

SEWERAGE SYSTEMS IN CYPRUS
National Implementation Programme
Directive 91/271/EEC
for the treatment of Urban Waste Water

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«Water Treatment – Sewage»

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Introduction

- The Council Directive 91/271/EEC **concerns** the collection, treatment and discharge of urban wastewater **with objective** the protection of the environment.
- According to Article 17 of the Directive, Cyprus **established an Implementation Programme** which concerns:
 - 57 Agglomerations
 - Population Equivalent(p.e.) 860.000
 - Investments €1.430 million
 - Co-Financing by EU €125 million
- The Ministry of Agriculture, Natural Resources and Environment has the overall **responsibility for the implementation of the Directive**

Requirements of the Directive 91/271/EEC

- **Installation** of collection networks and wastewater treatment plants for secondary or equivalent treatment, in the agglomerations with population equivalent (p.e.) greater than 2000, (Articles 3 and 4)
- **More stringent treatment in sensitive areas** which are subject to eutrophication – removal of Nitrogen and Phosphorus (Article 5)
- **Monitoring of discharge** of treated water and sludge (quality, issuance of disposal permits) (Article 15)
- **Reporting** to the European Commission
 - Monitoring Report (Article 15)
 - Situation Report (Article 16)
 - Implementation Programme Report (Article 17)
- **Transposition** of the Directive to the National Legislation (Article 19)

Important Definitions

- **‘Agglomeration’** : an area where the population and/or the economic activities are sufficiently concentrated for urban wastewater to be collected and conducted to an urban wastewater treatment plant.
- **Population Equivalent (p.e.)**: Expresses the size of an agglomeration in pollutant load or the capacity of a wastewater treatment plant and includes:
 - Permanent population
 - Seasonal population(visitors and Tourism)
 - Industries
- **“1 p.e. unit of population Equivalent”**: ~ 60g BOD₅/day
- In Cyprus the **concentration of BOD₅** in Urban Wastewater is estimated to be 500mg/l.

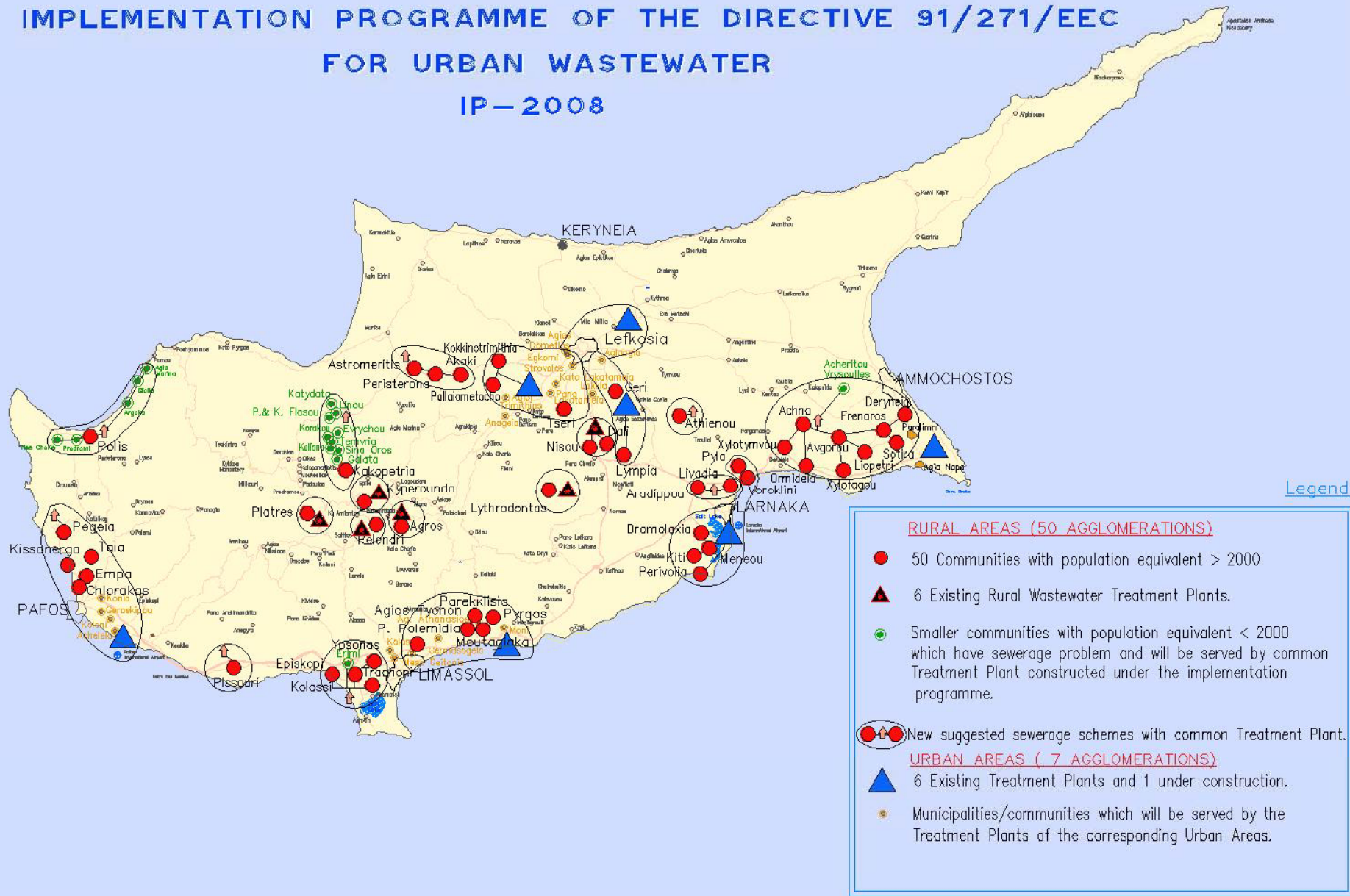
Cyprus Implementation Programme (IP) - General

