MINISTRY OF AGRICULTURE, NATURAL RESOURCES AND ENVIRONMENT

WATER DEVELOPMENT DEPARTMENT

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REVIEW AND UPDATE OF ARTICLE 5 OF DIRECTIVE 2000/60/EC (WATER RESERVOIRS) & CLASSIFICATION OF WATER STATUS (RIVERS, NATURAL LAKES AND WATER RESERVOIRS), THAT WILL ESTABLISH BASELINE INFORMATION AND DATA FOR THE 2ND CYPRUS RIVER BASIN MANAGEMENT PLAN

- REPORT ON THE REVIEW & UPDATE OF ARTICLE 5 (WATER RESERVOIRS) -

ENVECO S.A.
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Foreword

This report has been prepared by the Consortium consisting of ENVECO S.A. - I.A.CO Environmental & Water Consultants Ltd, including the team-members:

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The Water Development Department (WDD), under the leading role of the Division of Hydrometry, managed this project. Valuable support for the execution of the study was received from other Governmental Departments and Institutions. Grateful acknowledgement is made to the following authorities for their contribution to the project in terms of supply of data, information and suggestions:

- Water Development Department (WDD)
- Environment Department (ED)
- Department of Fisheries and Marine Research (DFMR)
- General State Laboratory (SGL)

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CHAPTER 1. INTRODUCTION

This report is prepared under the Contract signed on 20/08/2013 between the **Water Development Department** and the Consortium "**ENVECO S.A. - I.A.CO Environmental & Water Consultants Ltd**" concerning "**Specialized Consultancy Services for the review and update of Article 5 of Directive 2000/60/EC (water reservoirs) and for the classification of water status (rivers, natural lakes and water reservoirs), that will establish baseline information and data for the 2nd Cyprus River Basin Management Plan**", Contract No.: YY 02/2013. This report is the second deliverable of the Contract and constitutes the **Report on the Review and Update of Article 5 (water reservoirs)**.

The Contract Scope consists in the Provision of Services for:

a. the **review and update of Article 5.2 of Directive 2000/60/EC for water reservoirs**. This includes the "analysis of characteristics" and the "review of the impact of human activity on the status of surface waters" and does not include rivers, groundwater and the "economic analysis of water use".

b. the **classification of water status** (ecological and chemical) for rivers, natural lakes and water reservoirs, including all related Heavily Modified Water Bodies (HMWB) and Artificial Water Bodies (AWB).

The above two components will form the baseline information and data of the 2nd Cyprus River Basin Management Plan.

The **Report on the Review and Update of Article 5 (water reservoirs)** contains the following, as per the Terms of Reference of the above Contract:

1. Updated versions of the relevant reporting sheets included in the Cyprus WFD Art.5 Summary Report (Reporting sheets SWB1, SWB2, SWB3), with clear indication of changes/additions made in relation to the versions of 2004.
2. Detailed descriptions and sufficient reasoning for the updates made to the water reservoir water body network of 2004.
3. Detailed descriptions of the updated pressure situation at each reservoir water body.

This report is accompanied by all the relevant updated GIS files (shapefiles) including completed attribute tables, stored on appropriate digital storage media.

All the above are analysed in the following chapters of this report.

The data, information and references that were mainly used to compile this report are listed in the References section in the end of the report.

Cyprus has been identified as one River Basin District (11015 km^2). Hydrographically the island of Cyprus is subdivided into 9 hydrological regions made up of 70 watersheds and 387 sub-watersheds.

The competent authority is the Minister of Agriculture, Natural Resources and Environment of the Government of the Republic of Cyprus. The reported competent authority has responsibility over the entire River Basin District.

According to the provisions of Article 1 of Protocol No 10 on Cyprus, the application of the acquis is suspended in those areas of the Republic of Cyprus in which the Government of the Republic of Cyprus does not exercise effective control. Furthermore, the Memorandum of Understanding between the Government of the republic of Cyprus and the Government of the United Kingdom of Great Britain and Northern Ireland concerning responsibility for the implementation of the Protocol on the Sovereign Base Areas of Akrotiri and Dhekelia in Cyprus, provides for the application of the WFD in the Sovereign Base Areas of Akrotiri and Dhekelia in Cyprus. The area under government control contains 47 watersheds.

CHAPTER 2. UPDATED VERSIONS OF REPORTING SHEETS

This Chapter comprises information as required by Article 5 of the Water Framework Directive (WFD) for the Republic of Cyprus only for the water reservoirs (Heavily Modified Water Bodies, HMWBs) and storage basins (Artificial Water Bodies, AWBs), and has been prepared using as a reference the relevant reporting sheets included in the Cyprus WFD Art.5 Summary Report (2005). As per the Terms of Reference of this Contract, the analyses that are required for this project concern the "analysis of characteristics" and the "review of the impact of human activity on the status of surface waters" only for the water reservoirs and storage basins and do not include rivers, coastal waters and groundwater, as well as the "economic analysis of surface water". Thus the relevant reporting sheets that have been prepared and included in this report concern the following:

- SWB1: Typology of surface water bodies
- SWB2: Identification of surface water bodies
- SWB3: Provisional identification of artificial and heavily modified water bodies

The updated analysis of pressures for the water reservoirs and storage basins is presented in the following chapter 3.

In addition to numeric data and summary text, geographic information (GIS) is requested to allow the derivation of European maps. The required GIS-information is prepared separately and supplied by CD-rom (pl. refer to section 2.4 of this report).

2.1 SWB 1: TYPOLOGY OF SURFACE WATER BODIES (LAKES)

Differentiation of the lake types can be done using System A (altitude, mean depth, surface area and geology) or System B (obligatory factors of system A and physicochemical factors) conform Annex II of the WFD. Cyprus falls within Ecoregion 6: the Mediterranean Sea on system A: Ecoregions for transitional and coastal waters, and in Ecoregion 26 Cyprus on system A: Ecoregions for rivers and lakes (Cyprus government Law N. 13(10/2004).

As a result of the dry Mediterranean climate, there are only 6 natural lakes, which are brackish or salt. The other water bodies are created by human as a result of creation of storage basins.

In the first River Basin Management Plan of Cyprus, the water reservoirs (impounded rivers) were characterised as heavily modified lake water bodies and they were assigned two types of their own, i.e. L3: Connected shallow reservoir with fresh water, connected to river and water depth less than 5 m and L4: Connected deep reservoir with fresh water, connected to river and water depth more than 5 m. However, in the «Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans. Member State: Cyprus» it was stated that «*Reservoirs have been reported as heavily modified lakes, not as heavily modified rivers, as recommended. This limits the comparability with information from other Member States*». For that reason, it was finally decided that the water

reservoirs will not be characterised as heavily modified lake water bodies, but they are assigned as heavily modified river water bodies (see section 2.3: SW3 Provisional identification of artificial and heavily modified water bodies).

Therefore, the lake water bodies of Cyprus include six (6) natural lakes which are brackish or salt and (1) storage basin, which is an Artificial Water Body. All the lakes in Cyprus can be characterized as dynamic systems. The natural salt and brackish lakes dry up regularly, but not every year. Both the salt and brackish lakes contain typical species for these conditions. Also, the amount of water in storage basins is depending on the rainfall and use. During winter they fill up, but in summer most of the water is used and the water level declines. Consequently, the water level and size of these lakes is variable. Concerning the storage basins, as they are structured with the objective to provide water for irrigation, they have the possibility to dry out.

System B was used for the lake typology, because the evidence shows that the salt content is an important characteristic, which can be taken into account with this system. Altitude is an irrelevant factor for the classification as all lakes are below 100 meters. Also, there is no evidence that geology influences the ecology in Cyprus lakes considerably and that it may result in different types. In addition, although water depth is an important factor in the ecology of lakes, all lakes in Cyprus have depths below 3 m.

Considering the above, salt content was the most important characteristic for ecology in lakes of Cyprus and consequently the lake types. Salt content was used for the typology, considering three classes, i.e. salt, brackish and fresh water and two classes for the water depth (below or above 5 m), although all lakes fall below 5 m depth. Finally, 4 lake types were identified and mapped, using the salt content and depth as typology factors (see Figure 2.1-1 and Table 2.1-1). In total 7 lake water bodies were identified.

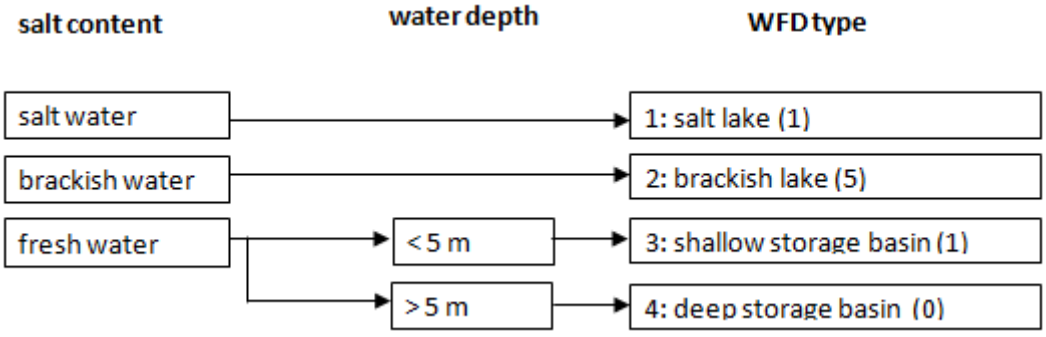

Figure 2.1-1: Flow chart for lake types, the number between brackets represents the amount of lake water bodies (their names are shown in Table 2.2.2-1)

Table 2.1-1: Lake water body types, the number of water bodies for each type and area they cover.

Lake type	Description	Number of water bodies	Cover (%)
L1: Salt lake	Salt water, isolated from the river, water depth < 5m.	1	23.7
L2: Brackish lake	Brackish water, isolated from the river, water depth < 5m	5	73.0
L3: Shallow storage basin	Fresh water, isolated from the river, water depth < 5m.	1	3.3
L4: Deep storage basin	Fresh water, isolated from the river, water depth > 5m.	0	0

2.2 SWB 2: IDENTIFICATION OF SURFACE WATER BODIES

2.2.1 Rivers (Impounded Rivers)

As it is mentioned previously in the Reporting Sheet SW1: Typology of Surface Waters (Lakes), in the first River Basin Management Plan of Cyprus the water reservoirs (impounded rivers) were characterised as heavily modified lake water bodies and they were assigned a typology. However, in the «Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans, Member State: Cyprus» it was stated that «*Reservoirs have been reported as heavily modified lakes, not as heavily modified rivers, as recommended. This limits the comparability with information from other Member States*». For that reason, it was finally decided that the water reservoirs will not be characterised as heavily modified lake water bodies, but they are assigned as heavily modified river water bodies (see section 2.3: SW3 Provisional identification of artificial and heavily modified water bodies).

These water reservoirs are characterised as river HMWBs, since this is the initial water category of these water bodies before the physical alterations by human activity occurred. However, the closest comparable natural water category to these HMWBs in the present situation is a lake. According to Annex II par. 1.1 V of the WFD "*for artificial and heavily modified surface water bodies the differentiation shall be undertaken in accordance with the descriptors for whichever of the surface water categories most closely resembles the heavily modified or artificial water body concerned*".

The WFD describes that lakes larger than 0.5 km^2 must be taken into account in the characterisation of water bodies. Since for water reservoirs the descriptors of lakes were used, this criterion was applied to water reservoirs. Thus, all water reservoirs larger than 0.5 km^2 were identified as water bodies. Water reservoirs smaller than 0.5 km^2 were identified as water bodies if they were located in protected areas (Natura 2000 or drinking water protected areas).

However, there are numerous small water reservoirs in the Natura 2000 area, which do not contribute to the biodiversity of a specific Natura 2000 area. It was not considered practical to take

all these reservoirs into account for a directive, which has the objective to protect and enhance ecology. Therefore, it was decided to only consider these reservoirs if they have an important ecological value, which was decided by expert judgment. Outside the Natura 2000 there are a lot of small reservoirs, which alter a specific water body into heavily modified water. These reservoirs are taken into account with their effect on the downstream river water bodies.

Based on the above, 15 water reservoirs (impounded rivers) water bodies have been identified. These are listed in Table 2.2.1-1 and are presented on the following map in Figure 2.2.1-1.

There are 4 new water bodies (impounded rivers) compared to the 1st RBMP reporting. These water bodies already existed in the 1st RBMP, but because three of them are smaller than 0.5 km^2 they were not designated as water bodies. At a later stage it was decided to include them as water bodies since three of them are now designated as water bodies used for drinking water and all four of them are now included in Natura 2000 sites. Only one of them (Kannaviou Reservoir) is larger than 0.5 km^2 (see Table 2.2.1-1). The Kannaviou Reservoir was not included in the 1st characterisation of River Basin District (RBD), since the construction of the dam was completed in March 2005 and the impounding of the reservoir started on October 2005.

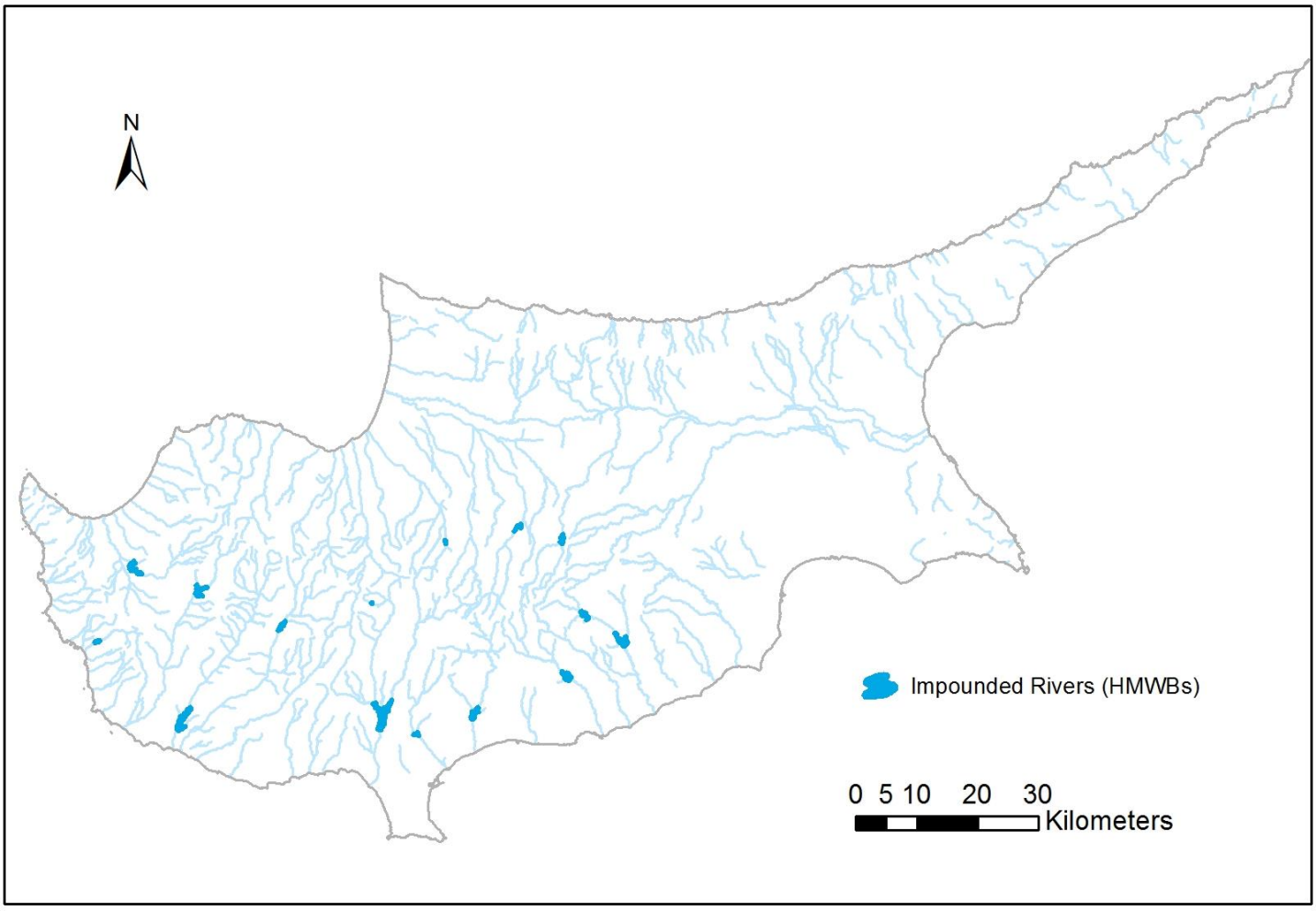

Figure 2.2.1-1: Impounded rivers (water reservoirs) water bodies (HMWBs)

Table 2.2.1-1: Characteristics of impounded rivers (water reservoirs) water bodies (HMWBs)

HM = Heavily modified. Red colour indicates the differences between these reporting sheets and the 1st River Basin Management Plan Reporting. The main difference though is that in the 1st River Basin Management Plan these water bodies were characterised as Lake HMWBs and not river HMWBs.

Water body code	Sub-watershed	Name	Area at overflow level (ha)	mean depth (m)	WFD-type	modified	drinking water area	natura2000	urban vulnerable zone	nitrate vulnerable zone
CY_9-6-j_RP_HM_IR	9-6-3	Pano Platres	2.7	n.a.	-	HM		x		
CY_3-5-b_RI_HM_IR	3-5-1	Xyliatos	5.3	21	-	HM		x		
CY_9-4-d_RI_HM_IR	9-4-3	Polemidia	16.9	11	-	HM			x	
CY_1-6-b_RIh_HM_IR	1-6-1	Mavrokolympos	18.2	18	-	HM		x		
CY_8-7-b_RI_HM_IR	8-7-2	Lefkara	45.2	21	-	HM	x	x		
CY_9-2-g_RI_HM_IR	9-2-5	Germasogeia	68.1	11	-	HM	x	x		
CY_8-9-d_RI_HM_IR	8-9-5	Kalavasos	87.0	16	-	HM	x			
CY_8-7-e_RI_HM_IR	8-7-4	Dipotamos	91.8	12	-	HM	x	x		
CY_2-2-e_RI_HM_IR	2-2-6	Evretou	113.8	22	-	HM		x		
CY_9-6-s_RP_HM_IR	9-6-9	Kouris	332.3	36	-	HM	x			
CY_1-3-d_RIh_HM_IR	1-3-9	Asprokremmos	225.4	23	-	HM	x	x		
CY_1-2-c_RP_HM_IR	1-2-4	Arminou	35.6	26	-	HM	x	x		
CY_1-4-c_RI_HM_IR	1-4-3	Kannaviou	92.6	35	-	HM	x	x		
CY_6-1-b_RIh_HM_IR	6-1-2	Tamassos	35.9	18	-	HM	x	x		
CY_3-7-i_RI_HM_IR	3-7-3	Akaki-Malounda	18.2	28	-	HM	x	x		

2.2.2 Lakes

As a result of the dry Mediterranean climate, there are only 6 natural lakes, which are all brackish or salt lakes (one of them has been characterised as HMWB). The other lakes are created by human as a result of creation of storage basins. There are 5 lake water bodies larger than 0,5 km^2 in the Cyprus river basin under government control.

