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Republic of Cyprus

Ministry of Agriculture and Natural Resources

WATER DEVELOPMENT DEPARTMENT

ANNUAL REPORT 1979

Nicosia, November 1980

WATER DEVELOPMENT DEPARTMENT
ANNUAL REPORT 1979

Republic of Cyprus
Ministry of Agriculture and
Natural Resources

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ANNUAL REPORT 1979

C St Lytras, M Sc DIC B Sc – Director

Nicosia, November 1980

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for the
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Abbreviations

m	metre
mm	millimetre
MCM	Million Cubic Metres
m^3	cubic metres
ha	hectare
WDD	Water Development Dept.
£	Cyprus pound*

Conversion factors

Donum	=	0.134	Hectares
	=	0.3306	Acres
	=	14,400	Sq. feet
	=	1,340	sq. metres
Hectare	=	7.46	Donums
Acre	=	3.25	Donums

* The Cyprus pound was on par with £ sterling up to July, 1972. In 1979 the value of the Cyprus pound on average (daily basis) was:-

$	2.8206
£st	1.3291
DM	5.1536
Drachma	103.6966

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I GENERAL

Introduction

During 1979 and for the fifth year running, the hydrometeorological as well as other work of the Department was confined to the southern part of Cyprus due to the continued occupation of northern Cyprus by the invading Turkish troops, allowing no contact whatever by any Government Agency with the occupied half. Although it is believed that limited data are collected in the north it is by no means certain whether such data will one day suffice for a complete hydrometeorological picture of Cyprus.

Regarding the groundwater situation in the free area there was a deterioration in all aquifers due to overpumping and due to low rainfall. In the case of Akrotiri aquifer where there was a marked improvement the previous year due to reduced pumpage through conveyance of Yermasoyia – Polemidhia Project water to the area the aquifer deteriorated relatively in 1979 due to poor precipitation.

Work on the feasibility study of the Southern Conveyor Project continued in 1979 and a draft prefeasibility report (stage 1) was almost complete by the end of the year.

The feasibility study of the Khrysokhou Watershed Irrigation Project started in March 1979 and work on preliminary studies of various development plans commenced immediately.

Design work was mostly concentrated on the requirements of Pitsilia Integrated Rural Development Project and contract drawings and documents for the Nicosia Water Supply component of Vasilikos – Pendaskinos Project were completed by a British Firm of Consultants.

A record expenditure was again reached this year amounting to £12,475,202. Construction works expenditure rose to £8,819,836 with Paphos Irrigation Project construction expenditure alone rising to £6,571,181

The Water Development Department

The Department of Water Development, Ministry of Agriculture and Natural Resources, is responsible for the Government's overall policy on water resources, planning, design and construction on the Island. It also cooperates in the manage-

On the occasion of the retirement of WDD Director C A C Konteatis in April 1979. Mr Konteatis pictured above with the WDD headquarters staff (sat centre) first joined the Department as a technical assistant in 1949. In 1959 he qualified as an Engineer and in 1967 became the first Cypriot Director of the Department. Mr Konteatis retired from Government service prematurely to establish a water engineering consulting firm in the private sector.

ment of water resources and water development projects together with other Departments and Ministries.

Water development projects include domestic water supplies, irrigation and drainage projects, flood protection works, protection works against pollution of water resources, groundwater recharge works and other relevant works.

The Government institutional set up for water resources conservation and development and the role of the Department of Water Development is shown on page 6

DEPARTMENTAL ORGANIZATION

The Departmental Organization is shown on page 8 and is made up of:

The **Division of Water Resources** which groups together all services required for the collection study and interpretation of hydrological and hydrogeological data both for ground and surface water and control of groundwater extraction.

The **Division of Planning** which deals with the preparation of reconnaissance and feasibility studies prior to the detailed design of major projects. The works for planning include field investigations for hydraulic structures, laboratory testing for these structures, water use studies, hydrological evaluations, evaluation of benefits, technoeconomic studies as well as engineering geology problems. Systems analysis and mathematical modelling techniques with the help of electronic computers are widely used in these studies.

The **Division of Design** which deals with

the preparation of detailed designs and contract documents and specification required for major projects after feasibility stage. In this Division the drawing and topographic functions of the Department are also incorporated.

The **Division of Construction** which is responsible for all construction work whether carried out by direct labour or by contract.

The **Division of Operation and Maintenance** which assists in the operation and maintenance of the major projects such as dams and town water supplies.

The **Division of Small Projects Planning** deals with the planning and designing of small irrigation and domestic water supply projects which are of a rather routine nature and do not need eleborate planning and design procedure.

The **Regional Offices** after the 1974 Turkish invasion are confined to Larnaca, Limassol and Paphos.

In these Regional Offices the main works carried out are:

Hydrological measurements, collection of engineering data, operation and maintenance of projects, investigations and planning for small projects and control of construction work.

The **Office Management Division** is responsible for the office services, accounts, labour, personnel and stores. Also a financial control and co-ordination branch is included which deals with financial aspects and control of expenditure.

Legal Matters

All legal matters concerning the day to day operation of the Department of Water Development in particular and the Ministry of Agriculture and Natural Resources in general are being referred to the Legal Adviser of the Department for scrutinization, advice and/or action.

These legal matters are multiform and may involve inter alia, amending laws, handling cases in courts attending meetings and so on.

FOREIGN TECHNICAL ASSISTANCE

The following sections of work were dealt with during the year.

United Nations

Technical Assistance received from United Nations during 1979 was:

(i) Experts—Paphos Irrigation Project.

B Milinusic, FAO Senior Irrigation Engineer continued his services with us throughout the year as the Project Manager of the Paphos Irrigation Project.

R C Bloemers, FAO Expert continued his services with us throughout the year on Pahos Irrigation Project.

T J Sytsema, FAO Associate Expert was assigned to Paphos Irrigation Project as from August 1979.

(ii) Experts—Khrysokhou Watershed Irrigation project.

J H Visser, FAO Water Resources Engineer, arrived in March 1979 as Project Manager of the Khrysokhou Watershed Irrigation Projects ,KWIP.. By summer of 1979 the KWIP became operational when offices in Nicosia and Polis had been established, the counterparts appointed and the field investigation programme established. The International staff members started their work in the period between September 1979 and February 1980.

JWF Cools, FAO Associate-expert, Agro-economy, was assigned to KWIP as from the 22nd September 1979.

A J Meulenbroek, FAO Associate-expert, Hydrology, was assigned to KWIP as from the 22nd October 1979.

International Staff Members - Consultants. ,KWIP

Project document of KWIP provided for Consultants in Water Resources Systems, Irrigation Engineering, Dam Engineering and Dam Geology. The following were assigned and took up their mission in 1979 as follows :-

I M Goodwill - Consultant in Water Resources Systems. His first mission began from 9 to 28 September, 1979. A mission report was prepared.

P Boyd, Consultant in Irrigation Engineering, arrived for his first mission on 31st October and left on 27 November 1979. A mission report was prepared.

E H Taylor, Consultant in Dam Engineering, arrived for his first mission on 24th November and left on 17th December 1979.

D J C Laming-Consultant in Dam Geology, arrived for his first mission on 24th November and left on 17th December 1979. A mission report was prepared by both E H Taylor and D J C Laming.

BRITISH TECHNICAL ASSISTANCE

Southern Conveyor Project

Four experts, from U.K. Ministry of Overseas Development (ODM) continued throughout 1979 their work together with Cypriot staff on the preparation of a feasibility study for the Southern Conveyor Project.

They are:

J F Laurence ..... Project Manager
M J Makin ..... Agriculturist
Dr R J Grimble ..... Agr. Economist
T J Kingham .....Civil Engineer

A detailed description of the work carried out during 1979 is given in chapter III of this report.

CONSULTANTS (SCP)

J Winter, of the Tropical Products Institute (TPI) of ODM, made a second visit to the project on February 1 en route to the Midle East where he would be carrying out investigations relating to the marketing study for the project.

Dr I Carruthers, of Wye Agricultural College, a specialist in water resources development, visited the project from March 26 to April 2 to advise on matters concerning water resource development economics.

Dr B W Eavis, of Land Resources Development Centre, ODM, a specialist in crop water use, visited the project from April 2-7 for discussions on the methodology of calculating economic water application rates under conditions of restricted water supply.

J Reid and E Jackson of Howard Humphreys & Partners visited the project on several occasions during the period in connection with their consultancy services and their revised report which was submitted at the beginning of March.

Dr B W Eavis, Irrigation Agronomist, of the Land Resources Development Centre, ODM, made three visits to the project during the period (June 7-17, July 23 - August 10, August 29 - 30) to assist on a study directed towards making the most realistic possible estimation of irrigation water requirements and also establishing relationships between water shortages and crop yield reductions.

Dr R Kitching, Hydrogeologist, of the Institute of Geological Sciences, (IGS), UK, spent two weeks with the project (June 24 - July 2) advising the Hydrology Section of the team on groundwater modelling applications in the Kokkinokhoria and Kiti-Perivolia areas.

L A Wince, Partner, and E Jackson, Senior Engineer, of Howard Humphreys and Partners, visited the project on August 14 for a discussion on future consultancy inputs by this firm.

Dr B W Eavis, Irrigation Agronomist, of the

Land Resources Development Centre, (LRDC) ODA, visited the project from September 27 to October 3 to assist on refining the computation of crop water requirements and of crop yield under conditions of water supply constraints.

R Simpson, Hydrogeologist, of Howard Humphreys & Partners, visited the project from October 29 to November 7 to advise on various hydrogeological matters.

M Beran, Hydrologist, of the Institute of Hydrology, visited the project from December 13 to 15 to discuss the assistance which will be required from the Institute in Stage 2.

SUMMARY OF ACTIVITIES

Water Resources

The hydrometeorological situation, given here, refers only to the southern part of the Island, as the northern part, is still under the occupation of the Turkish troops and no such data are available to us.

The precipitation for the hydrometeorological year 1978–1979 averaged 439 mm which is 82% of normal. The distribution of rainfall was uneven being above normal over the central Messaoria plain and parts of eastern Troodos slopes and eastern coastal areas. Over the remaining areas precipitation was lower than normal ranging between 70% and 90% of normal and as high as 125% of normal.

Regarding the monthly distribution of precipitation during this hydrometeorological year the months October, May, June and August were above normal. December was near normal. The remaining months were below normal.