- Cyprus has **submitted** until today 2 IP:
 - IP 2005- Census 2001 and data from Cyprus Tourism Organistaion (CTO) 2004
 - IP 2008- population forecasts for 2012 and CTO 2007 (update of IP-2005 according to the guiding document of the EU)
- According to the Directive, the Commission will be provided with an update of the information **every two years, if necessary.**
- For the monitoring and the evaluation of the implementation progress of the IP, a **Ministerial Committee** was established which consists of the Minister of Agriculture, Natural Resources and Environment (**President**) and the Ministers of Interior and Finance.

Description of IP-2008

Population Forecasts	2012
CTO Data	2007
Number of Urban Agglomerations	7
Number of Rural Agglomerations	50
Total Number of Agglomerations	57
Urban Agglomerations Load	630.000 (73%)
Rural Agglomerations Load	230.000 (27%)
Total Load of IP in p.e.	860.000

IMPLEMENTATION PROGRAMME OF THE DIRECTIVE 91/271/EEC FOR URBAN WASTEWATER IP-2008



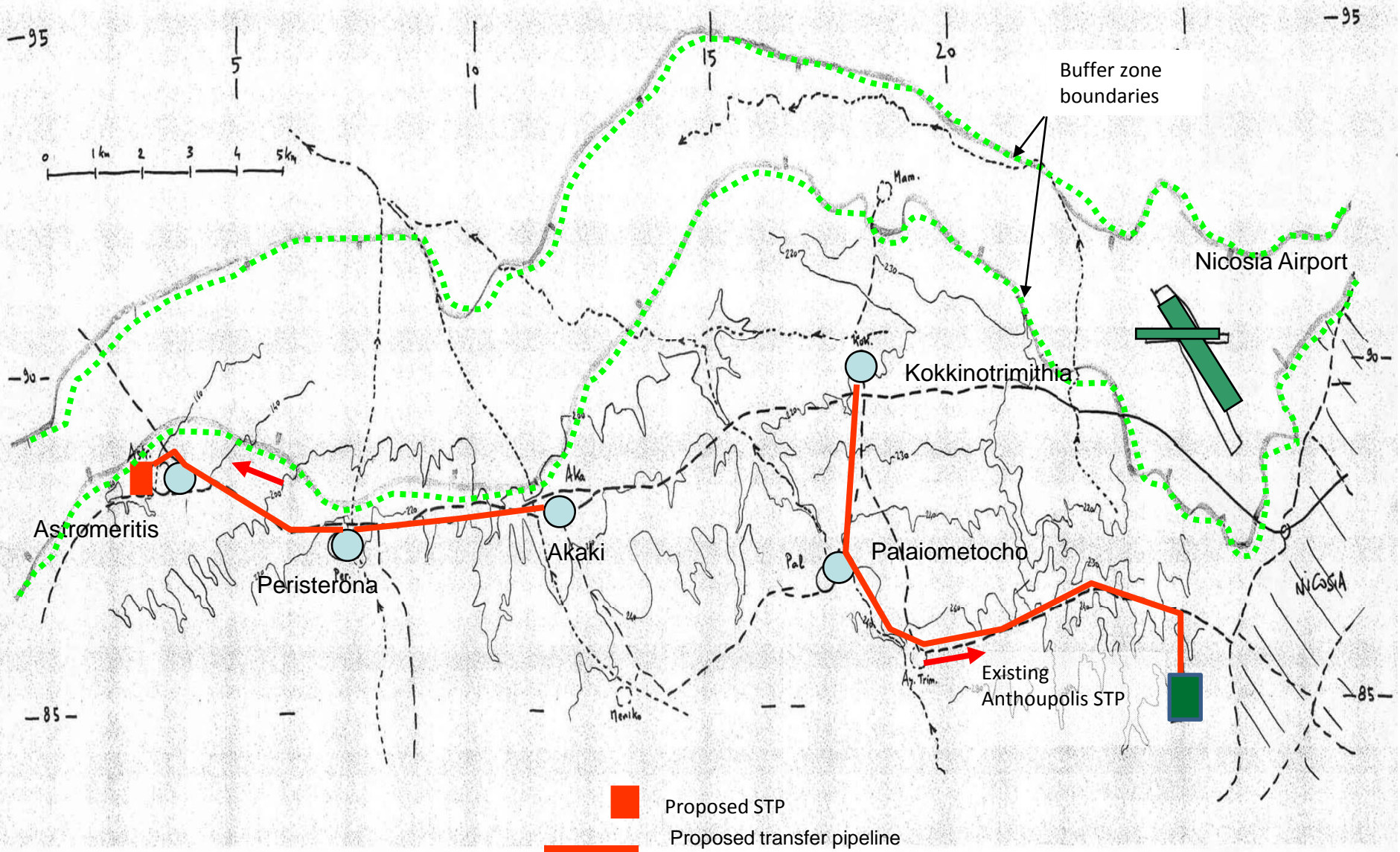
RURAL AREAS (50 AGGLOMERATIONS)

