of F/S Project (Financial Feasibility Scenario)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(SP thousands)																		
Cash outflows																		
Capital expenditures	0	-26,156	-152,672	-376,568	-215,582													
O&M costs						-24,574	-25,276	-27,683	-29,676	-31,813	-34,103	-36,559	-39,191	-42,013	-45,038	-48,280	-51,757	-55,483
Cash inflows																		
Fixed charges						0	0	0	0	0	0	0	0	0	0	0	0	0
Volume-based charges						103,262	113,374	124,407	133,365	142,967	153,261	164,295	176,125	188,806	202,400	216,972	232,594	249,341
Net cash flows excluding financing	**0**	**-26,156**	**-152,672**	**-376,568**	**-215,582**	**78,688**	**88,098**	**96,724**	**103,688**	**111,154**	**119,157**	**127,736**	**136,933**	**146,793**	**157,362**	**168,692**	**180,838**	**193,858**
Funding by Government (subsidy)	0%	0	0	0	0													
Funding by loan (loan repayment)	100%	26,156	152,672	376,568	215,582	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306	-59,306
Outstanding loan principal balance		*26,156*	*178,828*	*555,396*	*770,978*	*711,672*	*652,366*	*593,060*	*533,754*	*474,448*	*415,142*	*355,836*	*296,530*	*237,224*	*177,918*	*118,612*	*59,306*	*0*
Interest (% p.a.)	10%	-1,308	-10,249	-36,711	-66,319	-74,133	-68,202	-62,271	-56,341	-50,410	-44,480	-38,549	-32,618	-26,688	-20,757	-14,827	-8,896	-2,965
Net cash flows		**-1,308**	**-10,249**	**-36,711**	**-66,319**	**-54,750**	**-39,409**	**-24,853**	**-11,958**	**1,438**	**15,372**	**29,882**	**45,009**	**60,799**	**77,299**	**94,559**	**112,636**	**131,587**
Cumulative cash flows		*-1,308*	*-11,557*	*-48,268*	*-114,587*	*-169,337*	*-208,746*	*-233,599*	*-245,558*	*-244,120*	*-228,748*	*-198,866*	*-153,857*	*-93,058*	*-15,760*	*78,800*	*191,436*	*323,022*
Other assumptions																		
Cumulative inflation (at 7.2% p.a.)	1.0000	1.0720	1.1492	1.2319	1.3206	1.4157	1.5176	1.6269	1.7440	1.8696	2.0042	2.1485	2.3032	2.4691	2.6468	2.8374	3.0417	3.2607
Population forecast for F/S area	*43,680*	*44,340*	45,000	*45,660*	*46,320*	*46,980*	*47,640*	48,300	*48,860*	*49,420*	*49,980*	*50,540*	51,100	*51,580*	*52,060*	*52,540*	*53,020*	53,500
Number of households (@ 5.5 persons)	*7,942*	*8,062*	*8,182*	*8,302*	*8,422*	*8,542*	*8,662*	*8,782*	*8,884*	*8,985*	*9,087*	*9,189*	*9,291*	*9,378*	*9,465*	*9,553*	*9,640*	*9,727*
Generated wastewater / treated water (m^3/day)	*15,303*	*15,724*	*16,145*	*16,566*	*16,987*	*17,408*	*17,829*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*	*18,250*
Capital expenditure, total (SP '000)	770,978																	
Domesctic sewerage fixed fee (SP/household/year)	0																	
Domestic sewerage volume-based fee (SP/m^3)	**10.4**																	
Calculated FIRR	**10.0%**																	
Calculated NPV (SP thousand)	**0**																	
Capital cost sensitivity factor	1.0																	
O&M cost sensitivity factor	1.0																	
Revenue sensitivty factor	1.0																	

Note: only incremental cash flows that are relevant to Phase 1 included

Appendix for Chapter 6

RESULTS OF THE 3rd STAKEHOLDER MEETING AND PRE-EIA LEVEL STUDY

6.1 Attendants List of the 3rd Stakeholder Meeting

Table A6.1.1 Attendants List of the 3rd Stakeholder Meeting at Bloudan

No.	Name	Organization	Position
1	Wassim Fallouh	MHC	Director of the project
2	Ghassan Al-tarboush	MHC	Engineer
3	Thaer Janem	MHC	Engineer
4	Wisal Khalil	MHC	Engineer
5	Iyad Ali	MHC	Engineer
6	Ahmad AL yousef	GCEC - Damascus	Engineer
7	Zuheir Basatina	Renuxey Weida (Malaysian Com.)	Engineer
8	Adnan Alhamwi	Renuxey Weida (Malaysian Com.)	Engineer
9	Edwin thong	Renuxey Weida (Malaysian Com.)	Project manager
10	Hala Qaddour	Rural Damascus Governorate	Executive Office Member
11	Muhammad Khawandi	Rural Damascus Governorate	Executive Office Member
12	Madyan Nasra	DFEA (R.DAM)	Deputy manager
13	Huda zaid	DFEA (R.DAM)	Waste section chief
14	Muna Juma`a	DFEA (R.DAM)	Laboratory Section Chief
15	Muhammad albush	DFEA (R.DAM)	Engineer
16	Othman Yousef	Zabadani City Council	Mayor
17	Bassam Zaitun	Zabadani City Council	Maintenance Section Chief
18	Bassam Kheito	Zabadani City Council	Technical Office Chief
19	Dureid Ramadan	Zabadani City Council	Executive Office Member
20	Adna Albuqai`i	Farmers Association	Head of the Association
21	Kamal Yousef	Madaya Municipality	Mayor
22	Jiryos Hilal	Bloudan Municipality	Vice Mayor
23	Mustafa Mustafa	Bloudan Municipality	Council Member
24	Issa Rezeq	Bloudan Municipality	Engineer
25	Maha Hilal	Bloudan Municipality	Engineer
26	Nawwaf Ghanem	Madaya Municipality	Technical Office Chief
27	Diyab Khadija	Madaya Municipality	Mayor
28	Ali Alnammus	Madaya council	Member
29	Fares Fares	Bukein Municipality	Mayor
30	Muhammad Badawi Kana`an	Bukein Municipality	Technical Office Chief
31	Muhammad Awwad Alrifai`i	Zabadani Municipality	Public Lands Manager
32	Mahmud Burhan	Zabadani	Resident
33	Ahmad Mahmoud	Madaya	Resident
34	Majed Ghuson	(MOA) Zabadani Agriculture Department	Deputy Dep. Chief
35	Iman Alhourani	Zamalka Environmental Association (NGO)	Deputy manager
36	Nabil Tasabihji	-	-
37	Bassam Ghannam	-	-
38	Kinan Tasabihji	-	-
39	Yousef Hammor	-	-
40	Ruyat Yaseen	Environmental pioneers Associations NGO	Administration council member
41	Samir Alsafadi	Syrian Environment Association (NGO)	Chairman
42	Ahmad Yousef	Zabadani Friends Committee (NGO)	Chairman
43	Hikmat Abu Hamdan	Environmental pioneers Associations (NGO)	Chairman
44	Dr Farouq Ala`adili	Damascus University	Professor
45	Nadijda Ala`adili	Damascus University	Engineer
46	Micheil Khayyat	Albaath Newspaper	Journalist
47	Tomita Akiko	JICA Syria Office	Resident Representative

48	Osamu Itagaki	JICA Syria Office(GCWR)	Ex.
49	Tharwat Tarsos	JICA Syria Office	Driver
50	Hirofumi Sano	JICA Study Team	Team Leader
51	Ryunan Matsue	JICA Study Team	EIA
52	Toshiaki Ruike	JICA Study Team	Planning of STP
53	Takashi Watanabe	JICA Study Team	Sewage Planning STP
54	Atsushi Toyama	JICA Study Team	Cost Estimation
55	Seiichi Hanafusa	JICA Study Team	Sewage Planning STP
56	Victor Kupriyanov	JICA Study Team	Economist
57	Yaser Hamida	JICA Study Team	Engineer
58	Amal Hasan	JICA Study Team	Interpreter
59	Nagham Salman	JICA Study Team	Assistant Manager
60	Louay Khalil	JICA Study Team	Engineer/supporter
61	Rafiq DIAB	GTZ	Project Manager

6.2 Photos of the 3rd Stakeholder Meeting and Pre-EIA Level Study

	
1. Announcement of Stakeholder Meeting by visiting local municipality and poster distribution.	2. Opening Statement by Ms. Tomita, Resident Representative of JICA Syrian Office, Bloudan Grand Hotel (2007-11-20)
	
3. Introduction the results of F/S on Zabadani sewerage system to stakeholders by C/P, Bloudan Grand Hotel (2007-11-20)	4. Question from local resident, Bloudan Grand Hotel (2007-11-20)
	
5. Technical transfer to C/Ps for environmental and social considerations during whole study period.	6. Pre-EIA level survey with C/Ps. (groundwater quality survey in the field)

6.3 Minutes of the 3rd Stakeholder Meeting

Based on the agreement between Ministry of Housing and Construction (hereafter called as MHC) and Japan International Cooperation Agency (hereafter called as JICA), MHC in collaboration with the JICA Study Team organized the 3rd Stakeholder Meeting for the F/S of Zabadani Sewerage System on 20th November 2007. The place and timing of the Meeting is showed as **Table A6.3.1**.