The maximum amount of rainfall reported in a 24 hour period was 104.7 mm by Ayios Ioannis (Malounda) station on the 18th May 1979. The first snowfall occurred on mount Olympus the highest peak of the Troodos mountain range on the 2nd December 1978 which is the median date for the first snowfall in Cyprus. The last oc-

TECHNICAL STAFF OF W D D ON 31.12.1979

DRG. No. BM/G/202

	MONTHLY DAILY & ON CONTRACT TECHNICAL STAFF		D	AD	SWE	EH	EE	ME	Geo	H	Ch	QS	TIE	SW	SIW	EDR	IW	CF	ACF	TA	Sur	DR	F	PR	TOTAL
1	Permanent staff		1	2	2	1	18	1	2	3				4	6	1	18	5	11	53		5	49		182
2	Temporary staff				2		6	1		1	1		4		3		12		5	31		10	11		87
3	Daily paid staff and on contract						11					2	1							32	4	2		1	53
	TOTAL NUMBERS		1	2	4	1	35	2	2	4	1	2	5	4	9	1	30	5	16	116	4	17	60	1	322
	DISTRIBUTION OF STAFF																								
4	Divisions	i Water Resources				1			1						2		5			15			3		27
		ii Planning					2										2		1	7					12
		iii Design			1		8						2		1	1	2	1		12		10			38
		iv Construction			1		2	1						1	3		9	3	6	4			18		48
		v Small Projects Planning			1		1							1	1		5	1		2					12
		vi Operation & Maintenance					1				1			2	2		1			1			5		13
		vii Paphos Irrig Project					5	1									2			26	2				36
		viii Southern Conveyor Project			1		8		1	2			1							11		3		1	28
		ix Khrysokhou Project					1			2			1							2					6
5	Administration (Head Office)			2																		1			3
6	Regional Offices (Limassol L/ca & Paphos)						3										4		7	22		2	32		70
7	On Scholarship																			1		1			2
8	Vacancies		1				4					2	1						2	13	2		2		27
	TOTAL NUMBERS		1	2	4	1	35	2	2	4	1	2	5	4	9	1	30	5	16	116	4	17	60	1	322

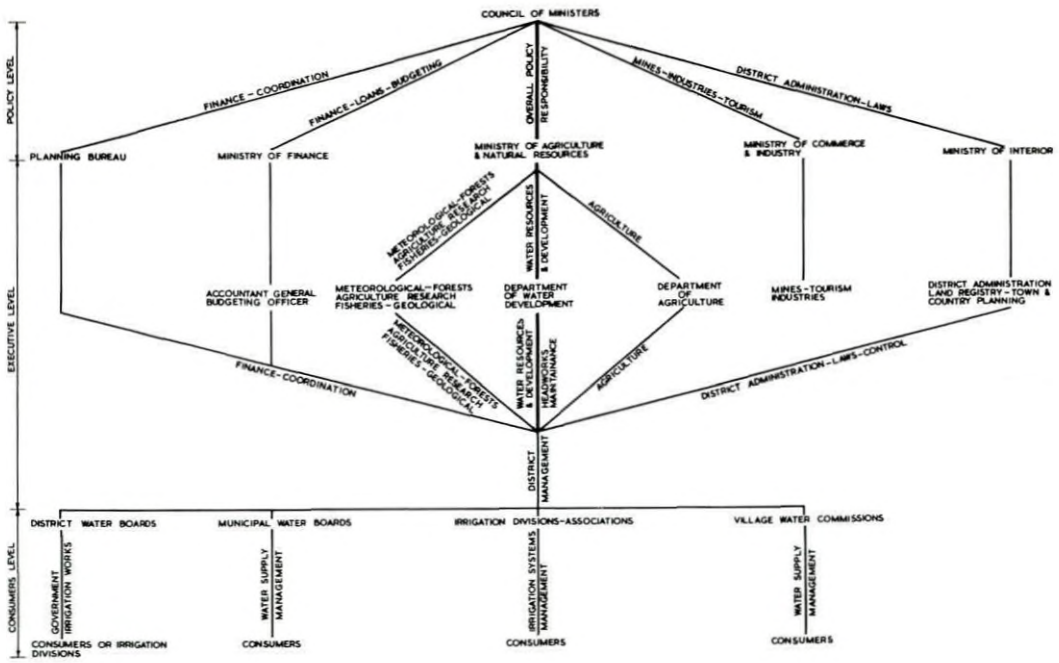
REFERENCE

D	Director
AD	Assistant Director
SWE	Senior Water Engineer
EH	Engineer Hydrologist
EE	Executive Engineer
ME	Mechanical Engineer
Geo	Geologist
H	Hydrologist
Ch	Chemist
QS	Quantity Surveyor
TIE	Topographer Irrigation Eng.
SW	Superintendent of Works
SIW	Senior Inspector of Works
EDR	Engineering Draughsman
IW	Inspector of Works
CF	Chief Foreman
ACF	Assistant Chief Foreman
TA	Technical Assistant
Sur	Surveyor
DR	Draughtsman
F	Foreman
PR	Programmer

curred on the 14th of April 1979, which comes to be at about the median date of last snowfall in Cyprus. The air temperature was as a whole slightly above normal in most areas. In particular the monthly mean was below normal in November and August, near normal in December, May and July but it was above normal in all other months.

Surface flows have been recorded in the southern part of Cyprus at 52 automatic river gauging stations. Most of the flows were below normal due to below normal rainfall.

Out of the 31 dams under regular observations 18 dams overflowed between January and March. The maximum volume of water accumulated in all these dams was



WATER DEVELOPMENT - ORGANIZATION CHART

The extreme maximum temperature has been reported from Nicosia to be 41.7°C on the 20th June and 5th of July and the extreme minimum from Prodhromos with -6°C on 5th of January 1979.

The measured evaporation from a USWB class A evaporation pan was 1.796 mm in Nicosia and 1.403 in Prodhromos.

27.25 MCM or 63.4% of their total capacity of 43.01 MCM.

The groundwater situation, as observed in the most important aquifers of the Island still under Government control, was grave especially in the Kokkinokhoria and Yialias area. In the other aquifers this water table declined as well.

DAMS CONSTRUCTED UP TO 1960

No	DAM	TYPE	HT	1000m³	YEAR
1	Kouklia	Earth	6	4,545	1900
2	Lymbia *	Gravity	5	18	1945
3	Lythrodhonda	Gravity	11	32	1945
4	Kalokhorio (K1)	Gravity	9	82	1947
5	Akrounda	Gravity	7	23	1947
6	Galini	Gravity	11	23	1947
7	Petra	Gravity	9	32	1948
8	Petra	Gravity	9	23	1951
9	Lythrodhonda	Gravity	10	32	1952
10	Kafizes	Gravity	23	113	1953
11	Ayios Loucas	Earth	3	455	1955
12	Gypsos	Earth	3	100	1955
13	Kandou	Gravity	15	34	1956
14	Perapedhi	Gravity	22	55	1956
15	Pyrgos	Gravity	22	285	1957
16	Trimiklini	Gravity	33	340	1958

Total Storage Capacity 6.174 $m^3 \times 10^6$

MINOR RECHARGE DAMS FROM 1960-70

No	DAM	TYPE	HT	1000m³	YEAR
47	Sotira	Earth	8	45	1962
48	Panayia (F)	Earth	7	45	1962
49	Paralimni (45)	Earth	5	115	1963
50	Ayia Napa (7)	Earth	8	55	1963
51	F'sta Recharge	Earth	5	50	1963
52	Phrenaros (6)	Earth	5	115	1964
53	Dherynia	Earth	6	23	1964
54	Phrenaros (3)	Earth	7	45	1966
55	Avgorou (7)	Earth	3	68	1966
56	Kandea (2)	Earth	5	82	1966
57	Xylophaghou (4)	Earth	7	86	1966
58	Sotira (4)	Earth	5	32	1966
59	Lysi	Earth	7	77	1967
60	Ay. Yeoryios (9)	Earth	3	68	1967
61	Ay. Epiktitos (6)	Earth	6	34	1968
62	Akanthou (6)	Earth	6	45	1968
63	Akhna (3)	Earth	4	40	1968
64	Xylotymbou (5)	Earth	5	50	1969

Total Storage Capacity 1,075 $m^3 \times 10^6$

(1) Dams constructed up to 1960

(124) Major dam projects from 1960-70

(809) Major dam projects from 1971-75

(36) Major recharge dams from 1960-70

(47) Minor recharge dams from 1960-70

H T refers to height in meters from foundation

YEAR is the year of completion

Phrenaros (6) means six small dams in Phrenaros area

*Inundated by New Lymbia Dam. See ref. No 69

MAJOR DAM PROJECTS FROM 1960-70

No	DAM	TYPE	HT	1000m³	YEAR
17	Prodhromos	Earth	10	122	1962
18	Morphou	Earth	13	1,879	1962
19	Lefka	Gravity	35	368	1962
20	Geunyeli	Earth	15	1,045	1962
21	Athalassa	Earth	18	791	1962
22	Kanli Kevy	Earth	19	1,113	1963
23	Argaka	Rockfill	41	1,150	1964
24	Mia Milia	Earth	22	355	1964
25	Ovgos	Earth	16	845	1964
26	Kiti	Earth	22	1,614	1964
27	Agros	Earth	26	99	1964
28	Liopetri	Earth	18	340	1964
29	Polemidhia	Earth	45	3,864	1965
30	Ayia Marina	Rockfill	33	311	1965
31	Kalopanayiotis	Earth	40	391	1966
32	Mavrokolymbos	Earth	45	2,180	1966
33	Pomos	Rockfill	38	859	1966
34	Yermasoyia	Earth	49	13,600	1968
35	Syngrasis	Earth	7	1 115	1968

Total Storage Capacity 32,041$m^3 \times 10^6$

MAJOR RECHARGE DAMS FROM 1960-70

No	DAM	TYPE	HT	1000m³	YEAR
36	Ayios Yeoryios	Earth	6	90	1962
37	F'sta Antiflood	Earth	8	165	1963
38	Ayios Nikolaos	Earth	2	1,365	1964
39	Paralimni Lake	Earth	1	1,365	1964
40	Fresh Water Lake	Earth	3	4,545	1964
41	Makrasyka	Earth	8	195	1966
42	Akhna (Mesania)	Earth	4	90	1967
43	Morphou spreading grounds	Earth	5	130	1968
44	Ormidhia	Earth	5	100	1968
45	Vrysoules	Earth	7	140	1969
46	Protopapas	Earth	6	90	1970