- 50 Communities with population equivalent > 2000
- ▲ 6 Existing Rural Wastewater Treatment Plants.
- Smaller communities with population equivalent < 2000 which have sewerage problem and will be served by common Treatment Plant constructed under the implementation programme.
- New suggested sewerage schemes with common Treatment Plant.

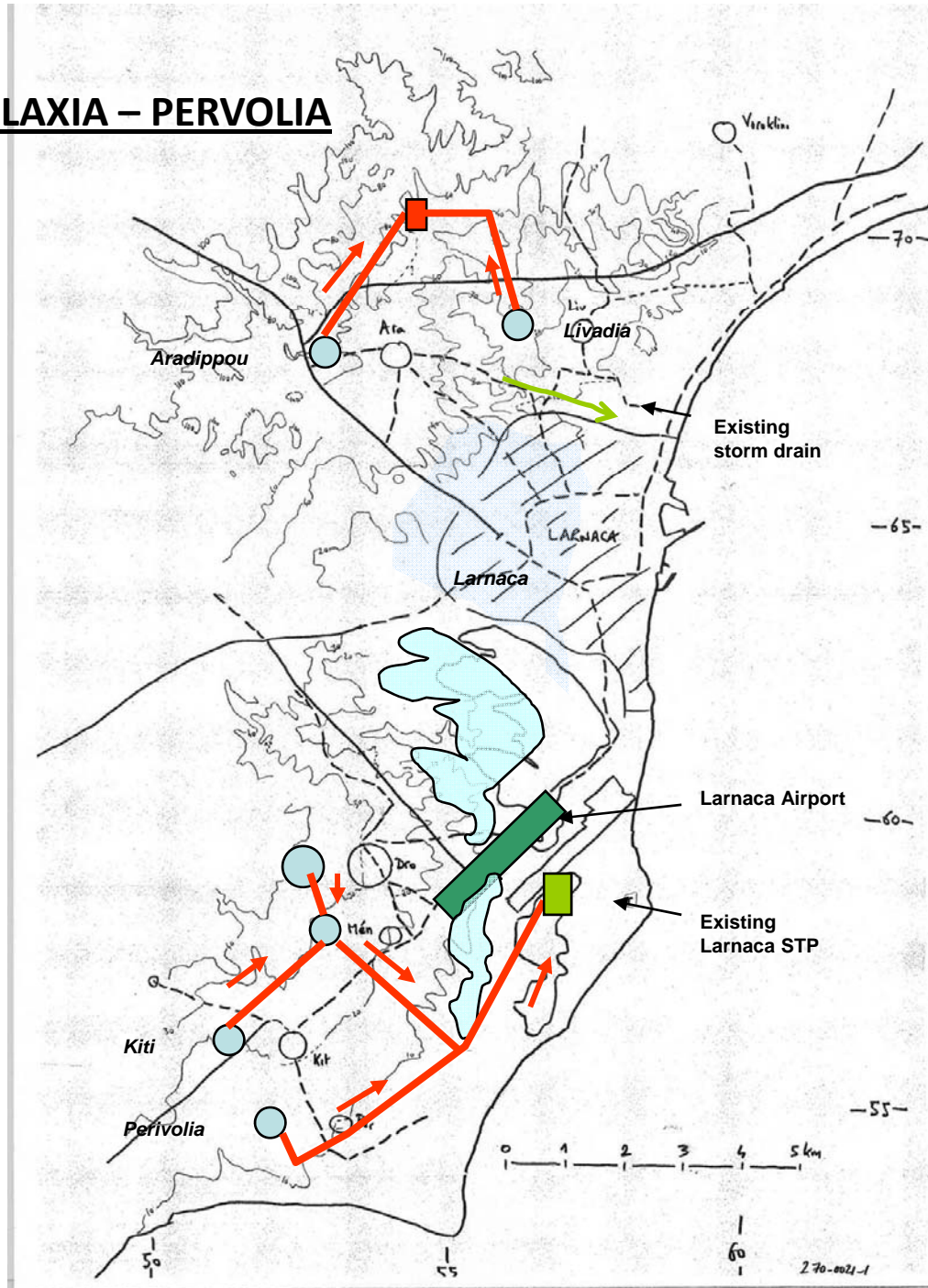
URBAN AREAS (7 AGGLOMERATIONS)

- ▲ 6 Existing Treatment Plants and 1 under construction.
- Municipalities/communities which will be served by the Treatment Plants of the corresponding Urban Areas.