The WFD describes that lakes larger than 0,5 km^2 must be taken into account. However, for Cyprus this means that some lakes with a high ecological value will be excluded. This is the case for the two brackish lakes near Larnaka which are smaller than 0,5 km^2, but they are included in the Natura 2000 Network. Thus, lakes smaller than 0,5 km^2 are included as water bodies if they are in the Natura 2000 Network and contribute to the biodiversity of a specific Natura 2000 site. This was decided by ecological experts.

Data on the location and characteristics of the lakes were given mainly by the WDD and DFMR.

Based on the above, 7 lake water bodies have been identified. These are listed in Table 2.2.2-1 and a relevant map is given in Figure 2.2.2-1.

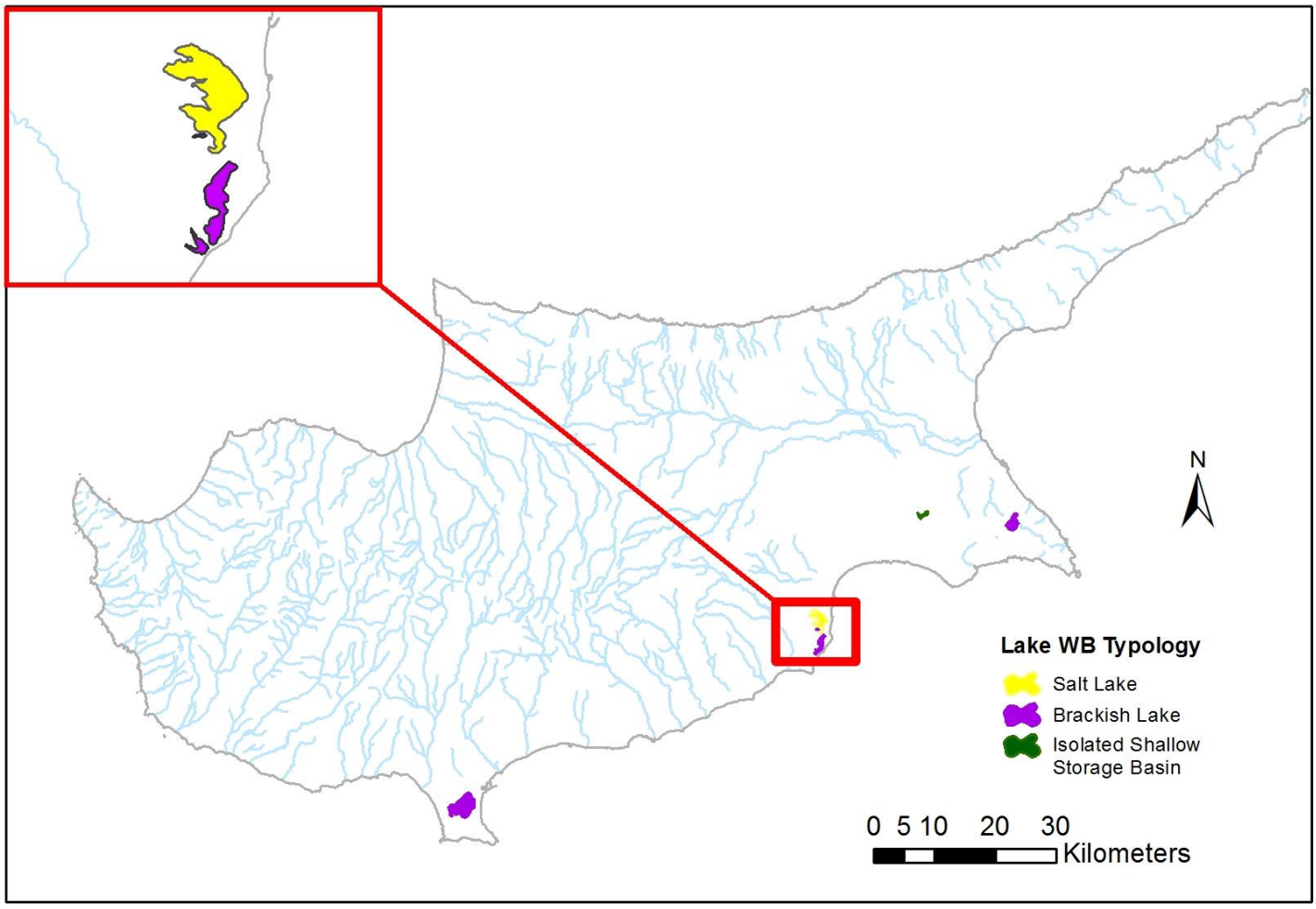

Figure 2.2.2-1: Lake water bodies and their typology

Table 2.2.2-1: Characteristics of Lake water bodies. HM = Heavily modified, A = Artificial, - = natural water body. For some lakes there was no information available on the depth (indicated with n.a.). For these lakes expert knowledge was used.

For some water bodies there was no information available on the depth (indicated with n.a.). Red colour indicates the differences between these reporting sheets and the 1st River Basin Management Plan Reporting. The main difference though is that in the 1st River Basin Management Plan the water reservoirs were characterised as Lake HMWBs and not river HMWBs thus these are not included in this table anymore.

Water body code	Sub-watershed	Name	Area at overflow level (ha)	mean depth (m)	WFD-type	modified	drinking water area	natura2000	urban vulnerable zone	nitrate vulnerable zone
CY_8-3-2_11_L1	8-3-2	Larnaka main salt lake	477.7	n.a.	1	-		x		
CY_8-3-2_17_L2	8-3-2	Larnaka Limni aerodromiou	3.9	n.a.	2	-		x		
CY_8-3-2_13_L2	8-3-2	Larnaka Limni Soros (Glossa)	24.5	n.a.	2	-		x		
CY_8-3-2_12_L2	8-3-2	Larnaka Limni Orfani	147.0	n.a.	2	-		x		
CY_9-5-3_10_L2	9-5-3	Akrotiri salt lake	1005.3	n.a.	2	-		x		
CY_7-2-6_16_L2-HM	7-2-6	Paralimni	290.4	1	2	HM		x		x
CY_7-1-2_34_L3-A	7-1-2	Achna	66.5	2	3	A		x		x

2.3 SWB 3: PROVISIONAL IDENTIFICATION OF ARTIFICIAL AND HEAVILY MODIFIED WATER BODIES

Heavily modified water bodies (HMWB) are bodies of surface water which as a result of physical alterations by human activity are substantially changed in character. The main human activities that are applicable in the context of Cyprus inland waters are water storage, such as for drinking-water supply or irrigation and canalisation of rivers.

Artificial water bodies (AWB) are bodies of surface water created by human-activity in a location where no water body existed before and which has not been created by the direct physical alteration, movement or realignment of an existing water body. In Cyprus this applies for small water bodies constructed for water storage in places where no water had been before.

The main difference between the first characterisation of River Basin District (RBD) in the first RBMP cycle and the second characterisation of RBD in the second RBMP cycle is that water bodies (natural, HMWB & AWB) have already been identified and a compliant monitoring programme is in place.

According to Guidance Document No. 4: Identification and Designation of Heavily Modified and Artificial Water Bodies, in the second RBMP cycle the Article 4(3) designation tests will be applied in three circumstances, as follows:

(i) Suspected HMWB and AWB which were, possibly, mistakenly not designated in the first RBMP

(ii) Newly modified water bodies, and

(iii) As part of the review of existing HMWB and AWB. The designations of HMWB and AWB must be reviewed every six years. It is assumed that these reviews will be undertaken as part of the production of the RBMP which will be complete in 2015. It is assumed that a review of HMWB and AWB will involve a reconsideration of the designation tests. Only where changes have occurred, the water body will be considered for the designation tests in the second cycle.

Therefore based on the above, there are only two circumstances where there are changes compared to the 1st RBMP, as follows:

a) There are 4 new water bodies (impounded rivers) compared to the 1st RBMP reporting. These water bodies already existed in the 1st RBMP, but because three of them are smaller than 0.5 km^2 they were not designated as water bodies. At a later stage it was decided to include them as water bodies since three of them are now designated as water bodies used for drinking water and all four of them are included in Natura 2000 sites. Only one of them (Kannaviou Reservoir) is larger than 0.5 km^2. The Kannaviou Reservoir was not included in the 1st characterisation of River Basin District (RBD), since the construction of the dam was completed in March 2005 and the impounding of the reservoir started on October 2005.

   The amount of water in the reservoirs (impounded rivers) depends on the rainfall and use. The reservoirs are also mainly filled by the inflow of water from rivers. During the winter months they collect water, but in summer most of the water is used and the water level declines. Consequently, the water level and size of these water bodies is rather variable. Some of these

water bodies might dry up some times, but the water depth is usually more than 3 meters. These four new water bodies are identified as heavily modified river water bodies, since they are reservoirs created by damming of rivers and there are no environmentally better options for the purposes that they serve (i.e. provide drinking and irrigational water).

b) As it is mentioned previously in the Reporting Sheet SW1: Typology of Surface Waters (Lakes), in the first River Basin Management Plan of Cyprus the water reservoirs (impounded rivers) were characterised as heavily modified lake water bodies and they were assigned a typology. However, in the «Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans, Member State: Cyprus» it was stated that «*Reservoirs have been reported as heavily modified lakes, not as heavily modified rivers, as recommended. This limits the comparability with information from other Member States*». For that reason, it was finally decided that the water reservoirs will not be characterised as heavily modified lake water bodies, but they are assigned as heavily modified river water bodies.

These water reservoirs are characterised as river HMWBs, since this is the initial water category of these water bodies before the physical alterations by human activity occurred. However, the closest comparable natural water category to these HMWBs in the present situation is a lake. According to Annex II par. 1.1 V of the WFD "*for artificial and heavily modified surface water bodies the differentiation shall be undertaken in accordance with the descriptors for whichever of the surface water categories most closely resembles the heavily modified or artificial water body concerned*".

Table 2.3-1 and Figure 2.3-1 give an overview of the amount and cover of the heavily modified and artificial water bodies concerning only impounded rivers and lake WBs.

Table 2.3-1: Overview of the amount of heavily modified and artificial water bodies concerning only impounded rivers and lake WBs.

	HMWB		AWB	
	Number of water bodies	**Cover (%)**	**Number of water bodies**	**Cover (%)**
River water bodies (only impounded rivers)	15	(n/a)*	0	0
Lake water bodies	1	14.4	1	3.3

** the % cover will be indicated after the typology and identification of all the river water bodies is completed*

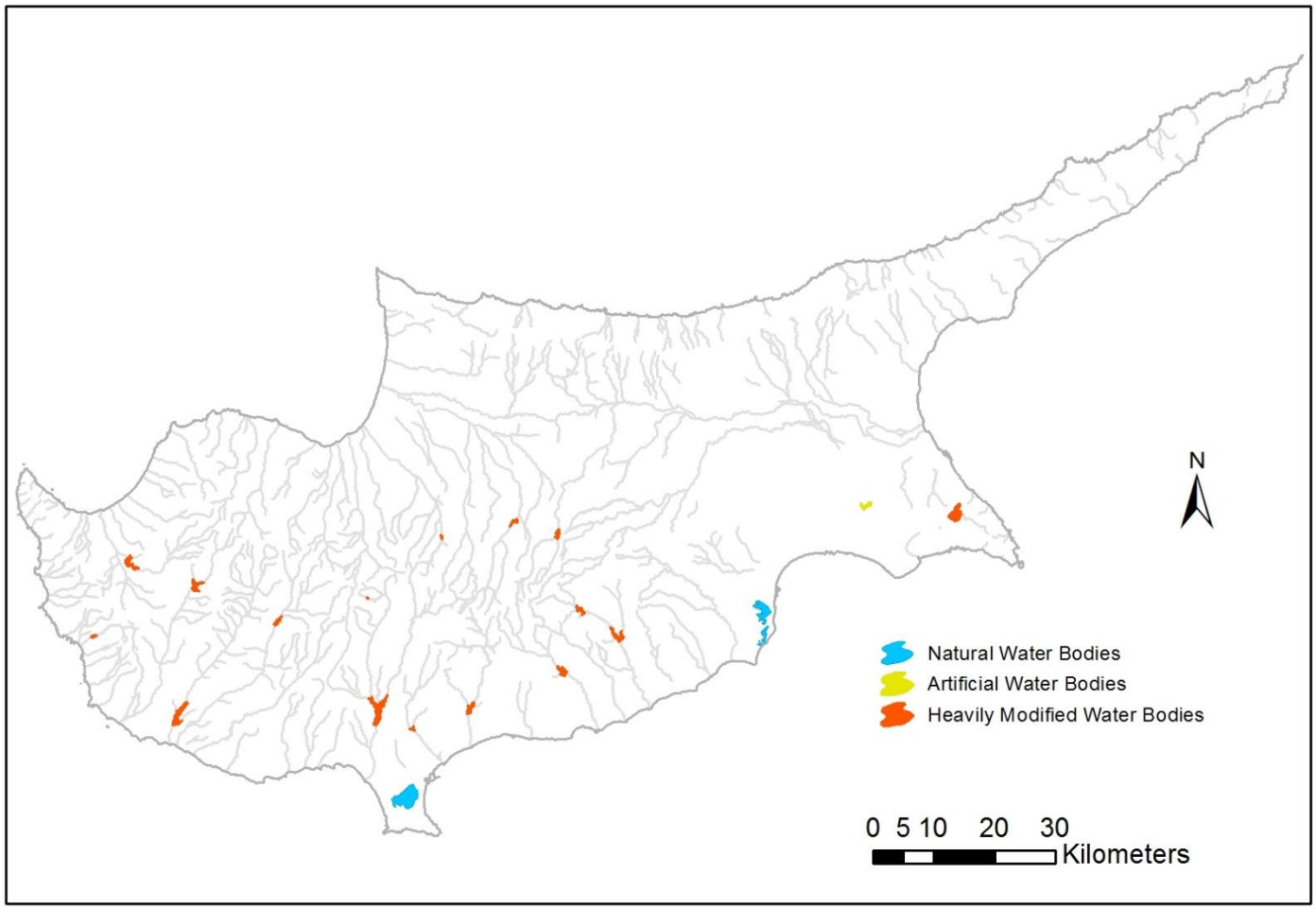

Figure 2.3-1: Overview to the natural, artificial and heavily modified water bodies concerning only impounded rivers and lake WBs.

2.4 DISCUSSION ON THE UPDATED REPORTING SHEETS

The main differences between the Reporting Sheets included in the Cyprus WFD Art.5 Summary Report in 2005 and the updated Reporting Sheets in this report concern the following:

- The water reservoirs (impounded rivers) were characterised as River HMWBs and not Lake HMWBs. Consequently,
  - the typology for the lake water bodies does not include the factor "connection to a river", and
  - the number of lake water bodies decreased from 18 to 7 water bodies.
- four new impounded rivers (Arminou, Kannaviou, Tamassos, Akaki-Malounda) were added.

It must be noted that in the typology of the water reservoirs in the Intercalibration Exercise, the category that Cyprus included its reservoirs is the "LM-8: Calcareous Reservoirs" which are: deep (> 15 m depth), large (> 0,5 km^2), with catchment area smaller than 20.000 km^2, calcareous (> 1 meq/l) and at an altitude from 0 to 800 m. However, not all the water reservoirs of Cyprus meet these

criteria. For example, Dipotamos, Germasogeia and Polemidia are more shallow reservoirs than 15 m, and Pano Platres is at a higher altitude than 800 m. This must be taken under consideration, since the monitoring results might not be completely representative of the status of these reservoirs.

2.5 UPDATED GEOGRAPHIC INFORMATION (GIS)

This report is accompanied by the relevant updated GIS files (shapefiles) for the lake water bodies and the impounded river water bodies, which include completed attribute tables. The attribute tables include the following information:

MS_CODE:	Member State Code of Water Body
NAME:	Name of Water Body
SUBWATERSH:	Subwatershed Code
WFD_TYPE:	Type of Water Body
MODIFIED:	Heavily Modified or Artificial
X_COORD:	Longitude of the central point
Y_COORD:	Latidute of the central point
AREA_HA:	Area of the Water Body in Hectares

CHAPTER 3. UPDATED PRESSURE SITUATION AT EACH RESERVOIR WATER BODY

3.1 INTRODUCTION

As part of the implementation of Article 5 of the European Water Framework Directive (WFD), each country has to make an analysis of all the pressures and impacts to the identified water bodies. This analysis is related to the identification of driving forces and pressures to water bodies with respect to main pollution concerns, abstractions, hydromorphological and other potential pressures, the preliminary estimation of the quality objectives and the assessment of impacts of these pressures to the water bodies' status and objectives.

During the first characterisation of River Basin District (RBD), Cyprus has reported the analysis of all the pressures and impacts to the identified water bodies (2004-2005). This analysis was updated during the elaboration of the 1st RBMP (2011).

For the purposes of this Contract, the pressure information for the water reservoirs and artificial and heavily modified lake water bodies was updated. The data that was used for the update of the pressure situation was mainly based on the data, analyses and results of the Department of Environment project "Preparation of an Inventory of Emissions, Discharges and Losses of Priority and Priority Hazardous Substances", [Contract Number 14/2012 (07 - 12 /2012) by I.A.CO Environmental and Water Consultants Ltd]. These data were updated by using data for year 2013, where these were available.