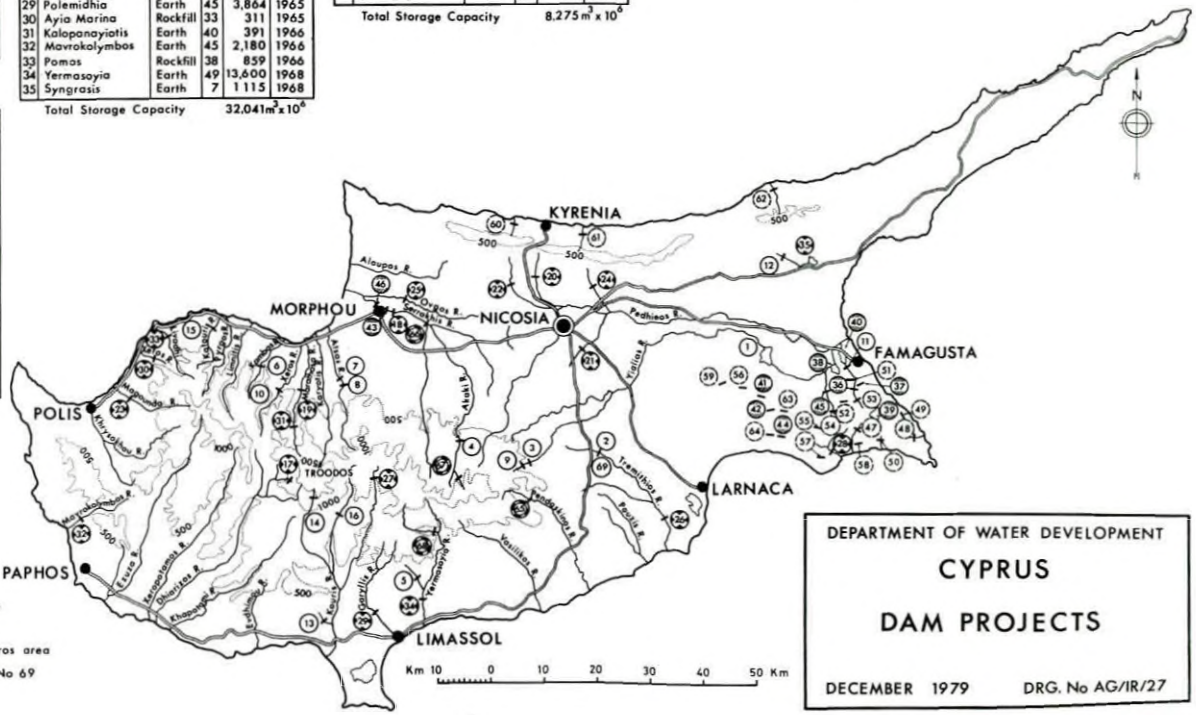
Total Storage Capacity 8.275 $m^3 \times 10^6$

MAJOR DAM PROJECTS FROM 1971-80

No	DAM	TYPE	HT	1000m³	YEAR
65	Lefkara	Earth Rockfill	71	13,850	1973
66	Massari Recharge dam	Earth	15	2,273	1973
67	Palekhori-Kambi	Gravity	33	620	1973
68	Arakapas	Gravity	23	130	1975
69	New Lymbia	Gravity	12	220	1977

Total Storage Capacity 17,093 $m^3 \times 10^6$

GRAND TOTAL UP TO END OF 1978: 64.7$m^3 \times 10^6$

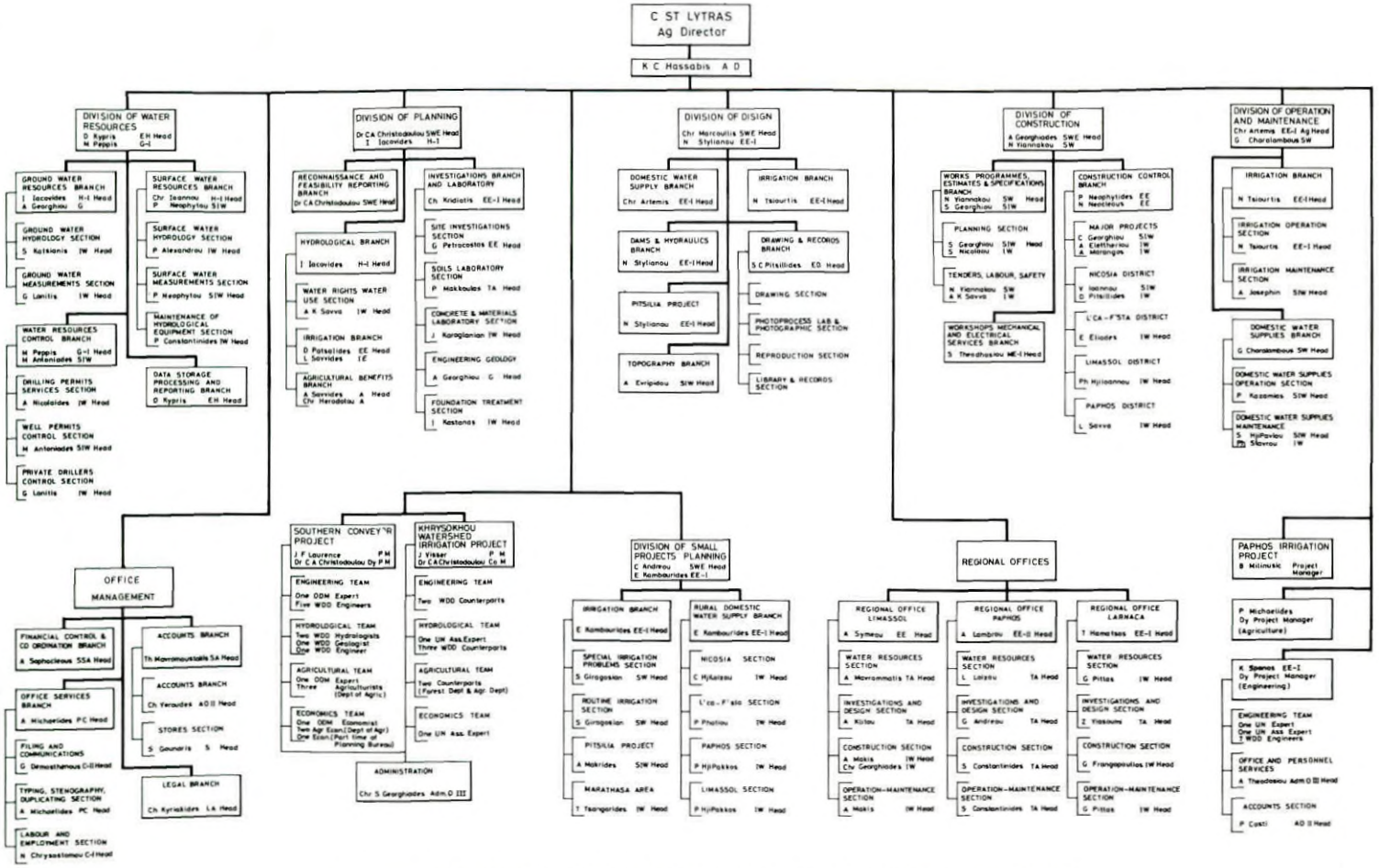


DEPARTMENT OF WATER DEVELOPMENT

CYPRUS

DAM PROJECTS

DECEMBER 1979 DRG. No AG/IR/27



WATER DEVELOPMENT DEPARTMENT – ORGANIZATION CHART – DEC 1979

PLANNING AND DESIGN OF PROJECTS

The Southern Conveyor Project teams continued to work throughout 1979 on the preparation of the draft feasibility study (Stage 1) identifying different development options with appraisals of the economic viability of each option. This draft report is to be submitted to the Council of Ministers during the beginning of the 1980.

Work on the feasibility study of the **Khrysokhou Watershed Irrigation Project** (KWIP) started in March 1979. The study is carried out with Technical Assistance from FAO under a UNDP/Government of Cyprus agreement. Due to lack of office space at WDD Head Quarters, a flat was rented in Nicosia for the KWIP offices.

The KWIP studies will be carried out in two phases. The first phase to be completed in 1980 will comprise of preliminary studies setting out various development plans. The second phase will entail preparation of a detailed technoeconomic study which is estimated to be completed by September 1981. The Project Manager as well as five other experts are provided by FAO, working with 12 local staff of various expertises.

The efforts for the financing of the **Vasilikos-Pendaskinos Project** continued by securing a loan from the Kuwait Fund for Arab Economic Development of 2.5 million dinars in addition to a loan of 11 million dollars already offered by the World Bank in 1978. The process for the selection of Consultants to carry out the detailed design of the Vasilikos-Pendaskinos Project components was initiated in 1979 and by the end of the year a number of consulting firms were preselected.

In the meantime the part of the Vasilikos-Pendaskinos Project providing for the temporary connection of the Nicosia Water Supply to that of Larnaca-Famagusta Water Supply was further promoted through the completion by March 1979 of the detail design and contract documents which were undertaken by a British Firm of Consultants. Contracts for the supply of various pipes and fittings were awarded in September 1979. The evaluation of Tenders for the execution of the Civil Works was almost completed by the end of 1979.

The Design Division of the Department was fully employed with feasibility studies and design work for the **Pitsilia Integrated Rural Development Project.** During 1979 the contract drawings and contract documents and specifications for Xyliatos dam were completed. Xyliatos is the only dam included in the project as impoundment of water will be in numerous offstream ponds throughout Pitsilia.

CONSTRUCTION OF PROJECTS

The expenditure incurred on all construction projects during 1979 reached the amount £8,819,836 which is a record figure of waterworks executed in a single year in the history of the Department.

Paphos Irrigation Project was the main construction activity of the Department with an unprecedented expenditure for one year for any water development project of £6,450,936. During 1979 work on the construction of Asprokremmos Dam continued along with the construction of the distribution network and storage tanks in the eastern area of the project, 14 pumping stations and the western area main conveyor pipeline. The total expenditure on Paphos Irrigation Project which will be completed at the end of 1981 is estimated to be £23 million. Up to the end of 1979 approximately £11 million was spent.