Table A6.3.1 Place and Timing of the 3rd Stakeholder Meeting

Timing	Place	Target Areas
10:00 – 14:00 20 November 2007	Bloudan Grand Hotel, Bloudan City	Zabadani, Madaya, Bukein and Bloudan

6.3.1 Opening Address, by Dr. Wassim Fallouh, Ministry of Housing and Construction

The Meeting was started by an opening address by Dr. Wassim Fallouh from Ministry of Housing and Construction (MHC), who introduced the current situation of sewerage sectors in Syrian Arab Republic and the future challenges which will be faced by the authorities in charge of these sectors, and explained briefly the essential topics of the Feasibility Study (F/S) and the pre-EIA study and insisted on the importance of the cooperation between the JICA Study Team and MHC.

6.3.2 Speech by Ms. Akiko TOMITA, JICA Resident Representative in Syrian Arab Republic

Ms. Tomita talked about the importance of the Zabadani Area as tourist site and explained the reasons to choose this area as the Feasibility Study target (it locates upstream the Fijeh Spring which is the most important water resources for Damascus) and insisted about the sustainability and environment protection of the sewerage projects.

6.3.3 Presentation by Mr. Hirofumi SANO, Team Leader, JICA Study Team

Mr. SANO explained the background and schedule of the Study, and the reasons of selection of pilot project for the F/S of Zabadani area. He also explained that supporting on Stakeholder Meeting is one of important contents as the JICA Study Team.

6.3.4 Presentation Part I, Eng. Ghassan Tarboush, C/P for the Project, MHC

Eng. Ghassan explained the outline of the F/S of Zabadani sewerage system which included the basic condition of the F/S and the proposed sewage treatment method in the STP and the

additional safeguards and the mitigation measures to reduce the offensive odor.

6.3.5 Presentation Part II, Eng. Thaer Janem, C/P for the Project, MHC

Eng. Thaer explained the results of the pre-EIA level study on the F/S of Zabadani sewerage system which included the benefits of proposed sewerage system, the procedures of environmental and social consideration of JICA, the results of IEE and pre-EIA level studies, the recommendations of mitigation measures for impacts.

6.3.6 Questions & Answers

The main topics discussed in the Meeting are summarized as below:

(1) Eng. Othman YOUSEF, Zabadani Mayor

Did you take into consideration the huge increasing of the population during summer season?
Are there some STPs in which the same treatment method (OD) is used in Syria?
In the upper area of proposed STP site, some people are using sewerage for irrigation. Can we pump up the treated water to that area?

Mr. SANO

We know that Zabadani Area is the most important site for tourists, especially in summer season and we took this issue in our consideration when we estimated the future population.

In Syria, there aren't any STPs using the OD method, but we have experiences in Japan, Philippine, India and other countries.

Eng. Thaer and Dr. MATSUE

We studied several alternatives in choosing the STP location and we found the proposed location is the best for reusing the treated water in irrigation. On the other hand, using raw sewage for irrigation may create damage to soil and agricultural products. For pumping up the treated water to the upstream area, it is possible in technical, but it is very expensive solution.

(2) Mr. Adnan Al BOUKAAI, Head of the Farmers Association

Can you explain the reasons why the STP location is changed from Tieba (downstream of the Zabadani Area, EIB proposed site) to the new site?

You know that Zabadani Area is a very important tourist area and it is very sensitive to the odor problem. Did you take this problem in your consideration during the design and planning stage? And you know that the wind direction is south east which means that the odor will have negative impact on the whole Zabadani area.

Dr. MATSUE and Eng. Thaer

In EIB study, all wastewater from Zabadani area will be collected to one central STP which is located at downstream of the Zabadani area. In our opinion, it is better to select the STP location near the existing wastewater discharge point to avoid constructing long trunk sewer, and to provide treated wastewater to farmers in the same area for irrigation.

We have given much weigh to odor problem. Firstly, during planning stage, we selected OD method and mechanical dewatering system, which will make the odor from the STP to be minimum level. Secondly, the distance between the STP and the nearest house is about 100 m, there will not be odor problem considering the situation at existing STPs using OD method and mechanical dewatering system. Thirdly, tree belt and buffer zone are proposed to mitigate odor. Finally, in future additional deodorization process can be applied if necessary.

(3) Eng. Kamal YOUSEF, Madaya Mayor

Is it possible to cover the STP completely, as you know the proposed location is inside the future residential expanding area and there are many houses locate near the STP and there is children camp located at about 2 km away.

Did you study other alternatives which take the new communities and future expanding in the consideration, such as decentralized sewerage systems? And did you take in your consideration the earthquake problem in Zabadani area which is considered as active area.

Mr. SANO and Eng. Ghassan

We proposed OD method to treat the wastewater and also we proposed the mechanical dewatering method to treat the sludge which requires special room for operation, which means that we will caver the STP partially. It is possible in technical to cover the STP completely but it cost too much.

Dr. MATSUE

We studied several alternatives and we reviewed all studies which were conducted by other organizations like EIB and MHC. We will take all these suggestions in our consideration and

we will include them in our F/S report.
MHC took the earthquake problem in the consideration and it will include this matter in details design study.

(4) Engineer from Zabadani Municipality

What is final disposal method for dewatering sludge?

Dr. MATSUE and Eng. Thaer

There are not isolation systems at existing dumping site to prevent groundwater pollution. In the pre-EIA study, we analyzed heavy metals of the sludge of existing STP and soil at Zabadani area. The results of the analysis show a lower level of heavy metals in the sludge and soil, which means that the sludge can be used for agriculture. But we proposed a monitoring system to check heavy metals in sludge and soil.

(5) Engineer from Zabadani Municipality

As the Zabadani Municipality, we have three questions: Are there any replacement or rehabilitation plans for our very old sewer network (more than 50 years); Did you take into consideration for capacity building plan in sewerage sector?; and did you put any recommendation in your study to employ the local engineers as operation staff in the proposed STP.

Mr, SANO and Dr. Wassim Fallouh

We don't have enough time and budget to make detailed survey on all sewer networks in each community, so we only focus on trunk sewer. For the second point it is very important thing, and MHC will be responsible for this sector. The third point is also very important to create job opportunities for local residents (engineers and other staff) but it is difficult to find qualified staff from the municipalities to STP operation and maintenance.

(6) Mr. Rafiq DIAB, Project Manager, GTZ

In my opinion we should take the following issues in our consideration as national side and foreigner side: We should prepare general plan for integrated water resources management in Zabadani area; we should prepare a regional study including the sewerage system, irrigation system for reusing treated wastewater etc. Finally, we should consider leakage problems (sewerage system and water supply system)

Mr. SANO

We will take it in our consideration

Annex I: Attendants List

6.4 Results of the Pre-EIA Level Survey

6.4.1 Results of Heavy Metals Analysis

In order to estimate the concentrations of typical heavy metals in dewatering sludge from the proposed STP and to evaluate whether dewatering sludge could be reused for agriculture at Zabadani area, the concentrations of heavy metals in dewatering sludge from existing STP (Adraa STP) and in the soil of agriculture land at Zabadani area are analyzed in the pre-EIA level study. The results are summarized in the **Table A6.4.1**.

Table A6.4.1 Results of Heavy Metals Analysis

Unit: mg/kg

Heavy Metal	Sludge at Adraa STP (& Homs)	Syrian Sludge Standard, Class C (EU)	Soil at Zabadani Area	Syrian Soil Standard (EU)
Arsenic (As)	1.7 (2.8)	20 (-)	7.0	20 (-)
Cadmium (Cd)	1.3 (2.2)	20 (20-40)	<1.0	1 (1-3)
Chromium (Cr)	64 (60)	500 (1,000-1,500)	67	100 (100-150)
Copper (Cu)	330 (158)	1,500 (1,000-1,750)	19	100 (50-140)
Lead (Pb)	6.8 (28)	300 (750-1,200)	12	100 (50-300)
Mercury (Hg)	1.2 (10)	15 (16-25)	<0.05	1 (1-1.5)
Nickel (Ni)	64 (51)	270 (300-400)	45	60 (30-75)
Zinc (Zn)	1,700 (783)	500 (2,500-4,000)	100	200 (150-300)

Source: JICA Study Team, GCEA and MHC

6.4.2 Results of noise survey

During the construction stage, the operation of construction equipment and vehicles may generate noise. Although at this stage precise construction schedules and methods can hardly be determined yet, the possible noise levels caused by the construction of STP may be reasonably estimated by assuming appropriate construction procedures. In this pre-EIA study, a survey on noise in/around STP is carried out in order to evaluate the impact of noise generated during construction stage on nearby residents.

Equivalent continuous A sound level (L_{aeq}) is used to assess noise level. The location map of measuring points is shown in **Figure A6.4.1**. To estimate the noise levels at the nearest houses during STP construction period, following conditions are considered:

- Major noise sources are backhoes (1 m^3, 2 sets), bulldozers (8t, 2 sets), dump trucks (4t, 2sets), truck crane (25t, 1 set) and tractor shovels (1.6 m^3, 2 sets);
- The noise levels of selected backhoe, bulldozer, dump truck, truck crane and tractor shovel

are estimated to be 100 dB(A), 100 dB(A), 100 dB(A), 95 dB(A) and 95 dB(A) respectively, and

- The noise declines only caused by distance, trees and ground are considered when the noise levels at sound receiving points are calculated.