With regards to potential point pollution sources the data that were used are the following:

- Data from the Cyprus Pollutant Release and Transfer Register (PRTR) (Department of Labour Inspection, Ministry of Labour and Social Insurance and Department of Environment, Ministry of Agriculture, Natural Resources and Environment)
- Data for facilities that operate within industrial areas (Industrial Development Service, Ministry of Commerce, Industry and Tourism)
- Registry of all the Waste Disposal Permits (Department of Environment, Ministry of Agriculture, Natural Resources and Environment)
- Registry of all the Air Emission Permits (Department of Labour Inspection, Ministry of Labour and Social Insurance)
- Research for the collection of quantity data for dangerous wastes in Cyprus for years 2008 – 2009, Contract No. Dep. of Env. 3/2010
- Animal Husbandry facilities (Registry of Veterinary Services, Ministry of Agriculture, Natural Resources and Environment)
- Data for the Urban Wastewater Treatment Plants through the reports for the implementation of Directive 91/271/EC (Department of Environment, Ministry of Agriculture, Natural Resources and Environment) & Data for UWWTP position and disposal

sites (Division of Waste Water and Reuse, Water Development Department, Ministry of Agriculture, Natural Resources and Environment)

- Record and evaluation of the existing and closed and/or abandoned mining waste facilities, Contract No. Dep. of Env. 6/2010 (Department of Environment, Ministry of Agriculture, Natural Resources and Environment)
- Data for the Integrated Solid Urban Waste Treatment Facility for the Districts of Larnaca – Famagusta, the Sanitary Landfill for the region of Pafos and all the uncontrolled waste disposal sites nationwide (Environmental Impact Assessment Studies and other studies, Solid Waste Management Section, Technical Services, Ministry of Interior)

With regards to diffuse sources, the data that were used are the following:

- Type and area of each crop per village boundaries (GIS Section, Technical Services, Integrated Administration and Control System (IACS) Division, Cyprus Agricultural Payments Organisation)
- Data for quantities of imported plant protection products and dosages per type of crop (Agrochemicals Control Section, Department of Agriculture, Ministry of Agriculture, Natural Resources and Environment)
- Non stabled animal husbandry facilities (Registry of all the Waste Disposal Permits, Department of Environment, Ministry of Agriculture, Natural Resources and Environment, Registry of all the Air Emission Permits, Department of Labour Inspection, Ministry of Labour and Social Insurance, Registry of Veterinary Services, Ministry of Agriculture, Natural Resources and Environment)
- Areas that are covered by sewage networks (Reporting for the Implementation of Directive 91/271/EC, Department of Environment & Water Development Department, Ministry of Agriculture, Natural Resources and Environment)

In addition, the reports of the Project "Provision of services for the establishment of Reservoir Protection Zones for the reservoirs used for the abstraction of drinking water", No: ΥΥ&Υ 1/2012Δ (Water Development Department, Ministry of Agriculture, Natural Resources and Environment) were reviewed for pressure data for water reservoirs used for drinking water purposes.

The significant pressures that are connected to human activities in Cyprus RBD are depicted in Table 3.1-1. With the exception of hydromorphological pressures, all other pressures cause pollution to surface water and groundwater. Pollution pressures can be further classified as point or diffuse source pollution.

Table 3.1-1: Significant pressures in Cyprus

Type of pressure	Point source or Diffuse source of Pollution
Urban waste water	Point source and diffuse source
Industrial waste water	Point source
Mines and quarries	Point source

Type of pressure	Point source or Diffuse source of Pollution
Storm water	Diffuse
Solid waste (landfills)	Point source
Agriculture runoff and infiltration	Diffuse
Livestock waste	Diffuse/Point source
Other types of pressures: hydromorphological pressures aquaculture	Point source

The pressure data that were assessed in the context of this Project, as it is described in the following paragraphs, concerns only the pollution sources and other pressures in the watersheds and sub-watersheds of the water reservoirs and storage basins (Analysis Area) (Figure 3.1-1).

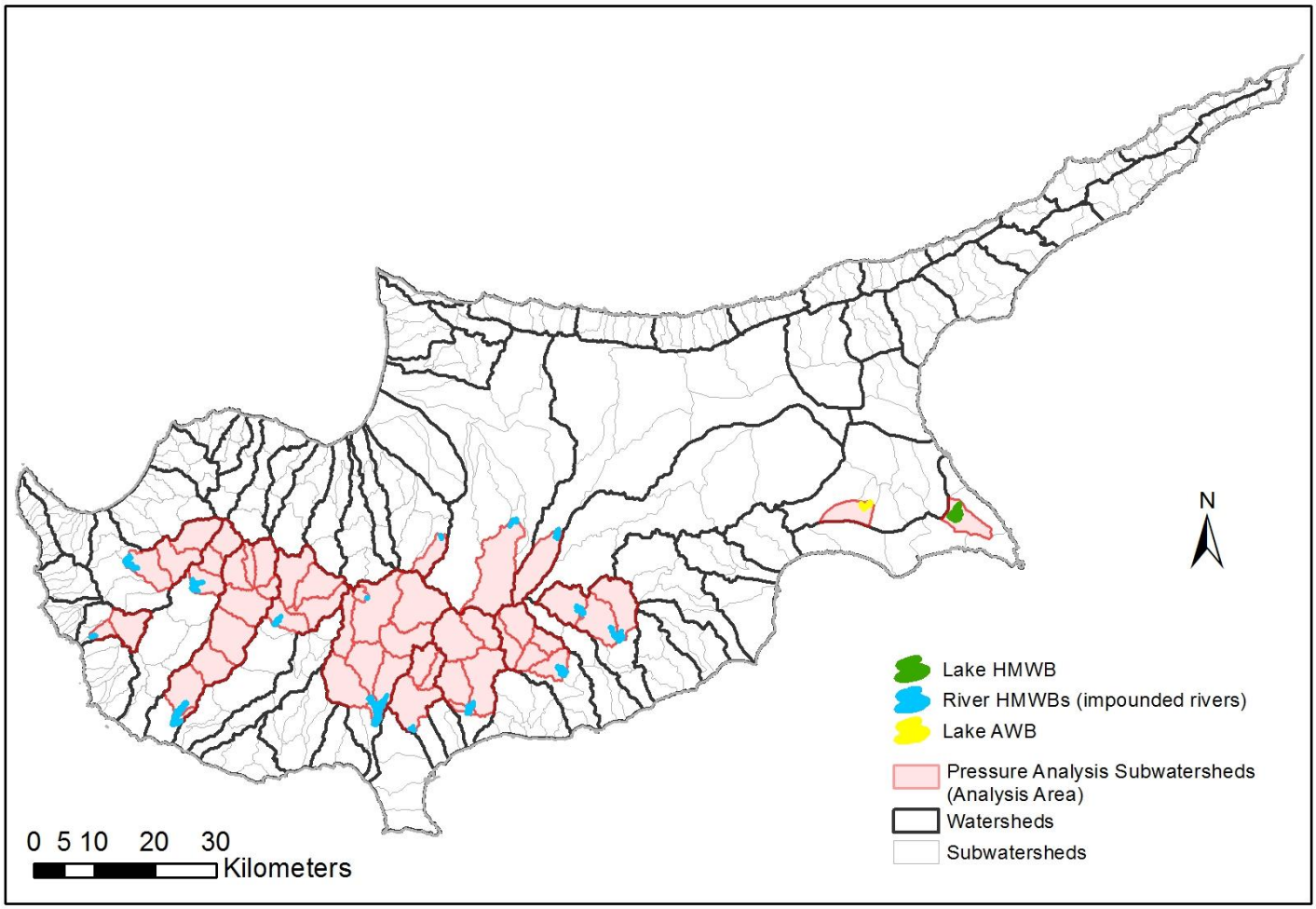

Figure 3.1-1: Pressure Analysis Sub-watersheds (Analysis Area)

In the following paragraphs, the methodology and results for the update of the pressure information in the Analysis Area are described. Following the pressures analysis, an assessment of the susceptibility of the status of water bodies to the pressures identified is made.

3.2 METHODOLOGY

3.2.1 Data Analysis - Assumptions

In this Section the data used per type of pressure and the assumptions made concerning the analysis of the data, as well as the spatial location of the pressure sources are described. The expected pollutants per pressure type are described in Section 3.2.2 of this report. In addition, the significance of each pressure source was assessed by its ability to cause pollution to the examined water bodies. The methodology for the indicative assessment of significance is presented in Section 3.2.3.

3.2.1.1 PRTR

Data from the Cyprus Pollutant Release and Transfer Register (PRTR) was used and only one installation was found in the Analysis Area, which constitutes potential point source of pollution. The Register provides information on the type and annual amounts of pollutant releases to air, water and from facilities that fall within the scope of the Regulation (EC) No. 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register (E-PRTR).

3.2.1.2 Industries

The industrial activity constitutes potential point source of pollution. For the update of industrial activity the data that were used are the following:

- Data for facilities that operate within the 13 industrial areas (Industrial Development Service, Ministry of Commerce, Industry and Tourism)
- Registry of all the Waste Disposal Permits (Department of Environment, Ministry of Agriculture, Natural Resources and Environment)
- Registry of all the Air Emission Permits (Department of Labour Inspection, Ministry of Labour and Social Insurance)

Only industrial facilities located in the Analysis Area were selected. An excessive evaluation of the data was made to avoid double counting due to different sources of data. An estimation of the type of expected pollutants referring to each industrial sector was made according to relevant bibliography (pl. refer to section 3.2.2), apart from the cases where the type of expected pollutants was referred in the facility's Waste Disposal Permit. In addition, based on the Waste Disposal Permits of each industrial facility, those facilities that dispose their wastes in central WWTPs were not considered as potential sources of pollution.

Regarding the spatial location of industrial facilities, the following assumptions were made:

- For industrial facilities that are reported in the implementation of the WFD Article 5 in Cyprus (2004-2005), these were placed in the centre of the community to which they belong.

- For industrial facilities that spatial information existed from the Waste Disposal Permits and Air Emission Permits, these were located using the plan/sheet information for each facility, in conjunction with the boundaries of the municipality in which they belong and verification was made with satellite imagery (Google Earth).

The significance of each industrial facility was assessed by its ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3.

3.2.1.3 Mines - Quarries

The data on mines were updated using as a baseline the results of the Department of Environment project "Recording and evaluation of the mine waste facilities in Cyprus" (2011). This project was used for the spatial location of mine facilities. Each facility is categorised either as pits or mining waste facilities, and both are potential point source of pollution.

These facilities were further categorized based on the 1st River Basin Management Plan of Cyprus according to the expected pollutants from each type of installation as follows: a) the copper mines are related with substances as Cd, Ni, Pb and As, (b) the chromite mines with Ni and As, while (c) the asbestos mines with Ni (pl. refer to section 3.2.2).

Concerning the quarries, data from the Mine Service was used to address the location and the type of quarries.

The significance of each mine and quarry facility was assessed by its ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3.

3.2.1.4 Agriculture

An important diffuse source of pollution is related to agricultural activities, which contribute to the enrichment of surface waters and groundwater with nutrients (nitrogen and phosphorus), as well as priority substance pollutants that are included in pesticides and plant protection products.

The data that were used are:

- Type and area of each crop per village boundaries for the year 2013 (GIS Section, Technical Services, Integrated Administration and Control System (IACS) Division, Cyprus Agricultural Payments Organisation)
- Data for quantities of imported plant protection products and dosages per type of crop (Agrochemicals Control Section, Department of Agriculture, Ministry of Agriculture, Natural Resources and Environment)

For the plant protection products, the substances that correspond to the different types of crops are:

- Alachlor in herbicides for potatoes, tomatoes, cabbage, cauliflower, beans, peas, chickpeas, peanuts.

- Diuron in herbicides for potatoes, citrus trees, vines.
- Trifluralin in herbicides for tomatoes, cabbage, cauliflower, beans, peas, chickpeas, carrots.
- Chlorpyriphos in insecticides for the following crops per type of product: (a) for liquid products 70% in citrus trees, 10% in potatoes, 5% in apple and stone fruits and the rest in various vegetables (tomatoes, eggplant, peppers, cucumbers, watermelons, pumpkins, melons, legumes onion, garlic, etc.), (b) for grain products more that 95% is applied to grass and (c) for powder products more than 95% is applied to vines.

Fertilizers are used mainly in cereals, potatoes and deciduous trees.

Regarding the spatial location of the crops and the relevant potential pollutants, CORINE 2006 was combined with the village boundaries in which these crops are recorded.

The significance of agricultural activity was assessed by its ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3.

3.2.1.5 Livestock

The main animal breeding facilities are those that are included in the IPPC Directive. Apart from those, additional data were used as follows:

- Registry of all the Waste Disposal Permits (Department of Environment, Ministry of Agriculture, Natural Resources and Environment)
- Animal Husbandry facilities (Registry of Veterinary Services, Ministry of Agriculture, Natural Resources and Environment)
- Non stabled animal husbandry facilities (Registry of all the Waste Disposal Permits, Department of Environment, Ministry of Agriculture, Natural Resources and Environment, Registry of all the Air Emission Permits, Department of Labour Inspection, Ministry of Labour and Social Insurance, Registry of Veterinary Services, Ministry of Agriculture, Natural Resources and Environment)

The main pollutants related to animal breeding are oxygen reducing organic substances (BOD), nitrogen, phosphorus, salinity and boron.

The animal breeding facilities were located using the plan/sheet information for each facility, in conjunction with the boundaries of the municipality in which they belong and verification was made with satellite imagery (Google Earth). Also, the Registry of the Veterinary Services and the PRTR that include spatial information, were used as well and a quality check was performed to avoid double counting.

The PRTR facilities, as well as those that have Waste Disposal Permits, were considered as potential point source of pollution.

For the diffuse source of pollution by animal breeding activities, the following assumptions were made: From the Registry of the Veterinary Services, the facilities that are included in the PRTR as well as those that have Waste Disposal Permits were discarded (since these are treated as potential

point source of pollution). For the remaining premises the load of BOD was calculated per animal type. The production rates are those that were used in WFD Article 5 reporting. The pollution load was summed up for each sub-watershed and if it exceeded the load resulting from a settlement with equivalent population 2.000 (120gr BOD / day), then it was assumed that the load resulting from all the facilities together can be considered as a significant diffuse source of pollution.

The significance of animal breeding activity was assessed by its ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3.

3.2.1.6 Urban Waste Water

The data that were used for the update of the Reporting under Article 5 (2004-2005) and the 1st RBMP are the following:

- Reporting for the Implementation of Directive 91/271/EC (Department of Environment & Water Development Department, Ministry of Agriculture, Natural Resources and Environment)
- Data for Sludge Disposal for soil-enhancing purposes by central wastewater treatment plants, (Land Use and Water, Department of Agriculture, Ministry of Agriculture, Natural Resources & Environment and Sewerage Boards)
- Information for all treatment plants as well as data for the disposal of the tertiary treated water and of the sludge of the domestic and industrial wastewater treatment Plan (Vathia Gonia) (Water Development Department, Ministry of Agriculture, Natural Resources and Environment)
- List of industries that take their wastes to Vathia Gonia Wastewater Treatment Plant (Water Development Department, Ministry of Agriculture, Natural Resources & Environment)

The pollutants that are related to waste water treatment plants (WWTP) are described in section 3.2.2 of this report. Especially for Vathia Gonia WWTP, the pollutants that were considered relevant are those that are related to the industries that dispose their wastes to Vathia Gonia.

For the spatial location of the WWTPs data from the Water Development Department were used and the following assumptions were made:

- The WWTPs were located based on data from Water Development Department and were regarded as potential point source of pollution.
- The areas irrigated with recycled (treated) water were located based on data from Water Development Department and these areas were regarded as potential diffuse source of pollution.
- In cases where the WWTPs dispose their tertiary treated wastewater to surface waters, these disposals were regarded as potential point source of pollution and the location was based on WDD data.
- In areas where sludge is disposed for soil-enhancing purposes, spatial data (sheet/plan) were used in conjunction to CORINE 2006 to spot the intensive agricultural areas. These areas were regarded as potential diffuse source of pollution.

In addition, areas that are not fully covered by sewage networks are considered as diffuse source of pollution. The reporting of the Implementation of Directive 91/271/EC was used for data on these areas and the following assumptions were made: For those settlements that they are covered by sewage network less than 90 percent, then the residential area of this settlement is considered as a diffuse source of pollution. For those settlements that are covered by sewage network at a percent equivalent or over 90%, but the proportion of the equivalent population that remains uncovered is more than 2000, then the residential area of this settlement is considered as diffuse source of pollution.

The areas irrigated with recycled (treated) water or where sludge is disposed and the water bodies where disposals of recycled (treated) water occur are considered to be related with Cadmium, Lead, Mercury and Nickel (based on Cyprus PRTR). Exception to these, are the areas irrigated with recycled (treated) water and the areas where sludge is disposed from Vathia Gonia, where various industries dispose their wastes. The pollutants that were considered relevant are those that are related to the industries that dispose their wastes to Vathia Gonia. The pollutants that are related to waste water treatment plants (WWTP) are described in section 3.2.2 of this report.

The significance of the urban waste water potential sources of pollution, as described in the previous paragraphs, was assessed by their ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3.

3.2.1.7 Solid Wastes (Landfills - Uncontrolled waste disposal sites)

For the update of the landfills data, the following studies were reviewed: a) the Strategic Plan for Landfills Restoration in Cyprus (Ministry of Interior, 2006), b) the Technical Studies for Landfills Restoration in the Regions of Paphos and Larnaca - Famagusta and earlier Feasibility Studies for restoring various other landfills.

All the landfills were placed based on the map of the Strategic Plan for Landfills Restoration in conjunction with satellite photographs (Google Earth).

The significance of the landfills as point sources of pollution was assessed by their ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3. The pollutants that are related to landfills are described in Section 3.2.2.

3.2.1.8 Storm Water

Based on the methodology of WFD Article 5 Cyprus Reporting (2004-2005), storm water diffuse pollution loads can originate from impervious urban areas, airports and designated industrial areas. These loads can be either collected by a sewage network or discharged as uncontrolled runoff. These impervious areas are the following:

- The 3 airports: Larnaka, Pafos, British Bases on Akrotiri - Lemesos

- Municipalities urban areas
- Industrial areas and zones (categories A and B) with an area more than 250 ha.

The significance of the storm water discharges as diffuse sources of pollution was assessed by their ability to cause pollution to the examined water bodies (reservoirs, storage basins). The methodology for the assessment of significance is presented in section 3.2.3. The pollutants that are related to storm water discharges are described in Section 3.2.2.

3.2.1.9 Hydromorphological pressures - water abstraction

In the 1st River Basin Management Plan, the hydromophological pressures were identified and assessed. Concerning the water bodies that are examined in this Report they have been identified as heavily modified since they are impounded rivers - water reservoirs or artificial water bodies in the case of Achna, which is an artificial storage basin.

The pressures concerning the water abstraction on these water bodies remain similar as it was reported in the 1st RBMP.