Expenditure on construction for supple-

REGISTRE DES BARRAGES EN CHYPRE — *REGISTER OF DAMS IN* CYPRUS

DRG. No. AG/IR/39

LIGNE (LINE) No:	NOM DU BARRAGE *NAME OF DAM*	ANNEE D'ACHEVEMENT *YEAR OF COMPLETION*	SITUATION *LOCATION* — COURS D'EAU *RIVER*	VILLE LA PLUS PROCHE *NEAREST CITY*	ETAT PROVINCE OU DEPARTEMENT *STATE PROVINCE OR COUNTY*	TYPE	HAUTEUR AU DESSUS DE LA PLUS BASSE FONDATION *HEIGHT ABOVE LOWEST FOUNDATION* (m)	LONGUEUR DE CRETE *LENGTH OF CREST* (m)	VOLUME DU BARRAGE *VOLUME CONTENT OF DAM* (10^3 m³)	CAPACITE TOTALE DU RESERVOIR *GROSS CAPACITY OF RESERVOIR* (10^3 m³)	DISPOSITION	CAPACITE MAXIMALE DES EVACUATEURS *MAXIMUM DISCHARGE CAPACITY OF SPILLWAYS* (m³/s)	TYPE DES EVACUATEURS *TYPE OF SPILL WAYS*	PROPRIETAIRE *OWNER*	BUREAU D'ETUDES *ENGINEERING BY*	CONSTRUCTEUR *CONSTRUCTION BY*	LIGNE (LINE) No:
1	KAFIZES	1953	Xeros (Morphou)	Nicosia	Nicosia	PG	23	27	4	113	I	54	L	Lefka Irrigation Division	Department of Water Development	Department of Water Development	1
2	KANDOU	1956	Kouris	Limassol	Limassol	PG	15	53	2	34	I	59	L	Kandou Irrigation Division	Department of Water Development	Department of Water Development	2
3	PERAPEDHI	1956	Kouris	Limassol	Limassol	PG	22	62	4	55	I	107	L	Perapedhi Irrigation Division	Department of Water Development	Department of Water Development	3
4	PYRGOS	1957	Katouris	Nicosia	Nicosia	PG	22	66	5	285	I	125	L	Pyrgos Irrigation Division	Department of Water Development	Department of Water Development	4
5	TRIMIKLINI	1958	Kouris	Limassol	Limassol	PG	33	76	6	340	I	59	L	Trimiklini Irrigation Division	Department of Water Development	Department of Water Development	5
6	ATHALASSA	1962	Pedhieos	Nicosia	Nicosia	TE	18	447	103	791	I	48	L	Government	Department of Water Development	Department of Water Development	6
7	GEUNYELI	1962	Pedhieos	Nicosia	Nicosia	TE	15	254	50	1 045	I	173	L	Geunyeli Irrigation Division	Department of Water Development	Department of Water Development	7
8	LEFKA	1962	Marathasa	Nicosia	Nicosia	PG	35	149	11	368	I	246	L	Lefka Irrigation Division	Department of Water Development	Department of Water Development	8
9	MORPHOU	1962	Serakhis	Nicosia	Nicosia	TE	13	1 436	206	1 879	I	764	L	Morphou Irrigation Division	Department of Water Development	Department of Water Development	9
10	PRODROMOS	1962	off stream	Limassol	Limassol	TE	10	756	73	122	I	-	L	Prodromos Irrigation Division	Department of Water Development	Department of Water Development	10
11	KANLI KEUY	1963	Pedhieos	Nicosia	Nicosia	TE	19	311	47	1 113	I	116	L	Kanli Keuy Irrigation Division	Department of Water Development	Department of Water Development	11
12	AGROS	1964	Kouris	Limassol	Limassol	TE	26	180	61	99	I	6	L	Agros Irrigation Division	Department of Water Development	Department of Water Development	12
13	ARGAKA	1964	Magounda	Paphos	Paphos	ER	41	173	138	1 150	I	0,5	L	Government	Howard Humphreys & Sons of U.K.	Department of Water Development	13
14	KITI	1964	Tremithos	Larnaca	Larnaca	TE	22	990	183	1 614	I	602	L	Government	Il Nuovo Castoro of Italy	Department of Water Development	14
15	LIOPETRI	1964	Potamos	Famagusta	Famagusta	TE	18	579	50	340	R	150	L	Liopetri Irrigation Division	Department of Water Development	Department of Water Development	15
16	MIA MILEA	1964	Pedhieos	Nicosia	Nicosia	TE	22	140	54	355	I	24	L	Mia Milea Irrigation Division	Department of Water Development	Department of Water Development	16
17	OVGOS	1964	Serakhis	Nicosia	Nicosia	TE	16	745	130	845	I	786	L	Morphou Irrigation Division	Department of Water Development	Department of Water Development	17
18	AYIA MARINA	1965	Xeros (Tyllirias)	Paphos	Paphos	ER	33	142	61	311	I	161	L	Ayia Marina Irrigation Division	Energoprojekt of Yugoslavia	Mediterranean Constructors Greece - G.P.Zachariades Cyprus	18
19	POLEMIDHIA	1965	Garyllis	Limassol	Limassol	TE	45	196	215	3 864	I	581	L	Government	Energoprojekt of Yugoslavia	Mowlem & Ridgway of U.K.	19
20	KALOPANAYIOTIS	1966	Marathasa	Nicosia	Nicosia	TE	40	137	156	391	I	207	L	Government	Howard Humphreys & Sons of U.K.	Department of Water Development	20
21	MAVROKOLYMBOS	1966	Mavrokolym-bos	Paphos	Paphos	TE	45	528	267	2 180	I	340	L	Government	Energoprojekt of Yugoslavia	Cybarco of Cyprus	21
22	POMOS	1966	Livadhi	Paphos	Paphos	ER	38	302	153	859	I	300	L	Pomos Irrigation Division	Energoprojekt of Yugoslavia	Mediterranean Constructors Greece - G.P.Zachariades Cyprus	22
23	YERMASOYIA	1968	Yermasoyia	Limassol	Limassol	TE	49	409	539	13 600	I	850	V	Government	Energoprojekt of Yugoslavia	Cybarco of Cyprus	23
24	LEFKARA	1973	Pendaskinos	Larnaca	Larnaca	TE/ER	74	240	820	13 850	S/I	316	L	Famagusta Water Board & Lefkara Irrigation Division	Howard Humphreys & Sons of U.K.	L. Fairclough & Medcon Construction Ltd.	24
25	MASARI	1973	Serakhis	Nicosia	Nicosia	TE	15	929	245	2 273	I	622	V	Government	Department of Water Development	Department of Water Development	25
26	PALEKHORI-KAMBI	1973	Akaki	Nicosia	Nicosia	PG	33	131	27	620	I	65	L	Government & Palekhori Irrigation Division	Department of Water Development	Department of Water Development	26
27	ARAKAPAS	1975	Yermasoyia	Limassol	Limassol	PG	23	97	10	129	I	205	L	Arakapas Irrigation Division	Department of Water Development	Department of Water Development	27

menting of the **water supply of Nicosia** was £623,431. The biggest items of expenditure for this purpose was made for Peristerona -Akaki- Orounda emergency scheme (£359,016) and the construction of the new Lakatamia reservoir (£239,304)

The expenditure during 1979 for the construction of irrigation works for **Pitsilia Integrated Rural Development Project was** £338,305.

For the water supply to **Refugee housing schemes** the expenditure was £339,666.

Minor Irrigation Works

50 routine irrigation schemes at an expenditure of £212,049 were carried out during 1979.

Works undertaken for other Government Departments etc.

During 1979 the Department undertook 38 schemes for construction for other Departments amounting to an expenditure of £178,726. Such schemes were mostly for the construction of water supply schemes for livestock farm areas and T/C villages.

Nicosia and Famagusta WS Schemes

Water sale by the Department was carried out only in the case of Nicosia (Greater Nicosia Scheme) and in the case of Famagusta Water Supply Project.

For Nicosia 3.9 MCM were provided giving a revenue of £381,893 at £283,405 corresponding expenses.

The revenue would have been much larger but the Turkish population of Nicosia was supplied free of charge. The cost of supply of water from the Turkish occupied Morphou sources is 97% electricity which is also supplied free.

Also 4 MCM were provided by the Water Board supply areas and 0.65 MCM by the Nicosia Water Commission area.

Efforts to unify the three Administrations as above and which started 11 years ago are still pending but formalities to this effect are at an advanced stage.

The Famagusta Domestic Water Supply Scheme supplies water to the Turkish occupied town of Famagusta, free of charge, to Larnaca and a number of villages. The total revenue from the sale of the water reached £154,105.

Regional Offices

Due to the occupation of northern Cyprus by Turkish troops, there are only three regional offices in operation, i.e. Famagusta - Larnaca, Limassol and Paphos. The regional offices are mostly responsible for the collection of water resources records and the design and supervision of minor projects.

Operation and Maintenance of Projects

The management of major irrigation works is done jointly with the District Administration, whilst the management of small irrigation and village water supply schemes is done by the District Administration and local committees. Town water supplies are managed by Water Boards.

In the year under review the total water available in all dams in Cyprus, in the Government controlled areas, amounted to 30.4MCM. From this quantity 12.5 MCM were used for the irrigation of 22,669 donums, 2.9 MCM were used for domestic water supplies, 3.5 MCM were used for recharge or lost because of seepage and 2.2 MCM were lost as evaporation The remaining 9.2 MCM were retained in the dams as overannual storage.

Water available for utilization from Government projects reached the figure of 28.3 MCM. Out of this only 15.4 MCM was utilized, 10.8 MCM for irrigation, 2.93 MCM

for domestic water supply and 1.623 MCM for recharge. Irrigation water was utilized on 20,084 donums of land planted with citrus, bananas, vines, deciduous, vegetables, potatoes, cereals and olives. The gross income from the sale of water amounted to £128,281 whereas the operational expenses reached £55,197. The maintenance expenses amounted to £7,202. The net income to Government projects for the year was £65,882.

Water available for utilization from contributory schemes was 2.00 MCM out of which 1.6 MCM was used for the irrigation of 2,615 donums.

Recharge works in the Government controlled areas represent only 11.5% of the total recharge capacity available in Cyprus and collected a total quantity of 0.09 MCM out of which 0.072 MCM was used for recharge whereas the rest was lost in the form of evaporation.

Legal Adviser

In the course of the operation of the Ministry of Agriculture and Natural Resources in general and the Department of Water Development in particular during the year 1979 a number of legal problems inevitably cropped up from time to time.

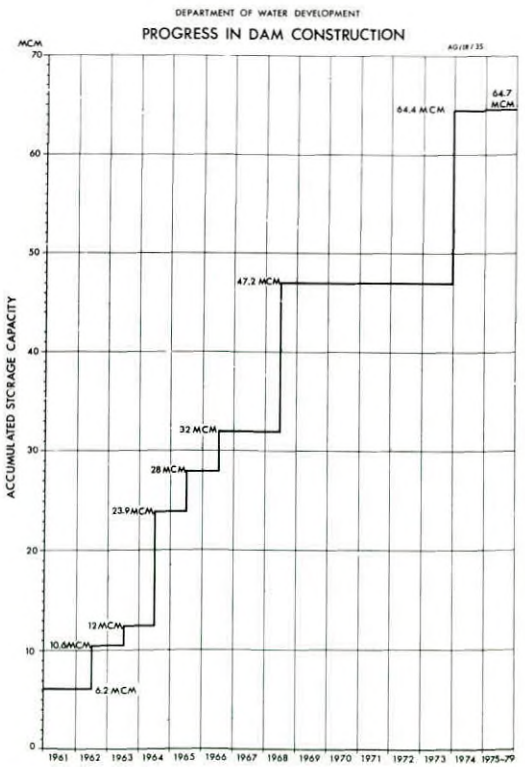
Such legal problems derived from Constitutional or Administrative matters from the Laws of Contract and Sale of Goods, the Wells Law, the Special Measures Law, the Government Waterworks Law, the Irrigation Divisions (Villages) Law, the Irrigation Associations Laws, the Water Supply (Municipal and other Areas) Law, the Water (Domestic Purposes) Village Supplies Law, the Streets and Buildings Regulation Law, the Immovable Property (Tenure Registration and Valuation) Law as well as numerous other laws.