Figure A6.4.1 Location Map of Measuring Points for Noise Survey

The results of estimation on the noise levels at survey points are summarized in **Table A6.4.2**.

Table A6.4.2 The Results of Estimation on Noise Levels around the STP

Location	Existing Noise Level dB (A)	Estimated Noise Level in Case 1[1)] dB (A)	Estimated Noise Level in Case 2[2)] dB (A)	Syrian Standard on Noise dB (A)	Remark
STP-1	54	95	108	-	STP
STP-2	47	95	107	-	STP
RA-1	69	70	72	55	House
RA-2	45	51	62	55	House

1): Used construction equipment will be truck crane (1 set)

2): Used construction equipment will be backhoes (2 sets), bulldozers (2 sets), dump trucks (2 sets), truck crane (1 set) and tractor shovels (2 sets). All the equipment will be operated at same time (the highest noise level).

Appendix for Chapter 7

Balanced Regional Planning and Urban Development

First: Balanced regional planning

Background

Social and economic indicators refer to a clear discrepancy between governorates and lack of balance in developmental efforts at the spatial level, which makes regional planning an indispensable tool and mechanism to push the wheel of reform and social, economic and environmental development on the right track within its spatial dimension. This can be achieved by putting an integrated vision involving sector and regional development where the developmental goals are determined for each region and where there is focus on mutual relations domestically among national regions and externally with the regions of neighbouring countries and the world.

There is no doubt that linking between the region's capacity resources, objectives, reality, developmental status, and economic goals on the one hand and its constructional framework and infrastructure comprising the human side on the other hand is a major equation in the process of regional planning. Therefore, it is indispensable in achieving the tenth five-year plan's goals in the process of development and modernization and fulfilling the objectives of national sustainable development.

Previous five-year plans did not include chapters dealing with regional planning and taking into consideration balance between regions and development planning models that link between the central plan and regional and domestic plans for each governorate. However, issues of allocating resources according to regional considerations remained one of the main goals of economic and social development in Syria where horizontal expansion in social and infrastructural sectors and productive establishments seems evident. This expansion; however, lacked planning standards and took place in the absence of models that can achieve developmental balance between governorates and divide Syria into regions and developmental attraction areas. This lack of a regional planning vision has led to a state of internal immigration accompanied by the pressure of high inhabitant growth rates thus causing clear imbalance in distributing development inputs and revenues and creating a gap between different regions in development, the individual's income rate and social welfare levels.

That is why the current five-year plan will endeavour to increase regional productivity by mobilizing resources that are scattered in different areas in the country and by putting an end to the current situation of imbalance and integrating regional development plans with the national plan and domestic plans. In seeking to achieve this, there will be focus on improving less developed regions particularly the north eastern region which the tenth five-year plan dedicates a whole chapter to talk about. All this can be fulfilled by adopting and designing a natural and developmental plan that depends on a comprehensive developmental map.

To put it more accurately, the current plan adopts the objectives of economic diversity, optimal exploitation of local and regional resources, encouraging local and foreign investment, coordinating and networking between infrastructure projects and facilities on one hand and economic productive activities on the other, achieving close

linkage between urban development and rural development, and developing cities and service centres and centres of human settlement. This is accompanied by a national policy to determine the priorities of regional projects and implement them in the framework of decentralization, local development, urban and rural planning and environment protection.

Regional planning will deal also with developing service-based cities in addition to creating small service units to which they are connected where they will facilitate land use and the establishment of developmental centres in regions and make services available.

Performance evaluation of the ninth five-year plan

The ninth five-year plan did not depend on **a spatial strategy; and its main point of weakness was that it depended on the sector-based dimension and distributing investments to different sectors then coordinating with concerned ministries to study and implement projects thus forgetting abut the regional and spatial dimension** that takes into account the settlement economic and social activities. This will help us on a later stage interpret the flaw in development balance indicators at the level of Syrian governorates.

Practically, we can say that the previous five-year plan has yielded a number of developmental projects and programs to address certain priority problems in some governorates where each governorate has its five-year and annual plan. For example, industrial cities were established in Damascus, Damascus countryside and several other governorates. Also, private universities broadly spread in view of the social and economic returns they yield. However, all these efforts and projects were not interrelated within one framework that puts the whole vision of the plan at a national spatial level. For instance, the ninth plan did not determine the strategic and developmental goals for each region neither did it study the mutual relationship between governorates or regions with the aim of reducing the difference in the levels of social and economic development among different governorates.

Therefore and despite what has been achieved in the horizontal expansion of health and educational services and adopting reform policies and measures to raise the social welfare level nationally; yet indicators refer to lack of justice in distributing human development at the level of governorates and even inside one governorate. There is an urgent need to implement more programs and policies that take into consideration local realities and development requirements and priorities in every governorate according to their importance and developmental need.

On the other hand, the ninth five year plan or previous plans did not take into account national, regional and domestic realities and their points of weakness and strength. This, in turn, has led to the raise in environmental imbalance indicators in different Syrian governorates accompanied by the drain and pollution of surface and ground water resources, land deterioration and green areas retrogression, deterioration in air quality, improper disposal of solid waste and growth of arbitrary areas not to forget the cost of environmental damage and its effect on public health, life quality,

productivity and revenues. All this has left indirect effect on the national economic performance and sustainable development.

In this regard, reference should be made to the fact that the putting the environmental strategy and action plan in Syria by the ministry of local administration and environment in 2003 is considered a first step towards focusing on the necessity of integrating environmental issues with social and economic development plans. However, this lacks the spatial link between environmental deterioration indicators, which calls for conducting more studies and analysis when preparing the chapter on environment in the current plan for the purpose of linking these indicators together according to different regional and spatial levels.

On the other hand, a review of the reality of construction development (in cities and the countryside) reveals clear imbalance in the hierarchal and synthetic structure of Syrian cities depending on the existence of two relatively big cities which are the capital, Damascus, and Aleppo both of which suffer from increasing inhabitant numbers without taking into account their circumstances and capabilities or in-advance planning for their activities, economic investments and construction expansion. Also, lack of commitment to urban plans and regular expansion led to great losses that clearly affected the national economy as a result of the construction advance, increasing deterioration of agricultural lands, and drain and deterioration of water reserves and life quality in cities.

Statistically, aspects of imbalance resulted by the lack of regional planning are evident in the following:

- Population density lacking water resources in Damascus governorate has reached 14.381 persons/square km in comparison with 29 persons/square km in Deir Ezzor governorate where the Euphrates River is the biggest water resource in Syria.
- The eastern area forms about 41% of the country's area and the inhabitants are 16.9% of the total number of Syrian population. A percentage of 58.1% of poor people are distributed in this area which is one of Syria's poorest areas particularly in some regions such as the steppe despite the availability of natural, animal and human wealth. The percentage of poverty has reached 17.9% in rural areas and 11.2 in urban areas.
- The 2004 Unemployment rate for age categories between 15-24 year olds reached in Hama, Idleb, Hasakeh, Deir Ezzor, Raqqa, and Quneitra the following consecutive percentages 32.6%, 23.1%, 41.4%, 23.1%, 45.1%, 16.1%, and 22.7%. This was due to the focus on agricultural activities while the focus on activities of industry, hotels, and trade prevailed in the governorates of Damascus, Aleppo and Homs where the majority of Syria's urban inhabitants exist in addition to investments and developmental efforts.
- The majority of social and economic activity models and investments prevail in the centres of big cities such as Damascus, Aleppo and Homs due to the availability of production and business requirements. This has resulted in condense immigration to these cities from different areas and the settlement of inhabitants there and therefore the emergence of huge constructional gatherings that need more capabilities than what is locally available. This has also led to crowdedness, traffic

jams, the increase in demand for residences, lack of water, raise in unemployment rates as well as environmental deterioration.

- Syrian governorates suffered from discrepancy in structure and regional and social formation. This was deduced by measuring indicators of human poverty and poor areas where human poverty indicators did not exceed about 5.2% in Damascus in 2002 while it doubled about twice in Aleppo, Idleb and Quneitra, three times in Hasakeh and Raqqa, and four times in Deir Ezzor.
- The 2002 unemployment indicators have shown clear disparity in a number of Syrian governorates where unemployment rate reached its highest point in al Hasakeh at 13.8% while it reached 13.5% in Aleppo, 11.53% in Latakia, and its lowest point at 5.00% in Damascus.

Problems and challenges

- In previous developmental efforts, the lack of adopting regional plans and stressing on increase in production led to initiating programs and developmental projects in areas that already have the readiness, resources and tools to grow, which has resulted in imbalance.
- Lack of linking planning to a strong system of monitoring, follow up and indicators-based effect mearusment has led to ignorance of the nature and size of regional differences, which is necessary to know in order to adopt new redistribution alternatives.
- Increase and disparity in unemployment rates in governorates and regions due to the lack of regional planning in addition to the spread of families under the poverty line in certain less developed governorates (Eastern area governorates).
- Increase in the rates of seasonal & ongoing internal immigration from less developed areas to Damascus and Aleppo and to neighbouring countries in the case of seasonal immigration.
- Prevail of centralization and lack of interest in regional and community development and its tools.
- Lack of scientific methodology and using regional analytical methods (settlement curve, specialization factor) in planning operations.
- Lack of administrative and technical cadres in the area of regional planning at domestic and national levels.