3.2.2 Expected pollutants per pressure type

Each pressure type - category was related with specific pollutants based on relevant bibliography and references. The main sources of data were the following:

- Reporting through WFD Article 5 for the 1st water bodies characterisation (2004-2005)
- Cyprus PRTR
- Geodatabase of the potential sources of soil pollutionin Cyprus, Geological and Mineral Research Institute, GEOINVEST LTD, Contract No. 5/2004
- Record and evaluation of the existing and closed and/or abandoned mining waste facilities, Contract No. Dep. of Env. 6/2010, Department of Environment, IACO LTD - ENVECO S.A. (2011)
- Priority Substances background documents (2010), supplementary to the Directive 2008/105/EC

In the case of industrial facilities, each facility was further examined case by case through their Waste Disposal Permits.

Table 3.2.2-1 describes the types of pressures and the relevant pollutants.

Table 3.2.2-1: Association of pollutants to potential pressures which are likely to cause introduction of these pollutants to the water bodies

Type of Pressure	NACE Category	Annex VIII - Pollutants			Annex X - Priority Substances																												
					1	2	4	5	6	7	9	10	11	12	13	15	17	20	21	22	23	24	25	27	28	28	28	29a	29b	31	32	33
		Organic Pollution (DO, BOD, NH_4, NO_2, TP)	Pollution the causes eutrophication (NO_3, PO_4)	Other Chemical Pollution	Alachlor	Anthracene	Benzene	Brominated diphenylethere	Cadmium	C10-C13 Chloroalkanes	Chlorpyrifos	1,2-Dichloroethane	Dichloromethane	DEHP	Diuron	Fluoranthene	Hexachloro-butadiene	Lead	Mercury	Naphthalene	Nickel	Nonylphenol	Octylphenol	Pentachloro-phenol	Benzo(a)pyrene	Benzo(b)fluor-anthene & Benzo(k)fluor-anthene	Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene	Tetrachloro-ethylene	Trichloro-ethylene	Trichloro-benzenes	Trichloro-methane	Trifluralin
Industrial waste water	Meat Processing	√	√	TSS																													
	Slaughtery	√	√	TSS																													
	Milk processing	√	√	TSS, EC																													
	Paint industries	√		Cr, CN, ketones, glycols, chlorinated hydrocarbons														v				v	v								v		
	Food Production	√	√	SS																													
Wastewater	Treated Wastewater Disposals	√	√	Zn, Cr, Cu					v									v	v		v												
	Waste water treatment facilities	√																															
Solid waste	Landfills	√	√	SO4, K, Na, Mg, Cu, As			v		v	v		v	v	v	v	v		v	v	v	v	v	v		v	v	v	v		v	v		
Agriculture runoff and infiltration	Agriculture		√		v						v				v																		v
Mines	Mines			As, Ba, Co, Cr, Cu, U, V, Zn, Fe					v									v			v												
Quarries	Quarries			TSS																													
Storm water	Storm water in urban areas	√	√	TSS, Cu, Zn														v															
Livestock waste	Livestock	√	√	B																													

3.2.3 Assessment of importance

According to the WFD reporting guidance, all significant pressures should be assessed according to their importance within the River Basin District (RBD): Very Important, Important, Less Important.

In the context of this deliverable, an indicative assessment of the importance of the significant pressures was made using the Surface Water Vulnerability to Pollution Map Tool (V-Tool). The V-Tool was developed by I.A.CO Ltd in the context of the project "Policy development guidelines to the Cyprus competent authorities for sustainable management of pig farming wastes in compliance with EU practice" LIFE 3rd Countries, European Commission (EC LIFE03 TCY/CY/000021). In Box 3.2.3-1 there is a description of the V-Tool and the way that it works.

Box 3.2.3-1: Surface Water Vulnerability to Pollution Map Tool (V-Tool)

The Surface Water Vulnerability to Pollution Map

The surface water vulnerability map refers to the streams themselves and the lakes created by dams or the natural ones (including Salt Lakes) and it deals with the vulnerability of pollution reaching them.

Four basic parameters of equal weight have been considered in developing the surface water vulnerability map to pollution. These are the **texture of soil** which affects the runoff coefficient, the **topography** in terms of the slope of site from the pollution source toward the surface water, the **distance from the pollution source to the nearest surface water** and the **quantity of annual rainfall** inducing runoff.

Each of these parameters, except for the distance to surface water body are further analyzed into four classes and given a rating of 1 to 4, according to their impact. The distance to surface water body is analyzed into seven classes given a rating of 0 to 6.

The average score of the four parameters defines the vulnerability of pollution reaching a surface water body, assigned as follows:

$$\textbf{Surface Water Vulnerability} = (S_R S_W + T_R T_W + D_R D_W + R_R R_W)$$

Where S_R, T_R, D_R and R_R is the rating value and the S_W, T_W, D_W and R_W is the weighing factor (equal to 1) assigned to the texture of soil, topography, distance and rainfall respectively.

The site is deemed to have a low, moderate to low, high to moderate or high vulnerability for pollution to reach surface water body according to the score.

The four individual maps with their delineated areas and their corresponding ratings were assembled into one map showing areas of equal average score of the four parameters, the Surface Water Vulnerability (SWV) Index which defines the vulnerability of pollution reaching a surface water body: The Surface Water Vulnerability Index being the result of the addition of the individual values as described in the relative layers.

This Tool leads to a grading of vulnerability of areas 200mx200m compared with the potential to cause pollution to the nearest surface body if on these areas a pollution source is located.

Therefore all the pressure sources were given a score according to the V-Tool grading. For the diffuse sources this score was given based on the V-Tool average grade of the 200mx200m areas inside each diffuse source polygon. The grading scale of the V-Tool is from 3 to 17, 3 being the lower score which means that the risk of pollution is reduced and 17 being the highest score, which indicates that there is an increased risk of pollution. This grading scale is subdivided as follows:

Vulnerability Scale based on V-Tool	Assessment of Importance
> 12	Very Important (3)
8 – 11,99	Important (2)
0-7,99	Less Important (1)

In addition, in the case of agricultural areas, where the size of each polygon varies greatly, a grading of significance was made based on the area of each polygon, as follows:

Agricultural Scale based on Area	Assessment of Importance
> 1000 ha	Very Important (3)
100 – 1000 ha	Important (2)
0 - 100 ha	Less Important (1)

Then, these values (V-Tool significance and significance based on area) were multiplied for the final significance agriculture index, as follows:

Agricultural Significance Scale	Assessment of Importance
> 5	Very Important
3 - 4	Important
1 - 2	Less Important

In the case of landfills there is one more factor that affects the importance of these pressure sources. On the Strategic Plan for Landfills Restoration in Cyprus (Ministry of Interior, 2006) each landfill was evaluated in terms of its capacity as a source of pollution. The assessment examines four basic types of waste. The risk factor of a landfill due to the presence of domestic waste is associated with the time of operation of the landfill, since the degree of degradation of the organic wastes and the production of biogas depend on time. For the assessment of each landfill, firstly, the main type of waste and its quantity are identified per case. Then, depending on the economic activities of the area of interest, the possibility that other secondary waste types exist in the landfill is assessed. This assessment leads to a grading of each landfill from 0 to 40, (grade 40 indicates that there is a high risk of pollution). In the context of this project, this grading scale was subdivided as follows:

Evaluation of the risk of Landfills to cause pollution	Assessment of Importance
> 30	Very Important (3)
15 – 29	Important (2)
<14	Less Important (1)

Following that, to assess the overall risk of a landfill to cause pollution, the average between the Assessment of Importance by V-Tool and by the scale of Strategic Plan for Landfills Restoration in Cyprus was calculated.

In evaluating a surface water body's vulnerability index, it is assumed that any pollutant from any pollution source reaching a stream will -for the relative small size of catchments in Cyprus- reach a downstream water body unaltered. However, it must be borne in mind that for non-persistent pollutants this index will need to be modified accordingly with the distance travelled, for environmental degradation through chemical, biological and photolytic processes.

This analysis of significance gives an indication of the importance of each potential source of pressure to cause pollution to surface water bodies. It is important to bear in mind that comparisons of significance can be made in pressures of the same type (i.e. among different landfills, or among different agricultural areas), but not between pressures of different types, i.e. a "significant agricultural area" is not necessarily more important potential pressure from a "less significant landfill area".

In the following Section 3.3 the results of this assessment are described per water body.

3.3 RESULTS

Based on the above, in the following paragraphs the results of the update of the pressure situation for the water reservoirs and artificial and heavily modified lake water bodies are presented per water body. For each water body a Table and a Map present the potential sources of pressures to the water body and an indication of their importance.

In the following Table 3.3-1 an overview of the pressures for all the water bodies examined is presented.

Table 3.3-1: Potential Pressures for water reservoirs and artificial water bodies

	Point Sources						Diffuse Sources			
	Industry	Urban Waste Water	Mine	Quarry	Landfills	Livestock	Agriculture	Livestock	Storm water	Urban Waste Water
Achna						✓	✓	✓		✓
Akaki-Malounda	✓			✓	✓		✓	✓		
Arminou			✓		✓		✓			
Asprokremmos	✓		✓	✓	✓		✓	✓		✓
Dipotamos		✓		✓	✓		✓	✓	✓	✓
Evretou	✓			✓	✓		✓	✓		
Germasogeia				✓	✓		✓			
Kalavasos	✓		✓				✓			✓
Kannaviou					✓		✓			
Kouris	✓	✓	✓	✓	✓	✓	✓	✓		✓
Lefkara							✓			
Mavrokolympos							✓			

	Point Sources						Diffuse Sources			
	Industry	Urban Waste Water	Mine	Quarry	Landfills	Livestock	Agriculture	Livestock	Storm water	Urban Waste Water
Pano Platres										✓
Paralimni	✓				✓	✓	✓		✓	✓
Polemidia	✓	✓			✓		✓		✓	✓
Tamassos			✓	✓						
Xyliatos							✓			

3.3.1 Achna Storage Basin (lake AWB)

Table 3.3.1-1: Potential Pressures on Achna Storage Basin

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Annex VIII - Pollutants	Annex X - Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Urban Areas with no sewage	Urban Area of Xylotymvou	Less Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
		Urban Area of Achna	Less Important		
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
Point	Livestock	13 Cow Breeding Units	Less Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes	
		1 Pig Breeding Unit	Less Important		

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Annex VIII - Pollutants	Annex X - Priority Substances
		1 Poultry Breeding Unit	Less Important	eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
	PRTR	Pig Breeding Unit	Less Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	

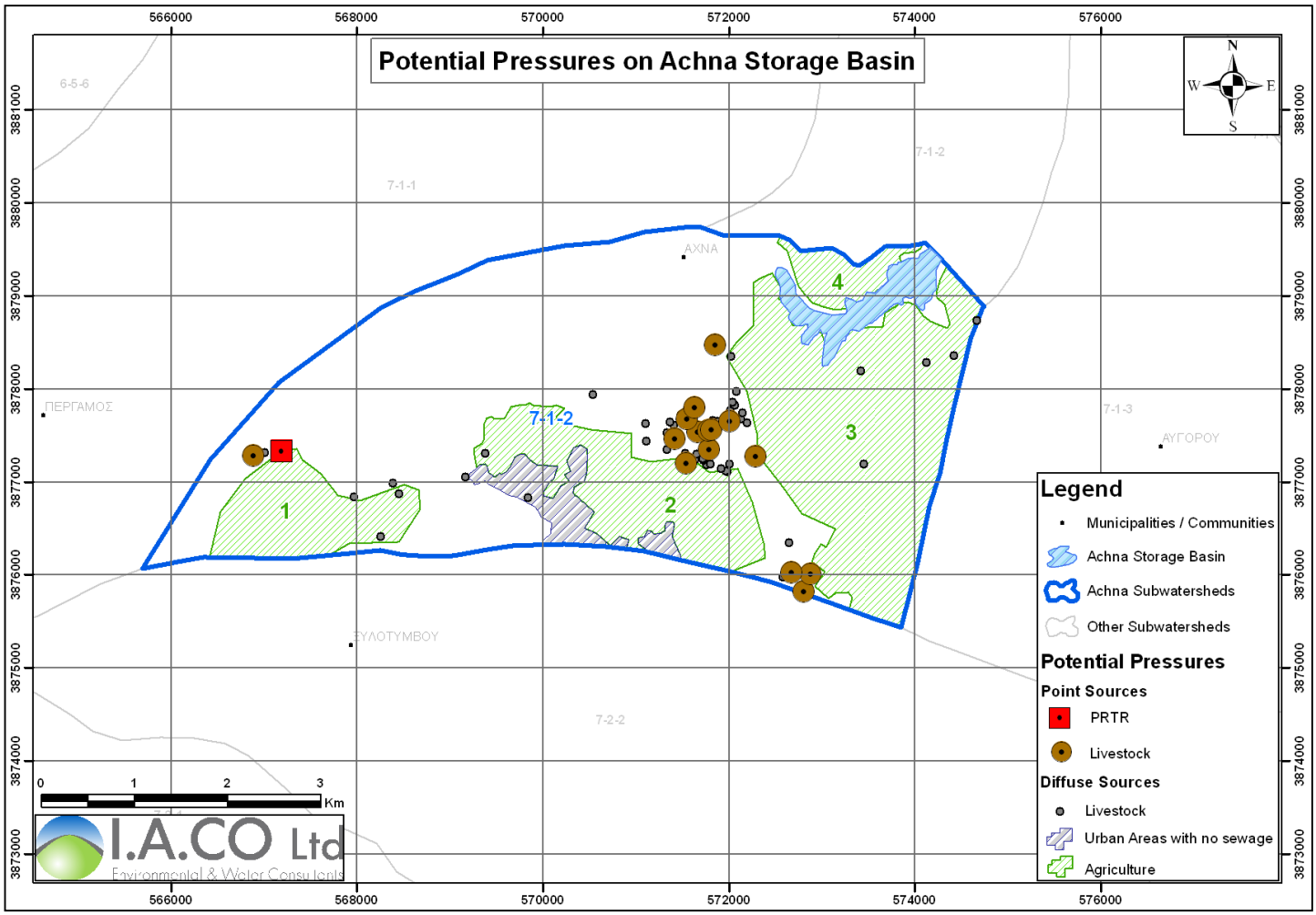

Figure 3.3.1-1: Potential Pressures on Achna Storage Basin

3.3.2 Akaki - Malounda Reservoir (river HMWB)

Table 3.3.2-1: Potential Pressures on Akaki - Malounda Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
Point	Industrial Facility	Poultry, Slaughtery	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (EC)	
	Qaurry Facility	Farmakas Quarry (AL 0249) - Excavation and Processing of Diabase Material	Important	Othen Chemical Pollution (TSS)	
	Uncontrolled Waste Disposal Site	Farmakas	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
					phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane,

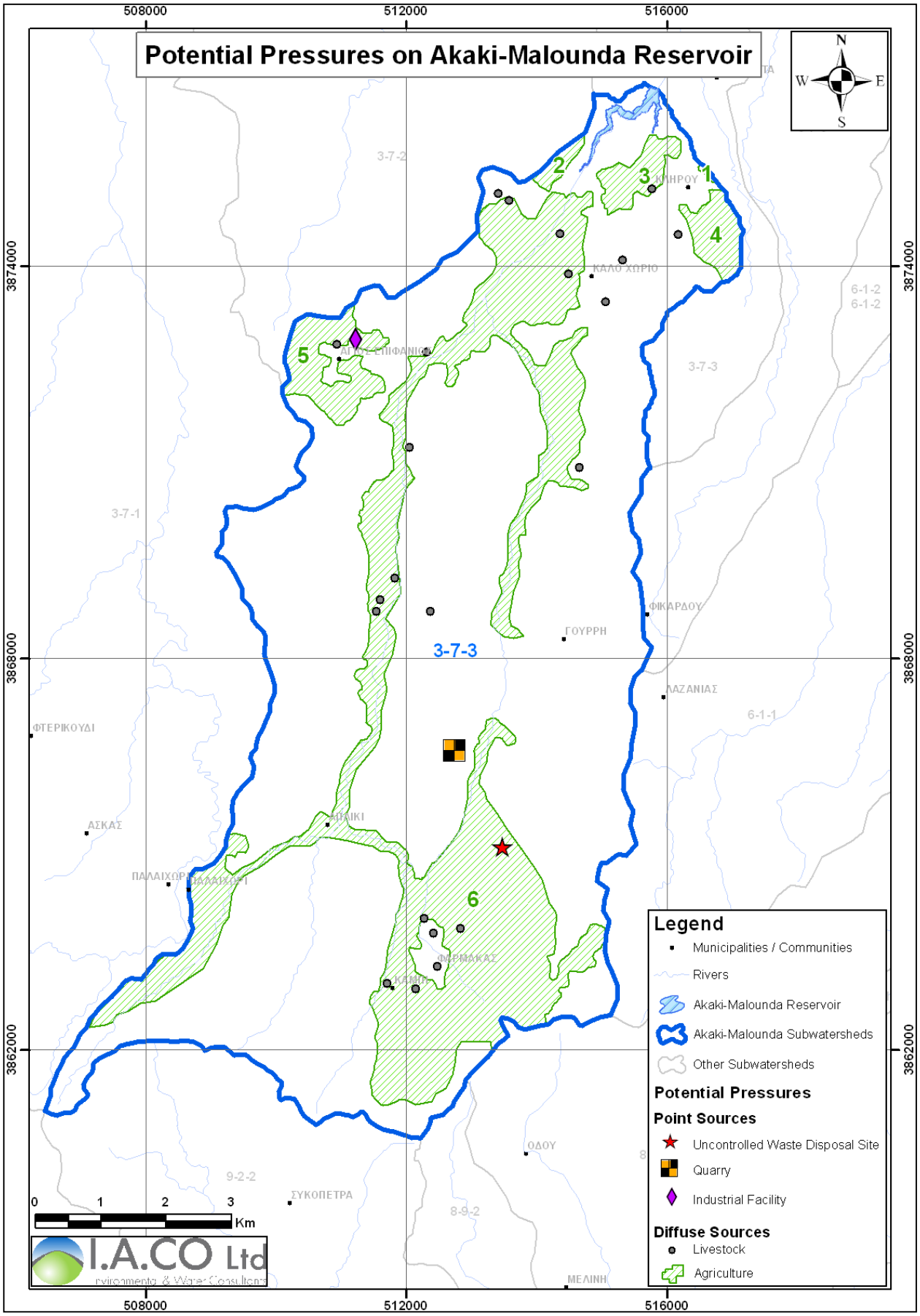

Figure 3.3.2-1: Potential Pressures on Akaki - Malounda Reservoir

3.3.3 Arminou Reservoir (river HMWB)

Table 3.3.3-1: Potential Pressures on Arminou Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 5	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 8	Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 9	Important		Chlorpyrifos, Diuron
Point	Abandoned Mine	Chatzipavlou - Mining Waste Facility	Important	Othen Chemical Pollution (As, Ba, Co, Cr, Cu, Zn, Fe)	Nickel
	Uncontrolled Waste Disposal Site	Treis Elies	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane
		Prodromos	Important		
		Lemithou	Important		

