

# WORKSHOP ON THE QUALITY OF RECYCLED WATER AND ITS APPLICATION IN AGRICULTURE

Organised by: SEWERAGE BOARD OF LIMASSOL-  
AMATHUS

LIMASSOL 27 APRIL 2012



WATER DEVELOPMENT  
DEPARTMENT  
1047 NICOSIA



REPUBLIC OF CYPRUS  
MINISTRY OF AGRICULTURE , NATURAL  
RESOURCES AND ENVIRONMENT

# TREATED EFFLUENT REUSE SCHEME IN CYPRUS

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# **1. Integrated Water Management Law N. 79(I) / 2010**

## **PART V - WASTEWATER**

**Based on the new law, Water Development Department is responsible for the following regarding wastewater treatment:**

- **Establishment of wastewater treatment system**
- **Storm water drainage system establishment**
- **Local authority technical advisor**
- **Technical Advisor for Sewerage Boards**
- **Sewage Treatment of all Buildings of the Republic**
- **Supply of water from the treatment of sewage**



## 2. Wastewater Treatment Plants

### a) Existing Urban Wastewater Treatment Plants

<b>Plant</b>	<b>Owner of the Plant</b>	<b>Capacity (m<sup>3</sup> / day)</b>
<b>Anthoupoli</b>	<b>Nicosia Sewerage Board</b>	<b>13.000</b>
<b>Vathia Gonia</b>	<b>Nicosia Sewerage Board</b>	<b>22.000</b>
<b>Vathia Gonia</b>	<b>Water Development Department</b>	<b>2.100</b>
<b>Mia Milia</b>	<b>UNDP (under construction)</b>	<b>30.000</b>
<b>Limassol (Moni)</b>	<b>Sewerage Board of Limassol Amathus</b>	<b>40.000</b>
<b>Larnaca</b>	<b>Sewerage Board of Larnaca</b>	<b>8.500 (18.000)</b>
<b>Paphos (Achelia)</b>	<b>Sewerage Board of Paphos</b>	<b>19.500</b>
<b>Paralimni –Ayia Napa</b>	<b>Sewerage Board of Paralimni- Ayia Napa</b>	<b>21.000</b>

## **b. CENTRAL MUNICIPAL AND INDUSTRIAL WASTEWATER TREATMENT PLANT IN VATHIA GONIA**

This plant has been constructed by the Water Development Department and treats waste which is transferred by tankers from the districts of Nicosia and Larnaca (areas which are not connected yet with sewer system but they use septic tanks).

It also treats five types of industrial waste, transferred also by tankers such as:

- dairy washings,
- fat oil and grease,
- washings from metals,
- strong organic waste and
- weak organic waste.

It also treats the surplus activated sludge from small wastewater treatment plants.

## c) Existing Rural Wastewater Treatment Plants (> 2000p.e.)

Plant	Owner	Capacity (m <sup>3</sup> /day)
Kyperounta	Sewerage Board of Kyperounta	300
Platres	Sewerage Board of Platres	300
Agros	Sewerage Board of Agros	450
Lythrodontas	Sewerage Board of Lythrodontas	360
Pelentri	Sewerage Board of Pelentri	300
Dali	Sewerage Board of Dali –Pera Chorio Nisou	500

## d) Existing Rural Wastewater Treatment Plants ( < 2000p.e.)

A/A	Plant	Owner	Capacity (m <sup>3</sup> /day)
1	Alassa	Limassol District Officer	80
2	Askas	Sewerage Board of Askas	36
3	Kakopetria (Center)	Sewerage Board of Kakopetria	144
4	Agglissides	Sewerage Board of Agglissides	90
5	Palechori	Sewerage Board of Palechori	300

## e) Existing Wastewater Treatment Plants for Refugee Housing

A/A	Plant	Capacity (m <sup>3</sup> /day)
1	Kofinou	80
2	Livadia	36
3	Arediou	90

## f) Existing Wastewater Treatment Plants for Hospitals

A/A	Plant	Capacity (m <sup>3</sup> /day)
1	Nicosia New Hospital	700
2	Larnaca Hospital	300
3	Limassol Hospital	280

## g) Existing Wastewater Treatment Plants for Military Camps

A/A	Plant	Capacity (m <sup>3</sup> /day)
1	Military Camp 1	100
2	Military Camp 2	72
3	Military Camp 3	70
4	Military Camp 4	72
5	Military Camp 5	120
6	Military Camp 6	50
7	Military Camp 7	140
8	Military Camp 8	24
9	Military Camp 9	36

# CYPRUS NATIONAL IMPLEMENTATION PROGRAMME (NIP-2008) OF THE URBAN WASTEWATER TREATMENT DIRECTIVE

91/271/EEC

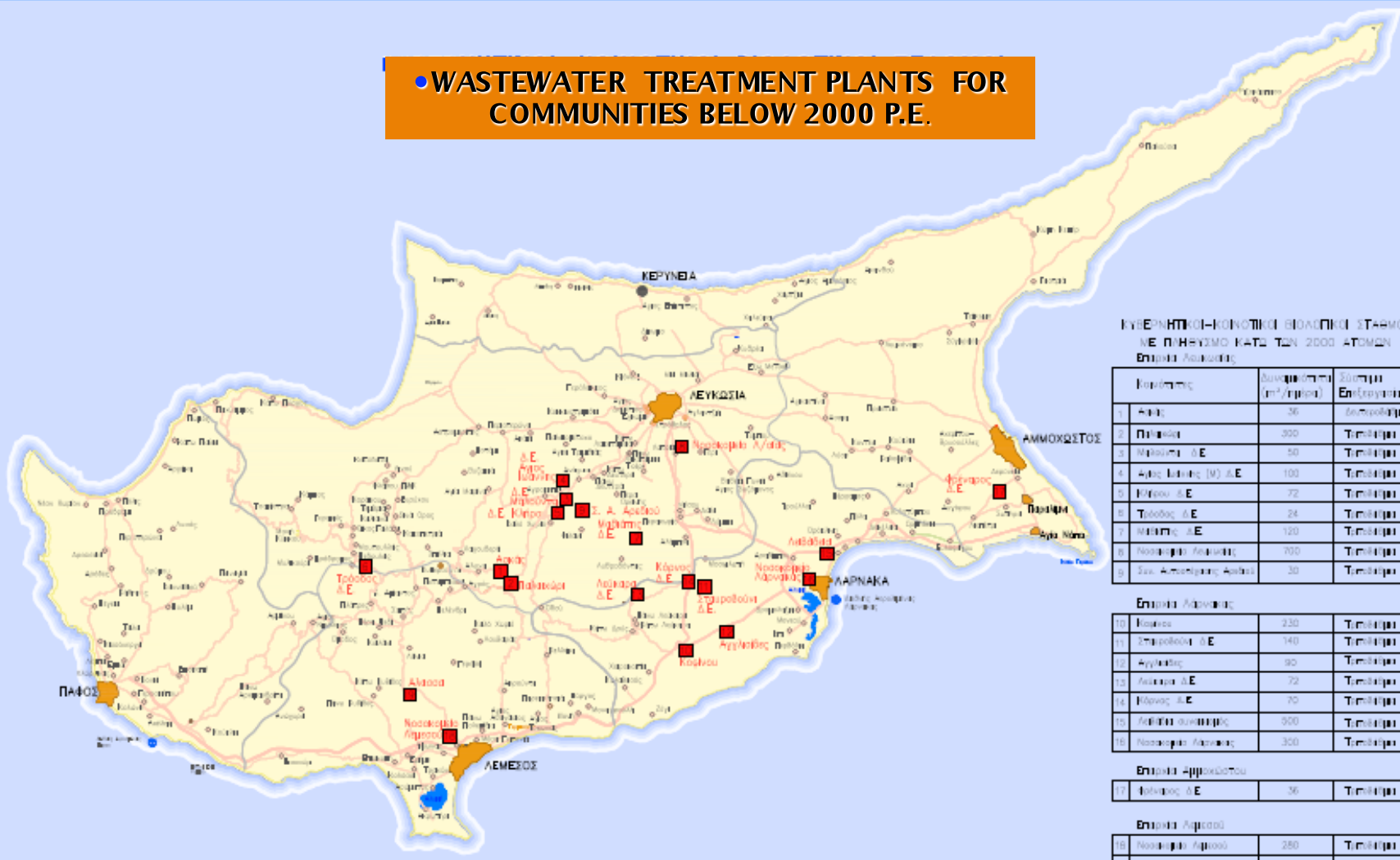


Date: June 2010

Prepared and printed by the Water Development Department  
Dwg. Ref.: NIP-2008



• **WASTEWATER TREATMENT PLANTS FOR COMMUNITIES BELOW 2000 P.E.**



ΕΥΡΕΝΗΤΙΚΗ-ΚΟΝΤΙΝΗ ΒΙΟΛΟΓΙΚΗ ΣΤΑΘΜΟΙ  
ΜΕ ΠΛΗΘΥΣΜΟ ΚΑΤΩ ΤΩΝ 2000 ΑΤΟΜΩΝ  
Επιπλέον Αρδεύσεις

Κοινότητα	Δυναμικότητα (m <sup>3</sup> /ημέρα)	Σύστημα Επεξεργασίας
1. Αλάτι	36	Βιολογικό
2. Πάφος	300	Τιμολόγο
3. Νεοκώμη Δ.Ε	50	Τιμολόγο
4. Αγιος Ιωάννης (Ν) Δ.Ε	100	Τιμολόγο
5. Κόρυθος Δ.Ε	72	Τιμολόγο
6. Τυροκόπος Δ.Ε	24	Τιμολόγο
7. Νεοκώμη Δ.Ε	120	Τιμολόγο
8. Νεοκώμη Αρδεύσεις	700	Τιμολόγο
9. Σύν. Αρδεύσεων Αλάτι	30	Τιμολόγο

Επιπλέον Αρδεύσεις

10. Κορυθός	230	Τιμολόγο
11. Στραπολόφι Δ.Ε	140	Τιμολόγο
12. Αγγιλιές	90	Τιμολόγο
13. Λεμεσός Δ.Ε	72	Τιμολόγο
14. Κόρυθος Δ.Ε	70	Τιμολόγο
15. Λεμεσός Αρδεύσεις	900	Τιμολόγο
16. Νεοκώμη Αρδεύσεις	300	Τιμολόγο

Επιπλέον Αρδεύσεις

17. Λεμεσός Δ.Ε	36	Τιμολόγο
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Επιπλέον Αρδεύσεις

18. Νεοκώμη Αρδεύσεις	280	Τιμολόγο
19. Αλάτι	60	Τιμολόγο

Δ.Ε = Αρχαίοι Ελληνιστές

Σχεδιαστική και τυπολόγηση από το Τμήμα Αναστήλωσης Υδάτων  
Οκτώβριος 2011

### 3. SUPPLY OF TREATED EFFLUENT

The policy of the Government is that the treated effluent produced by the Urban Sewerage Boards will be handled and disposed by the Government. For this reason the Water Development Department is responsible for the supply of treated effluent from the urban wastewater treatment plants.