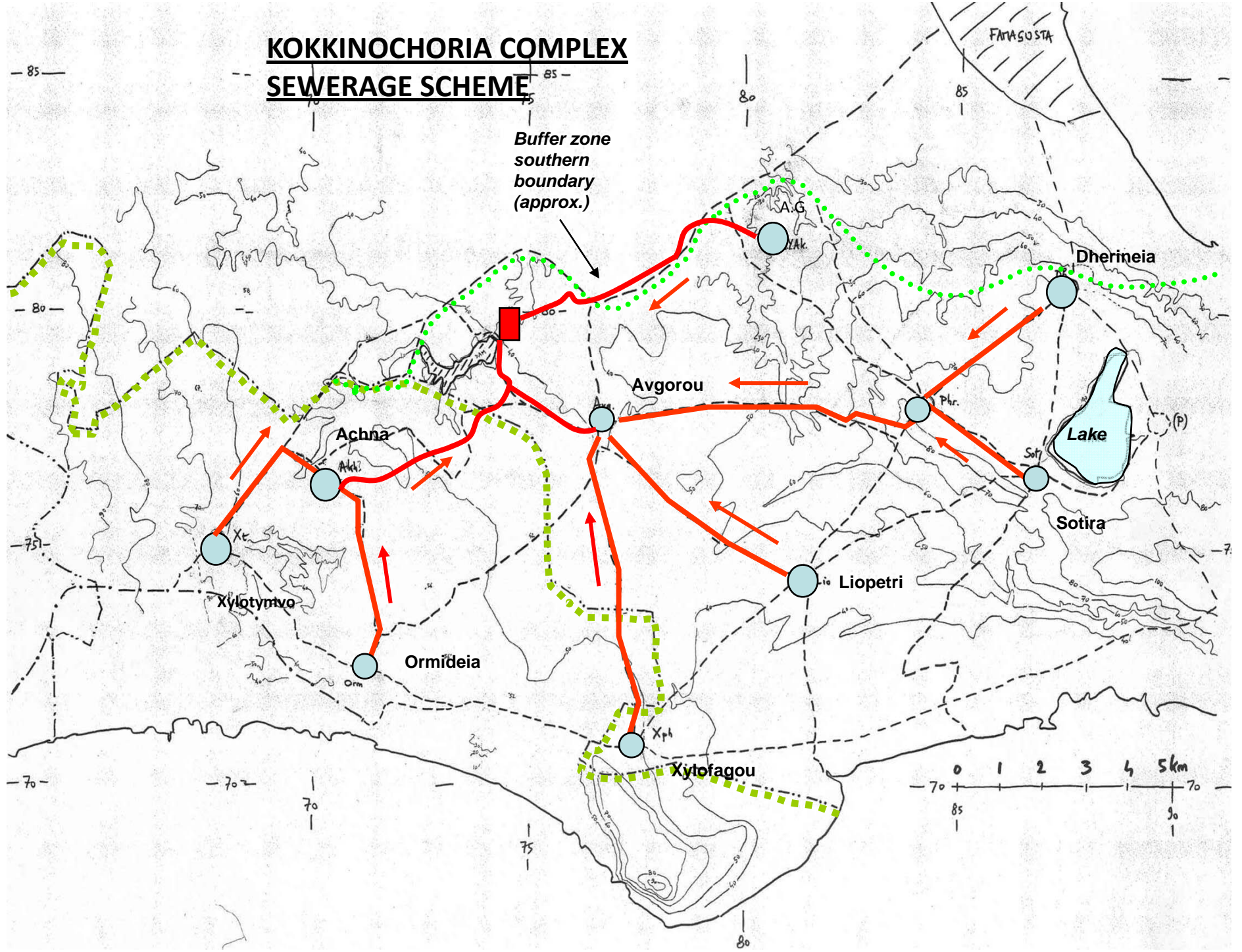
ASTROMERITIS – PERISTERONA - AKAKI & KOKKINOTREMITHIA – PALIOMETOCHO SEWERAGE SCHEMES