These problems have often been referred for scrutinization to the legal adviser who in turn prepared written or verbal advice or took the necessary or appropriate action under the circumstances.

The legal adviser attended all the meetings of the Advisory Committee held at diverse dates in order to study the applications submitted for the issue of permit to sink or construct a well to use underground or surface water, to alter the objects of a permit etc.

This Advisory Committee studied the applications of Nicosia, Famagusta, Larnaca, Limassol and Paphos Districts and advised the Director to give or to refuse to give his concurrence in the issue of a permit by the District Officer.

In addition the legal adviser attended a number of other meetings held either



within the Department or the Ministry. He has been appointed a member of the Committee which studies the possible repeals of the Wells Law, the Water Supply (Special Measures) Law, the Government Waterworks Law the Irrigation Division Villages Law the Irrigation Association Law. Further more, he is also acting as Secretary to the Committee appointed for the fixing of new rates for Contracts for the Paphos Irrigation Project where in there is no provision for such prices.

Apart from what is stated above, the legal adviser by special authority originally given to him by the Attorney-General of the Republic of Cyprus, performed the duties of the Counsel of the Republic. Thus he appeared before the courts of the Republic and handled cases for and against the Republic in the name of the Attorney-General of the Republic.

The legal adviser, in the course of the year 1979 brought upto date the Water Supply (Municipal and other Areas) Law Cap 350.

CYPRUS NATIONAL, INTERDEPARTMENTAL AND DEPARTMENTAL COMMITTEES

International Hydrological Programme

The Cyprus National Committee for the IHP consists of the following:

Chairman
C St Lytras, Ag. Director, W.D.D.

Secretary
I Iacovides, Hydrologist, W.D.D.

Members
Dr V Krentos, Director Agricultural Research Institute.
A Louca, Director, Department of Agriculture
E Michaelides, Director, Department of Forests
K Constantinou, Director, Geological Survey Department
Cl. Philaniotis, Head, Meteorological Office

The IHP is sponsored by UNESCO and its purpose is to implement and carry on the findings and activities of International Hydrologic Decade which ended in 1975. The IHP officially started being operational in 1976 with the establishment of National Committees to act as focal points for IHP activities.

Several scientific and educational IHP projects have already been decided upon and questionnaires regarding local practice have been answered. Data from the Cyprus Decade stations were continued to be provided. The computer storage of hydrologic data initiated during the IHD is continuing.

International Commission on Large Dams

The International Commission on Large Dams (ICOLD) is a non-profit seeking organization with 71 member countries. As set out in its constitution "The objects of the Commission are to encourage improvement in the design, construction, maintenance and operation of large dams by bringing together information thereon, and by studying questions relating thereto".

The Cyprus National Committee on Large Dams (CYNCOLD) was elected to full membership of the International Commission in 1969. During 1979 the National Committee was composed of the following:

Chairman
C St Lytras, Ag. Director, WDD
Secrctary
C C Artemis, Executive Engineer I, WDD
Members
K C Hassabis, Assistant Director, WDD
A Papadopoulos, Representative of the

Association of Civil Engineers and Architects

P Christophorou, Representative of the Association of Building Contractors.

The 47th Executive Meetings and Thirteenth Congress on Large Dams took place in New Delhi, India between October 24th and November 2nd 1979. CYNCOLD was not represented at the meeting. The Congress was followed by organized Study Tours to large dams in India. The subjects dealt with by the Congress are:-

* Interface Problems of Dams
* Deterioration or Failure of Dams
* Large Capacity Outlets and Spillways, and
* Seismicity and Aseismic Design of Dams

During the year under review CYNCOLD has continued the exchange of correspondence with the Central Office of the Commission in Paris and its Technical Committees and has both received and supplied technical information of dams and related subjects.

The 47th Executive Meeting is scheduled to be held in Rome, Italy from 6th to 9th October 1980 and will be followed by Study Tours to Dams between 10th and 15th October 1980.

International Commission on Irrigation and Drainage

The International Commission on Irrigation and Drainage is a non-profit organization whose objectives are to stimulate and promote the development and application of the science and techniques on irrigation, drainage, flood control and river training in the engineering, economic and social aspects. The ICID was set up in 1950 with central office in New Delhi, India.

Membership to the ICID has risen from 73 in 1978 to 76 National Committees from an equal number of member countries with the admission of Chile, Honduras and New Zealand.

Cyprus is a member country of the ICID since 1954 and the Cyprus National Committee in its present form was established in 1964. The Cyprus National Committee is now composed of the following:-

Chairman
C St Lytras, Ag. Director, WDD
Secretary,
N Tsiourtis, Executive Engineer I, WDD
Members, Ex-officio
Director, Department of Forests
Director, Department of Agriculture
Director, Agricultural Research Institute

During the year 1979 the Cyprus National Committee continued the exchange of in-

Relocation of water mains to facilitate the construction of the Nicosia-Limassol new dual carriage road. The construction of the new road is posing several problems both for our existing water conveyors as well as for our future projects, namely the Vasilikos-Pendaskinos Project and the Southern Conveyor Project.

formation with the central office of ICID and other National Committees. All publications such as six monthly bulletins, annual reports and other documents which were received from the Central Office of the ICID or elsewhere were distributed to all members of the CYNCID.

In the year under review the following activities of the ICID took place.

* Twelfth European Regional Conference on Irrigation and Drainage. This was held at Dubrovnik (Yugoslavia) from 17 to 19 September followed by study tours from 21-24 September. The theme of the conference was "Multipurpose Water Engineering Projects or River Basin Scale".
* Thirtieth International Executive Council Meetings of the ICID.
  This was held at Institute Agronomique Et Veterinaire Hasan II, Rabat (Morocco) May 21-22.

The International Executive council meeting has dealt with the following

* Membership
* Publications
* Approved date and place for forth coming meetings and congresses and,
* To consider the reports of the various Working Groups.

The following working groups or permanent committees have been established in the past by ICID and are now working.

* Working group on standardization of Technical Terms commonly used in Irrigation and Drainage,
* Permanent Committee to focus attention on New Developments
* Working group on Evapotranspiration,
* Permanent Paper Committee,
* Committee on Irrigation and Drainage Construction Techniques,
* Working Group on Irrigation by 2000 A.D.,
* Committee on History of Irrigation,
* Committee on Irrigation Efficiencies,
* Working Group on Drip Irrigation and Similar Methods,
* Permanent Committee on Application of System Analysis to Irrigation, Drainage and Food Control.

The Cyprus National Committee does not participate in any of the above activities of the ICID.

International Water Supply Association

The Department of Water Development was an associate member of the IWSA until 1969. Late in 1969 a National Committee was established. The 1979 Committee was ;

Chairman

C St Lytras, Ag. Director, W.D.D.

Secretary

G. Charalambous, Superintendent of Works, WDD, and the representatives of the Ministry of Interior and Water Boards of Nicosia, Limassol, Famagusta and Larnaca as members.

The Cyprus National Committee of the International Water Supply Association exchanged regular correspondence with the Head Office of the Association relative to the activities of this Organization.

MEETINGS OF THE AG. DIRECTOR WITH THE STAFF

Several meetings were held during the year under the Chairmanship of the Ag. Director with the Heads of the various Divisions, Regional Engineers as well as with other members of the staff to discuss various aspects of works and personal matters.

Interdepartmental meetings with the Departments of Agriculture, Forests, ARI, the Geological Survey Department, Meteorological Office, Fisheries Department and the District Administration were also held during the year.

FINANCE, EXPENDITURE AND REVENUE

During the year 1979 the total expenditure by the Department was £10,340,569 from budgeted and non-budgeted votes amounting to £12,475,202.

This is by far the highest expenditure made since the creation of this Department.

The general picture is as follows:-

TABLE I–1a

GENERAL BUDGET – EXPENDITURE FIGURES

Description	Budget	Expenditure
	£	£
WDD Development Estimates including loans	10 122 577	8 479 326
WDD Ordinary Estimates	897 553	834 946
WDD expenditure for Pitsilia Project	471 542	338 305
Non Budgeted votes for Refugee Housing estates, works for other Government Departments and private developers and villages deposits	983 530	687 992
Totals	£12 475 202	£10 340 569

The level of Construction Works carried out during 1979 was £8,819,836 from WDD and other votes. See table V—I under Construction Division.

The largest item of expenditure was for the Paphos Irrigation Project for which the sum of £6,450,936 was spent.

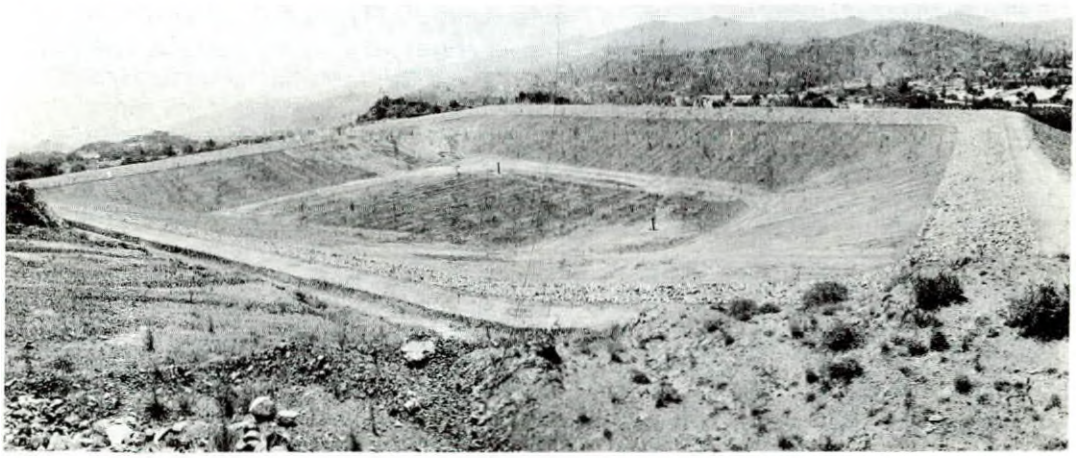
Revenue

The sum of £532,637 was collected during the year (1978 was £521,557) as revenue mainly from the sale of water for the Greater Nicosia and Famagusta Water Supply Schemes.

Loan Proceeds

(a) Three loans from the Federal Republic of Germany for the sum of £3,210,000 (approx) were approved for the construction of Irrigation Schemes in rural areas. During the period 6/12/76–10/12/79, the sum of £2,391,121 was withdrawn from the loan.

(b) Loan from the International Bank of Reconstruction and Development for the Paphos Irrigation Projects ($14,000,000)
During the period 22/1/76–5/7/80, the sum of £3,691,150 was withdrawn from the loan.