The cost for the construction and the operation and maintenance of the tertiary treatment plant carried out by the Urban Sewerage Boards is undertaken by the Government.

## 4. REUSE OF TREATED EFFLUENT

IN CYPRUS THE TREATED EFFLUENT FROM THE URBAN WASTEWATER TREATMENT PLANTS IS REUSED FOR THE FOLLOWING PURPOSES :

- IRRIGATION
- ENRICHMENT OF UNDERGROUND WATER (PAPHOS WASTEWATER TREATMENT PLANT)

THE IRRIGATION IS DONE UNDER THE CODE OF CORRECT AGRICULTURAL PRACTICE.

### 4.1 OTHER WAYS OF DISPOSAL

- DISCHARGE INTO THE SEA

IN THE PAST YEARS DURING SOME WINTER MONTHS IN LARNACA AND LIMASSOL THERE WAS NO DEMAND AND SOME QUANTITIES WERE DISCHARGED INTO THE SEA.

## **5. QUANTITIES OF TREATED EFFLUENT PER PLANT**

### **TABLES AND GRAPHS ARE FOLLOWING WITH THE PRODUCED QUANTITIES OF TREATED EFFLUENT FOR THE YEARS 2004–2011**

**5.1 YEARLY QUANTITIES OF TREATED EFFLUENT PER PLANT**

**5.2 YEARLY QUANTITIES OF TREATED EFFLUENT USED FOR IRRIGATION**

**5.3 GRAPH FOR QUANTITIES OF TREATED EFFLUENT USED FOR IRRIGATION**

**5.4 YEARLY QUANTITIES OF TREATED EFFLUENT PER PLANT DISCHARGED TO THE SEA**

**5.5 GRAPH FOR LIMASSOL AND LARNACA PERCENTAGES OF TREATED EFFLUENT DISCHARGED TO THE SEA.**

**5.6 YEARLY QUANTITIES OF TREATED EFFLUENT USED FOR AQUIFER RESCHARGE**

**5.7 2004–2011 QUANTITIES AND USES OF TREATED EFFLUENT**

**5.8 TREATED EFFLUENT DISPOSAL FROM THE URBAN WASTEWATER TREATMENT PLANTS FOR THE YEAR 2011**

**5.9 2011 PERCENTAGES OF TREATED EFFLUENT DISPOSED**

**5.10 2011 USES OF TREATED EFFLUENT FROM URBAN WASTEWATER TREATMENT PLANT**

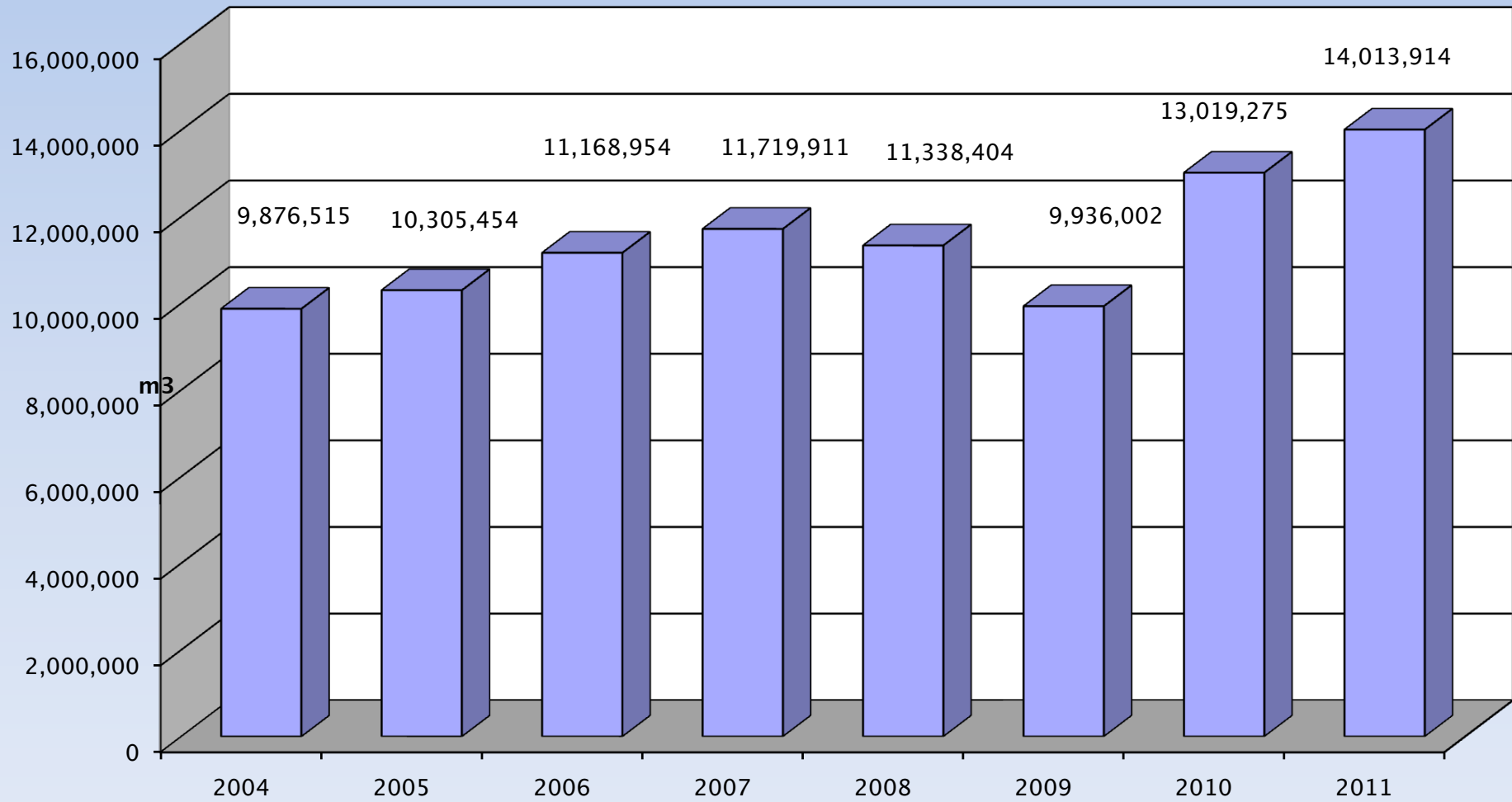
### 5.1 YEARLY QUANTITIES OF TREATED EFFLUENT PER PLANT

WASTEWATER TREATMENT PLANT	QUANTITIES (m <sup>3</sup> )							
	2004	2005	2006	2007	2008	2009	2010	2011
LIMASSOL	6.246.854	6.417.670	6.548.390	6.435.900	5.490.179	5.820.010	6.635.360	6.667.050
PAPHOS	1.837.730	2.177.883	2.952.463	2.553.812	2.380.061	2.325.182	2.460.547	2.293.563
AYIA NAPA	790.926	849.204	680.129	852.220	966.609	972.389	1.056.312	1.011.401
PARALIMNI	1.076.131	1.426.513	1.730.827	1.419.793	1.320.053	1.131.951	1.316.818	1.444.503
LARNAKA	2.287.663	1.876.764	2.139.196	1.935.294	1.840.117	1.774.498	2.021.626	2.198.119
ANTHOUPOLIS	297.600	297.600	292.000	292.000	295.376	573.357	828.362	976.715
VATHIA GONIA ( WDD)	457.930	365.502	419.553	335.237	310.874	314.958	293.905	230.640
VATHIA GONIA ( SBN)							647.034	1.699.626
<b>TOTAL PRODUCTION (m<sup>3</sup>) (A)</b>	<b>12.994.834</b>	<b>13.411.136</b>	<b>14.762.558</b>	<b>13.824.256</b>	<b>12.603.269</b>	<b>12.912.345</b>	<b>15.259.964</b>	<b>16.521.611</b>
REFUGEE HOUSINGS (3 -- 2007, 4 -- 2009,2010, 3 -- 2011)	275.575	275.575	275.575	275.575	323.025	323.025	323.025	277.400
HOSPITALS (4 -- 2007, 5 -- 2009, 2010, 4 -- 2011, )	368.650	368.650	368.650	368.650	540.200	540.200	540.200	474.500
SMALL COMMUNITIES < 2.000 P.E. (3 -- 2007, 4 -- 2009, 2010, 5 -- 2011)	167.900	167.900	167.900	167.900	204.400	204.400	204.400	237.250
MILITARY CAMPS (8 -- 2007, 9 -- 2009, 2010, 2011, )	150.745	150.745	150.745	150.745	249.660	249.660	249.660	249.660
RURAL COMMUNITIES > 2.000 P.E (4 -- 2007, 5 -- 2009, 6 -- 2010, 2011)	456.250	456.250	456.250	456.250	587.650	587.650	770.150	770.150
<i>SUBTOTAL (B)</i>	1.419.120	1.419.120	1.419.120	1.419.120	1.904.935	1.904.935	2.087.435	2.008.960
<b>GRAND TOTAL (A) +(B)</b>	<b>14.413.954</b>	<b>14.830.256</b>	<b>16.181.678</b>	<b>15.243.376</b>	<b>14.508.204</b>	<b>14.817.280</b>	<b>17.347.399</b>	<b>18.530.571</b>