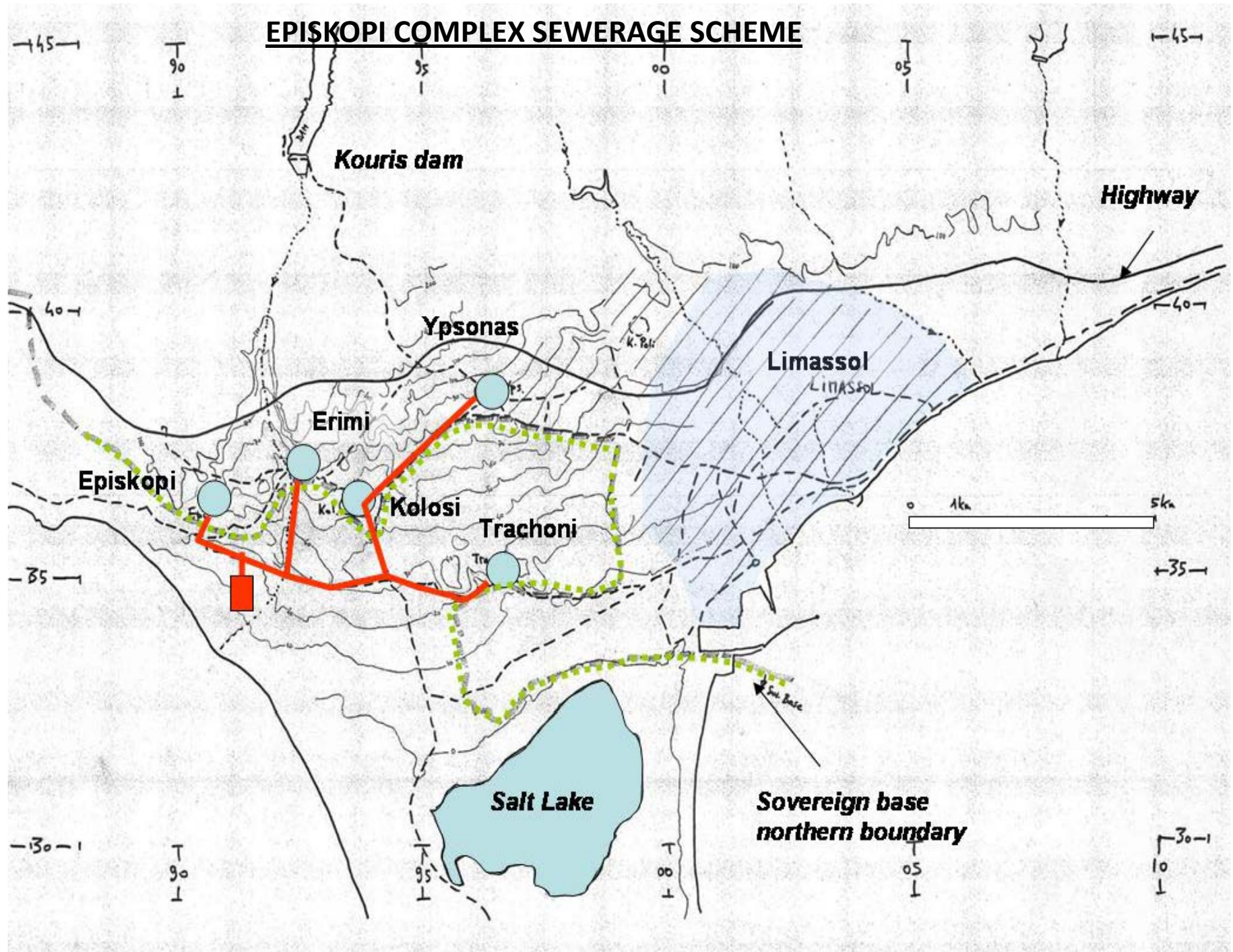
ARADIPPOU - LIVADIA
& KITI - MENEOU - DROMOLAXIA - PERVOLIA
SEWERAGE SCHEMES



KOKKINOCHORIA COMPLEX SEWERAGE SCHEME



EPISKOPI COMPLEX SEWERAGE SCHEME



Cyprus Compliance Dates

- The **Transitional Date** of Cyprus for compliance with the Directive is the 31st December 2012.
- **Intermediate Target Dates:**
 - 31-12-2008 : Limassol & Paralimni
 - 31-12-2009 : Nicosia
 - 31-12-2011 : Paphos

 - (31-12-2012: Larnaca, Agia Napa and Rural Agglomerations)

Construction Responsibilities

- **Urban Agglomerations** – Urban Sewerage Boards
- **Rural Agglomerations** – Water Development Department until the construction stage. **Exempted:**
 - The rural Municipalities that have the responsibility of construction for their own projects (eg Polis Chrysochous).
 - The suburban rural agglomerations that are integrated in the borders of the Urban Sewerage Boards. (Kokkinotremithia – Paliometochos).
 - The agglomerations Pelendri and Lythrodontas (Department of Town Planning and Housing).
 - **After the construction stage**, operation and maintenance of the sewerage schemes is taken over by the respective Sewerage Boards, with the technical support by WDD.