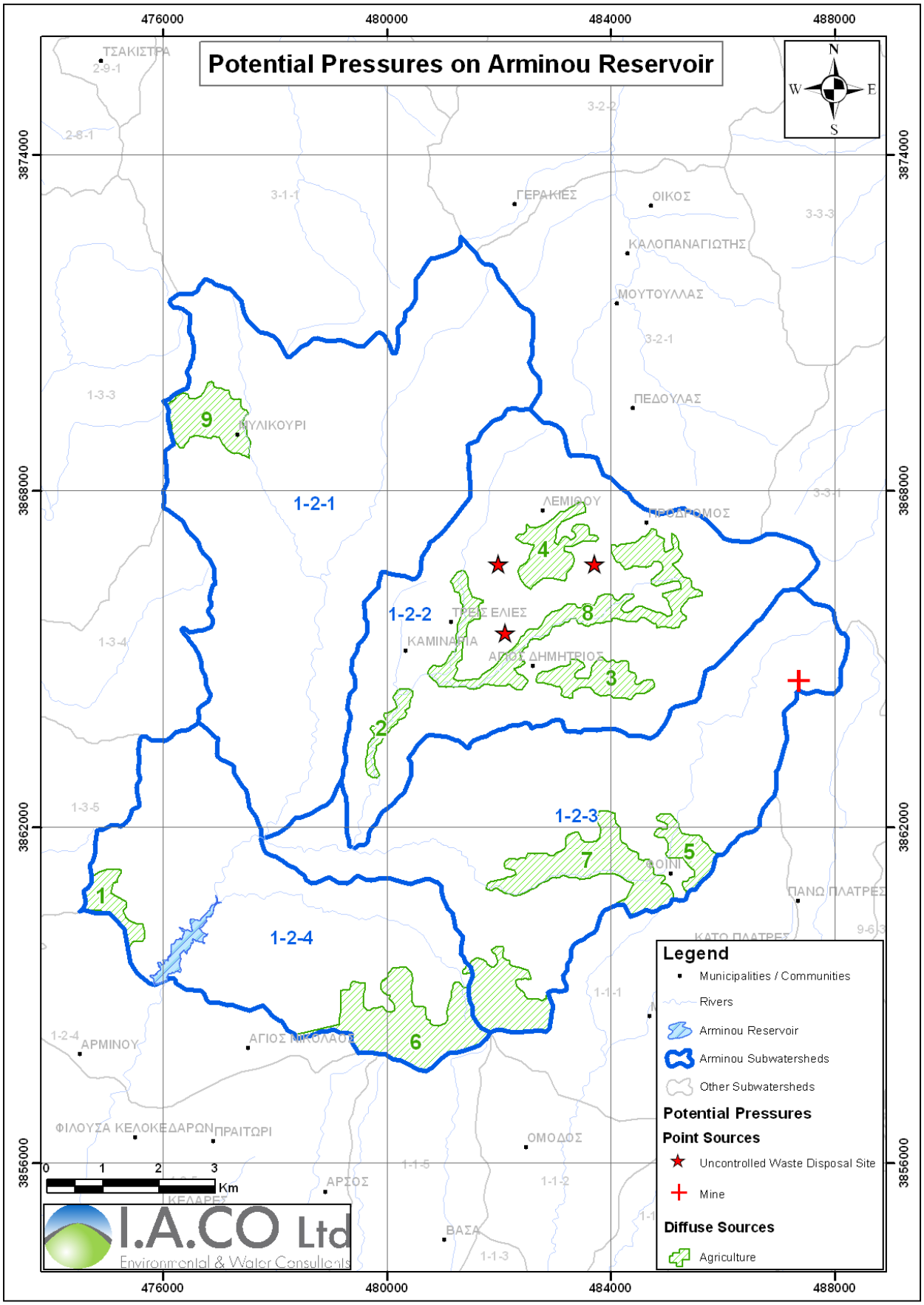

Figure 3.3.3-1: Potential Pressures on Arminou Reservoir

3.3.4 Asprokremmos Reservoir (river HMWB)

Table 3.3.4-1: Potential Pressures on Asprokremmos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	Less Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 8	Less Important		Alachlor, Chlorpyrifos, Diuron,
		Agricultural Area 9	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 10	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 11	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 12	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 13	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 14	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 15	More Important		Chlorpyrifos, Diuron
	UWWTP Sludge Disposal	Axylou	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical	

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
				Pollution (B)	
Point	Industrial Facility	Milk processing installation	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (TSS, EC)	
	Qaurry Facility	Nata (AL 0319) Excavation and Processing of Havara	Important	Othen Chemical Pollution (TSS)	
	Abandoned Mine	Vretsia Mine - Pit and Mining Waste Facility	More Important	Othen Chemical Pollution (As, Ba, Co, Cr, Cu, Zn, Fe)	Cadmium, Lead, Nickel
	Uncontrolled Waste Disposal Site	Amargeti	Less Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane
		Kelokedhara_A	Important		
		Kelokedhara_B	Important		
		Salamiou	Important		
		Agia Marina Kelokedharon	Important		
		Pentalia	Important		
		Agios Ioannis	Important		
		Galataria	Important		

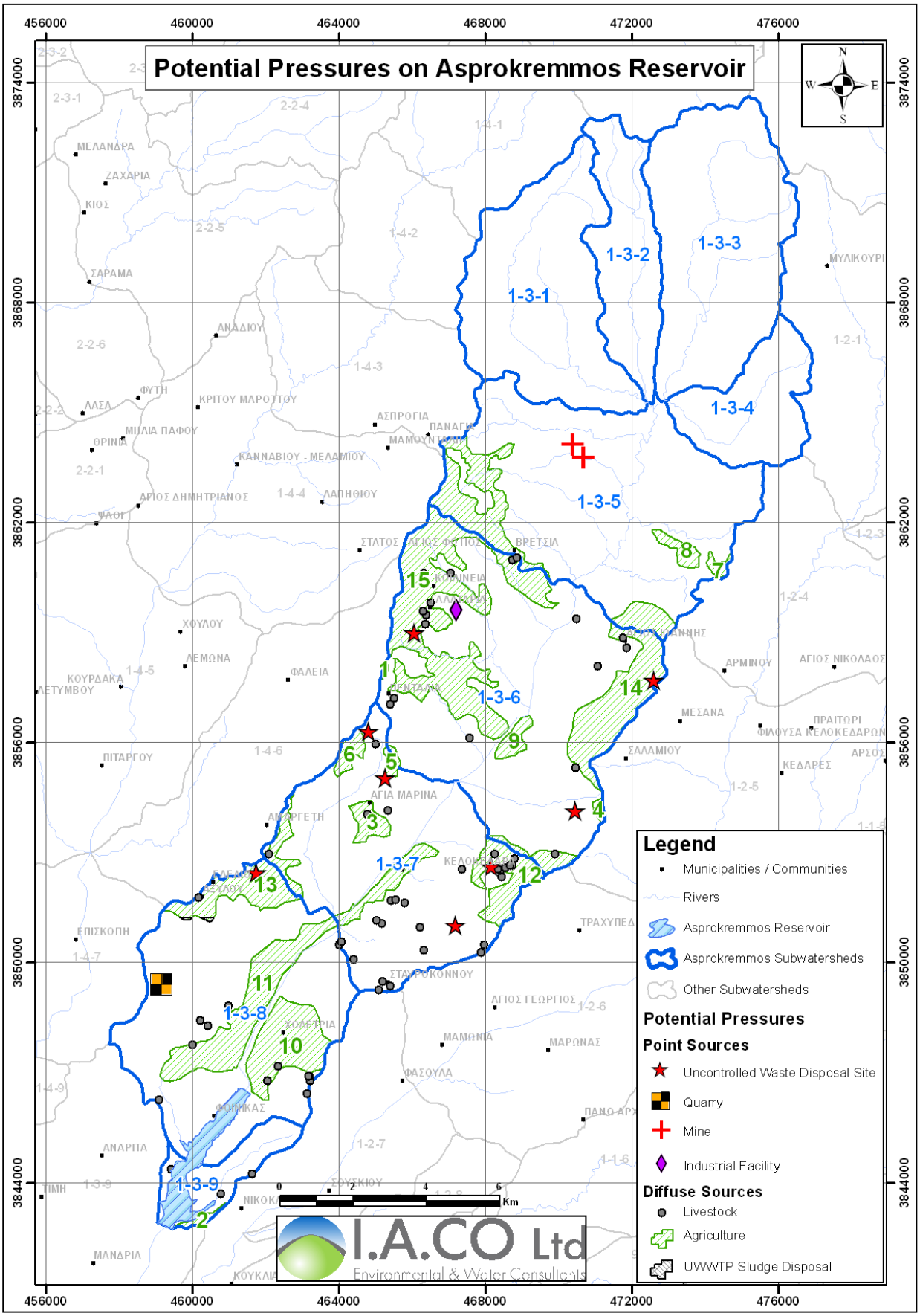

Figure 3.3.4-1: Potential Pressures on Asprokremmos Reservoir

3.3.5 Dipotamos Reservoir (river HMWB)

Table 3.3.5-1: Potential Pressures on Dipotamos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 8	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 9	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 10	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 11	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 12	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 13	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 14	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
	Stormwater Runoff	Pano Lefkara	More Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3,	Lead

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
				PO_4) Othen Chemical Pollution (TSS, Cu, Zn)	
	Irrigation with UWWTP treated water	Irrigated Area of Military Camp 4	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
Point	UWWTP	Military Camp 4	More Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP)	
	Qaurry Facility	Pano Lefkara (AL 0257 & AL0225)Excavation and Processing of Clay Material	More Important	Othen Chemical Pollution (TSS)	
		Pano Lefkara (AL 0385, AL 0283 & 0380) Excavation and Processing of Clay Material	Important	Othen Chemical Pollution (TSS)	
	Uncontrolled Waste Disposal Site	Kornos	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane

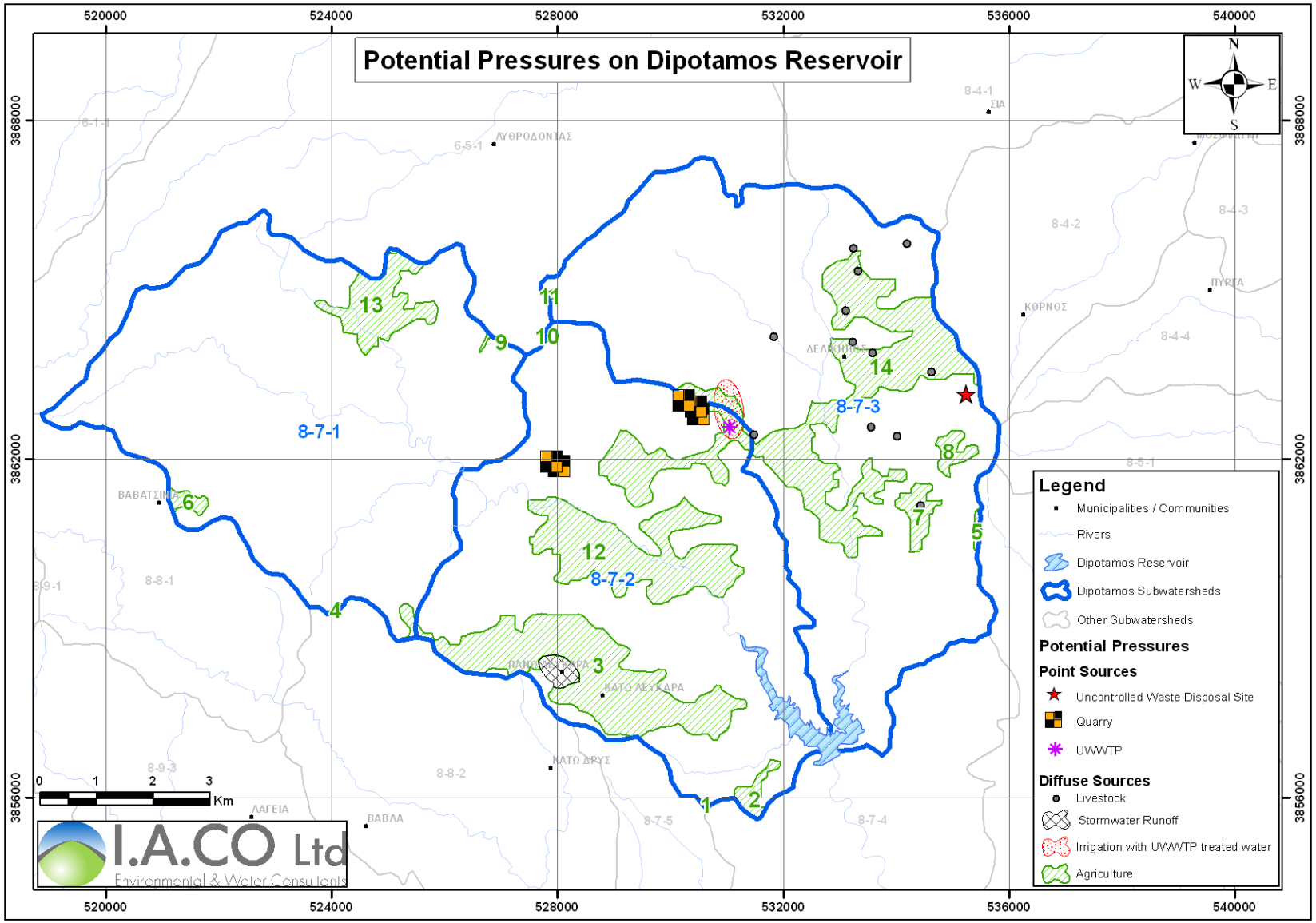

Figure 3.3.5-1: Potential Pressures on Dipotamos Reservoir

3.3.6 Evretou Reservoir (river HMWB)

Table 3.3.6-1: Potential Pressures on Evretou Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
Point	Industrial Facility	Simou - Milk processing installation	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (TSS, EC)	
	Qaurry Facility	Sarama (AL 0184) - Excavation and Processing of Havara	Important	Othen Chemical Pollution (TSS)	
	Uncontrolled Waste Disposal Site	Fyti	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene,
		Anadiou	Important		
		Filousa	Important		
		Zacharia	Important		
		Lysos	Important		

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
					Trichloro-benzenes, Trichloro-methane

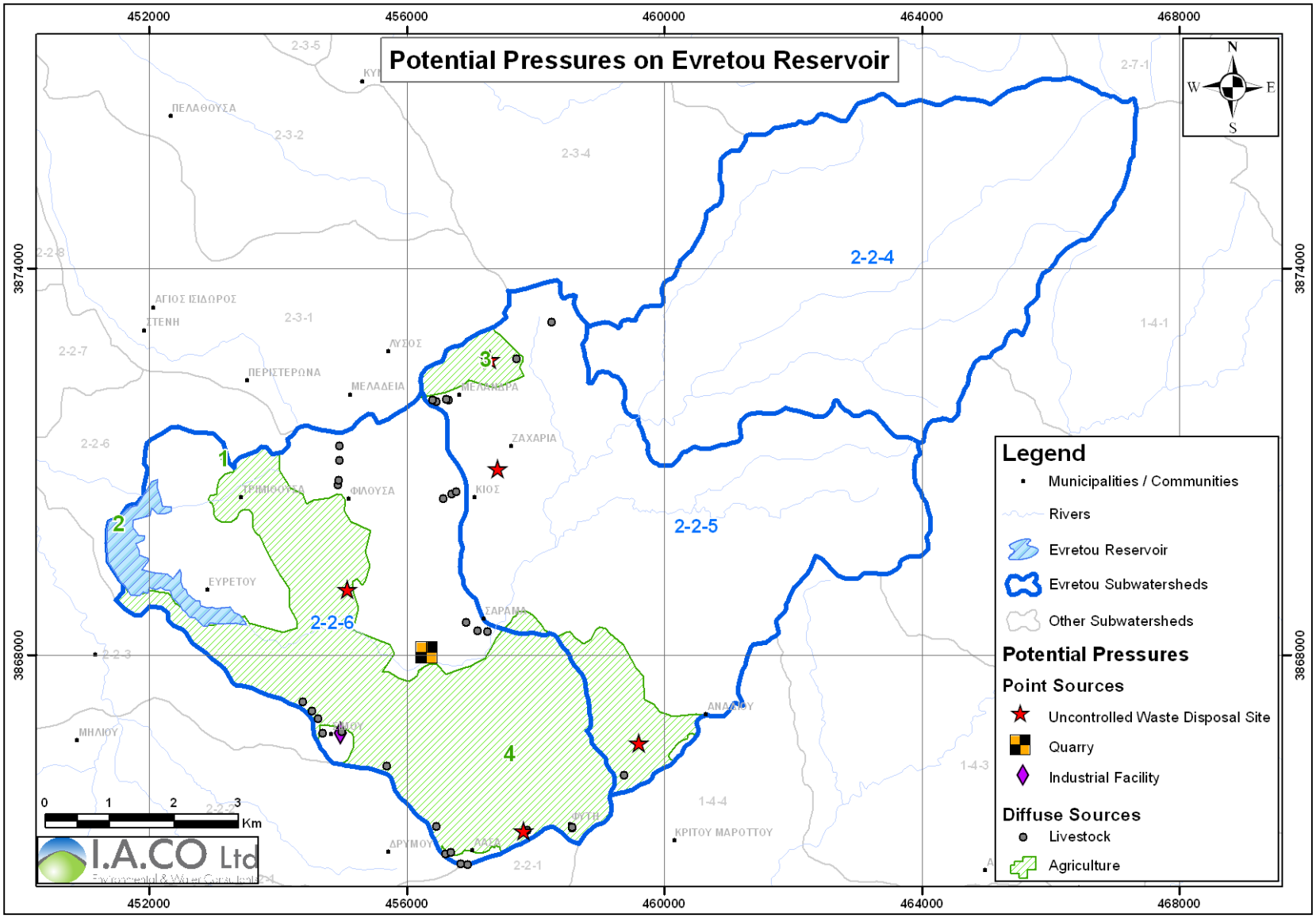

Figure 3.3.6-1: Potential Pressures on Evretou Reservoir

3.3.7 Germasogeia Reservoir (river HMWB)

Table 3.3.7-1: Potential Pressures on Gerrmasogeia Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 6	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 8	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 9	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 10	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 11	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
Point	Qaurry Facility	Armenochori (AL 0318 & AL 0296) - Excavation and Processing of Betonite	Important	Othen Chemical Pollution (TSS)	
	Uncontrolled Waste Disposal Site	Agios Konstantinos	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1-,3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene &
		Arakapas	Important		
		Dierona	Important		
		Eptagonia	Important		
		Kalo Chorio	Important		
		Kellaki	Important		