5.2 YEARLY QUANTITIES OF TREATED EFFLUENT USED FOR IRRIGATION

WASTEWATER TREATMENT PLANT	IRRIGATION							
	2004	2005	2006	2007	2008	2009	2010	2011
LIMASSOL	3.842.671	4.131.167	4.716.458	5.466.247	4.700.440	3.822.240	5.055.630	4.826.700
PAPHOS	0	0	0	0	0	0	0	0
AYIA NAPA	790.926	849.204	680.129	852.220	966.609	972.389	1.056.312	1.011.401
PARALIMNI	1.076.131	1.426.513	1.730.827	1.419.793	1.320.053	1.131.951	1.316.818	1.444.503
LARNAKA	1.992.137	1.816.348	1.910.867	1.935.294	1.840.117	1.216.172	1.733.779	1.815.369
ANTHOUPOLIS	297.600	297.600	292.000	292.000	295.376	573.357	828.362	976.715
VATHIA GONIA ( WDD)	457.930	365.502	419.553	335.237	310.874	314.958	293.905	1.699.626
VATHIA GONIA ( SBN)							647.034	230.640
<b>TOTAL PRODUCTION (m<sup>3</sup>) (A)</b>	<b>8.457.395</b>	<b>8.886.334</b>	<b>9.749.834</b>	<b>10.300.791</b>	<b>9.433.469</b>	<b>8.031.067</b>	<b>10.931.840</b>	<b>12.004.951</b>
REFUGEE HOUSINGS (3 -- 2007, 4 -- 2009,2010, 3 -- 2011)	275.575	275.575	275.575	275.575	323.025	323.025	323.025	277.400
HOSPITALS (4 -- 2007, 5 -- 2009, 2010, 4 -- 2011, )	368.650	368.650	368.650	368.650	540.200	540.200	540.200	474.500
SMALL COMMUNITIES < 2.000 P.E. (3 -- 2007, 4 -- 2009, 2010, 5 -- 2011, 2012)	167.900	167.900	167.900	167.900	204.400	204.400	204.400	237.250
MILITARY CAMPS (8 -- 2007, 9 -- 2009, 2010, 2011, )	150.745	150.745	150.745	150.745	249.660	249.660	249.660	249.660
RURAL COMMUNITIES > 2.000 P.E (4 -- 2007, 5 -- 2009, 6 -- 2010, 2011,2012)	456.250	456.250	456.250	456.250	587.650	587.650	770.150	770.150
<i>SUBTOTAL (B)</i>	1.419.120	1.419.120	1.419.120	1.419.120	1.904.935	1.904.935	2.087.435	2.008.960
<b>GRAND TOTAL (A) +(B)</b>	<b>9.876.515</b>	<b>10.305.454</b>	<b>11.168.954</b>	<b>11.719.911</b>	<b>11.338.404</b>	<b>9.936.002</b>	<b>13.019.275</b>	<b>14.013.911</b>

### 5.3 GRAPH FOR QUANTITIES OF TREATED EFFLUENT USED FOR IRRIGATION

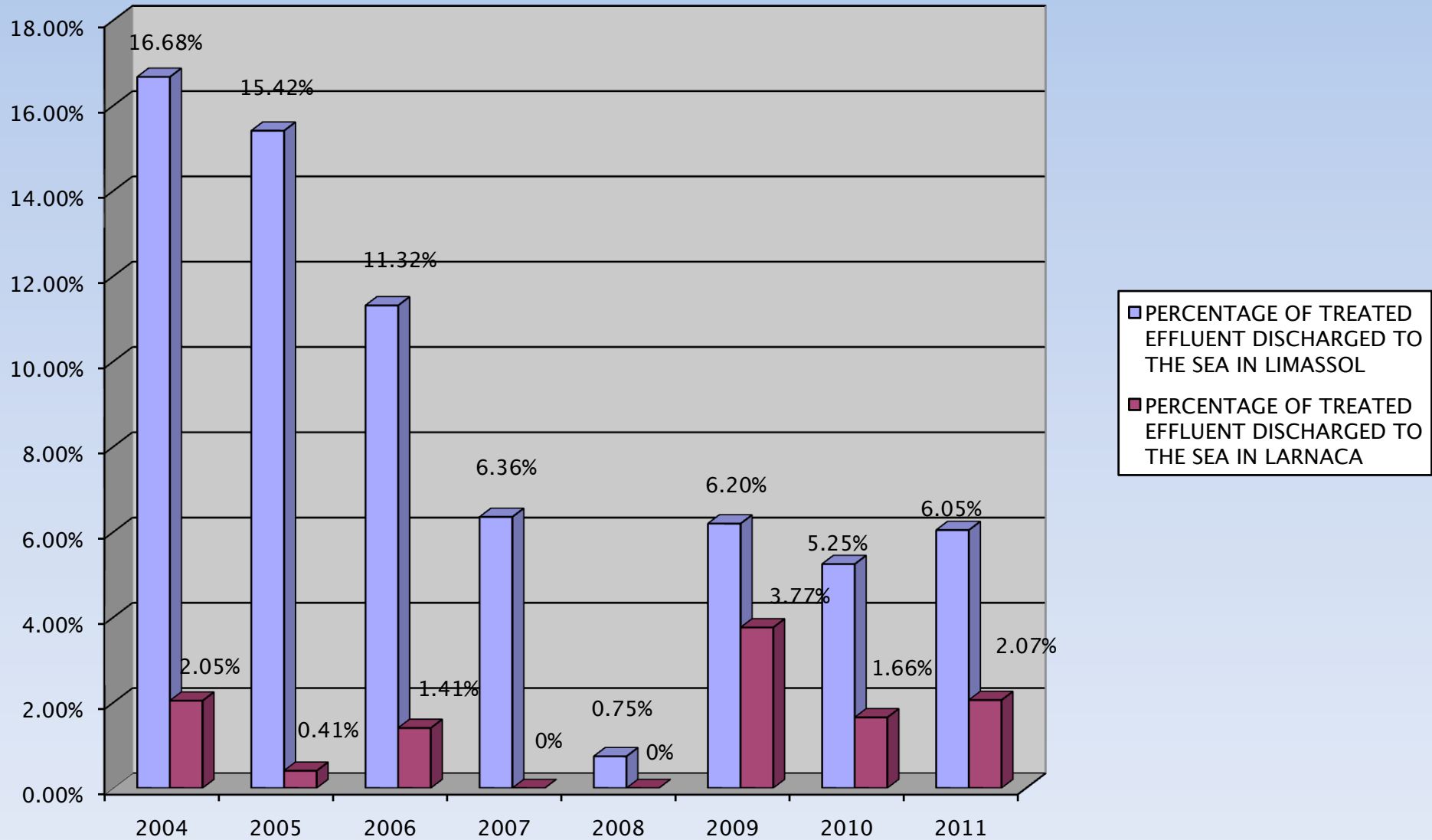


### 5.4 YEARLY QUANTITIES OF TREATED EFFLUENT PER PLANT DISCHARGED TO THE SEA

WASTEWATER TREATMENT PLANT	SEA							
	2004	2005	2006	2007	2008	2009	2010	2011
LIMASSOL	2.404.183	2.286.503	1.831.932	969.653	108.255	919.340	911.590	1.121.550
PAPHOS	0	0	0	0	0	0	0	0
AYIA NAPA	0	0	0	0	0	0	0	0
PARALIMNI	0	0	0	0	0	0	0	0
LARNAKA	295.526	60.416	228.329	0	0	558.326	287.847	382.750
ANTHOUPOLIS	0	0	0	0	0	0	0	0
VATHIA GONIA ( WDD)	0	0	0	0	0	0	0	0
VATHIA GONIA ( SBN)							0	0
<b>TOTAL PRODUCTION (m<sup>3</sup>) (A)</b>	<b>2.699.709</b>	<b>2.346.919</b>	<b>2.060.261</b>	<b>969.653</b>	<b>108.255</b>	<b>1.477.666</b>	<b>1.199.437</b>	<b>1.504.300</b>



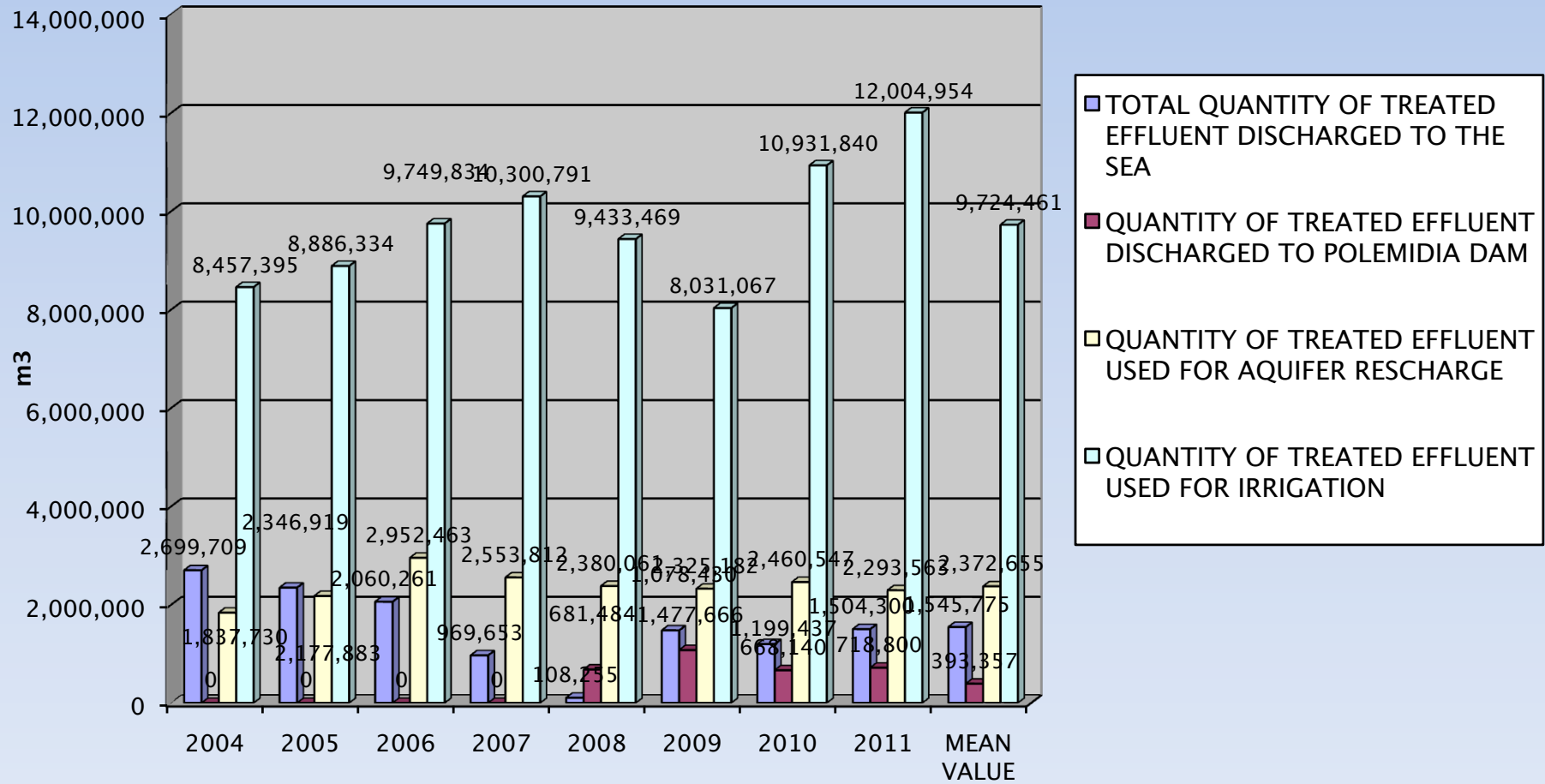
5.5 GRAPH FOR LIMASSOL AND LARNACA PERCENTAGES OF TREATED EFFLUENT DISCHARGED TO THE SEA