Future vision to adopt regional planning and urban development

The future vision of the next two decades seeks to **establish and integrate the spatial and urban dimension** in all strategies, policies, plans, and sector-based programs and at all levels (national, regional, domestic) depending on implementing the **partnership or participatory method** between the central government and local and regional administrative bodies on one hand and the private sector and civil society on another. This is to be achieved within a framework of **integration, flexibility, and transparency** in order to draft, implement and evaluate developmental plans and the process of decision-making by adopting a scientific methodology that helps in determining priorities and choosing sustainability standards as a measure in responding to the requirements of contemporary society thus **guaranteeing the availability of development fruits to all society individuals and at all levels: nationally, regionally and domestically.**

There is a plan to develop balanced regional planning in Syria during the next two decades where it:

- possesses a planning structure and balanced and progressive administrative divisions (national, regional and local).
- maintains highly-qualified local and regional administrative bodies where they can take part in enhancing administrative and financial decentralization.
- Is Marked by its economic regions that are diversified and integrated economically and balanced socially and in construction.
- Enjoys the ability to enhance the economic and political role of Damascus as an international capital by providing high-level modern services (international banks, international investment companies, airports, fast trains…etc.) and at the same time preserving the rich local constructional fabric and providing present and future needs to local inhabitants.
- Becomes remarkable for the distribution of local and regional capitals (balance attraction points) that are based on creativity, domestic richness, and diversity and that enjoy a high level of modern services and play a local and international economic role. This is a major factor in creating more job opportunities because these centres will be source of attraction for big investments that will serve the whole region with its (regional hospitals, regional universities, big commercial centres, regional parks, big modern transportation station, tourist and cultural regional centres…etc.).
- has medium-size cities that are distinguished with their special developmental aspect such as (tourist cities, commercial cities, technological cities, health cities or cultural cities). These cities are linked to the regional capitals according to a planned hierarchy and multi-centred planned constructional system. Also, they are connected together by modern and developed land transportation networks where those regional capitals become multi-centred developmental attraction points that interact with each other according to a living and active economic, social and constructional dynamism.
- Has qualified villages and rural areas with high level services depending on their resources in sustainable development. Those villages are self-managed and developed by the civil society in partnership with local administration bodies.
- Has land transportation networks that depend on modern technology (fast trains) connecting all regional levels together according to the hierarchy of spatial planning levels.

Long-term objectives

In the framework of quantified objectives to be achieved during two consecutive plans until 2015, a natural long-term plan will be adopted depending on enhancing and involving the spatial dimension in all strategies, policies, programs and developmental economic, social, environmental, constructional and technological projects. This would enable us to divide Syria into regional developmental centres; it would also help us reduce poverty and increase employment rates in less developed governorates. According to the long-term natural plan, there will be allocation of natural resources and distribution of economic capabilities, residential buildings, service and infrastructure centres in each area in order to implement the programs of balanced regional development.

The tenth five-year plan

a. Objectives

regional planning aims at achieving several multi-purpose objectives: economic, social, constructional, environmental, institutional and strategic in order to achieve balanced development of the state. Here is a number of objectives that can be fulfilled by activating regional planning in Syria:

1. reducing imbalance between regions and governorates by achieving balanced and sustainable development at the national, regional and domestic levels.
2. achieving national social and economic integration by exerting rapid developmental efforts where there is focus on income-generating projects and activities that reduce poverty.
3. stress on improving the production by allocating the domestic resources of each geographic region.
4. enhancing decentralization and regional administration.

b. Major quantified objectives at the national and regional levels

1. optimal distribution of revenues at the national level where the Gini Factor is reduced to 25% in regions.
2. reducing poverty indicators at 50% in governorates where poverty indicators are high. These include…
3. reducing unemployment indicators at 50% in governorates where unemployment rates are high such as…
4. increasing Syrian construction by 10%. In other words, adding new human settlement areas in addition to developing remote human settlement areas such as service centers, developmental attraction areas and export points especially at the Iraqi and Turkish borders.
5. increasing regional public utilities and infrastructure and social service establishments in addition to improving their performance by 25% in different regions.

c. Strategy

The strategy aims at limiting economic and social differences between districts in addition to diminishing the phenomenon of urban attraction of the three main cities and intensive focus on economic activities by means of activating relative and competitive advantages of different regions, establishing constructional gatherings in developmental areas, development of urban unorganized areas, and reducing population density until inhabited constructional spaces increase where they can accommodate the expected increase in population in future.

This has to be accompanied by investment in infrastructure which is the backbone of development, sector-based construction of transportation, roads, bridges and tunnels and establishing systems to manage liquid and solid waste and other similar utilities and services that are considered an indispensable and necessary factor in economic renaissance and reform and protecting natural resources.

The following strategies are set to take part in balanced regional and urban development during the tenth five-year plan:

- reducing the current imbalance between regions and governorates and achieving regional and urban balanced development (objective 1).
- Finding integrated planning formulas and time frameworks that connect between national developmental plans and governmental and regional developmental plans.
- **Achieving economic, social and regional integration by exerting rapid developmental efforts where there is focus on income-generating projects and activities that reduce poverty particularly in less developed areas (objective 2).**

1. preparing the main orientations of regional planning in Syria
2. building and creating balanced and integrated regions.

- **Stressing production improvement by allocating the local resources for each geographic region (objective 3)**

3. launching a comprehensive regional plan
4. preparing national plans for regional planning in Syria

- **Enhancing decentralization and regional administration (objective 4)**

5. establishing an administrative organising structure comprising urban and regional planning units that are interrelated, coordinated and able to implement the planning mission with all its spatial, economic, social and constructional dimensions.
6. building capacities in regional administration and planning.

d. Policies and action plan

- **Setting integrated planning formulas that link between the national development plan and governmental and regional plans (strategy 1)**

- finding feasible formulas that link between preparation times of developmental plans and governorates and regional local plans with a spirit of coordination and networking.
- Issuing booklets about the structure and content of national, local and regional plans and determining their content and planning methods to be committed to.
- Concluding the natural national plan and dividing Syria into developmental areas and determining planned regions in Syria depending on analytical economic and social causes and the regional environment.

- **Preparing main orientations for regional planning in Syria (Strategy 2)**

- Establishing the national council for regional planning and urban development (with representatives from the public sector, private sector, and civil society institutions) as well its financing fund and entrusting to it

directive projects, laying out standards and methodologies and suggesting plans and legislations.
- Creating regional development councils that work on drafting and implementing regional plans.
- Giving room to regional investments in governorates' economic and social plans that will be prepared as of 2006.
- Implementing several targeted projects of public benefits and in a balanced way in order to develop cities and regions.
- The regional plan will seek to link between policies of industrial development, agricultural development, education and training, technological development and infrastructure on the one hand and the spatial policy and development of rural and urban centres on the other.
- Enabling the private sector and civil society to take part in building the economic, social, constructional, regional and urban balanced structure.
- Adopting a new methodology of spatial planning and implementing modern and contemporary methods in the management and planning of cities and regions where they are prepared to meet the requirements of the digital age, move to the economy of knowledge and become developmental centres.
- Building developmental regions based on principles of sustainable development and respect of natural resources.
- Improving investment at the macro level by encouraging productive and labour-extensive models, export-based activities and small enterprises to reduce unemployment.
- Directing governmental investments and private sector and civil sector investments in the first stage according to the new regional developmental map of Syria.
- Directing governmental investments towards providing the necessary investment-attracting infrastructure in developing regions such as transportation, communications, drinking water, and sewage…etc.
- Improving the qualification of the cities system by developing medium and small cities where settlement is encouraged through initiating new projects and activities that are linked to a network of roads thus making them integrated with the urban economic system.
- Facilitating optimal access to service centres (educational, health and entertainment…etc.) in all regions equally.

- **Putting a comprehensive regional developmental plan (strategy 3)**

- preparing a methodological framework to evaluate the status quo and regional differences according to the data of natural national planning.
- Evaluating data and regional information that are currently available and preparing a major map that would help us determine the advantages and obstacles of development in every region according to the programs of the GIS Geographical Information System.
- Preparing the national strategy of regional planning and the principal orientations of urban development by means of:

1. **enhancing the economic foundation of every region** based on attaching importance to less developed residential gatherings by providing new job opportunities and improving the quality and quantity of social services.
2. **supporting networks of residential gatherings in remote governorates.** This can be done by optimal distribution of economic activities, social and technical utilities and residences where sector-based networking of governorates' public services is achieved thus enabling inhabitants in a specific residential gathering in a governorate to benefit from the centres services of another governorate and another residential gathering. This can be done according to a gradual process of establishing and developing those service centres (big regional centres, secondary semi-regional centres, local centres, and preliminary service centres), conducting a feasibility study of coexistence and functional integration among these centres, calculating costs and setting regional budgets in the light of this.
3. **management of environmental resources,** including unirrigated agricultural lands and groundwater resources, and taking part in solving contradictions between developmental projects set in the developmental plans of the region's governorate and the region on one side and standards of environmental considerations, pollution issues and the protection of protected areas and biodiversity on another.
4. **improving living standards** and providing main needs that have to do with education, health, residence and income by means of functional and service integration between governorates and residential gatherings of the region with the aim of improving investment in the concerned region's governorates and achieving maximum benefit of financial resources where there is focus on expanding the civil sector contribution.