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
		Louvaras	Important		Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane
		Prastio Kellakiou	Important		
		Sykopetra	Important		

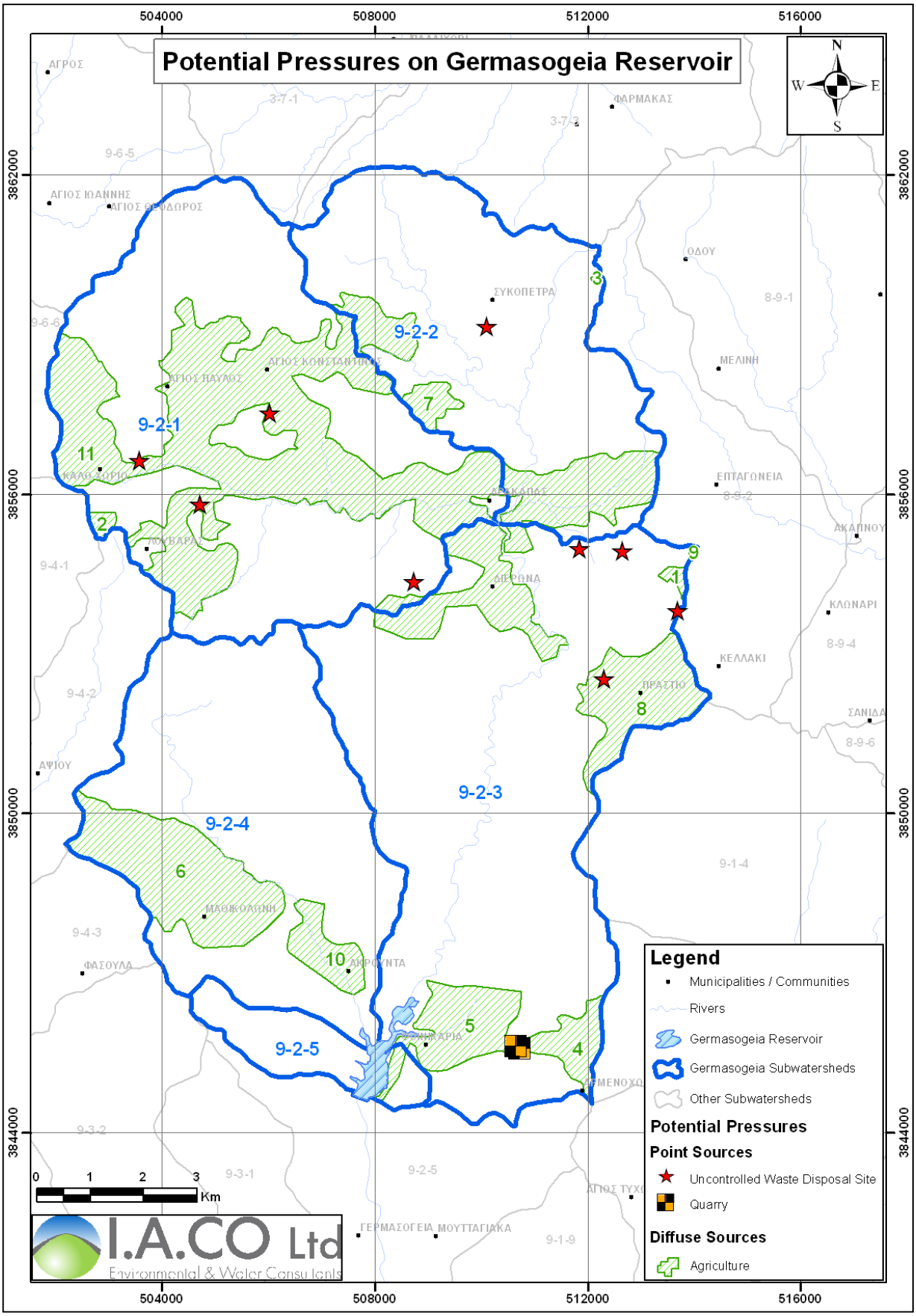

Figure 3.3.7-1: Potential Pressures on Gerrmasogeia Reservoir

3.3.8 Kalavasos Reservoir (river HMWB)

Table 3.3.8-1: Potential Pressures on Kalavasos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	UWWTP Sludge Disposal	Sanida	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
Point	Industrial Facility	Ora - Poultry, Slaughtery	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (EC)	
	Abandoned Mine	Platies Mine - Pit	More Important	Othen Chemical Pollution (As, Ba, Co, Cr, Cu, U, V, Zn)	Cadmium, Lead, Nickel
		Platies Mine - Mining Waste Facility	Important		
		Mavridia (Mavri Sykia) - Mining Waste Facility	Important		

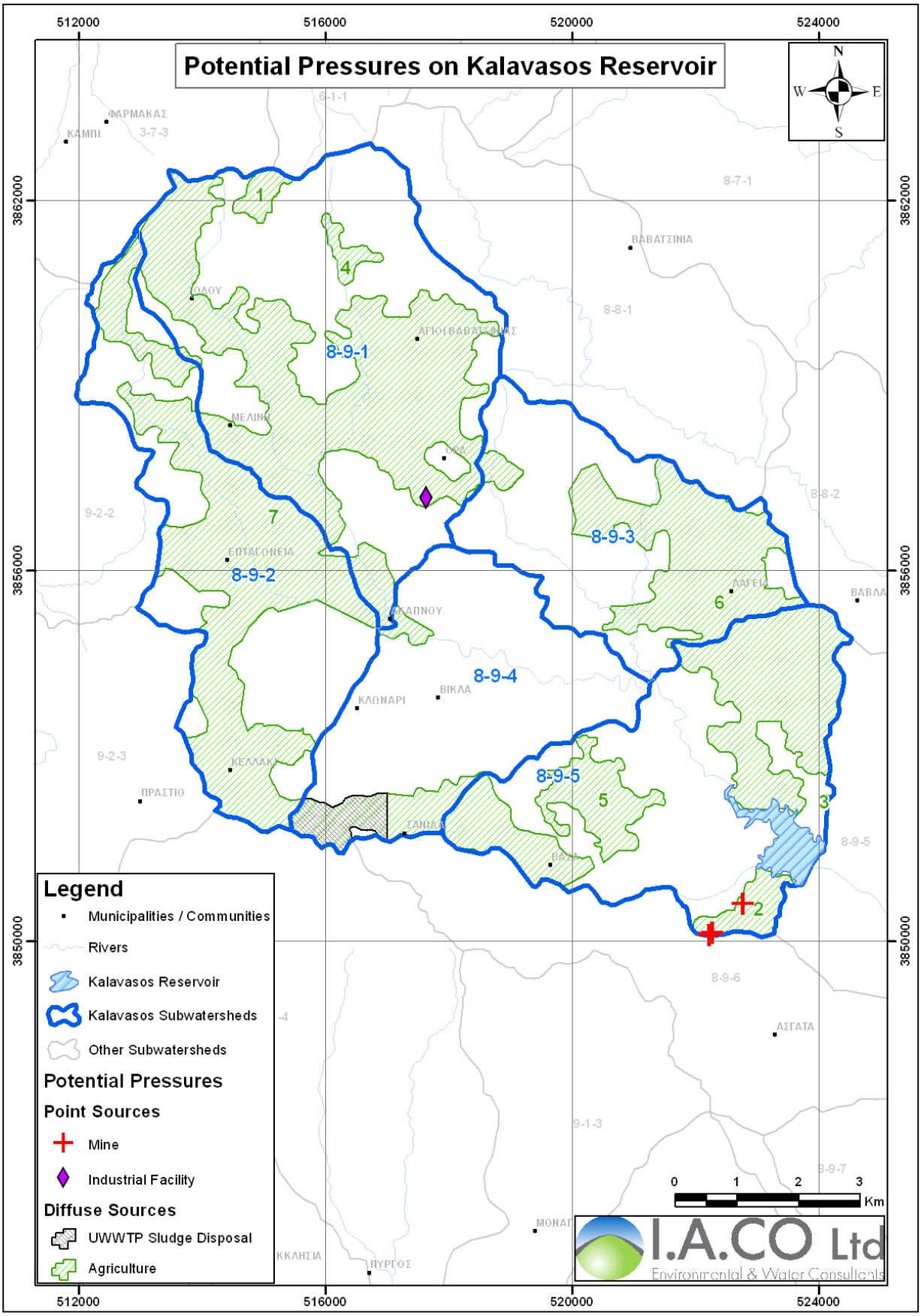

Figure 3.3.8-1: Potential Pressures on Kalavasos Reservoir

3.3.9 Kannaviou Reservoir (river HMWB)

Table 3.3.9-1: Potential Pressures on Kannaviou Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
Point	Uncontrolled Waste Disposal Site	Panagia	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane

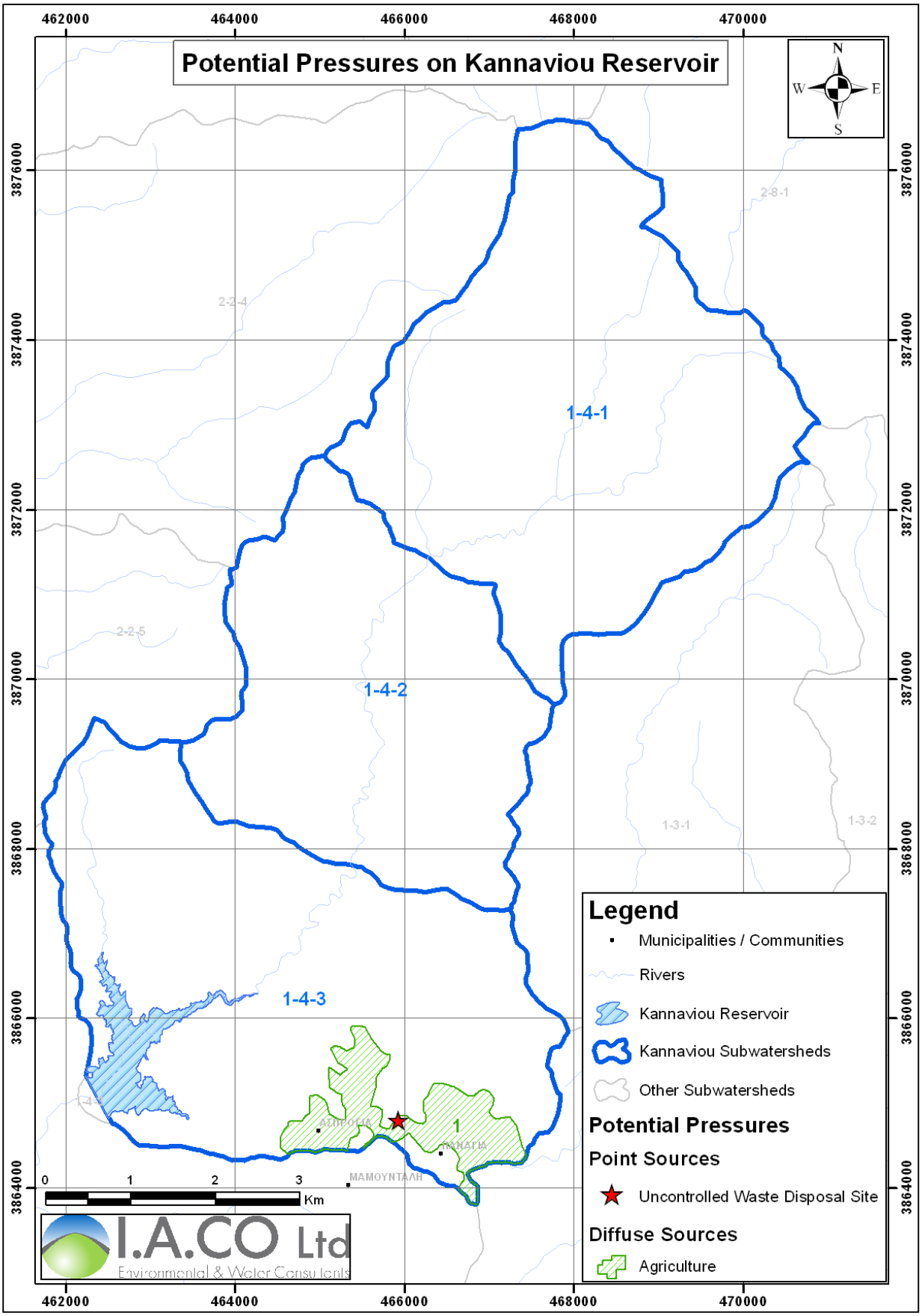

Figure 3.3.9-1: Potential Pressures on Kannviou Reservoir

3.3.10 Kouris Reservoir (river HMWB)

Table 3.3.10-1: Potential Pressures on Kouris Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	Less Important		Chlorpyrifos, Diuron,
		Agricultural Area 7	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 8	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 9	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 10	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 11	Important		Chlorpyrifos, Diuron
		Agricultural Area 12	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 13	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 14	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 15	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 16	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 17	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 18	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 19	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 20	More Important		Alachlor, Chlorpyrifos, Diuron
		Agricultural Area 21	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
		Agricultural Area 22	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 23	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Irrigation with UWWTP treated water	Irrigated Area by Military camp 7 UWWTP	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
		Irrigated Area by Pelendri UWWTP	Important		
		Irrigated Area by Pelendri UWWTP	Important		
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
Point	UWWTP position	Agros	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP)	
		Alassa	More Important		
		kyperounda	Important		
		Military Camp 7	Important		
		Pelendri	Important		
		Platres	Important		
	Disposal of treated waste water	from Agros UWWTP - River	More Important		Cadmium, Lead, Mercury, Nickel
		From Kyperoundas UWWTP - River	More Important		Cadmium, Lead, Mercury, Nickel
		From Kyperoundas UWWTP - Storage Reservoir	Important		Cadmium, Lead, Mercury, Nickel
		From Platres UWWTP - Infiltration Ponds	Important		Cadmium, Lead, Mercury, Nickel
	Livestock	Pigs Breeding Unit	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
	Industrial	Vouni - Meet	Important	Organic Pollution	

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
	Facility	Processing Facility		(DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (TSS)	
	Qaurry Facility	P.Kyvides (AL0323) - Excavation and Processing of Calcarenite	Important	Othen Chemical Pollution (TSS)	
		Zoopigi (0116) - Excavation and Processing of Diabase	More Important		
	Closed Mine	Amiantos	Important	Othen Chemical Pollution (Co, Cr, Ni)	Nickel
	Uncontrolled Waste Disposal Site	Kividhes	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane
		Ayios Therapon	Important		
		Agios Theodoros	Important		
		Ayios Ioannis Agrou	Important		
		Agros	Important		
		Dhymes	Important		
		Agridhia	Important		
		Kyperounda	Important		
		Chandria	Important		

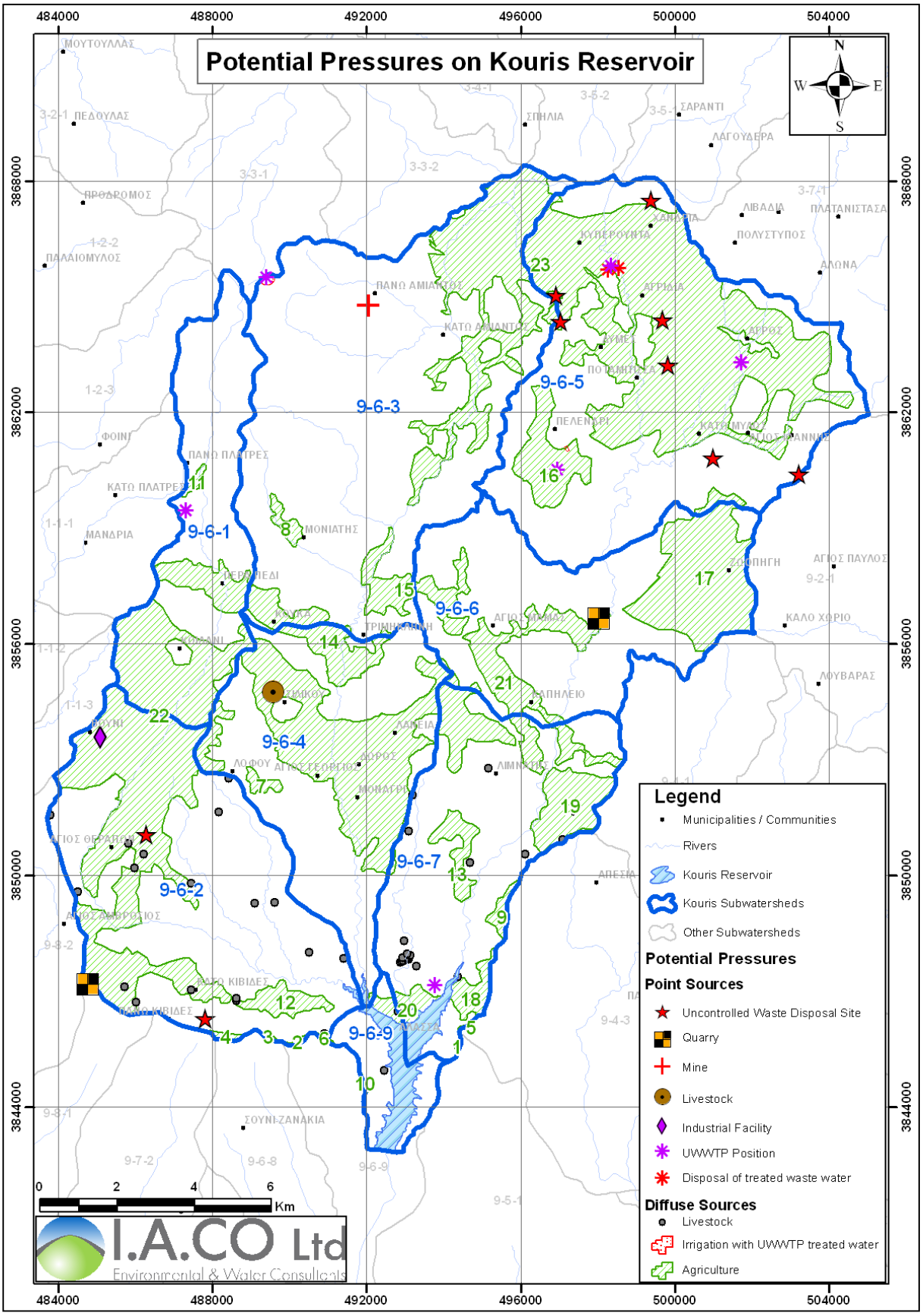

Figure 3.3.10-1: Potential Pressures on Kouris Reservoir

3.3.11 Lefkara Reservoir (river HMWB)

Table 3.3.11-1: Potential Pressures on Lefkara Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin

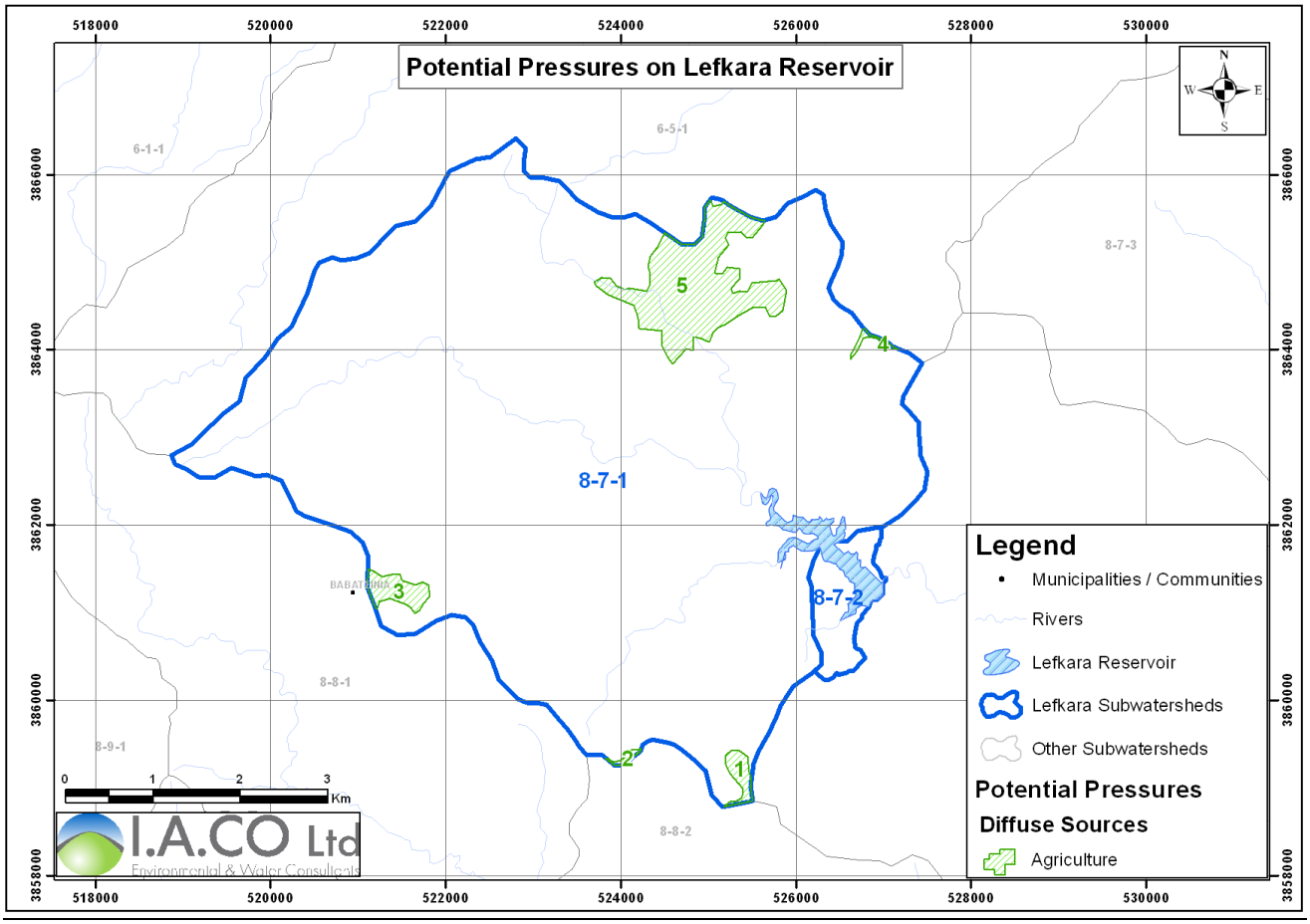

Figure 3.3.11-1: Potential Pressures on Lefkara Reservoir

3.3.12 Mavrokolymbos Reservoir (river HMWB)

Table 3.3.12-1: Potential Pressures on Mavrokolymbos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin

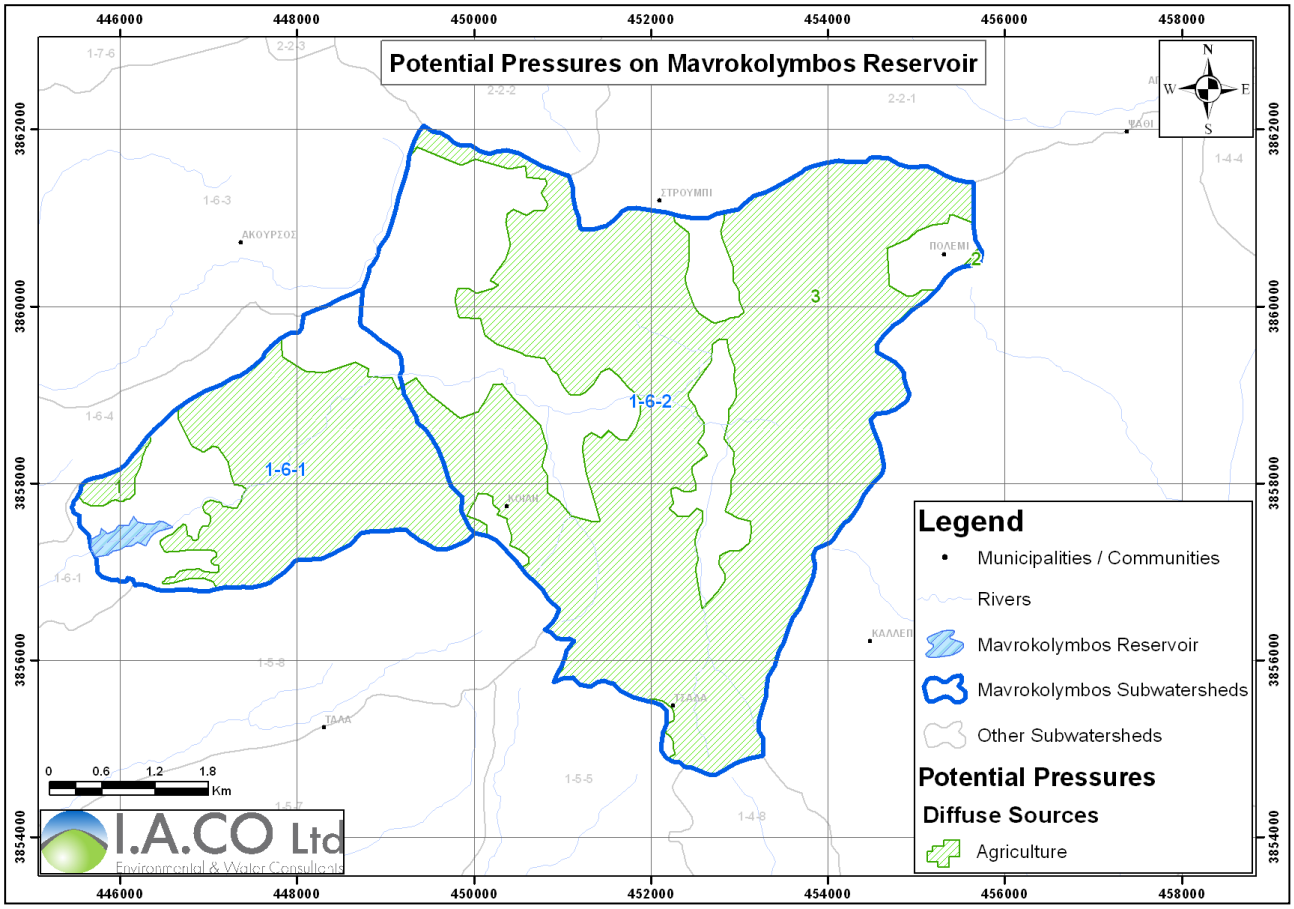

Figure 3.3.12-1: Potential Pressures on Mavrokolymbos Reservoir

3.3.13 Pano Platres Reservoir (river HMWB)

Table 3.3.13-1: Potential Pressures on Pano Platres Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Irrigation with UWWTP treated water	Irrigated Area of Military Camp 7	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
Point	UWWTP position	Military Camp 7	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP)	

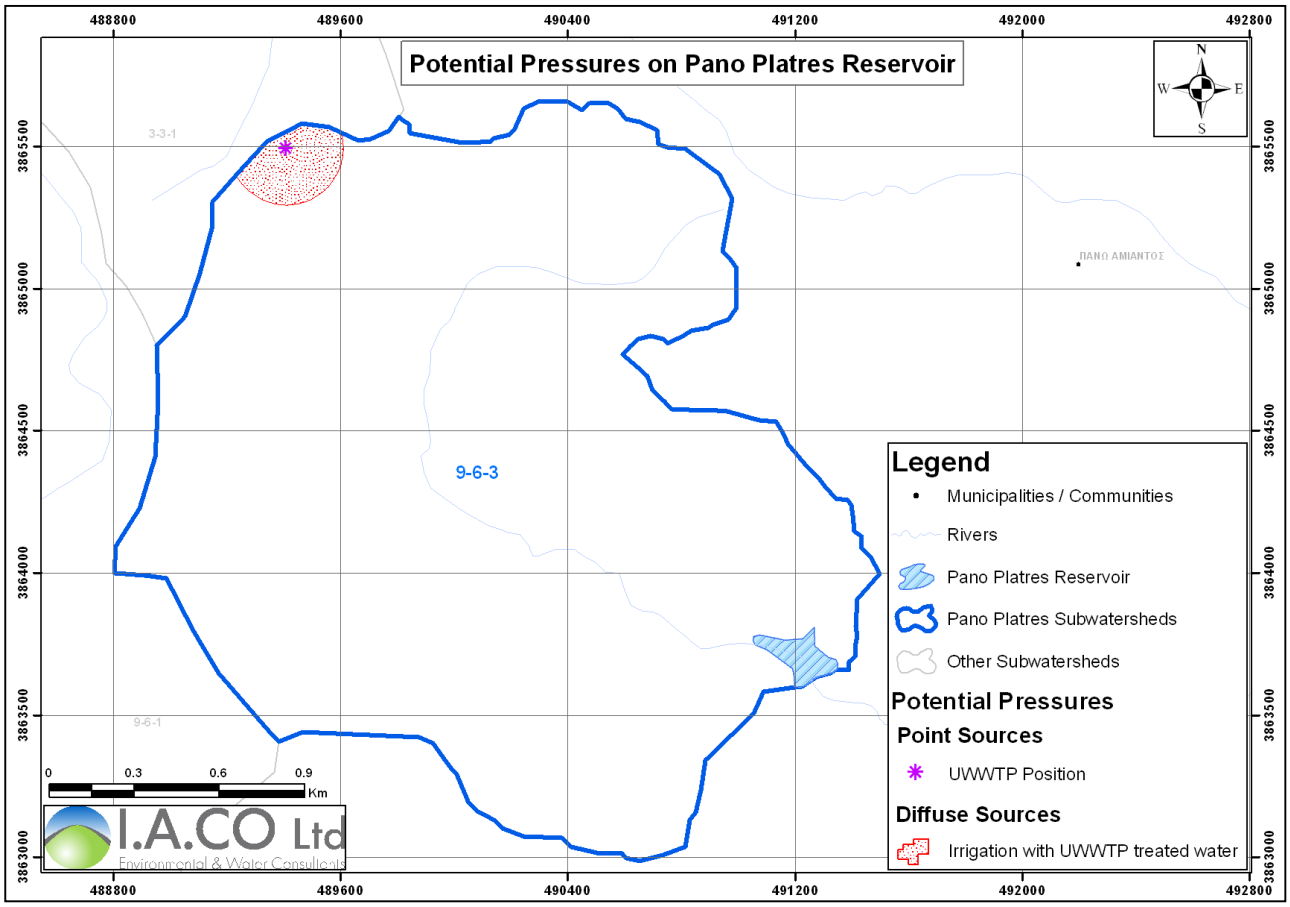

Figure 3.3.13-1: Potential Pressures on Pano Platres Reservoir

3.3.14 Paralimni (lake HMWB)

Table 3.3.14-1: Potential Pressures on Paralimni Lake

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Irrigation with UWWTP treated water	Irrigated Area of Paralimni and Agia Napa	Less Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
	Urban Areas with no sewage	Deryneia	Less Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
		Sotira Ammochostou	Less Important		
	Storm Water Runoff	Deryneia	More Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (TSS, Cu, Zn)	Lead
		Paralimni	More Important		
		Sotira	More Important		
		Industrial Zones	More Important		
Point	Industrial Facility	Paralimni - Milk processing installation	Less Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (EC)	
		Deryneia - Milk processing installation	Less Important		
	Livestock	Poultry Breeding Unit	Less Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
	Uncontrolled Waste Disposal Site	Paralimni	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane

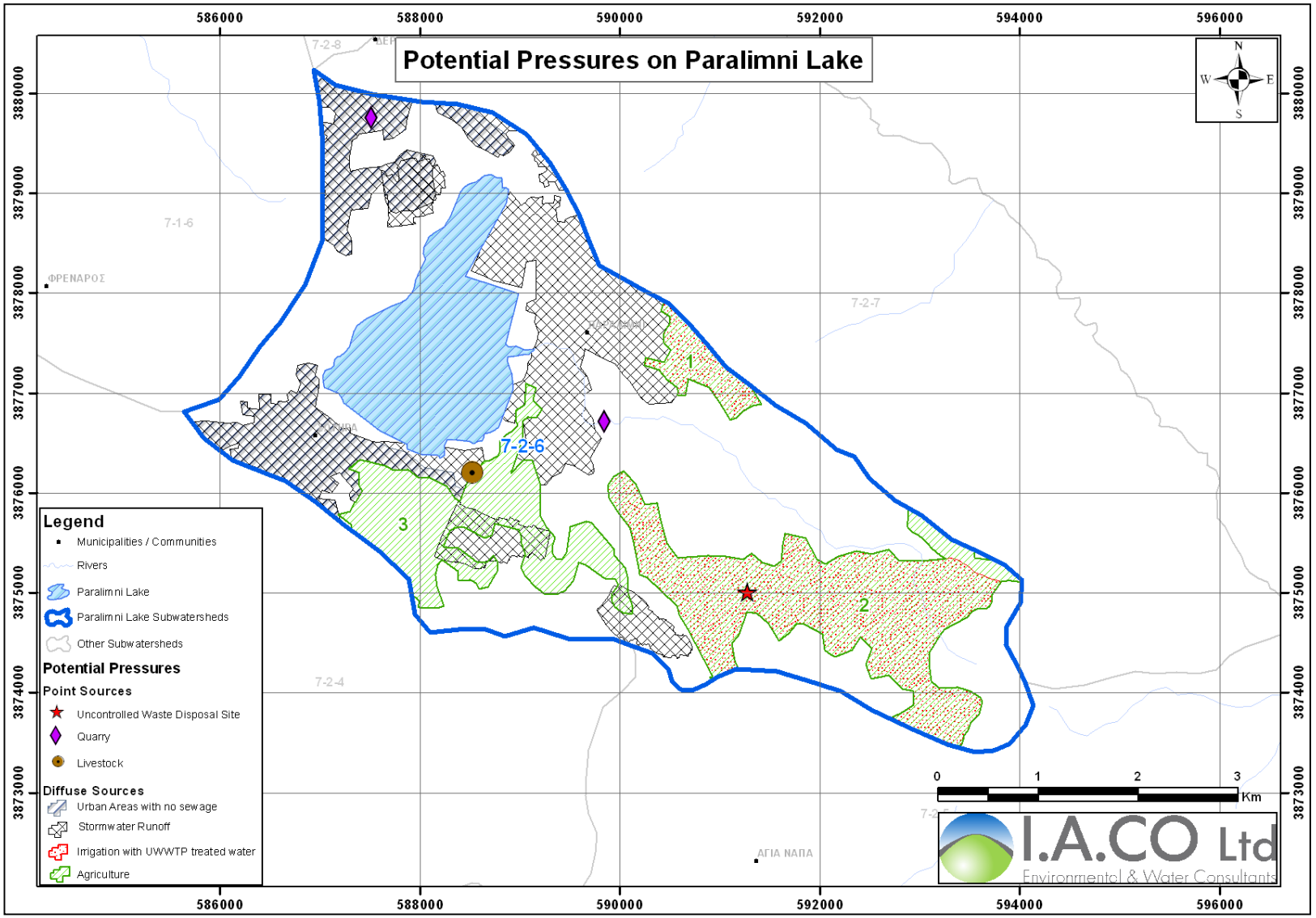

Figure 3.3.14-1: Potential Pressures on Paralimni Lake

3.3.15 Polemidia Reservoir (river HMWB)

Table 3.3.15-1: Potential Pressures on Polemidia Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Less Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 2	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 3	Less Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 4	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 5	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 6	Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
		Agricultural Area 7	More Important		Alachlor, Chlorpyrifos, Diuron, Trifluralin
	Irrigation with UWWTP treated water	Irrigated Area by Alassa UWWTP treated water - Limnatis	Important	Othen Chemical Pollution (Zn, Cr, Cu)	Cadmium, Lead, Mercury, Nickel
	Livestock	Diffuse Livestock	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (B)	
	Storm Water Runoff	Industrial Zone	More Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (TSS, Cu, Zn)	Lead
Point	Disposal of treated waste water	from Limassol UWWTP - Polemidia Reservoir	More Important		Cadmium, Lead, Mercury, Nickel

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
	Industrial Facility	Ypsonas - Production of dyes, inks, varnishes and other	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Othen Chemical Pollution (Cr, CN, ketones, chlorinated hydrocarbons)	Lead, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Trichloro-methane
	Uncontrolled Waste Disposal Site	Vati	Important	Organic Pollution (DO, BOD, NH_4, NO_2, TP) Pollution the causes eutrophication (NO_3, PO_4) Othen Chemical Pollution (SO_4, K, Na, Mg, Cu, As)	Benzene, Cadmium, C10-C13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, DEHP, Diuron, Fluoranthene, Lead, Mercury, Naphthalene, Nickel, Nonylphenol (4-Nonylphenol), Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)), Benzo(a)pyrene, Benzo(b)fluor-anthene & Benzo(k)fluor-anthene, Benzo(g,h,i)-perylene & Indeno(1,2,3-cd)-pyrene, Trichloro-benzenes, Trichloro-methane
		Apsiou	Less Important		