Current Situation – Urban Agglomerations

Collection Networks

- These have been fully completed by **SBPAN**.
- For the **remaining urban agglomerations** whilst a major part is constructed, the expansion is ongoing.

Waste Water Treatment Plants

- The **SBN** has completed the treatment plant at Anthoupolis and Vathia Gonia. The contract for the bi-communal treatment plant at Mia Milia was signed in early February 2010 and will be completed in two years.
- The **SBLA** implemented the expansion of the treatment plant in Moni and is planning the construction of a new treatment plant in Ypsonas in order to serve Ypsonas and Limassol western areas.
- The **SDBL** is planning the expansion of its treatment plant by 2013.
- The **SBPA** carries on with the expansion of its treatment plant.
- The **SBPAN** has completed the expansion of its treatment plant.

Current Situation – Rural Agglomerations

- **7 agglomerations** are provided with and operate centralised sewerage systems
(Dhali, Pera Chorio Nisou, Platres, Kyperounda, Agros, Lythrodontas, Pelendri).
- **9 agglomerations** their collection networks are under construction
(Astromeritis, Akaki, Peristerona, Athienou, Xylophagou, Geri, Emba, Chlorakas, Kissonerga).
- **12 agglomerations** plan their networks construction at the end of 2010
(Kokkinotremithia, Paliometochos, Tseri, Polis Chrysochous, Kakopetria, Ormideia, Xylotymvou, Achna, Avgorou, Derynia, Sotira, Liopetri).
- **5 agglomerations** under study (Pissouri, Peyia, Tala, Pyla, Oroklini).
- The implementation programme of the remaining **17 agglomerations** will depend on the Decision of the Ministerial Council regarding the proposed new Investment Programme.
- Tendering for the construction of **7 Waste Water Treatment Plants** is planned by the end of 2010 beginning of 2011
- The tenders for the treatment plant of Aradippou and Pissouri are **pending**.

Overall Compliance

Agglomeration	IP-2008 (p.e.)	Compliant (p.e.)	Compliance Percentage
Urban	630.000	412.000	66%
Rural	230.000	18.700	8%
TOTAL	860.000	430.700	50%

Compliance of Urban Agglomerations

Agglomeration	IP-2008 (p.e.)	Compliant (p.e.)	Compliance Percentage
Nicosia	220.000	132.000	60%
Limassol	145.000	115.000	79%
Larnaca	70.000	42.500	61%
Paphos	67.000	50.000	75%
Agia Napa	27.000	27.5000	100%
Paralimni	45.000	45.5000	100%
Agia Fyla	55.000	0	0%
TOTAL	630.000	412.000	66%

Compliance of Rural Agglomerations in terms of p.e.

Agglomeration	IP-2008 (p.e.)	Compliant (p.e.)	Compliance Percentage
Dhali	7.000	3.500	50%
Pera Chorio	4.000	2.000	50%
Kyperounda	2.200	2.200	100%
Platres	2.000	2.000	100%
Agros	2.500	2.500	100%
Lythrodontas	3.500	3.500	100%
Pelendri	2.200	3.000	100%
Remainig 43	206.600	0	0%
TOTAL	230.000	18.700	8%

In terms of number of agglomerations in compliance: 14% (7 out of 50)

Total Collection Networks – Future Tenders - % Compliance

Agglomerations	Constructed (km)	Under Construction (km)	Invitation for Tenders (km)	Total Collection Networks (km)	Compliance %
Urban	1.825	275 (110)	670	2.770	70%
Rural	65	305 (100)	1.173	1.543	11%
Total	1.890	580 (210)	1.843	4.313	49%

NB: The brackets include the Km that have already been constructed in the running contracts

Collection Networks – Urban Agglomerations (Current Situation and Future Tenders)

Agglomerations	Contracting Authority	Collection Networks (Km)	Implementation Stage
Nicosia	SBN	1.110	Constructed 1.050 Km. Under construction 60 Km.
Limassol	SBLA	750	Constructed 350 Km. Under construction 130 Km. Tendering 270 Km gradually from December 2010.
Agia Fyla	SBLA	260	Constructed 20 Km. Under construction 40 Km. Tendering 200 Km gradually from December 2010.
Larnaca	SDBL	320	Constructed 120 Km. Commencement of Construction 25 Km June 2010. Tendering of 175 Km gradually from the beginning of 2011.
Paphos	SBPA	220	Constructed 175 Km. Under construction 45 Km.
Paralimni & Agia Napa	SBPAN	110	Completed

Collection Networks – Rural Agglomerations (1/3)

(Current Situation and Future Tenders)