- Putting a policy to increase the contribution of certain regions in economic and social development of the state.
- Putting a suitable development policy for each region within the framework of development national policy.
- Building a sector-based hierarchal structure that determines promising sectors for each region.
- Putting a vision for the planning and management of lands and providing them with utilities, infrastructure and services by means of:

1. the management of land use and planning working areas as will be proposed by the spatial strategy.
2. preparing urban designs and establishing a coordinating body for cities planning in order to take into account aesthetic and fictional aspects and provide a favourite urban constructional environment in every region in the integrated sense of urban planning and its constructional, social and educational aspects. This can be done by providing appropriate technical and social utilities (services of electricity, transportation, sewage, educational and propaganda establishments, public gardens, health and educational institutions, expanding the

national roads network, establishing and constructing railway networks, and modernising communication and electronic service systems to meet the requirements of this).

3. preparing alternatives in the constructional planning process for every region (development centre) including strategies and assessment mechanisms for developing human settlements, infrastructure, and natural resources.

- **Building and creating balanced and integrated regions (strategy 4)**

- building regional balanced and developmental attraction centres based on biodiversity, feasibility and developmental integration.
- Those region will be points of attraction for foreign investments that take part in generating more job opportunities and improving the level and quality of citizens' lives.
- Regions will depend on their local resources for the continuity and sustainability of development.
- Adopting an economic methodology and developed technologies to achieve integration and interaction with local and international regions.
- Regions will be able to increase their revenues by collecting regional taxes.
- Regions will be able to receive loans from the market and the development bank to expand their investments and develop their infrastructure.

- **Preparing national plans for regional planning in Syria (Strategy 5)**

- Preparing a regional developmental map that clarifies the distribution of current economic, social and service activities in Syria.
- Building urban regional observatories.
- Coordinating with information centres at local planning levels through the regional centre.
- Building a regional database in order to support the SPC capacities in drawing and directing its developmental policies based on a regional perspective and the needs of every region.
- Preparing national plans of regional planning according to the bases and methodology of sustainable development.

- **Establishing an administrative organizing structure comprising regional and urban planning units that are inter-connected and coordinated in a way they can perform the planning function with all its spatial, economic, social and constructional dimensions (strategy 6)**

- Restructuring administrative systems and distributing authorities among the central government, regional planning bodies and local administration bodies.
- Creating a regional organizing structure that can work as a linking point between the central government and local governments and that is supported by working teams responsible for technical affairs, policies support, providing assistance in policies analysis and choosing alternative

policies, setting projects, and evaluation of developmental plans adopted by the region.
- Improving the competence of local administration bodies such as cities councils and municipalities.
- Building a participatory base for different effective parties such as administrative governmental bodies (central, regional and local), NGOs, Scientific Research Centres and Universities, and local inhabitants and civil society organizations, according to a planning methodology starting from the base in order to take part in developmental planning as well as implementation, follow up and assessment of developmental policies.
- Building a modern hierarchal structure of cities and regions in Syria where a study is conducted about their relationship according to the spatial-functional division.

- **Building the capacities of workers in regional administration planning (strategy 7)**

- Establishing a high-level planning body comprising multi-specialization technical planning cadres such as experts in economic, social, administrative, constructional, urban and rural planning and experts in land use, data collection, artists, surveyors and IT technicians.
- Building scientific and investment institutions and research centres in order to take part in solving problems of regional and constructional development.
- Capacity building in administrative bodies of central, regional and local government.
- Raising the level of regional development by means of regional administration bodies with a developmental vision and creative leading systems.

- **Reforms at political, legal and institutional levels and in implementation requirements**

- Modernising legislations in order to meet modern policies, objectives, and developmental orientations towards administrative and financial decentralization of governmental administrative bodies.
- Modernization of urban legislations and issuing special laws of urban and regional planning and administration in a way that fulfils modern requirements and addresses activating regional planning in Syria.
- Building regional, virtual networks that provide information and data and linking them to a number of local regional networks.
- Clarifying the terminology of regional and urban planning.
- The availability of legislations that meet modern developmental policies, objectives and orientations and administrative and financial decentralization.
- The availability of legislations and laws on urban planning and management, urban development and regions planning and management.

e. Programs and projects

- **The project of enhancing spatial and regional dimensions in development plans**

- preparing the theoretical background and working bases of regional planning.
- Analysing the development reality in Syria based on the spatial dimension.
- Analysing and providing available resources (advantages and challenges) from a regional perspective.
- Determining planned regions in Syria.
- Building a planned structure and gradual and balanced administrative divisions (national, regional and local).
- Rearranging and reorganizing the economic, social and constructional structure at the national, regional and local levels.
- Creating a hierarchal and balanced structure of cities and regions (big, medium and small).
- Building a hierarchal sector-based structure that determines necessary sectors in every region.
- Preparing a map for land use in the status quo and at the regional level clarifying the distribution of economic, social and service activities.

- **The project of preparing a national strategy for regional planning**

- Preparing national plans for regional planning according to the methodology of sustainable development.
- Preparing the distribution plan of industrial and service areas.
- Preparing the distribution plan of scientific research centres and universities as attraction points of technology and information.
- Preparing the distribution plan of constructional and cultural services.
- Preparing the distribution plan of public health services.
- Preparing the plan of information and communication public services.
- Preparing the plan of transportation public services with all their forms (travellers and commodities)
- Preparing the plan of energy public services.
- Preparing the plan of public services for natural and agricultural areas.
- Preparing the plan of sports public services.
- Determining the developmental goal for every region and focusing on mutual relations among regions.

- **The project of Big Contemporary Damascus**

- Improving the quality and quantity of services provided to the central capital, Damascus, where it can play an economic and political role in the network of big world capitals.
- Providing high-level modern services (banks, international investment companies…etc.)
- The availability of qualitative constructional gatherings with a mixture of local characteristics, international requirements and local inhabitant needs.
- Achieving qualitative transformation in transportation (local, regional and international).
- Controlling constructional expansion and addressing the problem of random residences.
- Getting nature into the heart of the city.
- Improving the standards and quality of living for local inhabitants.

- Adopting the local agenda 21 at the national, regional and local levels as a tool in evaluating work according to sustainable development.
- Establishing developmental linking points in non-developed areas.
- Activating the development of rural growth centers and guaranteeing their effective development.
- Encouraging social and economic development in rural areas.

- **The project of building local regional capitals as balance points at the national level with an economic and cultural role at the regional and international levels.**

- Improving economic and environmental foundations, infrastructure and services in cities especially economically weak areas in order to make them investment attraction points.
- Controlling urban expansion.
- Enhancing main urban centres.
- Supporting urban attraction points in outskirts according to a multi-centre structure.
- The availability of economic, technological, cultural and tourist development attraction points.
- The availability of high-quality urban transportation networks.

- **The program of managing sustainable development in urban and rural areas**

- Reducing qualitative discrepancy between urban areas and rural and random residential areas in sewage, waste disposal and water supply.
- Giving priority to poor people living in random residential areas in developmental programs.
- Achieving diversity, coherence and social integration at the local and regional levels.
- Achieving integration between urban areas and rural areas where they support each other.
- Supporting sustainable development and job opportunities in poor rural areas.
- Addressing the problem of random residential areas and organizing them.
- Renewing and reviving cities.
- Controlling urban expansion.
- Using renewable energy in buildings and the constructional system.
- Local use of local wastes in gas production and soil fertilizing.
- Using local systems of water harvesting and water reuse.
- Using lands in energy harvesting operations.

- **The program of restructuring governmental administrative systems and authority distribution between the central government, and local and regional planning bodies**

- A clear role for regional planning bodies.
- Building capacities in regional and local governmental bodies, supporting policies, providing assistance in analyzing local developmental policies, determining alternative policies and setting projects and assessment of developmental plans adopted by the region.

- the program of improving regional development through bodies with developmental vision and creative leadership.

- **Building capacities in central, regional and local governmental bodies**

- Training field workers to collect information and data of relevance to the status quo locally and regionally.
- Upgrading and training technical cadres to prepare regional plans.
- Initiating research projects in the field of regional planning and urban development.

- **The project of building a national, regional and local database**

- Creating a regional database in order to support the SPC capacities in drawing and directing its developmental policies from a regional perspective and according to the needs of every region.
- The availability of regional information centers at the local planning levels where these centers are interconnected by a central communication network.
- The availability of local urban observatories in Syrian governorates.
- Evaluating environmental, social and economic indicators regionally and issuing an annual report with a CD, database and major maps.
- The possibility of exchanging expertise, information and experiences by joining the networks of international sustainable cities.

- **The project of sharing local inhabitants in preparing local and regional plans**

- Easy, regular and continuous access to information by the e-government system and by making developmental indicators public in order to enhance public participation in decision making.
- Preparing published materials about regional planning (booklets, case studies, best practices…etc.).
- The availability of enabling environment for public participation in decision making.

1.5.6 Achievements and revenues expected from the sector in the plan

- Creating regional developmental centers by achieving economic diversity.
- Taking part in achieving balanced and sustainable development.
- Reducing poverty and human resources development.
- Protecting natural resources and improving the environment quality at the national and local levels.
- Activating the role of the local community specially women and youth categories.
- Putting comprehensive regional plans for urban development and regional planning in Syria.
- Improving living standards by providing new job opportunities in regions and developing areas.
- Upgrading inhabitants to keep pace with the development produced by regional planning.
- Providing main services in regions and developing areas.
- Enhancing social integration and supporting weak and poor categories.