5.6 YEARLY QUANTITIES OF TREATED EFFLUENT USED FOR AQUIFER RESCHARGE

WASTEWATER TREATMENT PLANT	AQUIFER RESCHARGE							
	2004	2005	2006	2007	2008	2009	2010	2011
LIMASSOL								
PAPHOS	1.837.730	2.177.883	2.952.463	2.553.812	2.380.061	2.325.182	2.460.547	2.293.563
AYIA NAPA								
PARALIMNI								
LARNAKA								
ANTHOUPOLIS								
VATHIA GONIA ( WDD)								
VATHIA GONIA ( SBN)								
<b>TOTAL PRODUCTION (m<sup>3</sup>) (A)</b>	1.837.730	2.177.883	2.952.463	2.553.812	2.380.061	2.325.182	2.460.547	2.293.563

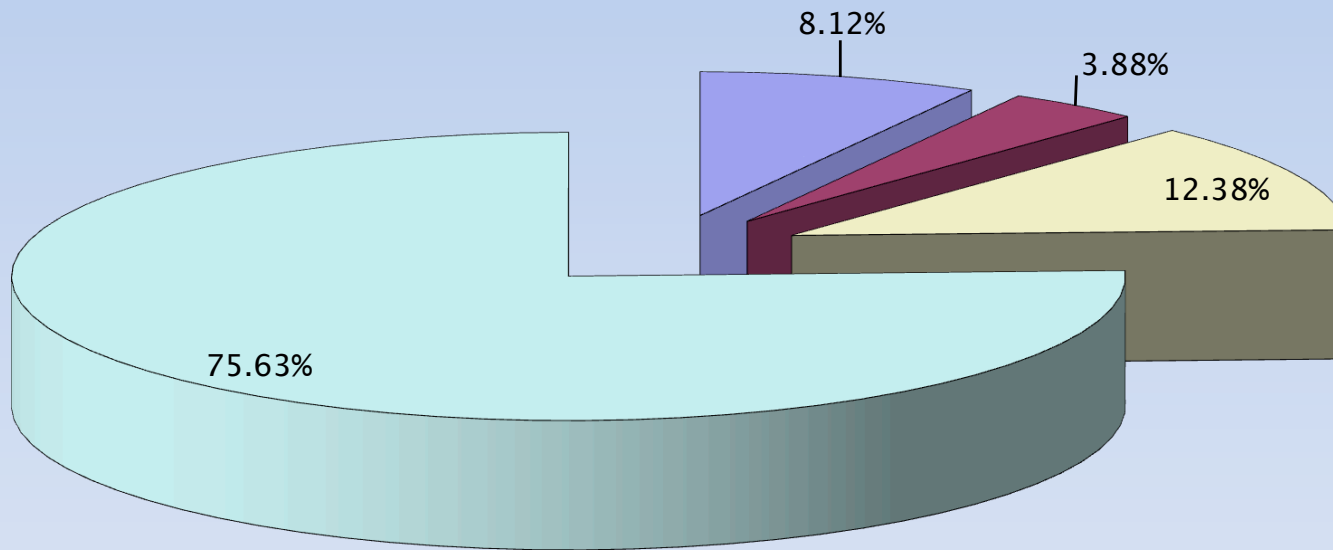
## 5.7 2004 - 2011 QUANTITIES AND USES OF TREATED EFFLUENT



5.10 TREATED EFFLUENT DISPOSAL  
FROM THE URBAN WASTEWATER TREATMENT PLANTS  
FOR THE YEAR 2011

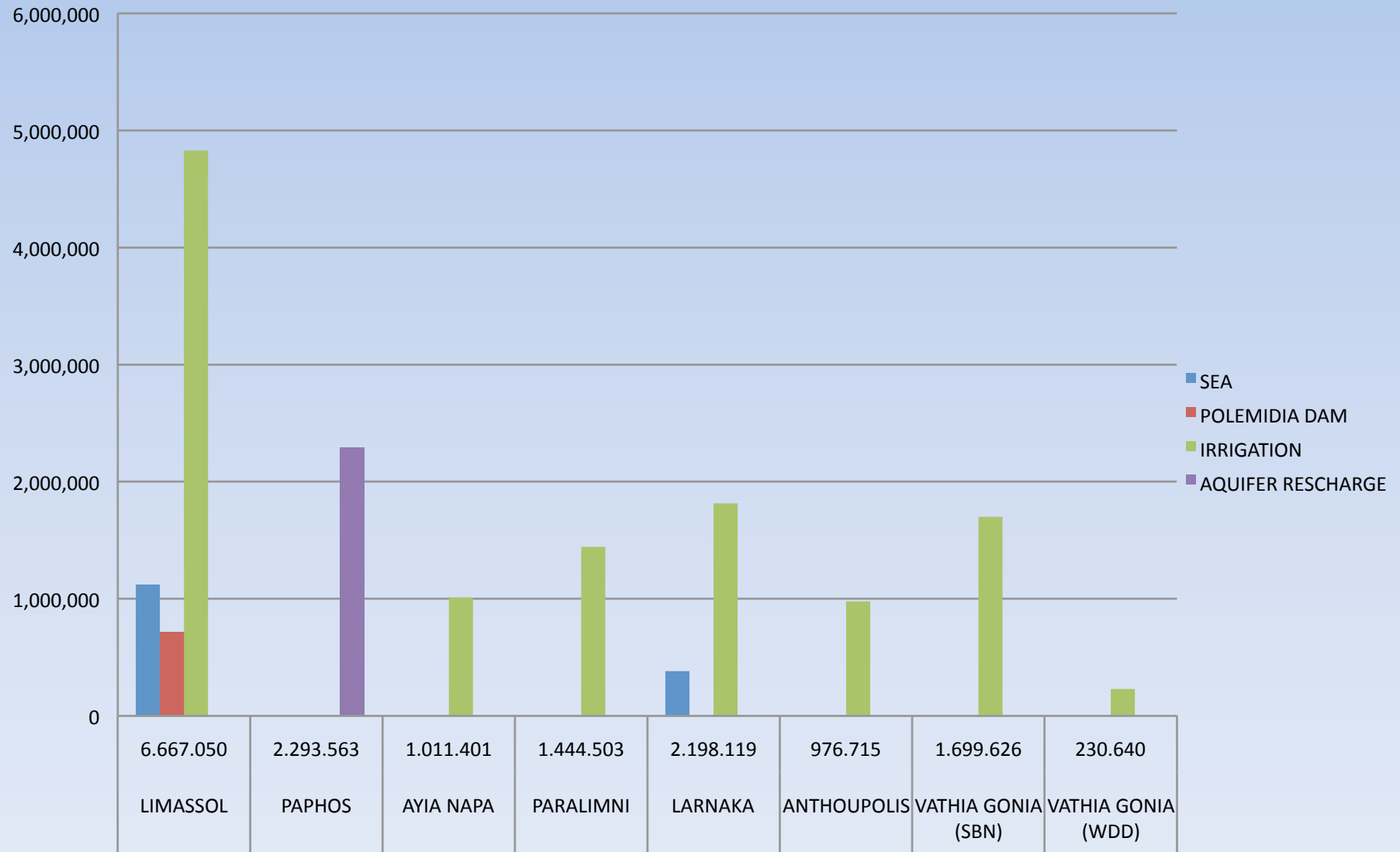
WASTEWATER TREATMENT PLANT	YEARLY QUANTITY	TREATED EFFLUENT DISPOSAL (m <sup>3</sup> )				
		SEA	POLEMIDIA DAM	IRRIGATION	AQUIFER RESCHARGE	TOTAL
LIMASSOL	6.667.050	1.121.550	718.800	4.826.700	0	6.667.050
PAPHOS	2.293.563			0	2.293.563	2.293.563
AYIA NAPA	1.011.401			1.011.401	0	1.011.401
PARALIMNI	1.444.503			1.444.503	0	1.444.503
LARNAKA	2.198.119	382.750		1.815.369	0	2.198.119
ANTHOUPOLIS	976.715			976.715	0	976.715
VATHIA GONIA (SBN)	1.699.626			1.699.626	0	1.699.626
VATHIA GONIA (WDD)	230.640			230.640	0	230.640
<b>TOTAL PRODUCTION (m<sup>3</sup>) (A)</b>	<b>16.521.617</b>	<b>1.504.300</b>	<b>718.800</b>	<b>12.004.954</b>	<b>2.293.563</b>	<b>16.521.617</b>

### 5.9 2011 PERCENTAGES OF TREATED EFFLUENT DISPOSED



- PERCENTAGE OF TREATED EFFLUENT DISCHARGED TO THE SEA
- PERCENTAGE OF TREATED EFFLUENT DISCHARGED TO POLEMIDIA DAM
- PERCENTAGE OF TREATED EFFLUENT USED FOR AQUIFER RESCHARGE
- PERCENTAGE OF TREATED EFFLUENT USED FOR IRRIGATION PURPOSES