Several polythene lined earth reservoirs are being constructed in Pitsilia area being the main water resources component of the Pitsilia Integrated Rural Development Project. Water is diverted to these ponds from specially constructed weirs on small streams during the wet season. A pipeline distribution net work is then laid to cover the irrigation areas. In the protograph Ephtagonia Pond No. 1 of 92,000 m³ capacity was substantially completed by the end of 1979.

TABLE I–1

EXPENDITURE WATER DEVELOPMENT DEPARTMENT VOTES FOR THE YEAR 1979

Ser. No.	Details	Expenditure Govt. £	Village £	Total £
1	Administration			
	Ordinary £414,484	852 249	–	852 249
	Developt. £437,765			
2	Greater N'sia scheme–Running Expenses	283 403	–	283 403
3	Famagusta Water Supply–Running Expenses	84 766	–	84 766
4	Regional Village Water Supply Running Expenses	20 829	–	20 829
5	Irrigation Drainage and Dams.	6 895 042	86 829	6 981 873
6	Town Water Supplies	629 778	–	629 778
7	Village Water Supplies	140 363	68 884	209 247
8	Hydrology	90 746	–	90 746
9	Surveys & Investigations	116 930	–	116 930
10	Purchases and Maintenance of Machinery and Equipment.	20 408	–	20 408
11	Stores	10 988	–	10 988
12	Drilling and Prospecting	11 180	–	11 180
13	Others.	1 877	–	1 877
	Total.	£9 158 559	£ 155 713	£ 9 314 272

Breakdown of Irrigation Drainage & Dams

		£
1	Paphos Irrigation Project.	6 450 936
2	Major Irrigation Works	294 390
3	Minor Irrigation Works	212 049
4	River-Training.	9 635
5	Consultant's Fees	4 890
6	Dam M/ce at Distribution systems	9 971
	Total.	£6 981 871

Breakdown of Administration

		£
1	Personal Emoluments.	277 802
2	Travelling.	48 604
3	Operation of Motors Transport	6 475
4	Office Expenses	10 618
5	Leave Pay to Regular Employees	3 830
6	Govt. Water Supply	4 920
	Total.	£852 249

TABLE I–2

MONTHLY STATEMENT OF ORDINARY EXPENDITURE FOR THE YEAR 1979

Head 20A – Water Development

1979 Approved	£821 403
Add Special Warrants	£76 150
Total	£897 553

Month	Monthly Expend. £	Expend. to-date £	%
January	35 130	35 130	3.91
February	47 076	82 206	9.16
March	69 439	151 645	16.90
April	49 151	200 796	22.37
May	48 470	249 266	27.77
June	62 229	311 495	34.70
July	51 550	363 045	40.45
August	71 387	434 431	48.40
September	88 173	522 604	58.23
October	78 575	601 179	66.98
November	67 307	668 486	74.48
December	166 460	834 946	93.02

Summary

Amount approved	£897 553	100%
Less actual Expenditure	£834 946	93.02%
Balance	£ 62 607	6.98%

TABLE I–3

MONTHLY STATEMENT OF DEVELOPMENT EXPENDITURE FOR THE YEAR 1979

Head 2D Water Development

1979 Approved	7 692 288
Add Special Warrants	2 216 883
Total	£9 909 171

Month	Monthly Expend. £	Expend. to-date £	%
January	124 460	124 460	1.26
February	662 642	787 102	7.94
March	612 765	1 399 867	14.13
April	735 345	2 135 212	21.55
May	755 137	2 890 349	29.17
June	392 866	3 283 215	33.13
July	819 256	4 102 471	41.40
August	812 122	4 914 593	49.60
September	621 035	5 535 628	55.86
October	768 647	6 304 275	63.62
November	538 476	6 842 751	69.05
December	1 480 862	8 323 613	84%

Summary

Amount approved	£9 909 171	100%
Less actual expenditure	£8 323 613	84%
Balance	£1 585 558	16%

TABLE I–4

STATEMENT OF REVENUE COLLECTED DURING THE YEAR 1979

Description	£
Drilling Charges	25
Greater Nicosia Scheme	382 363
Famagusta Water Supply Scheme	91 043
Village Water Supplies	18 449
Other Fees	40 757
Total	£532 637

TABLE I–5 PAPHOS IRRIGATION PROJECT–EXPENDITURE — 1979

Ser No	Description	1979 Expenditure £	Total Expenditure upto 31.12.79 £
1	**Wellfield Conveyance System:**		
	Drilling and testing of boreholes		81 914
	Supply and installation of well pumps	43 299	131 819
	Supply of pipes and valves	3 038	212 535
	Supply of canaletti	38 641	56 579
(a)	Installation of wellfield conveyance system by ASPEM	–	17 680
(b)	Installation of WCS by WDD	125 062	234 259
	Topographical control works	1 784	1 784
	Redevelopment of boreholes and lowering well pumps	1 610	1 610
	Diversion of river water into the canaletti	–	–
2	**Construction of Main Canal**		
	Main canal construction (GCC)	62 579	904 828
	Diversion of services	–	9 239
	Main canal investigations	–	17 307
	Alkali activity tests	57	1 759
	Compensation to field crops	1 472	1 472
	Fencing of main canal	3 240	3 240
	Repairs and additional works	–	–
3	**Irrigation Network Eastern Area**		
	Installation of irrigation network (SOCEA)	986 247	1 386 138
	Supply of AC pipes (CPI)	902 197	1 235 969
	Handling of AC pipes	20 778	36 663
	Topographical control works	4 606	18 137
	Inspection of cast iron fittings	–	316
	Preparation of steel fittings (Workshop WDD)	2 972	2 972
	Compensation of demages to field crops	5 970	6 435
	Inspection of CPI factory	1 570	1 570
	Reinstallation of AC pipes at Akhelia	–	–
	Supply and installation of strainers	–	–
	Inspection of hydraulic equipement installed by SOCEA	–	528
4	**Main Contract "Western Conveyor, Pumping Stations and Remote Indications"**		
	Supply and installations of pumping stations, western main pipeline and remote indication (Costain)	1 918 003	2 178 663
	Topographical control works	977	4 865
	Compensation to damages	449	449
	Investigations western coveyor	344	344
	Installations of four private wire–remote indication telemetry	–	–

TABLE I–5 PAPHOS IRRIGATION PROJECT–EXPENDITURE — 1979 (cont.)

Ser No	Description	1979 Expenditure	Total Expenditure upto 31.12.79
		£	£
	Supply and installation of louvres for 13 pumping stations for ventilation	–	–
	Roofing of pumping stations	–	–
	Installation of steel gates	–	–
	Connection of main pumping station with the canal	–	–
5	**Asprokremmos Dam**		
	Construction of Asprokremmos Dam (J & P & Medcon, "Joint Venture")	2 040 039	3 420 110
	Model testing	41	18 834
	Asprokremmos Dam investigations	1 030	21 610
	Diversion of services	500	1 509
	Asprokremmos Dam, laboratory triaxal tests		
	Design of spillway	530	530
	Supply of progress photographs	472	472
	Topographical control works	2 799	2 799
	Pentonitic clay dispersion tests	–	–
	Alkali activity reaction tests abroad	1 500	1 500
	Compensations: Water supply to Mandria	2 133	2 133
	Other works by WDD		
6	**Erection of Buildings & Offices**	490	72 232
7	**Electricity Supply**		
	Electricity supply	16 507	147 979
	Metering Units	–	–
8	**Other Works by WDD**		
	Purchase of equipment	4 486	70 629
	(a) Agriculture research activities	2 095	33 862
	(b) Agriculture development		
	Land aquisitions		
	Installation of six automatic recorders	683	4 118
	Soil and concrete laboratory	3 556	3 556
	Operator plan printing machine	–	–
9	**New agricultural research station Akhelia**	8 978	8 978
10	**Management**		
	Furniture & fittings	328	4 625
	Office requirements	6 395	16 517
	Wages of drivers	23 069	50 361
	Operation of motor transport	6 144	16 835
	Maintenance of project vehicles	3 149	6 592
	Training programme	3 405	5 197

TABLE I–5 PAPHOS IRRIGATION PROJECT–EXPENDITURE — 1979

Ser No	Description	1979 Expenditure	Total Expenditure upto 31.12.79
		£	£
	Travelling	12 645	25 348
	Purchase of tools	—	—
	Advertisements	—	2 287
	Overtime fees	22 592	38 009
	Poster "Paphos Irrigation Project"	—	335
	Computer charges	—	291
11	**Consultants Fees**		
	Sogreah	80 674	337 243
	Macdonald and Partners	74 772	183 088
	PAC	606	2 626
	Mr G Post	—	864
	Extension services (Hannun, Dr. Providenti)	3 595	14 651
	Mr Sabarles	1 748	1 748
	Mr Bonvelier	—	—
	Mr Taylor	—	—
12	Maintenance & Operation of the Project		
	Well Pumps & Conveyance System		
	(a) Operation & maintenance		
	(b) Electricity		
	Main Canal		
	(a) Cleaning	1 080	1 080
	(b) Maintenance & operation		
	Purchase of equipment		
	Operation of vehicles		
	Staff		
	(a) Electrotechnician & mechanic		
	Main Contract		
	(a) Operation and maintenance		
	(b) Electricity		
13	**Irrigation Network & Reservoirs**		
	Western Area		
1	Installation of irrigation network		
2	Supply of pipes		
3	Handling of pipes		
4	Supply of valves 8S2		
5	Supply of hydrants 8S3		
6	Compensations		
7	Topographical control works		
8	Supply and installation of strainers		
14	**Road Network**		
	Total	£6 450 936	£11 067 622

TABLE 1–6 MAJOR WATERWORKS – YEAR 1979

Scheme	Contribution		Total	Expenses		Total	Balance		Total	
	Government	Village		Government	Village		Government	Village		
CONTRIBUTORY SCHEMES	£	£	£	£	£	£	£	£	£	
1. Lymbia dam.	2 144	1 072	3 216	20	10	30	2 124	1 062	3 186	1/3
2. Polemidhia	36 666	18 334	55 000	35 364	17 681	53 045	1 302	653	1 955	"
3. Pakhyammos	–	–	–	11 074	5 536	16 610	11 074CR	5 536CR	16 610CR	"
4. Yermasoyia	12 133	6 067	18 200	11 904	5 952	17 856	229	115	344	"
5. Yermasoyia–Polemidhia Project										
(i) Trakhoni Extension.	44 409	–	44 409	35 662	–	35 662	8 947	–	8 947	Govt.
(ii) Polemidhia dam (Comp.). . .	1 513	–	1 513	1 513	–	1 513	–	–	–	"
(iii) Yermasoyia-Akrounda–Phinikaria	800	–	800	680	–	680	120	–	120	"
(iv) Ayios Nikolaos Ext.	12 000	–	12 000	9 208	–	9 208	2 792	–	2 792	"
6. Masari dam	695	–	695	695	–	695	–	–	–	"
7. Lefkara Distr.	400	–	400	108	–	108	292	–	292	"
8. Pissouri Irr.	78 000	–	78 000	76 344	–	76 344	1 656	–	1 656	"
9. Khrysokhou Valley.	60 000	–	60 000	52 867	–	52 867	7 133	–	7 133	"
10. Ayios Theodhoros (L'ca)	40 000	–	40 000	29 774	–	29 774	10 226	–	10 226	"
Total	£288 760	£25 473	£314 233	£265 213	£29 179	£294 392	£23 747	£3 706	£20 041	