7.5.6 Expected obstacles and challenges in implementation and achieving expected results

The most important challenges that might face the implementation of planning and previous programs cover the following:

- Current political pressures.
- Difficulty in implementing administrative and financial decentralization in a way that guarantees transparency and accountability.
- Weak participation of the civil and private sector.
- Weak financing for projects implementation.
- Weak coordination between concerned parties (governmental, private and civil).
- Lack of implementation and continuous follow up of developmental standards and projects.
- Lack of coordination between administrative levels (central government, regional and local).

8.5.6 Indicators of revenues and performance follow up

- Statistics and regular reports that follow up development at the sector and local level as well as the reports that follow up the plan
- Reports of evaluating training and capacity building which is part and parcel of the program
- The report on the environment status and human resources reports at the local level in case they are available.

There is a Matrix here

Second- Urban development

1.2.5.6 Background

In any economic reform program where we seek sustainable development, good environment for the business sector, and encouraging local and foreign investments there is need for taking care of financial, functional, environmental and asthetic planning of cities. This requires a new mentality of urban planning that covers the two following dimensions:

1. the economic and social dimension: where spatial planning becomes based on a thorough study of the reality and future of the city and its social relationships and

needs such as services, communications, land use, industrial and commercial divisions, expansion possibilities and environment care.
2. the geographic dimension: where the city can be part of comprehensive and balanced regional planning.

Since urban development used to ignore those two strategic dimensions, this led to the lack of functional-spatial integration, discrepancies in policies, problems in population density, cities growth and the development of certain service centers at the expense of others, and difficulty in planning redistribution, upgrading and the implementation of developmental projects.

2.2.5.6 The performance of urban development in the ninth five year plan

As it is the case in pervious five-year plans, the ninth plan dealt with urban development in the context of geometrical development operations. This means that interest in the urban surrounding is limited to infrastructure development (public utilities) with the aim of constructional organization of human gathering areas and topographic survey of those areas.

During the FYP years computerized topographic plans were set to continue the topographic survey plans (at a scale of 1/1000) for all Syrian residential gathering areas (urban and rural) whose population is over 1000 inhabitants.

As for constructional planning, there is an annual public organizing planning operations and sometimes detailed planning (of certain important areas) that put their topographic plans during the previous year.

Topographic survey and organizing planning was conducted in the industrial areas of Aleppo, Homs, Damascus Countryside and Deir Ezzor.

One of the most important achievements of the ninth five-year plan is the topographic survey of Damascus and its active surrounding area as a step to set urban planning studies for this area.

Generally speaking, the ninth plan did not depend on a comprehensive long-term vision in the field of urban development. This is due to the lack of regional planning that determines the relationship between spatial planning and social and economic activities and functions and their geographic distributions where local resources and future orientations are prominent. Therefore, constructional and organizational plans that have been achieved will still be partial plans that need integration and redesign in the light of comprehensive regional and national planning that will be achieved in the tenth plan.

On the other hand, the concept of cities planning and urban development in the ninth five-year plan and previous plans was dominated by the consistency of Syrian society while there was neglect of the issue of cultural diversity which calls for the presence of ‘culturally-diversified urban environments” on the territories of the republic. This

resulted in preserving special constructional appearances and local traditions and conventions in different Syrian areas. Also, previous plans were dominated by stereotyped ways of dealing where planning operations and constructional organization of residential gatherings where performed under unified and uncontroversial planning that does not take into account the social, environmental and geographical peculiarity of the studied region.

Finally, the ninth plan is criticized for failing to meet the different needs of urban development represented by the necessity to reconsider old constructional plans of cities and towns (particularly governorates' centers), and the importance of re-evaluating these plans and modernizing their topographic and organizational designs. This should have been done with emphasis on the necessity to transform those plans into digital formulas, notwithstanding that integrated detailed digital plans will not be feasible economically unless they are employed for public use (to meet all requirements of digitizing plans in Syria) and in local governance administrations and all affairs of the urban region.

2.2.5.6 Problems and challenges

- problems that have to do with the issue of land, borders, continuing occupation of the Golan territories, and lacking a radical treatment and future planning of refugees camps and immigrants areas, which carries the risk of emerging poor districts that lack the necessary required infrastructure for good living. This might turn in the future into the phenomenon of "urban poverty" in certain Syrian regions.
- Excessive population growth and geographical expansion in big cities (on top of which Damascus and Aleppo) which lead to spatial density of inhabitants, industry, trade, transportation, energy consumption, water use, waste production and threatening the environment at the expense of cities archeological centers and neighboring rural areas. This expansion takes place in the absence of strategic studies of its economic and social effects thus leading to crises in residential, services and economic fields and increasing pressure on utilities and infrastructure, which requires big costs for modernizing these cities and compensating for their deteriorating performance.
- Expansion in the functions of big cities and increasing their economic activity thus creating a vicious circle of crises and crises treatment measures. This also caused social-cultural harm to archeological centers and rural areas that are surrounded and covered by the expansion because each lost an important part of its local cultural identity represented by the constructional fabric and related elements such as traditions, conventions and daily life practices where they integrated with a new local social environment that lacks consistency thus leaving negative effects on the historical cultural-urban diversity that distinguished Syria through ages.
- Continuing internal immigration from the countryside to the city and from small cities to big cities in all Syrian governorates seeking work and services, and increase in the relative difference between growth rates in the countryside and the city. This leaves its direct effects on the local economies of the two concerned areas and on their demographic structure particularly imbalance in

constructional structure and lack of balance in gender distribution where most immigrations take place among the youth specially males.

- Lacking a reliable national regional plan in the absence of regional planning studies at the level of governorates and regions. This leads to a lack of a clear, integrated and balanced agenda of land use and also to lacking a central strategic consolidated vision on urban development and improving the conditions of cities that are greatly influenced by contraventions and pressures that derail planning operations off their objective and scientific natural track. The absence of all this leads to the following:

  - pressures of urgent needs of society and the state where planning operations take place in response to scattered and uncalculated projects submitted by the state's institutions (governorates, local administration units, different ministries…etc.) in order to address current urban problems and sometimes to overcome emerging crises.
  - Pressures of the interests of economic institutions that are interested in constructional projects in urban development areas without taking into account current or future plans most of the times.
  - Lack of the law control in the constructional field and spread of contraventions and random urban areas that impose a big burden on the developmental process and cause failure in the implementation of plans making them lagging behind the developments imposed by the community's constructional practices.
  - Lack of requirements and necessary tools of urban planning such as topographic planning surveys, statistical data, and results of social and economic surveys. There are many urban areas in Syria that are not covered by detailed topographic planning surveys. As for cities and towns that implemented their plans, they are not subject to continuous modernization, which makes them not identical with reality and misleading for planners because if they are adopted as they are, the planning decision will not be realistic. Not to mention that several areas in Syria were not subject to operations of property consolidation (such as areas on the borders that have not been marketed yet). In many Syrian areas there are important technical problems (general area networks) that negatively affect the authenticity and accuracy of real estate plans and consequently the accuracy in determining real estate property. Also, the problem of lacking an integrated statistic information system in Syria makes the operations of urban development planning not possible due to their high costs. This is due to the absence of computer digitizing which is still in its beginnings where most plans and above-mentioned data are still in the conventional paper form and they can't be effective tools in contemporary urban planning.
  - irrational use of natural resources in cities, deterioration of the climate and the environment, lack of drinking water resources and the inability to implement projects of water drawing and desalination in urban areas.
  - Lack of implementation of urban development plans and spending on them from public financial resources which are inadequate unless the private sector is involved in funding the implementation of projects after a study of their economic feasibility.

- Weak self capabilities and lack of necessary human resources to manage urban development planning which is still the mission of directorates with limited capacity and unable to keep in pace with the rapid development of urban gatherings. They virtually take care of the geometric dimension and do not have the capacity to take care of the social and economic dimensions. Those directorates are practically responsible for making the constructional planning decision in partnership with governorates' councils and rarely do they seek the help of private sector or civil society institutions expertise (such as the engineers union, organizations…etc.). other reasons behind the bad performance in urban development planning have to do with bureaucratic work systems and the legislations of constructional planning and organization that rely on old foundations, go back to the sixties of last century, and need development and radical modernization.
- No coordination between central administrations of urban planning. The regional planning directorate in the ministry of housing and construction is independent from the directorate of topography and constructional planning in the ministry of local administration and environment.
- There are old legislations and judicial pending issues that need solutions in the field of government dealing with real estate and its assessment of the real value of individual properties. Those issues include nationalization, land reclamation, confiscation, employment and hiring for low financial compensation, public benefit appropriation for unfair financial compensation, lack of implementation of judicial resolutions that have to do with agricultural relations and with evacuating real estate property and lands hired by governmental parties for special governmental affairs (such as the areas of defense affairs). All these make the citizen and investor lose confidence in the credibility and honesty of constructional policies, organizational operations and urban planning. Those problems have to be addressed by means of a clear strategy because the sanctity of real estate individual property is one of the main foundations of the urban development process.
- Retrogression of aesthetic construction in Syrian cities and loss of aesthetic constructional identity, marked for its diversity as result of consecutive Syrian civilizations through ages, in modern urban gatherings. This is due to giving priority to quantified developmental policies over qualitative policies and to manipulation of constructional planning operations by ministries, institutions, and governmental companies that adhere to routine construction and building systems without any participation of the civil society, creative geometric institutions or private economic institutions.
- Incomplete implementation of constructional development plans and stopping projects in many areas and lands for different reasons most of which have to do with the unwillingness of owners and investors to continue their projects or the unwillingness to invest in them as real estate property where those lands are prepared to be built on. Another reason has to do with the lack of deterrent constructional legislations and administrative procedures that address this phenomenon. All this leads to

waste of certain implemented components of the plan and to a big delay in implementing the plan fully.