Agglomerations	Contracting Authority	Collection Networks (Km)	Implementation Stage
NICOSIA DISTRICT			
Astromeritis – Peristerona - Akaki	WDD	63	Under construction
Lythrodontas	DTPH	13	Constructed
Kokkinotremithia	SBN	50	Invitation for Tenders April 2010
Paliometochos - Ag. Tremithias	SBN	68	Invitation for Tenders May 2010
Dhali – Pera Chorio Nisou	SBN	33	Invitation for Tenders December 2010
Lympia	SBN	24	Invitation for Tenders December 2010
Kakopetria – Galata	WDD	30	Invitation for Tenders March 2010
Geri	SBN	60	Under construction
Tseri	SBN	50	Works initiation April 2010

Collection Networks – Rural Agglomerations (2/3)

(Current Situation and Future Tenders)

Agglomerations	Contracting Authority	Collection Networks (Km)	Implementation Stage
LIMASSOL DISTRICT			
Kyperounda – Pano Platres – Agros	WDD	42	Constructed
Pelendri	DTPH	10	Constructed
Ypsonas - Kolossi- Episkopi - Trachoni – Erimi	SBLA	217	Invitation for Tenders in 2011
Pissouri	WDD		Under study
Pano Polemidia, Agios Tychonas, Mouttagiaka, Parekklesia, Pyrgos	SBLA	143	Invitation for Tenders end of 2010
PAPHOS DISTRICT			
Polis Chrysochous	SBPCh	37	Invitation for Tenders June 2010
Emba, Chlorakas, Kissonerga	SBPA	100	Under construction
Tala, Peyia		60	Under study

Collection Networks – Rural Agglomerations (3/3)

(Current Situation and Future Tenders)

Agglomerations	Contracting Authority	Collection Networks (Km)	Implementation Stage
LARNACA DISTRICT			
Aradippou	WDD – SDBL	132	The integration of the Municipality with SDBL is pending
Kiti – Pervolia – Meneou – Dromolaxia	SDBL	118	Invitation for Tenders in 2011
Athienou	WDD	36	Under construction
Ormideia – Xylotymvou	WDD	40	Tenders Evaluation Stage
Xylophagou	WDD	46	Under construction
Livadia - Pyla – Voroklini	WDD & SDBL		Under Study
FAMAGUSTA DISTRICT			
Achna – Avgorou	WDD	46	Invitation for Tenders 03/2010
Derynia		40	Invitation for Tenders 04/2010
Sotira – Liopetri		54	Invitation for Tenders 05/2010
Phrenaros - Acheritou		31	Invitation for Tenders 06/2010

Urban Wastewater Treatment Plants in Operation

Treatment Plant	Utilisation Body	Capacity (m ³ /day)
Anthoupolis	SBN	13.000
Vathia Gonia	SBN	22.000
Vathia Gonia	WDD	2.100
Mia Milia	UNDP (Under construction)	30.000
Limassol (Moni)	SBLA	40.000
Larnaca (Airport)	SDBL	8.500 (18.000)
Paphos (Achelia)	SBPA	8.000 (19.500)
Paralimni – Agia Napa	SBPAN	21.000

NB: The brackets include the future expansions of the plants



ANTHOUPOLIS PLANT



VATHIA GONIA PLANT (SBN)



VATHIA GONIA PLANT (W.D.D.)



SBLA PLANT IN MONI



SDBL LARNACA PLANT (AIRPORT)



SBPA PLANT (ACHELIA)



PARALIMNI – AGIA NAPA PLANT

Rural Wastewater Treatment Plants in Operation (>2000 p.e.)

Plant	Utilisation Body	Capacity (m ³ /day)
Kyperounda	Kyperounda S.B.	300
Platres	Platres S.B.	200
Agros	Agros S.B.	250
Lythrodontas	Lythrodontas S.B.	300
Pelendri	Pelendri S.B.	300
Dhali	Dhali S.B.	500



PLATRES PLANT



AGROS PLANT



KYPEROUNDA PLANT

Rural Wastewater Treatment Plants to be constructed

Plant	Contracting Authority	Capacity (m ³ /day)	Invitation for Tenders
Astromeritis	WDD	1.800	November 2010
Athienou	WDD	1.100	November 2010
Achna	WDD	11.000	November 2010
Skouriotissa (Solea)	WDD	1.500	Beginning of 2011
Polis Chrysochous	SBPCh	3.500	June 2010
Episkopi	SBLA	20.000	Beginning of 2011
Ypsonas	SBLA	20.000	End of 2010
Aradippou	WDD & SDBL	5.000	Under study
Pissouri	WDD	700	Under study

Conditions of Contract – Rural Contracts

Waste Water Treatment Plants (and associated works)

- FIDIC Contracts
- Design-Built-Operate (DBO)
- 20 years operation and maintenance period
- The treated water quality is specified
- The treatment method is defined by the Tenderer

Collection Networks

Terms of Contracts for construction of Civil Engineering
Public Works

- With estimated quantities
- Based on the conditions of FIDIC Contracts

Required Investments

Agglomerations	Expenditure until 2009 € m.	Remaining Expenditure € m.	Total Required Expenditure € m.
Urban	455	250	705
Rural	25	700	725
Total	480	950	1.430