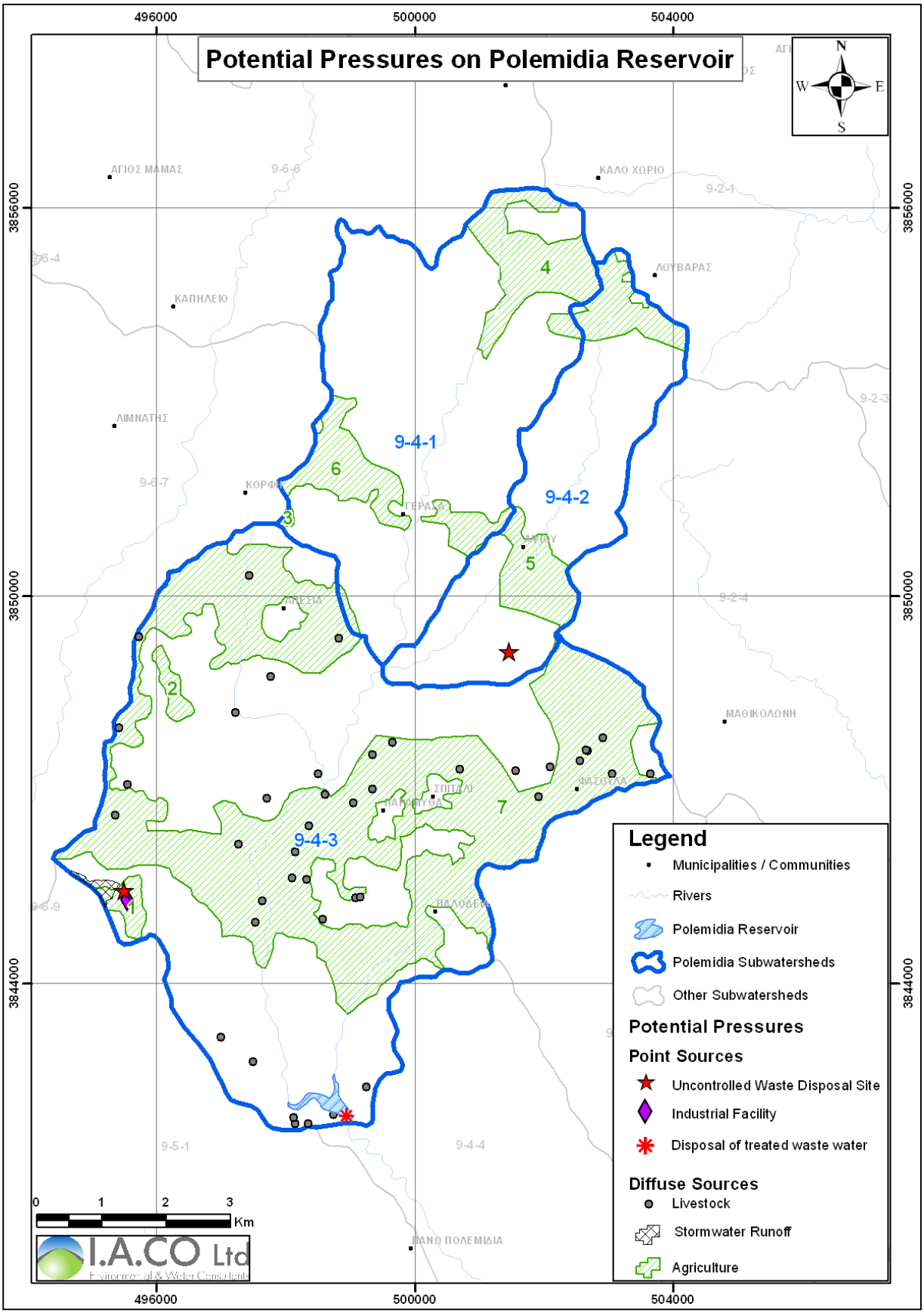

Figure 3.3.15-1: Potential Pressures on Polemidia Reservoir

3.3.16 Tamasos Reservoir (river HMWB)

Table 3.3.16-1: Potential Pressures on Tamasos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Point	Qaurry Facility	Politiko (AL0198) - Excavation and Processing of Diabase	More Important	Othen Chemical Pollution (TSS)	
Point	Abandoned Mine	Peristerka - Pytharochoma: Pit and Mining Waste Facility	Important	Othen Chemical Pollution (As, Ba, Co, Cr, Cu, U, V, Zn)	Cadmium, Lead, Nickel

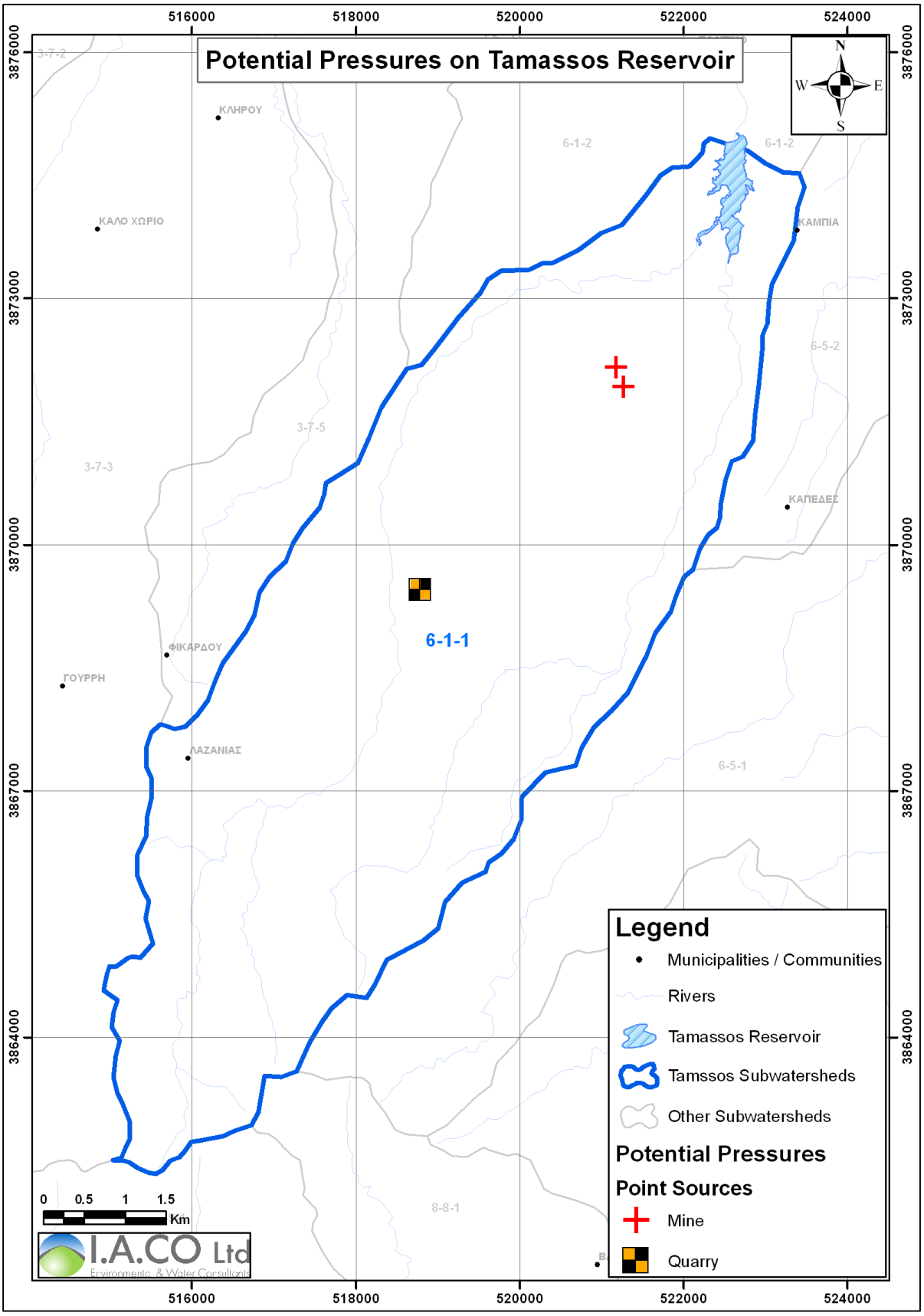

Figure 3.3.16-1: Potential Pressures on Tamassos Reservoir

3.3.17 Xyliatos Reservoir (river HMWB)

Table 3.3.17-1: Potential Pressures on Xyliatos Reservoir

Category of source (Point/Diffuse)	Type of source	Name / Description	Significance	Other substances	Priority Substances
Diffuse	Agriculture	Agricultural Area 1	Important	Pollution that causes europhication (NO_3, PO_4)	Alachlor, Chlorpyrifos, Diuron, Trifluralin

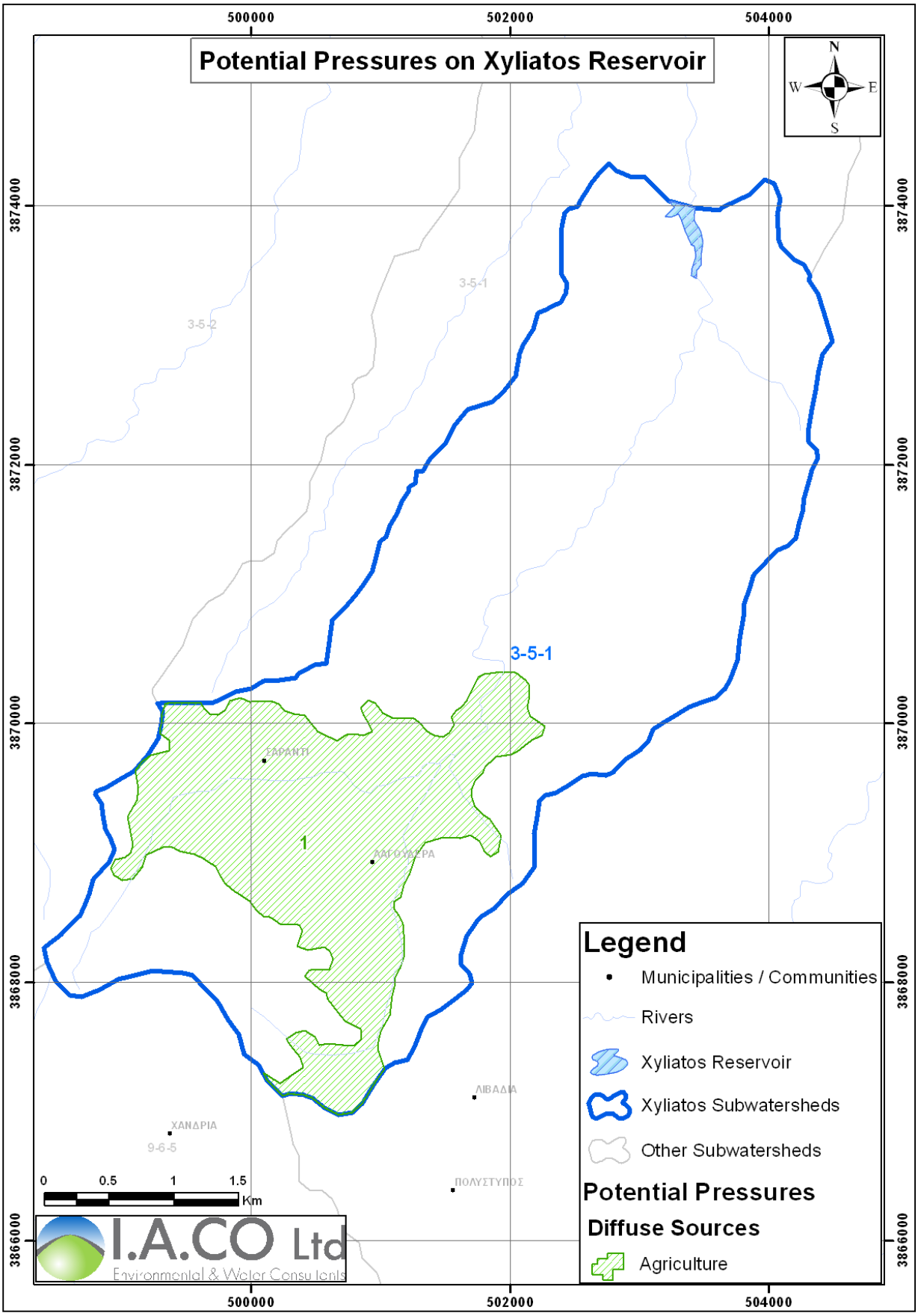

Table 3.3.17-1: Potential Pressures on Xyliatos Reservoir

3.4 ASSESSMENT OF IMPACTS

Following the pressures analysis, as it was described in the previous chapter of this report, an assessment of the susceptibility of the status of water bodies to the pressures identified must be made (impact analysis). In the context of this Project, the impact analysis is made in Activity 2: Classification of water status, which is actually based on the results of the monitoring programme.

The overall status of the impounded river water bodies and Paralimni and Achna lake water bodies is depicted in Table 3.4-1 [for the full presentation and analysis of available data, methodology and results, please refer to the Report on the classification of water status (rivers, natural lakes, water reservoirs)].

Thus, according to the results of WFD monitoring programme, out of the 13 impounded river water bodies that were evaluated, 11 were classified in the Good and Above Status, while 2 (Germasogia and Polemidia reservoirs) are below Good Status, which is attributed to both ecological potential and chemical status. Germasogia reservoir was classified as Moderate and Polemidia as Bad.

Germasogia reservoir shows exceedances in Lead and Total Phosphorus concentrations that can be attributed to the uncontrolled waste disposal sites and agriculture.

Polemidia reservoir shows consistent bad biological status, exceedences in Total Phosphorus, Total Coliforms, pH and also in Lead, Cadmium, Mercury and Chlorpyrifos. All the above can be justified by the identified pressures (Agriculture, Irrigation with UWWTP treated water, Livestock facilities, Storm Water Runoff, Disposal of treated waste water, Industrial Facilities and Uncontrolled Waste Disposal Site).

Two water bodies (Akaki - Malounda & Tamassos) were not evaluated since they are new water bodies and a monitoring program will be implemented in the next WFD management cycle. Although pressures have been identified in their watersheds, their impact on water bodies' status is not certain. The risk status of these two water bodies needs further assessment.

Achna Artificial Storage Basin can be characterised as Above Good Status based on the results of the chemical -physicochemical assessment. According to the biological monitoring, the Achna lake was consistently evaluated below good biological potential during the whole sampling period. However, this is most probably due to the fact that this assessment method is for water reservoirs (different type) and is not that suitable for artificial storage basins. Due to the fact that Achna lake is the only water body of this type in Cyprus (storage basin) and there is no assessment method still for the ecological quality of this water body and its type, it was decided that the ecological potential of Achna Lake at this stage should be set as unknown. Based on the monitoring results of priority substances, Achna lake has a Good Chemical Status.

With reagards to the Paralimni lake there are no monitoring data, and thus, assessment of ecological or chemical status based on monitoring results cannot be performed. There are pressures identified in the Paralimni watershed (Industrial Facilities, Landfills, Agriculture, Storm water run-off, Urban areas with no sewage and areas irrigated with UWWTP treated water, intense water level regulation). Due to the fact that for Paralimni lake there are no data available and there is no

assessment method still for the ecological quality of this water body, it was decided that the ecological and chemical status of Paralimni lake at this stage should be set as unknown.

Table 3.4-1: Status of Impounded rivers (water reservoirs) and Paralimni and Achna lake water bodies, based on the assessment of WFD monitoring results

Water Body Code	Name	ECOLOGICAL POTENTIAL	CHEMICAL STATUS	OVERALL STATUS
CY_1-2-c_RP_HM_IR	Arminou	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_1-3-d_RIh_HM_IR	Asprokremmos	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_1-4-c_RI_HM_IR	Kannaviou	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_1-6-b_RIh_HM_IR	Mavrokolympos	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_2-2-e_RI_HM_IR	Evretou	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_3-5-b_RI_HM_IR	Xyliatos	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_3-7-i_RI_HM_IR	Akaki-Malounda	Unknown*	Unknown*	Needs further Assessment
CY_6-1-b_RIh_HM_IR	Tamassos	Unknown*	Unknown*	Needs further Assessment
CY_8-7-b_RI_HM_IR	Lefkara	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_8-7-e_RI_HM_IR	Dipotamos	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_8-9-d_RI_HM_IR	Kalavasos	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_9-2-g_RI_HM_IR	Germasogia	MODERATE	FAILING TO ACHIEVE GOOD	MODERATE
CY_9-4-d_RI_HM_IR	Polemidia	BAD	FAILING TO ACHIEVE GOOD	BAD
CY_9-6-j_RP_HM_IR	Pano Platres	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_9-6-s_RP_HM_IR	Kouris	GOOD AND ABOVE	GOOD	GOOD AND ABOVE
CY_7-2-6_16_L2-HM	Paralimni	Unknown*	Unknown*	Needs further Assessment
CY_7-1-2_34_L3-A	Achna	Unknown***	GOOD	Needs further Assessment

* *no data*
** *assessed by expert judgement*
*** *no assessment system - methodology has been developed*

The pressure and impact analysis as presented in Chapter 3 of this report provides an analytical inventory of the pressures based on the available data, an indicative assessment of the significance of these pressures and an evaluation of the susceptibility of the status of water bodies to the pressures using the WFD monitoring results. However, some constraints exist and these must be taken into consideration for future pressure and impact analyses. These mainly concern the following:

- Data limitations: The data used for the analyses of pressures were collected from a number of different Departments in various different forms (reports, hardcopy files, excel tables etc). Moreover, important information, such as the exact location, was not available in most cases. In addition, there is no information, through e.g. a constistent monitoring programme, on the actual pollutants and loads that are emitted from potential pollution sources (industrial facilities, livestock facilities, mines, landfills, UWWTP). These limitations create some degree of uncertainty since various assumptions had to be made concerning e.g. the exact location of pollution sources, the expected substances per pollution source, effectiveness level of waste management practices of the facilities etc.
- Pathway analysis: In addition, although there might be potential sources identified in a catchment, a pathway of the associated pollutants to the water bodies might not exist. This might need further investigation in future analyses.
- Data and Methodology for Classification for Achna and Paralimni Lakes: The WDD Contract for the determination of reference conditions in the lake water bodies of Cyprus will provide a tool for the accomplishment of this target.

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