2.2.5.6 Future vision

in the framework of societal transformation the 2025 vision of Syria, the city will play a pivotal role in providing the necessary foundations for social and economic advancement and moving to the digital age and developed social and economic services and infrastructure. Thus, Syria will be a successful future model for diversified urban environment which, besides being modern, preserves the mixture of Arab-Islamic culture and other cultures where we achieve:

- Vital cities with small modern service centers geographically independent from the expansion of existing big cities where they offer their services to developing rural areas that they are linked to. Those cities enjoy the privileges and services of contemporary cities, are void of illiteracy, poverty and unemployed people and work as economic developmental attraction points that are distributed to all territories of the republic. They include:

  - scientific, technological and cultural cities that attract investors, scientists, researchers and young people from inside and outside Syria.
  - Industrial cities specializing in agricultural and manufacturing industries.
  - Entertainments and summer vacationing cities that provide tourist attraction services.

- Historical cities that are archeologically protected.
- Capital and big cities void of poor districts or random residential gatherings. Those cities contain modern administrative, economic and service centers that are distributed far from their old traditional centers.
- Environmentally-protected areas where there are cities, towns and villages that are void of industries and polluting activities.
- Modern constructional infrastructure institutions that are technically and economically beneficial where they provide transportation, water and sewage, electricity and communications.
- Participatory administration of urban and constructional planning that is open to creative individual initiatives with the direct participation of local governments, women and youth categories, civil society institutions and private economic institutions.
- Guarantee of Syrian citizens rights in benefiting from urban development and safe good living irrespective of their geographical position as well as guarantee of the rights and needs of old people, women, children, and individuals with special needs.

2.2.5.6 Long-term objectives

- The next ten years will witness concluding modern constructional plans of cities and residential gatherings and developing their infrastructure, services and aesthetic environment.
- Putting directive and organizational plans for small urban areas.

- Implementing developmental plans of land use in urban areas.

2.2.5.6 The tenth five-year plan

Objectives

1. enhancing capacity building of urban development planning and improving their organizational, institutional and human frameworks.
2. linking urban planning and development to economic and social reform programs and rehabilitation and development of Syria's urban areas in an integrated and balanced manner where there is focus on less developed governorates.
3. improving the urban, physical, natural, and human aspects of big cities, developing small and medium cities, and creating new urban areas according to contemporary standards in order to redistribute service centers and urban development attraction points in Syria.

Major quantified objectives at both the sector-based level and the macro level

- studying and implementing the integrated information system of regional planning, urban development and geographic information.
- Accomplishing 50% of the preliminary plan of land use in existing planned urban areas.
- Conducting a study of alternative and small cities, a study of developing Damascus and Aleppo and a study of developing al Quneitra.
- Re-evaluating constructional plans of 30% of cities and urban gatherings.
- Accomplishing plans of detailed topographic survey and organizational plans of all urban areas in Syria inhabited by over 500 inhabitants.
- Accomplishing 50% of topographic photographs and organizational and directive plans for all urban areas in Syria inhabited by less than 500 inhabitants.
- Conducting preliminary studies of local regional planning.

Strategy

- **Enhancing capacity building of urban development planning and improving their organizational and institutional frameworks (Objective 1)**

1. restructuring the urban development planning sector at the central, regional, and local levels in a way that enhances integration and the government's ability to draft policies and strategies that are suitable for achieving sustainable development in urban areas.
2. enhancing the role of decentralization in the process of development, building local capacities and benefiting of conventional local knowledge in the constructional field.

- **Linking urban planning and development to economic and social reform programs and rehabilitation and development of Syria's urban areas in an integrated and balanced way where there is focus on less developed governorates (objective 2)**

1. adopting the program of modernizing Syrian cities and preparing them for social market economy and competitiveness according to the 2025 vision of Syria, starting to conduct studies of gradual urban development (preliminary, directive, and final), and depending on the private sector and advisory offices in this context.

- **Improving urban, physical, natural and human aspects of big cities, developing small and medium cities, and creating new urban regions according to contemporary standards in order to redistribute service centers and urban development attraction points in Syria (objective 3)**

    1. putting administrative policies for land use and planning programs for human gathering areas in major cities, taking measures to improve the infrastructure adequacy, linking between service centers in cities, and reducing environmental deterioration caused by population density.
    2. developing existing small cities and creating new cities that would become development attraction points to attract inhabitants, investments, and the working force, and reducing internal immigration and population density in big cities.
    3. enhancing Arab and international cooperation and coordination with organizations of urban development.

Policies and working plan

- **Restructuring the urban development planning sector by expanding its organizational central structure (strategy 1)**

    - establishing branches of the national council of regional planning and urban development in governorates and municipalities where there is focus on decentralization in design and implementation of urban development projects and interest in local peculiarity.

    (regional planning affairs)

    - establishing the national council of regional planning and urban development (comprising representatives of the public sector, private sector and civil society institutions) and its financing fund and entrusting it with the mission of directing projects, setting standards and methodologies and recommending plans and legislations.
    - Establishing an administrative technical party that is responsible for the central missions of regional planning and urban development, supporting it with competent human cadres and providing it with the physical and informational requirements for its work.

- **Enhancing the role of local administration in taking part in the process of urban development and building local capacities (strategy 2)**

  - Building a system of national geographic information in order to prepare maps on urban development, exchanging information, and determine the problems and needs of human gathering areas.
  - Encouraging the local private sector and civil society institutions to take part in developing the urban environment.
  - Preparing and implementing training courses in the field of integrated constructional administration, implementation of urban sustainable development policies, and regular evaluation of those courses and policies.

- **Adopting programs of modernizing Syrian cities and preparing them to the social market economy and competitiveness (strategy 3)**

  - Putting the policies and programs of urban development in the light of the economic development of cities and different areas, transformation possibilities in their economic activity and the requirements of such development and transformation such as a spatial environment, services, infrastructure, and mutual relationship between those cities and their service centers.
  - Putting programs for industrial and services resettlement in less developed governorates where counter-immigration from big cities is encouraged.
  - Encouraging investment and capital attraction, supporting new opportunities to achieve urban development, and enhancing the capacities of small and medium-size constructional companies and developing their competitiveness and integration.
  - Adopting the method of local community participation in the policies and programs of urban development where there is participation in building and maintenance operations through volunteering collective work and costs recovery.
  - Cultural sector participation in the projects of developing cities and embellishing them through plastic arts that give Syrian cities with their ethnic, geographic and historical diversities their aesthetic and peculiar culture.
  - Rehabilitation of maps and plans that can be used in the GIS (geographical information systems), providing temporally-consecutive satellite images and digitizing topographic designs.
  - Preparing medium-scale maps and plans for the studies of local constructional development of cities, governorates centers and their vital surrounding, developmental areas and centers.
  - Implementing topographic designs of residential gatherings and their expansion at a major scale of 1/1000 in order to prepare organizational plans.
  - Providing orto-photo photographs at a scale of 1/2000-1/5000 in order to prepare directive plans.
  - Preparing digital archive and information bank of tourist products that have to do with local administration and environment.

- Digitizing and integrating all topographic, organizational and real estate plans and preparing them as a basis for the GIS in a way that serves the implementation of planning and municipality administration operations.
- Updating information and creating a link with governorates.

- **Putting policies to manage land use, planning programs of human gatherings in major cities and taking measures to improve the infrastructure adequacy (strategy 4)**

(needs new policies)

- creating a department for land use in the ministry of local administration and environment.
- Reconsidering cities organizational plans in a way that addresses the current reality and future expansion capabilities as well as adopting a new policy of managing land use taking into account residential needs and private sector needs in commercial, industrial and service activities.
- Preparing special projects to develop the centers of major cities (city center) in a way that reveals the constructional identity of Syria.
- Launching projects of infrastructure modernization and development particularly in the sectors of transportation, water, and solid waste in Damascus, Aleppo and other big cities.
- Reducing the level of random expansion in Damascus and Aleppo and the necessity to focus on programs of rural and urban integrated development in order to contain this urban development and encourage counter-immigration.

- **Development of small existing cities and creating new cities that can work as development attraction centers as well as reducing internal immigration and population density in big cities (strategy 5)**

- conducting a study of creating alternative cities and specialized cities (technological cities, cultural cities, industrial cities for agricultural and manufacturing industries, entertainment, summer vacationing and tourist cities).
- Conducting a study of developing existing small and medium cities.
- Conducing a study about the problem of random urban areas and contravention areas.
- Supporting free zones projects and implementing taxes and customs facilitation on projects of establishing vital urban areas.
- Giving rural areas priority in preparing developmental programs specially health, educational and service programs.

- **Enhancing Arab and international cooperation and coordination with organizations working in urban development (strategy 6)**

- encouraging the programs of “twinning cities and municipalities” with Arab and foreign countries.