## 5.10 2011 USES OF TREATED EFFLUENT FROM URBAN WASTEWATER TREATMENT PLANTS



# 6. FUTURE QUANTITIES OF TREATED EFFLUENT

	<b>2015</b>	<b>2025</b>
MUNICIPAL WASTEWATER TREATMENT PLANTS	51,000,000	69,000,000
WASTEWATER TREATMENT PLANTS FOR RURAL COMMUNITIES	14,000,000	16,000,000
<b>TOTAL QUANTITIES</b>	<b>65,000,000</b>	<b>85,000,000</b>

**7. SELLING RATES OF TREATED EFFLUENT  
FROM TERTIARY TREATMENT PLANTS**

The rate of the treated effluent from the big wastewater treatment has ministerial decree as per the following table. These rates are charged by

A/A	USE	Water Selling Rate	
		Existing Rate of Tertiary Treated Effluent	<i>Suggested Selling Rate of Fresh not filtered water from governmental water works</i>
		EURO Cent/ m <sup>3</sup>	<i>EURO Cent/ m<sup>3</sup></i>
1	a) For Irrigation divisions for agricultural production	5	15
	b) For Persons for agricultural production	7	17
2	For sports	15	34
3	For irrigation of hotels green areas and gardens	15	34
4	For irrigation of Golf Courses	21	34
5	For pumping from an underground aquifer recharged by treated effluent	8	
6	For over consumption for items 1 to 5	increase by 50%	56
7	For municipal parks, green areas for rural communities where a park has been built within its limits and the quantity does not exceed the approved quantity of more than		

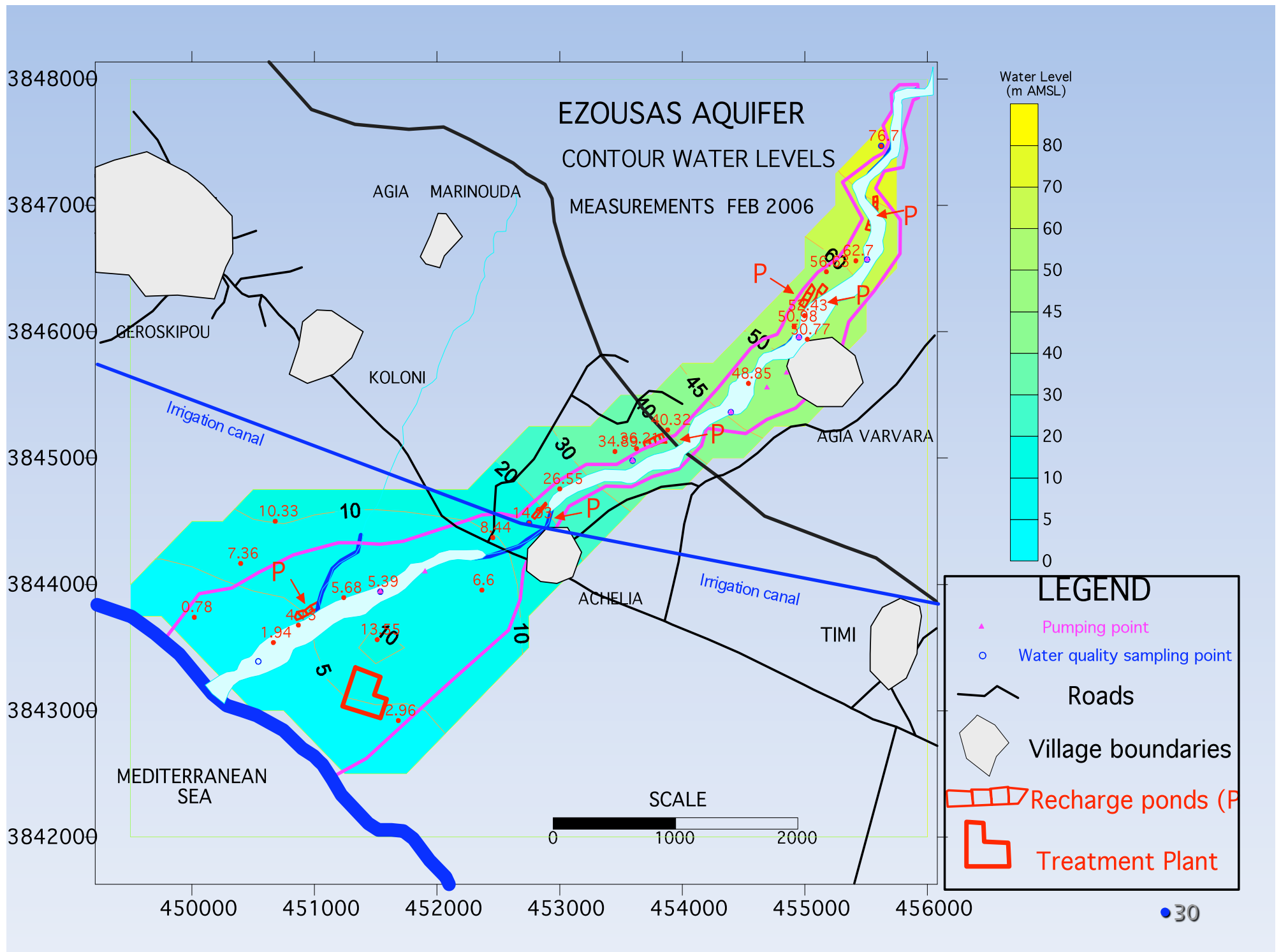


## **8. AQUIFER RESCHARGE**

### **8.1 AREA OF PAPHOS**

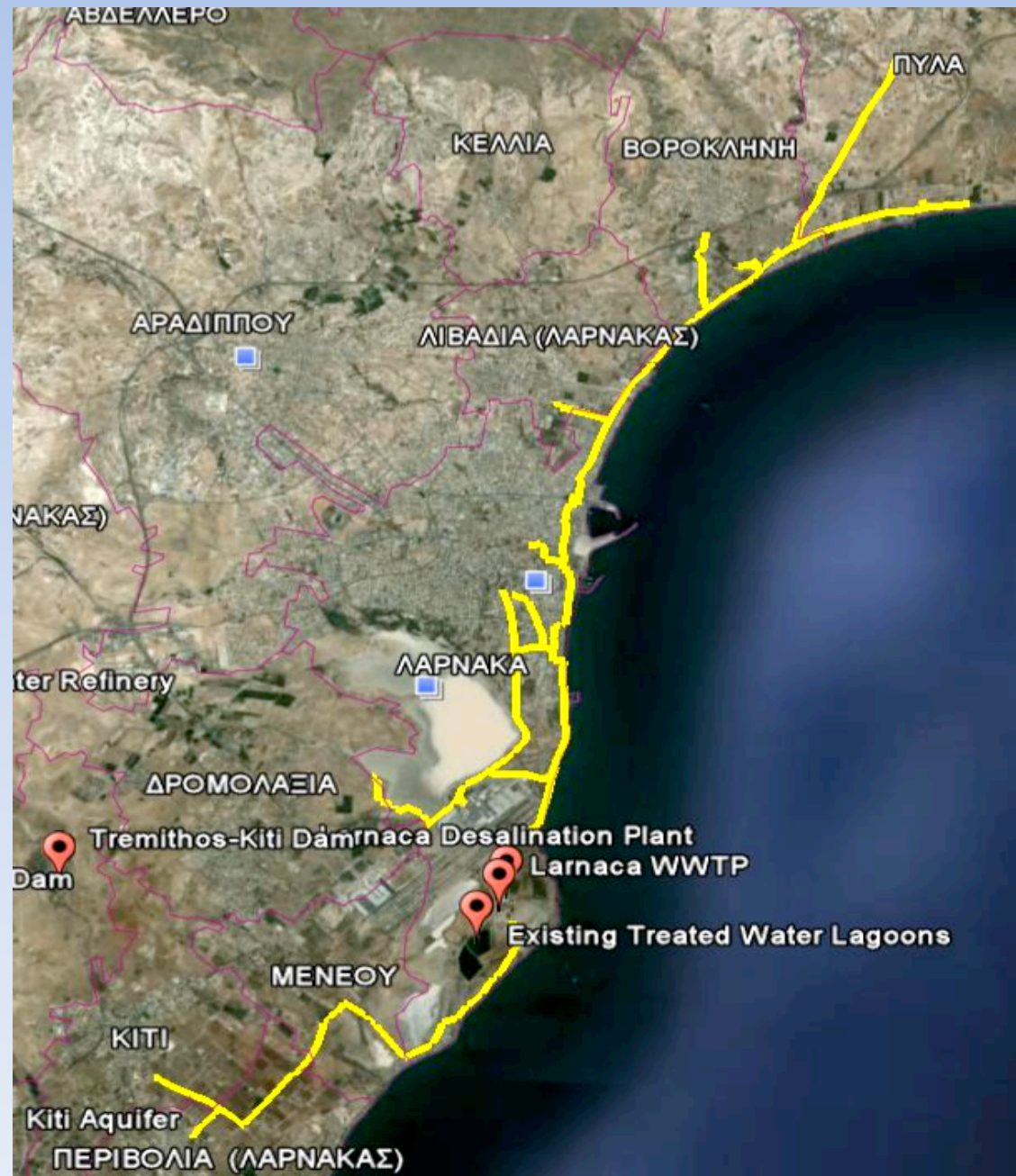
IN THIS AREA THE TREATED EFFLUENT IS USED FOR THE ENRICHMENT OF EZOUSA AQUIFER.