TABLE 1–7 MINOR IRRIGATION SCHEMES – 1979

Scheme	Budget			Actual Expenditure			Balance			
	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	Village Contr
1. Ayia Marina - Yialia	26 160	17 440	43 600	16 069	10 713	26 782	10 091	6 727	16 818	2/5
2. Akaki-Meniko "Riatiko"	5 334	2 666	8 000	4 591	2 295	6 886	743	371	1 114	1/3
3. Akaki-Meniko	1 202	601	1 803	671	335	1 006	531	266	797	1/3
4. Astromeritis	1 500	1 500	3 000	1 488	1 488	2 977	11	12	23	1/2
5. Astromeritis	5 000	5 000	10 000	4 077	4 976	8 153	923	924	1 847	1/2
6. Ayii Trimithias - Palcometokho	8 035	–	8 035	6 956	–	6 956	1 079	–	1 079	Govt
7. Ayios Ioannis (Malounda) "Pitsilis"	3 480	2 520	6 000	1 234	894	2 128	2 246	1 626	3 872	42%
8. Ayios Ioannis (Agros) "Teratsia"	375	188	563	331	166	497	44	22	66	1/3
9. Anayia	4 599	2 301	6 900	4 521	2 261	6 782	78	40	118	1/3
10. Dhali	4 800	2 400	7 200	4 436	2 218	6 654	364	182	546	1/3
11. Evrykhou	7 584	3 791	11 375	7584	3 791	11 373	–	–	–	1/3
12. Evrykhou-Phlasou-Korakou "Kousouliotis"	8 000	4 000	12 000	8 000	4 000	12 000	–	–	–	1/3
13. Yialias River Recharge	2 340	–	2 340	2 332	–	2 332	8	–	8	Govt
14. Kalavasos Recharge	3 000	–	3 000	2 932	–	2 932	68	–	68	Govt
15. Kakopetria	2 036	1 016	3 052	2 014	1 007	3 021	22	9	31	1/3
16. Kissonerga	12 288	–	12 288	12 274	–	12 274	14	–	14	Govt
17. Kalliana	3 069	1 534	4 603	3 053	1 526	4 579	16	8	24	1/3
18. Khirokitia "Anefantis"	3 344	–	3 344	3 344	–	3 344	–	–	–	Govt
19. Kambos "Potamos tou Kalogirou"	13 334	6 666	20 000	2 696	1 348	4 044	10 638	5 318	15 956	1/3

TABLE I–7 MINOR IRRIGATION SCHEMES— 1979 (cont.)

Scheme	Budget Govt. £ mils	Budget Village £ mils	Budget Total £ mils	Actual Expenditure Govt. £ mils	Actual Expenditure Village £ mils	Actual Expenditure Total £ mils	Balance Govt. £ mils	Balance Village £ mils	Balance Total £ mils	Village Contr.
20. Mandria (Limassol) "Mylaris"	400	–	400	400	–	400	–	–	–	Govt.
21. Meniko "Litharkes"	2 666	1 334	4 000	8	4	12	2 658	1 330	3 988	1/3
22. Mosphileri	2 174	–	2 174	1 548	–	1 548	626	–	626	Govt.
23. Moutoullas	1 625	811	2 436	1 232	616	1 848	393	195	588	1/3
24. Orounda "Maoutsos"	5 487	4 489	9 976	5 442	4 453	9 895	45	86	81	45%
25. Orounda "Limni"	8 160	5 440	13 600	4 696	3 131	7 827	3 464	2 309	5 773	2/5
26. Perapedhi	1 130	566	1 696	667	330	1 001	463	232	695	1/3
27. Peristerona (N)	5 000	5 000	10 000	4 571	4 571	9 142	429	429	858	1/2
28. Peristerona (N) Recharge	33 888	–	33 888	19 416	–	19 996	14 472	–	14 472	Govt.
29. Pedhieos River Recharge	14 991	–	14 991	12 996	–	12 996	1 995	–	1 995	Govt.
30. Pera "Vyzakia"	99	50	149	52	26	78	47	24	71	1/3
31. Pedhoulas	342	171	513	342	171	513	–	–	–	1/2
32 Polis (Khrysokhou)	1 132	566	1 698	191	95	286	941	471	1 412	1/3
33. Phlasou - Katydhata. "Karydes"	10 666	5 334	16 000	3 987	1 994	5 981	6 679	3 340	10 019	1/3
34. Tris Elies "Kaminoudhi	3 800	1 900	5 700	3 696	1 848	5 544	104	52	156	1/3
35. Chakistra	13 334	6 666	20 000	6 534	3 267	9 801	6 800	3 399	10 199	1/3
36. Yerakies "Xeros Potamos"	20 000	10 000	30 000	43 000	22	65	19 957	9 978	29 935	1/3
37. Vyzakia	700	350	1 050	649	325	974	51	25	79	1/3
	241 074	94 300	335 374	155 074	56 975	212 049	85 658	37 325	122 983	

TABLE I-8 **IMPROVEMENT OF VILLAGE WATER SUPPLY**— 1979

SCHEME	Budget			Actual Expenditure			Balance			Village Contribution
	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	
Anaphotia	1 486	881	2 367	382	226	608	1 104	655	1 759	
Ayios Epiphanios (Orini)	5 750	5 750	11 500	2 961	2 961	5 922	2 789	2 789	5 578	
Arminou Regional Scheme	1 800	—	1 800	1 800	—	1 800	—	—	—	Govt.
Amathus	40 000	—	40 000	16 641	—	16 641	23 359	—	23 359	Govt.
Ayii Trimithias	11 333	5 667	17 000	6 624	3 312	9 936	4 709	2 355	7 064	1/3
Anayia	6 667	3 333	10 000	6 667	3 333	10 000	—	—	—	1/3
Astromeritis	475	475	950	70	70	140	405	405	810	½
Dherinia	3 780	1 890	5 670	3 683	1 842	5 525	97	48	145	1/3
Dhali	2 930	2 930	5 860	46	46	92	2 884	2 884	5 768	½
Episkopi (Limassol)	284	284	568	145	145	290	139	139	278	½
Yerasa	225	225	450	191	191	382	34	34	68	½
Kholi	539	608	1 147	193	217	410	346	391	737	53%
Kilinia	420	609	1 029	47	68	115	373	561	934	59.18%
Kambi	279	293	572	279	293	572	—	—	—	
Klirou	346	347	693	137	137	274	209	210	419	½
Kiti		2 492			2 351			141		
Meneou										
Dhromolaxia	2 492		4 984	2 352		4 703	140		281	½
Perivolia										
Tersephanou										

TABLE I-8 **IMPROVEMENT OF VILLAGE WATER SUPPLY—1979** (cont.)

SCHEME	Budget			Actual Expenditure			Balance			Village Contribution
	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	
Khlorakas	3 150	3 150	6 300	3 150	3 150	6 300	—	—	—	½
Laxia	142	74	284	77	40	153	65	34	131	½) 52%
Yeri		68			36			32		)48%
Layia	74	2 926	3 000	53	2 070	2 123	21	856	877	97.53%
Liopetri Recharge	2 800	2 800	5 600	2 551	2 551	5 102	249	249	498	½
Ayios Athanasios		216								
Moutayiaka Reg.	822		1 644	832	832	1 664	10Cr	10Cr	20Cr	½
Ayia Phyla		606								
Mathikoloni	600	600	1 200	235	236	471	365	364	729	½
Nata	3 700	3 700	7 400	3 114	3 114	6 228	586	586	1 172	½
Odhou	858	1 064	1 922	102	126	228	756	938	1 694	55.36%
Ormidhia	5 750	5 750	11 500	4 289	4 289	8 578	1 461	1 461	2 922	½
Psomolophou	7 711	7 711	15 422	6 749	6 749	13 498	962	962	1 924	½
Paleometoho	1 972	1 972	3 944	1 007	1 007	2 014	965	965	1 930	½
Piyenia	2 200	—	2 200	2 200		2 200	—	—	—	Govt.
Paramytha		157 500			147			10 500		) 30%
Spitali	525	157 500	1 050	490	147	980	35	10 500	70	)½ 30%
Palodhia		210 000			196			14 000		) 40%

TABLE I-8 **IMPROVEMENT OF VILLAGE WATER SUPPLY—1979** (cont.)

SCHEME	Budget			Actual Expenditure			Balance			Village Contribution
	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	Govt. £ mils	Village £ mils	Total £ mils	
Peristerona (P)	3 900	3 900	7 800	676	675	1 351	3 224	3 225	6 449	
Pitsilia Reg. Scheme	8 738	—	8 738	8 738	—	8 738	—	—	—	
Panayia tou Glossa Mon.	2 400	600	3 000	2 400	381	2 781	—	219	219	1/3
Pano Platres	785	785	1 570	703	703	1 406	82	82	164	½
Paralimni	5 839	3 568	11 678	5 677	3 468	11 353	162	100 63	325	)61.10%)½ 38.90%
Ayia Napa		2 271			2 208	743	4	5	9	½
Peristerona (N)	376	376	752	372	371	7 409	18	18	36	58.68%, ½
Philousa	3 250	4 195	7 445	3 232	4 177	196	—	—	—	½
Pedhoulas	98	98	196	98	98	37 952	5 202	2 601	7 803	1/3
Tseri	30 503	15 252	45 755	25 301	12 651	484	—	—	—	½
Vasa (Kilani)	242	242	484	242	242	340CR	346	346	692	½
Sotira (Limassol)	176	176	352	170CR	170CR	13 380	3 311	—	311	Govt.
Statos - Ayios Photios	13 691	—	13 691	13 380	—	16 872	3 013	1 006	4 019	
Troulli - Kellia	15 667	5 224	20 891	12 654	4 218	209 274	54 405	24 749	79 154	
	194 775	93 633	288 408	140 370	68 904					

TABLE 1 - 9 PITSILIA PROJECT EXPENIDTURE 1979

Scheme	Contribution			Expenses			Balance			
	Govt.	Vill.	Total	Govt.	Vill	Total	Govt.	Vill	Total	
Agros "Rano Lambadha"	653	327	980	650	325	975	3	2	5	1/3
Agros "Kaouros"	1 066	534	1 600	1 052	526	1578	14	8	22	1/3
Agros "Kato Taliou"	2 733	1 367	4 100	2 662	1 331	3 993	71	36	107	1/3
Purchase of pumping unit	6 120	—	6 120	3 684	—	3 684	3 436	—	2 436	Govt.
Ayii Vavatsinias Distr. System	17 334	8 666	26 000	6 484	3 242	9 729	10 850	5 424	16 274	1/3
Ayios Ioannis - K. Mylos	18 467	9 233	27 700	8 983	4 491	13 474	9 484	4 742	14 226	1/3
Ayios Ioannis - Operation	392	—	392	232	—	232	160	—	160	Govt.