- Organizing scientific meetings and Arab and international workshops on constructional organization and benefiting of successful experiences in this field.
- Preparing programs on urban development at the local level and attracting international funding to implement them.
- Organizing cultural local seasons in cooperation with Arab and foreign cultural bodies with the purpose of vitalizing life in Syrian cities and achieving an investment revenue by tourist propaganda.

Reforms at the policies, legal and institutional levels and implementation requirements

- reconsidering and modernizing legislations that have to do with planning and constructional organization in a way consistent with balanced and integrated regional and urban planning.
- Issuing legislations to restructure the organization and administration of the urban development sector and constructional planning.
- Reconsidering the policies, legislations and anti-constitutional practices on preserving individual real estate property.
- Developing and modernizing systems that appreciate the value of lands and real estate property appropriated by the state and adopting the rules of real estate trade in the free market.
- Developing and modernizing the central and conventional methods and relations of planning and the necessity to open to public participation, private sector, civil society institutions and local governance administrations.
- Abolishing construction legislations that allow the settlement of contravention areas, putting firm legal regulations to implement urban development plans and comply by them, and putting legislations to address the problems of random urban areas in order to put an end to their expansion.

2.5.6 Programs and projects

2.2.5.6 The project of creating a general directorate (or body) for regional and urban planning

responsible for the management of regional planning and urban development central missions and providing them with competent human cadres and their financial and informational requirements

the total cost is 300 million SP distributed to the FYP years in the following way:

Table missing

2.2.5.6 The project of establishing the national council for regional and urban planning

Representatives of the public sector, the private sector and civil society institutions take part in this council. It has a fund for financing urban projects and it is entrusted

with directing projects, setting standards and methodologies and recommending plans and legislations.

The total cost is 25 million SP distributed to the FYP years in the following way:

year	2007	2008	2009	2010
percentage	10%	10%	10%	10%

2.2.5.6 The project of conducting a study about developing Damascus and Aleppo and limiting their expansion

Integrated social, economic, constructional, and geometric study

Total cost is 200 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	50%	50%	0%	0%

2.2.5.6 The project of conducting studies about creating alternative cities and new small cities

integrated study of planning 5 cities during the FYP years

Total cost is 200 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	60%	40%	0%	0%

2.2.5.6 The project of conducting studies for the development of existing small and medium cities

(integrated study for planning 30 cities)

Total cost is 450 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	25%	25%	25%	25%

2.2.5.6 Studies of random areas

(integrated social, economic, and constructional study: 10 areas)

Total cost is 200 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	25%	25%	25%	25%

2.2.5.6 Studies of developing northern governorates

Total cost is 90 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	25%	25%	25%	25%

2.2.5.6 Studies of developing al Quneitra governorate

Total cost is 40 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	50%	50%	0%	0%

2.2.5.6 Studies of local urban balance

Total cost is 100 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	40%	30%	20%	10%

The information system

Conducting a study about the creation of an integrated information system for urban planning and topography and linking it to information systems in governorates based on the GIS and statistic data.

Total cost is 72 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	24%	30%	28%	18%

2.2.5.6 Projects of the plans of city centers and development centers

This needs to conduct a study about governorates' central cites and their vital surrounding for the purpose of comprehensive local constructional development in order to plan the use of current and future lands where we can provide proper residential and constructional activity expansions in a way that meets the needs of surrounding environment and developmental goals of areas. This also covers

conducing a study about constructional development of peculiar development centers such as Damascus and its vital surrounding (al Zabadani Plain and Sidnaia Plain)- Deir Ezzor and their vital surrounding- Damascus- Dar'a center - Homs-Hama center – Latakia-Tartous Region – Aleppo-Sarakeb center- Latakia-Jericho center- al Gab region- Deir Ezzor-al Bou Kamal Center, covering international roads and neighboring residential gathering by constructional studies to prevent intruding upon international roads and providing safety to neighboring residential gatherings of those roads, and conducting comprehensive studies of constructional development areas, creating areas of future expansion and alternative districts, and development of areas with peculiar nature such as the gathering of (Ma'loula, Jibi'deen, Ein al Teena, al Sarkha, Hala), the gathering of (Qara- Der Atyeah- al Nabk, al Qastal, Yabrood) and al Hamrat gathering in al Raqqa.

Total cost is 100 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	14%	15%	22%	49%

2.2.5.6 Directive photographing

Issuing directive photographing of gatherings whose population is less than 500 inhabitants since issuing detailed organizational photographing of such gatherings requires the financial costs of topographic photographs at a scale of 1/1000 as well as putting detailed organizational plans that reveal the service centers for every gathering on its own.

Those directive plans are put based on ortophoto photographing at a scale of 1/2000 or 1/5000 by using the techniques of aireal photographing or remote sensing in the case of satellite photographs with a resolution suitable to the scale; whereby a study is conducted about every group of small neighboring gatherings in order to provide common services, road connection, future expansion areas, and determine building systems and in a way that guarantees protection of agricultural lands and prevents intruding upon them. Those studies cover small residential gatherings in all regions of the country with priority to the following regions: the coastal area and its mountains, Aleppo countryside, al jazeera region and the steppe gatherings.

Total cost is 80 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	16%	19%	27%	38%

2.2.5.6 Topographic survey

Total cost is 423 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	33%	27%	13%	12%

2.2.5.6 Maps Rehabilitation for the Use of GIS and Satellite Images

Rehabilitating maps at a scale of 1/50000 produced by the public institution of areas with the aim of preparing comprehensive constructional topographic data within the general coordinates of the country. Those maps can be used as a unified area foundation in the GIS studies of comprehensive constructional local studies supported by satellite images with resolutions suitable to the study objectives. Also, they provide continuous updating of changes in residential gatherings and constructional activities and a means to follow up with those changes at the level of all territories of the country where there are digitized maps for all regions in the country ready for the application of GIS and supported by satellite images with 5m resolution. That is why we have to take rapid measures to put such maps and satellite images in the service of constructional development studies.

Total cost is 60 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	16%	24%	42%	18%

2.2.5.6 Digitizing topographic plans and integrating them with real estate and organizational maps

Moving to the digitized forms of city centers topographic planning since the majority of those plans were made in paper forms; then integrating those maps with organizational and real estate maps and using them in computer applications that guarantee regular updating of those plans and good implementation of organizational plans and municipal administration. The projects that will be accomplished during the tenth five-year plan are: Hama, Latakia, Sweida, Dar'a, Homs, Tartous, Idleb, and Deir Ezzor as well as cities of special importance such as Bloudan, Jaramana, Jericho, al Bou Kamal.

Total cost is 90 million SP distributed to the FYP years in the following way:

Year	2007	2008	2009	2010
percentage	11%	16%	24%	49%

5.6 Achievements and expected revenues

- Guarantee of urban expansion and development to meet economic and social development.
- Establishing a solid basis of studies, plans, detailed planning, and informational system for long-term sustainable urban planning and therefore improving the reality of planning and the possibility of its success.
- Preparing integrated detailed plans of required constructional projects and submitting them to donor bodies for investment or direct implementation.

5.6 Obstacles, expected challenges in implementation and expected results

- Delay in legislative and administrative reforms.

- Inability to attract or employ necessary human resources.
- Lack or delay in funding programs and projects.
- Failure in partnership attempts with private sector and civil society.
- Regional political challenges in the Middle East and exerting pressures to prevent good implementation of regional and urban planning.

5.6 Indicators of performance follow up and revenues

The tenth five-year plan programs and projects of urban development can be divided into two main types:

- Programs and projects of building Syrian capacities for urban planning.
- Programs and projects of urban development studies.

The performance of the first is measured by the SPC planned monitoring.

The performance of the second is measured by technical reports of bodies monitoring the studies and supervising them.

The revenues of those programs and projects to cover all planning needs will be direct in this plan.

As for executive economic, social and constructional revenues they will only appear in next plans (eleventh five-year plan)

5.6 Executive Matrix

	strategies	Programs / projects	outcome	Indicators	Implementing body	Time frame
1	Capacity building	Creating a general directorate or body for regional and urban planning	Implementing programs and projects mentioned in the FYP	Results of following up reports issued by SPC	Ministry of local administration and environment	2-4 years
		Establishing the national council for urban and regional planning	Quality of programs and projects mentioned in the FYP	Results of following up reports issued by SPC	SPC in cooperation with the ministry of local administration and environment	1-4 years
		The Information System	Providing contemporary tools of urban planning & other public use	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
		Topographic survey	Providing the basis for spatial reference of planning & future geometric projects	The results of Monitoring & evaluation reports	Ministry of local administration and environment	5 years
		Maps rehabilitation	Providing the basis for spatial reference of planning and future geometric projects	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
		Digitizing plans	Providing the basis for spatial reference of planning and future geometric projects	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
2	Big cities	Studies of developing Damascus & Aleppo	Finding solutions for the crises of the two cities and their effects on the national economy	The results of Monitoring & evaluation reports	Ministry of local administration and environment	2 years
		Projects of city centers and development centers plans	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
3	small cities	Studies of creating alternative and small cities	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	2 years
		Studies of developing existing small and medium cities	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
		Random areas studies	Finding solution to the challenge of urban poverty	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
		Directive photographing	Providing raw materials for urban planning	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
4	Urban balance	Studies of developing northern governorates	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years
		Study of developing al Quneitra governorate	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	2 years
		Studies of local urban balance	Putting the basis for sustainable development	The results of Monitoring & evaluation reports	Ministry of local administration and environment	4 years