THE MAP OF THE POINTS OF ENRICHMENT OF EZOUSA AQUIFER - PAPHOS



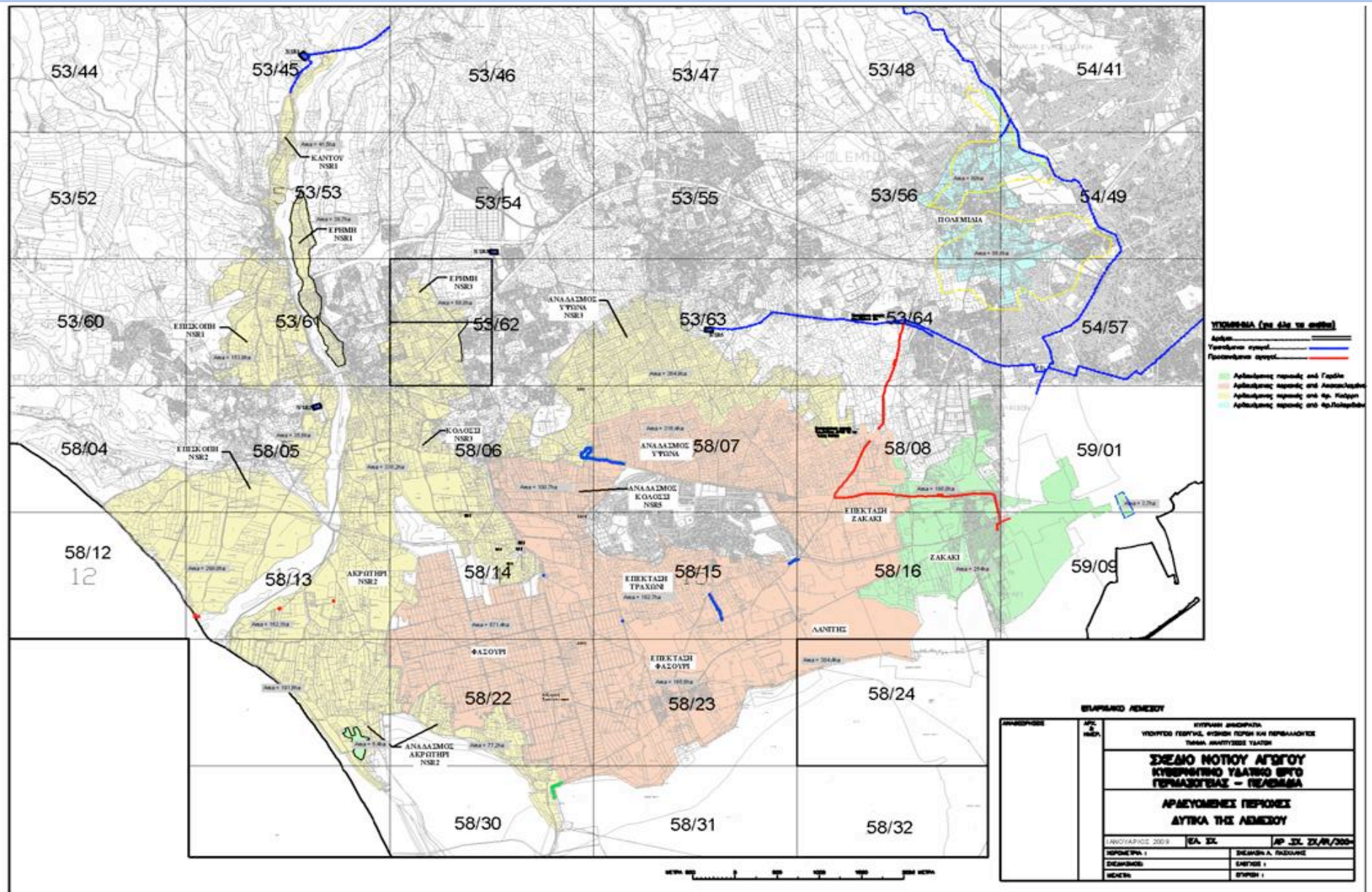
## 9. TREATED EFFLUENT IRRIGATION NETWORKS

## 9.1 LARNACA AREA TREATED EFFLUENT IRRIGATION NETWORK



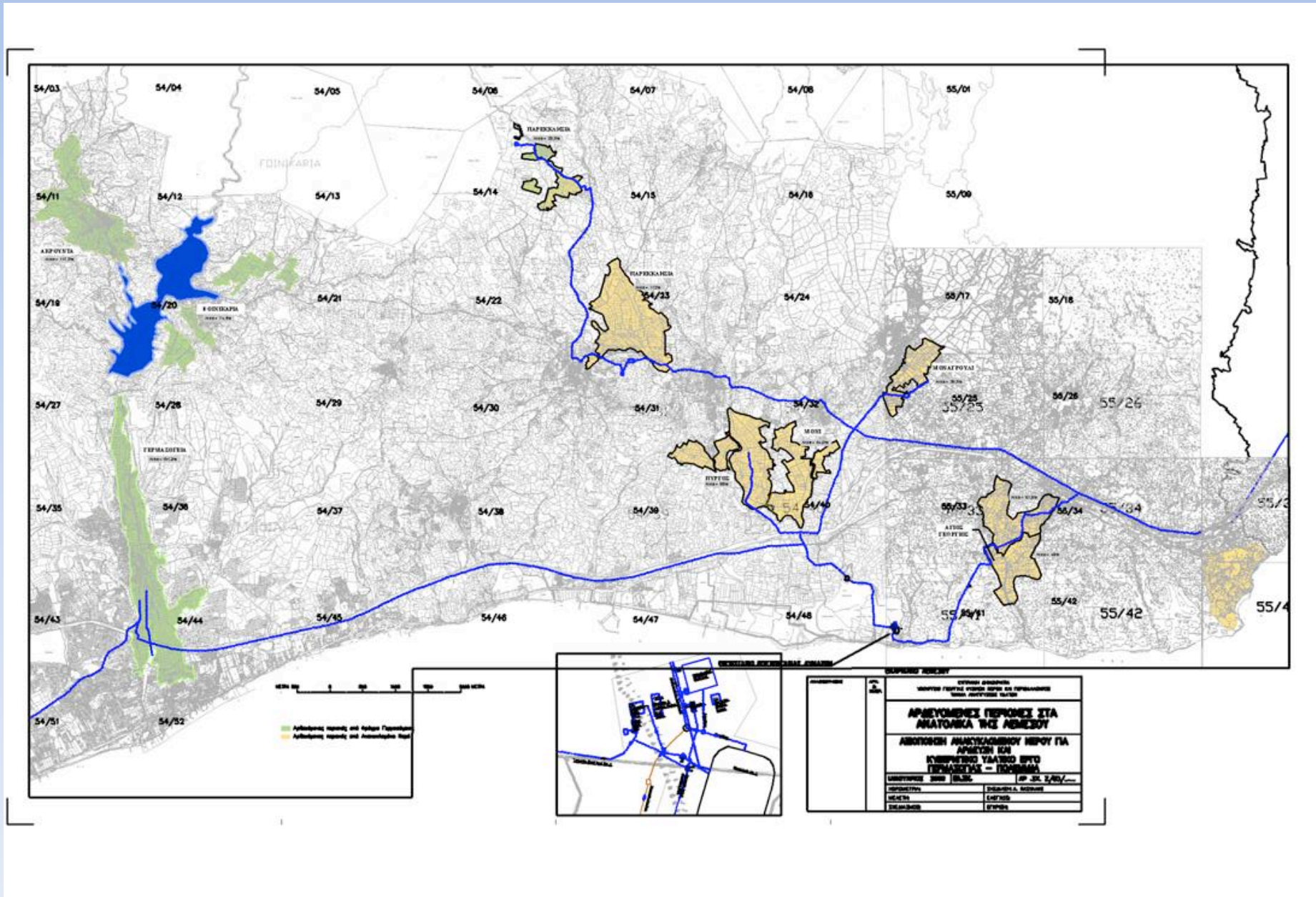


## 9.2a LIMASSOL AREA TREATED EFFLUENT IRRIGATION NETWORK

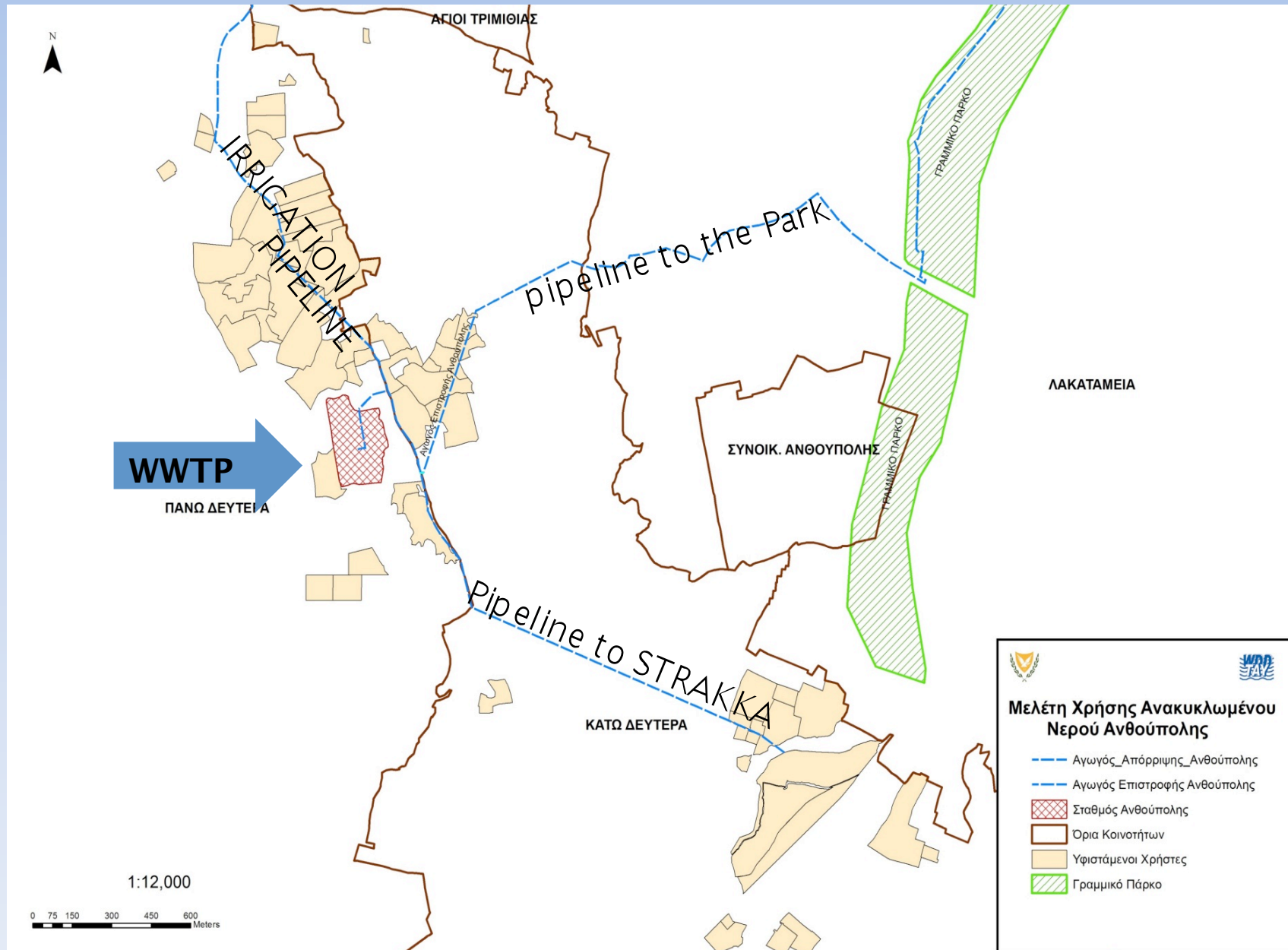




## 9.2b LIMASSOL AREA TREATED EFFLUENT IRRIGATION NETWORK



### 9.3 IRRIGATION NETWORK FOR ANTHOUPOLIS WWTP



## **10. OTHER USES OF TREATED EFFLUENT**

### **10.1 TREATED EFFLUENT FOR RURAL COMMUNITIES AND REFUGEE HOUSING ESTATES**

THE TREATED EFFLUENT IN THESE AREAS IS MAINLY USED FOR:

- AGRICULTURAL USE
- GREEN AREAS

FOLLOWING THE CORRECT CODE FOR THE AGRICULTURE PRACTICE

### **10.2 TREATED EFFLUENT FOR HOSPITALS AND MILITARY CAMPS**

THE TREATED EFFLUENT IN THESE AREAS IS MAINLY USED FOR:

- GREEN AREAS



## **11. QUALITY CHARACTERISTICS AND CONTROL OF THE TREATED EFFLUENT FOR AGGLOMERATIONS ABOVE 2000P.E. ACCORDING TO THE DISCHARGE PERMITS:**

According to the Laws of the Water Pollution Control of 2002 until 2007, for the big municipal wastewater treatment plants the Minister Of Agriculture is issuing a Wastewater Discharge Permit for the same Wastewater treatment Plant to the following competent authorities:

- Sewerage Boards
- Water Development Department

In the Discharge Permit the following are defined:

- quality characteristics.
- number and the type of analyses
- disposal of the treated effluent

For the Discharge Permit of the Water Development Department the following are included:

- Name of Authority : Water Development Department
- Type of Process: Disposal of Treated Effluent
- Type of Discharge: Treated effluent from the wastewater treatment plant.

- **The Water Development Department and the Sewerage Boards are also following the quality of the treated effluent according to the requirements of their Discharge Permits.**

- **THE QUALITY CHARACTERISTICS AND THE FREQUENCY OF ANALYSES OF THE TREATED EFFLUENT WHICH ARE INCLUDED IN THE DISCHARGE PERMITS FOR THE WASTEWATER TREATMENT PLANTS ARE PRESENTED IN THE FOLLOWING TABLES:**

- DISCHARGE PERMITS FOR QUALITY AND CONTROL FOR URBAN WASTEWATER TREATMENT PLANTS
- FREQUENCY OF ANALYSES AND MAXIMUM LIMITS FOR WWTP FOR COMMUNITIES WITH ABOVE 2000P.E.

REPUBLIC OF CYPRUS  
 MINISTRY OF AGRICULTURE NATURAL RESOURCES & ENVIRONMENT  
 WATER DEVELOPMENT DEPARTMENT  
 WASTEWATER AND REUSE DIVISION

DISCHARGE PERMITS EFFLUENT QUALITY AND CONTROL REQUIREMENTS ISSUED BY THE ENVIRONMENT SERVICE FOR WDD											
PARAMETERS		AYIA NAPA - PARALIMNI SEWAGE TREATMENT PLANT		LIMASSOL AMATHOUNTA SEWAGE TREATMENT PLANT		LARNAKA SEWAGE TREATMENT PLANT (A)		PAPHOS SEWAGE TREATMENT PLANT (A)		ANTHOUPOLIS-NICOSIA SEWAGE TREATMENT PLANT (A)	
		Maximum Permitted Value	Frequency of analyses	Maximum Permitted Value	Frequency of analyses	Maximum Permitted Value	Frequency of analyses	Maximum Permitted Value	Frequency of analyses (b)	Maximum Permitted Value	Frequency of analyses (b)
pH		6,5 -- 8,5	4/year	6,5 -- 8,5	4/year	6,5 -- 8,5	4/year	6,5 -- 8,5	4/year	6,5 -- 8,5	4/year
COD (mg/l)		70	4/year	70	4/year	70	4/year	70	4/year	70	4/year
BOD5 (mg/l)		10	4/year	10	4/year	10	4/year	10	4/year	10	4/year
Suspended Solids (mg/l)		10	4/year	10	4/year	10	4/year	10	4/year	10	4/year
Total Nitrogen (mg/l)		15 <sup>(4)</sup>	4/year	15 <sup>(1) (2)</sup>	4/year	15 <sup>(3)</sup>	4/year	15	4/year		4/year
Nitrates (mg/l)											
Chlorides (mg/l)		300	4/year	300	4/year	300	4/year	300	4/year	300	4/year
Fat and Oil (mg/l)		5	4/year	5	4/year	5	4/year	5	4/year	5	4/year
Residual Chlorine (mg/l)		1	4/year	1 <sup>(1) (2)</sup>	4/year	1 <sup>(3)</sup>	4/year	1	4/year		4/year
Total Phosphorous (mg/l)		2 <sup>(4)</sup>	4/year	10 <sup>(1) (2)</sup>	4/year	10 <sup>(3)</sup>	4/year	10	4/year		4/year
E. Coli (units/100ml)		50 / 100ml	4/year	50 / 100ml <sup>(1)</sup>	4/year	5 / 100ml	4/year	50 / 100ml	4/year	5 / 100ml	4/year
Eggs of Intestinal Worms		nothing /l	4/year	nothing /l	4/year	nothing /l	4/year	nothing /l	4/year	nothing /l	4/year
Conductivity(μS/cm)		2200	4/year	2200	4/year	2900	4/year	1700	4/year	2200	4/year
Heavy Metals in reused effluent											
Zinc(mg/l)		1	2/year	0,1 <sup>(2)</sup>	2/year	0,1	2/year	1	2/year	1	2/year
Copper (mg/l)		0,1	2/year	0,1	2/year	0,1	2/year	0,1	2/year	0,1	2/year
Lead (mg/l)		0,15	2/year	0,15	2/year	0,15	2/year	0,15	2/year	0,15	2/year
Cadmium (mg/l)		0,01	2/year	0,01	2/year	0,01	2/year	0,01	2/year	0,01	2/year
Mercury (mg/l)		0,005	2/year	0,005	2/year	0,005	2/year	0,005	2/year	0,005	2/year
Chromium (mg/l)		0,1	2/year	0,1	2/year	0,1	2/year	0,1	2/year	0,1	2/year
Nickel (mg/l)		0,2	2/year	0,2	2/year	0,2	2/year	0,2	2/year	0,2	2/year
Boron (mg/l)		1	2/year	0,75	2/year	1	2/year	1	2/year	1	2/year
Toxicity	Microtox							*a	4/year	*a	4/year
	Daphnia										
	Algae										

(A) PRELIMINARY DISCHARGED PERMIT

\*a :75 % of samples

Microtox TU50<1 TU 20<1.5

or Daphnia TU < 1

Algae TU < 1

Mutatox S9 not positive

<sup>(1)</sup> for discharge into Polemidia Dam (sensitive area)

Residual Chlorine (mg/l)		<2
E. Coli (units/100ml)		5
Total Nitrogen (mg/l)		10
Total Phosphorous (mg/l)		1

<sup>(2)</sup> for discharge into the sea

Residual Chlorine (mg/l)		0,5
Zn (mg/l)		0,1
Total Nitrogen		400 Kg /d (40,00 m <sup>3</sup> /hr TN 10 mg/l)
Total Phosphorous		80 Kg /d (40,000 m <sup>3</sup> /hr TP 2 mg/l)

<sup>(3)</sup> for discharge into the sea

Residual Chlorine (mg/l)		0,5
Total Nitrogen		100 Kg /d (8,500 m <sup>3</sup> /hr TN 11 mg/l)
Total Phosphorous		20 Kg /d (8,500 m <sup>3</sup> /hr TP 2,3 mg/l)

<sup>(4)</sup> or reduction of TN upto 70-80%

## **12. QUALITY SPECIFICATIONS OF THE TREATED EFFLUENT FOR AGGLOMERATIONS LESS THAN 2000 P.E.**

QUALITY SPECIFICATIONS OF THE TREATED EFFLUENT FROM MUNICIPAL WASTEWATER TREATMENT PLANTS FROM AGGLOMERATIONS LESS THAN 2000 P.E.

	SPECIES ALLOWED TO BE IRRIGATED	BOD <sub>5</sub> mg/l	SUSPENDED SOLIDS mg/l	E. COLI /100ml	INTESTINAL WORMS***
1	ALL CROPS AND GREEN AREAS WITH NOT RESTRICTED USE (A)	10*	10*	5*	NIL
2	COOKED VEGETABLES (B)	10*	10*	15** 50*	NIL
3	PRODUCTS FOR HUMAN EATING , GREEN AREAS WITH RESTRICTED USE BY THE PUBLIC	15** 20*	15** 30*	100** 200*	NIL
4	FODDER CROPS	30** 20* 30**	45** 30* 45**	1000** 1000* 5000**	NIL
5	INDUSTRIAL PLANTS	50* 70**	--	3000* 10000**	--

\* 80% OF THE SAMPLES, 24 SAMPLES / YEAR

\*\* MAXIMUM ACCEPTABLE VALUE

\*\*\* SAMPLING FREQUENCY ONCE A YEAR / SUMMER MONTHS

(a) VEGETABLES WITH LEAVES, BULBS AND CONDYLES EATEN RAW

(b) POTATOES, BEETROOTS

## **13. ANALYSES OF TREATED EFFLUENT**

**IN THE FOLLOWING TABLES AND GRAPHS ARE PRESENTED THE FOLLOWING:**

- **2010 CHEMICAL ANALYSES YEARLY MEAN VALUES FOR ALL THE URBAN WASTEWATER TREATMENT PLANTS**
- **2010 YEARLY NUMBER OF SAMPLES FOR ALL THE URBAN WASTEWATER TREATMENT PLANTS**
- **GRAPH FOR 2010 TREATED EFFLUENT CONDUCTIVITY FOR ALL THE URBAN WASTEWATER TREATMENT PLANTS**