The Remaining Expenditure of €700 million for the **rural agglomerations** will be derived from:

- Government Contributions €385 million
- Communities Contributions €190 million
- Co-financing €125 million

Government Subsidies

Rural Communities

- **80% of the capital investment** (collection networks, conveyance pipeline, waste water treatment plant, treated effluent storage pond and conveyance pipeline to the irrigation area)
- **100% of the plant capital investment** or its required expansion for the communities that are integrated in the Urban Sewerage Boards
- **100% of the capital investment** of the plant and the conveyance pipeline, for the communities in the boundaries of which the common waste water treatment plant will be installed, in the case of agglomerations.
- The contribution of each community **is reduced to 50%** in the case that the project is co-financed by the Cohesion Fund
- **No subsidy** for the operation and maintenance of the sewerage systems

Urban Sewerage Boards

- **100%** of the capital and operational expenditure of the tertiary treatment

Co-Financing by EU

- It is expected that an amount of **€125million** will be co-financed by the **Cohesion Fund 2007-2013** (Programme Sustainable Development and Competitiveness)
- The **Co-financed Projects** are:
 - Astromeritis – Akaki – Peristerona Complex
 - Athienou Municipality
 - Kokkinochoria Complex
 - Solea Complex
- For the **Co-financed Projects**
 - Beneficiary:** Water Development Department
 - Managing Authority:** Planning Bureau
 - Intermediate Body:** Ministry of Communications and Works

Financing

- The Ministry of Finance in cooperation with WDD continue their consultations with the **European Investment Bank (EIB)** in order to ensure financing **up to 50% of the required expenditure of €700million** for the sewerage projects of the rural communities.
- The Urban Sewerage Boards have ensured **their loans** from EIB and other European Banks

Study on the Organisation Structure of the Rural Sewerage Boards

- **Goal:** Defining the most appropriate Organisation Structure for implementation and operation of sewerage projects in rural communities
- **Examination of 3 strategic options**
 - A) Agglomeration of neighbouring rural communities
 - B) Establishment of District Sewerage Boards (1 per district)
 - C) Establishment of one Sewerage Board for the whole country
- **Conclusion:** Option B is the most advantageous in the long term

Problems encountered in the Implementation Programme

- **Strong objections by the communities relating to the:**
 - Location of plants and pumping stations
 - Usage of treated wastewater
 - Representation of communities in the unified Sewerage Boards
 - Incorporation of suburban communities in the Urban Sewerage Boards
- **Delay in the “maturity” of projects due to time consuming procedures for the:**
 - Establishment of Sewerage Boards and regulations issuance
 - Loans approval
 - Required land acquisition
- **Difficulties in finding big areas of land for the construction of the :**
 - Waste water treatment plants
 - Treated effluent storage ponds

Quality of Treated Waste Water

- Wastewater treatment: **tertiary**
- **Very strict** quality criteria due to reuse
 - BOD₅ : 10mg/l
 - SS : 10mg/l
 - Faecal Coliforms : 5 E. Coli/100ml
 - Eggs of intestinal worms : nil
- The produced treated water is appropriate for irrigation **of all the cultivations** except from leafy vegetables and bulbs that can be eaten raw

Re-use of Treated Wastewater

- In **2009** ~**13million m³** of treated water were produced which were used as follows:
 - 8,2million m³ for irrigation of cultivations and green areas
 - 2,3million m³ for recharge of Ezousa aquifer
 - 1,2million m³ for storage in Polemidia dam
 - 1,3million m³ disposal in the sea during the winter months
(due to no demand and maintenance of storage reservoirs in Larnaca)
- In **2025** it is estimated that ~**85million m³** will be produced

Contribution of the Treated Water to the Water Balance

- In **2009** **4,4 million m³** were integrated in the Water Balance (in the Southern Conveyor project)
- In **2010** in conditions of continuous water supply (without water cuts) it is expected that **6 million m³** will be integrated

Projections for the Implementation of the Directive by 2012

- In the past three years **many problems were resolved** (technical, legal, procedural, organisational), the investment programme and the financing of the projects were established having as target the project completion by the end of 2012 as the requirements of the Directive.
- Due to the large required investment for the Implementation Programme and the reduction of the Government budget due to the world's financial crisis, **a proposal has been forwarded to the Council of Ministers** regarding the approval of a new Investment Program in relation to the implementation of the Directive beyond 2012.

The End

Thank you for your attention

For further information

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Glossary

- WDD – Water Development Department
- DTPH – Department of Town Planning and Housing
- SDBL – Sewerage & Drainage Board of Larnaca
- SBN – Sewerage Board of Nicosia
- SBLA – Sewerage Board of Limassol and Amathous
- SBPCh – Sewerage Board of Polis Chrysochous
- SBPA – Sewerage Board of Paphos
- SBPAN – Sewerage Board of Paralimni – Agia Napa