2010  
CHEMICAL ANALYSES  
YEARLY MEAN VALUES

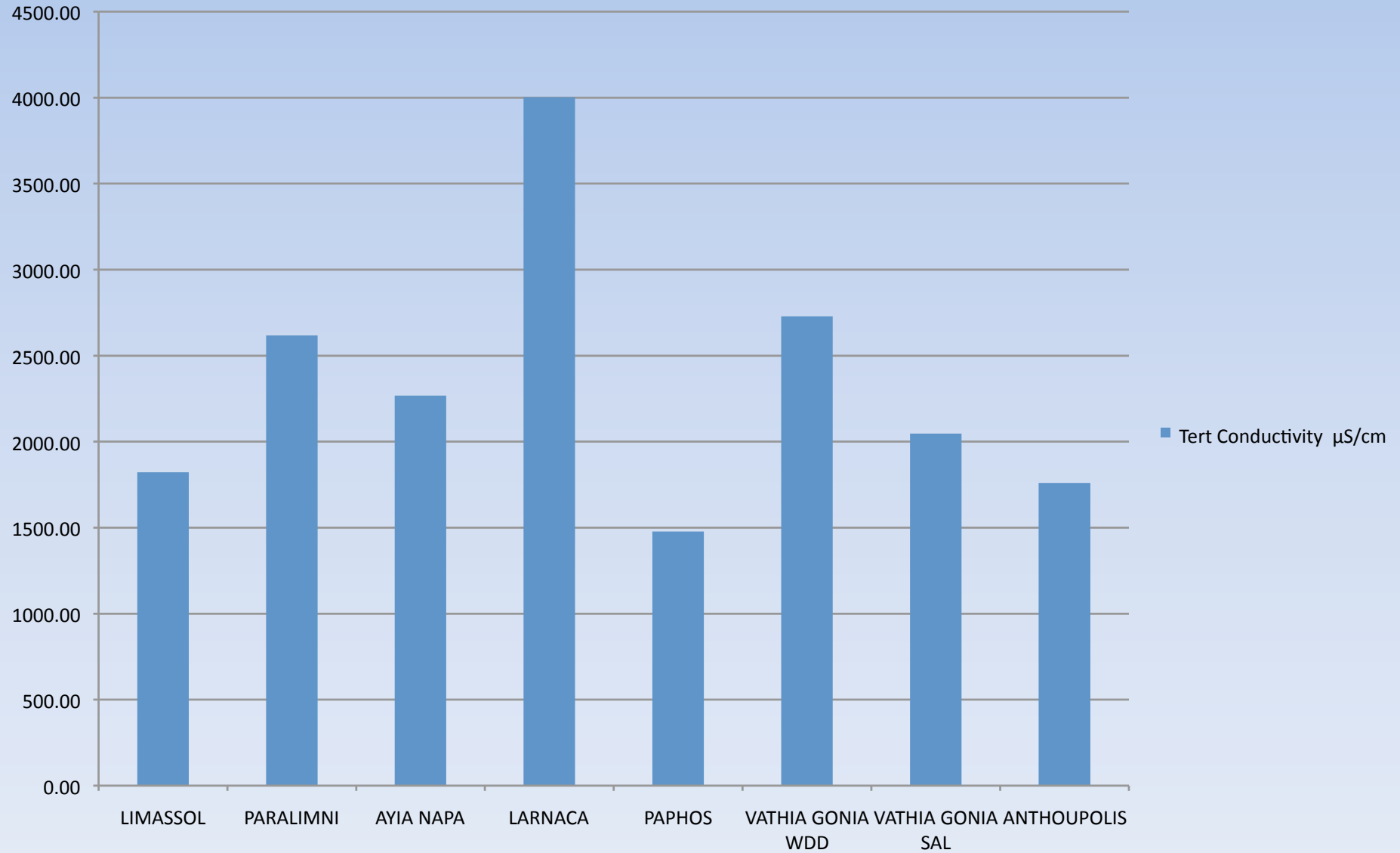
	TERTIARY TREATMENT OUTLET													TERTIARY		
	Tert BOD <sub>5</sub> mg/l	Tert Specs BOD <sub>5</sub> mg/l	Tert COD mg/l	pH	Tert Conductivity $\mu$ S/cm	Tert TKN mg/l	Tert SS mg/l	Tert Specs SS mg/l	Tert Free Ammoniacal Nitrogen mg/l	Tert Boron mg/l	Residual Chlorine mg/l	Tert Nitrates mg/l	Tert Total Phosphorus mg/l	E.coli / 100ml	Specs E.coli / 100ml	Intestinal Worms / 100ml
LIMASSOL	3,00	10,00	28,00	8,13	1822,50	5,88	9,75	10,00		0,40	0,35	5,27	2,65	0,80	50,00	0,00
PARALIMNI	3,00	10,00	25,50	7,90	2617,50	7,10	7,00	10,00		0,50	0,05	2,70	1,78	8537,75	50,00	0,00
AYIA NAPA	3,00	10,00	24,50	7,28	2268,25	8,38	7,00	10,00		0,47	0,69	3,93	2,73	0,75	50,00	0,00
LARNACA		10,00	43,40	7,70	4002,00	17,20	12,00	10,00		0,93	7,50	2,08	3,16	0,40	5,00	0,00
PAPHOS	4,25	10,00	28,25	7,65	1477,50	9,00	7,00	10,00		0,30	0,01	3,77	1,05	2,75	50,00	0,00
VATHIA GONIA WDD	3,45	10,00	29,18	7,83	2728,45	9,06	7,30	10,00		0,60	3,90	2,80	5,06	2017,44	50,00	0,00
VATHIA GONIA SAL	3,25	10,00	25,50	8,08	2046,25	5,56	7,00	10,00		0,90	0,01	7,86	2,63	1,00	5,00	0,00
ANTHOUPOLIS	12,25	10,00	34,25	7,78	1760,50	39,58	7,00	10,00		0,81	0,01	3,55	1,55	18,00	5,00	0,00



2010  
YEARLY NUMBER OF SAMPLES/ ANALYSES

	TERTIARY TREATMENT										TERTIARY	
	Tert BOD <sub>5</sub>	Tert COD	pH	Tert ACe Cμμ αΧαΠ	Tert AΦε ab Kjeldahl	Tert SS	Tert ΒιЭль mg/l	Tert Residual Chlorine	Tert Nitrates	Tert Total phosphorus	E.coli	Intestinal Worms
LIMASSOL	4,00	4,00	4,00	4,00	4,00	4,00	2,00	4,00	3,00	4,00	5,00	5,00
PARALIMNI	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00
AYIA NAPA	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	3,00	4,00	4,00	4,00
LARNACA	4,00	5,00	5,00	5,00	5,00	4,00	3,00	5,00	4,00	5,00	5,00	5,00
PAPHOS	4,00	4,00	4,00	4,00	4,00	4,00	2,00	4,00	3,00	4,00	4,00	4,00
VATHIA GONIA (WDD)	11,00	11,00	11,00	11,00	11,00	10,00	2,00	11,00	11,00	11,00	9,00	1,00
VATHIA GONIA (SBN)	8,00	8,00	8,00	8,00	8,00	8,00	1,00	8,00	8,00	8,00	7,00	1,00
ANTHOUPOLIS	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00

## 2010 Treated Effluent Conductivity



## 14. METHODS OF DISINFECTION OF URBAN WASTEWATER TREATMENT PLANTS

TYPE OF DISINFECTION		
NAME OF WWTP	TYPE	METHOD
LIMASSOL	CHLORINATION	ONSITE CHLORINE GENERATION AND SODIUM HYPOCHLORITE
PARALIMNI	CHLORINATION	GAS CHLORINE
AYIA NAPA	CHLORINATION	GAS CHLORINE
LARNACA	CHLORINATION	ONSITE CHLORINE GENERATION AND SODIUM HYPOCHLORITE
PAPHOS	CHLORINATION	GAS CHLORINE
VATHIA GONIA (WDD)	CHLORINATION	GAS CHLORINE
VATHIA GONIA (SBN)	UV DISINFECTION	-
ANTHOUPOLIS	UV DISINFECTION	-

## 15. DATA FOR SOIL IRRIGATED WITH TREATED EFFLUENT

### 2010 DATA FOR SOIL IRRIGATED WITH TREATED EFFLUENT

#### LIMASSOL AREA.

Sampling Date:	08/09/2010
Control Parameters	
Plot No:	39, LAYOUT.: 54/40 W1
Exchangeable cations (mg/kg)	2015,5
Total Salinity (mg/kg)	970,2

#### ANTHOUPOLIS AREA.

Sampling Date:	07/09/2010
Control Parameters	
Plot No.	384
Exchangeable cations (mg/kg)	239,10
Total Salinity (mg/kg)	826,20

## **16. GENERAL COMMENTS FOR THE REUSE OF TREATED EFFLUENT**

The treated effluent is another constant source of water.

The Government's policy is to introduce the treated effluent in the Cyprus Water Balance.

The Quality is under control and remains constant.

The treated effluent is suitable for the majority of the crops.

Almost all the Wastewater Treatment Plants are equipped with Tertiary Treatment , consisting of Sand Filtration and Chlorination in order to achieve higher quality characteristics in order to use the treated effluent in the Agriculture.

The farmers use less quantities of fertilisers because the treated effluent contains already nutrients such as Phosphorous and Nitrogen.







# ΤΜΗΜΑ ΑΝΑΠΤΥΞΕΩΣ ΥΔΑΤΩΝ

ΥΠΟΥΡΓΕΙΟ ΓΕΩΡΓΙΑΣ, ΦΥΣΙΚΩΝ ΠΟΡΩΝ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΣ







● **LIMASSOL (MONI) WWTP**





**ANTHOUPOLIS WASTEWATER TREATMENT PLANT -SBN**



**VATHIA GONIA WASTEWATER TREATMENT PLANT -SBN**





**VATHIA GONIA CENTRAL WASTEWATER (SEPTIC SEWAGE/INDUSTRIAL WASTE)  
TREATMENT PLANT -WDD**





**LARNACA WASTEWATER TREATMENT PLANT-SBL**





**PARALIMNI-AYIA NAPA WASTEWATER TREATMENT PLANT**



WATER DEVELOPMENT  
DEPARTMENT  
1047 NICOSIA



REPUBLIC OF CYPRUS  
MINISTRY OF AGRICULTURE , NATURAL  
RESOURCES AND ENVIRONMENT

**THANK YOU FOR YOUR  
TIME**