TABLE 1 - 9 PITSILIA PROJECT EXPENIDTURE 1979 (cont.)

Scheme	Contribution		Total	Expenses		Total	Balance		Total	
	Govt.	Vill.		Govt.	Vill		Govt.	Vill		
	£ mils	£ mils	£ mils	£ mils	£ mils	£ mils	£ mils	£ mils	£ mils	
Ayios Ioannis "Yerambelos" . . .	2 833	1 417	4 250	1 863	932	2 795	970	485	1 455	1/3
Askas "Themelios"	2 400	1 200	3 600	2 322	1 161	3 483	78	39	117	1/3
Agridhia "P & Leftina".	6 200	3 100	9 300	4 404	2 202	6 606	1 796	898	2 694	1/3
Ephtagonia Pond.	43 637	21 818	65 455	39 934	19 968	59 902	3 703	1 850	5 553	1/3
Melini Distr. System.	10 000	5 000	15 000	6 039	3 019	9 058	3 961	1 981	5 942	1/3
Melini Pond	10 000	5 000	15 000	1 954	978	2 932	8 046	4 022	12 058	1/3
Odhou.	1 500	750	2 250	969	484	1 453	531	266	797	1/3
Kalokhorio.	15 000	7 500	22 500	8 664	4 332	12 996	6 336	3 168	9 504	1/3
Kambi (Pharmakas) W S.	1 000	650	1 650	954	477	1 431	46	173	219	39.33%
Kyperounda "Klima".	600	400	1 000	558	371	929	42	29	71	40%
Kyperounda "Appis"										
Avlaki tous Palantzides".	1 667	833	2 500	1 285	642	1 927	382	191	573	1/3
Kyperounda W S	9 000	9 000	18 000	8 678	8 679	17 357	322	321	643	1/2
Khandria Pond	37 000	18 500	55 500	35 179	17 589	52 768	1 821	911	2 732	1/3
Khandria "Panayia".	800	400	1 200	662	331	993	138	69	207	1/3
Kambi (Pharmakas) Irrigation . .	10 000	5 000	15 000	4 698	2 349	7 047	5 302	2 651	7 953	1/3
Pelendria Pond	70 823	35 322	106 145	43 805	21 902	65 707	27 018	13 420	40 438	1/3
Pelendria "Potamoulia"	2 200	1 100	3 300	1 985	992	2 977	215	108	323	1/3
Purchase of Membrane	37 000	–	37 000	36 237	–	36 237	763	–	763	Govt.
Test Pumping	18 000	–	18 000	12 871	–	12 871	5 129	–	5 129	Govt.
Xyliatos Dam	7 000	–	7 000	4 418	–	4 418	2 582	–	2 582	Govt.
Zoopiyi W S	500	500	1 000	378	378	756	122	122	244	1/2
	333 925	137 617	471 542	241 604	96 701	33 395	92 321	40 916	133 237	

STAFF MATTERS

Appointments

On a Monthly (Unestablished or Temporary) Basis

During the period under review the following persons have been appointed to the posts as indicated:

Pantelis Eliades, Executive Engineer, Class II, with effect from 1.2.1979.

Demosthenis Antoniou, Executive Engineer, Class II, with effect from 1.2.1979.

Stephanos Papatryfonos, Hydrologist, Class II, with effect from 1.5.1979.

Antonios Shellis, Technical Assistant, with effect from 1.3.1979.

Zacharias Yiasoumi, Technical Assistant, with effect from 1.3.1979.

Andreas Phylactou, Technical Assistant, with effect from 1.3.1979.

Nicos Philippides, Technical Assistant with effect from 1.3.1979.

Georghios Zachariou, Technical Assistant, with effect from 1.3.1979.

Stelios Eracleous, Foreman 2nd Grade, with effect from 1.5.1979.

Pambos Diplaros, Foreman 2nd Grade, with effect from 1.5.1979.

Savvas Nicolaou, Foreman 2nd Grade, with effect from 1.5.1979.

Kyriacos Marcou, Foreman 2nd Grade, with effect from 1.5.1979.

Iacovos Constantinou Foreman 2nd Grade, with effect from 1.5.1979.

Phidias Hji Xenophontos, Foreman 2nd Grade, with effect from 1.5.1979.

Eleftherios Elia, Foreman 2nd Grade, with effect from 1.5.1979.

Ioannis Potamaris, Foreman 2nd Grade, with effect from 1.5.1979.

Pavlos Aristotelous, Foreman 2nd Grade, with effect from 1.5.1979.

Costas Andreou, Foreman 2nd Grade, with effect from 1.5.1979.

Phidias Metaxas, Foreman 2nd Grade, with effect from 1.5.1979.

On a Permanent Basis

Iacovos Tsimittis, Technical Assistant, with effect from 1.3.1979.

Andreas Aniftos, Technical Assistant, with effect from 1.3.1979.

Stavros Socratous, Technical Assistant, with effect from 1.3.1979.

Constantinos Stavrou, Technical Assistant, with effect from 1.3.1979.

Loucas Loizou, Technical Assistant, with effect from 1.3.1979.

Andreas Christodoulides, Hydrologist, Class II, with effect from 15.4.1979.

Christos Ioannou, Hydrologist Class I, with effect from 15.4.1979.

Charilaos Charalambous, Foreman 2nd Grade, with effect from 1.5.1979.

Savvas Avgousti, Foreman 2nd Grade, with effect from 1.5.1979.

Savvas Kyriacou, Foreman 2nd Grade, with effect from 1.5.1979.

Charalambos Hji Christodoulou, Foreman 2nd Grade, with effect from 1.5.1979.

Georghios Poullos, Foreman 2nd Grade, with effect from 1.5.1979.

Maroulla Karamanidou, Clerical Assistant, G.C.S. with effect from 1.2.1979.

Andreas Ioannou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Philippos Ioannou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Krinoulla Menikou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Rita Moustaka, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Georghios Georghallides, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Georghios Theophilou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Aphrodite Christodoulou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Maria Papakyriacou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

Chrystalla Papaevriviadou, Clerical Assistant, G.C.S., with effect from 1.2.1979.

On Contract

The contracts of **Charalambos Kyriakides,** Legal Adviser, **Georghios Hji Ioannou,** Technical Assistant and **Christoforos Georghiades,** Administrative Officer, was renewed for one more year.

Promotions, Secondments

A number of Officers were promoted or seconded to the posts appearing opposite their names.

Maria Zachariou, from Executive Engineer, Class II, to the permanent (Ordinary) post of Executive Engineer, Class I, with effect from 1.1.79.

Kyriacos Spanos, from Executive Engineer, Class II, to the permanent (Ordinary) post at Executive Engineer, Class I, with effect from 1.1.79.

Tassos Hamatsos, from Executive Engineer, Class II, to the permanent (Ordinary) post of Executive Engineer, Class I, with effect from 1.1.79.

Michael Hji Constantinou, from the Temporary (Development) post of Chief Foreman on secondment, to the permanent post of Chief Foreman with effect from 15.1.79.

Vassos Athanasiou, from the post of Assistant Chief Foreman to the permanent post of Chief Foreman, with effect from 1.2.79.

Costas Hji Stavrou, from the permanent post of Assistant Chief Foreman (on secondment) to the permanent post of Assistant Chief Foreman, with effect from 1.2.1979.

Takis Olympios, from the Temporary (Development) post of Assistant Chief Foreman on secondment to the permanent post of Assistant Chief Foreman with effect from 1.2.1979.

Armand Josephin, from Senior Inspector of Works to the permanent post of Superintendent of Works, with effect from 1.3.1979.

Andreas Makrides, from the Temporary (Development) post of Senior Inspector of Works (on secondment) to the permanent post of Senior Inspector of Works with effect from 1.3.1979.

Andreas Marangos, from permanent (Development) post of Inspector of Works, to the permanent (Ordinary) post of Inspector of Works with effect from 1.3.1979.

Costas Hji Loizou, from the permanent (Ordinary) post of Inspector of Works (on secondment) to the permanent (Development) post of Inspector of Works with effect from 1.3.1979.

Secondments

Panayiotis Scordis, from the post of Technical Assistant, was seconded to the Temporary (Development) post of Executive Engineer Class II, with effect from 1.2.1979.

Nikos Kaisis, from the post of Assistant Chief Foreman was seconded to the Temporary (Development) post of Chief Foreman with effect from 1.2.1979.

Antonios Zakheos, from the Temporary (Development) post of Assistant Chief Foreman (on secondment) was seconded to the permanent post of Assistant Chief Foreman with effect from 1.2.1979.

Demos Zoppos, from the permanent post of Foreman 1st Grade was seconded to the Temporary (Development) post of Assistant Chief Foreman with effect from 1.2.1979.

Meletios Michael, from the permanent post of Foreman 1st Grade was seconded to the Temporary (Development) post of Assistant Chief Foreman with effect from 1.2.1979.

Michael Antoniades, from the permanent post of Inspector of Works, was seconded to the temporary (Development) post of Senior Inspector of Works, with effect from 1.3.1979.

Savvas Katsianis, from the Temporary (Development) post of Inspector of Works (on second nent) was seconded to the permanent (Ordinary) post of Inspector of Works, with effect from 1.3.1979.

Georghios Pittas, from the permanent post of Technical Assistant, was seconded to temporary (Development) post of Inspector of Works, with effect from 1.3.1979.

TRANSFERS, RETIREMENTS

Transfers

Theodoros Nicolaides, Executive Engineer, Class II was transferred from Limassol to Nicosia, with effect from 5.6.1979.

Athinoulla Andreou, Technical Assistant, was transferred from Nicosia to Paphos, with effect from 13.8.1979.

Stylianos Theodorou, Technical Assistant, was transferred from Nicosia to Larnaca, with effect 29.10.1979.

Savvas Shekkeris, Clerical Assistant, G.C.S., was transferred from this Department to the Ministry of Foreign Affairs with effect from 2.1.1979.

Georghios Georghallides, Accounting Officer 3rd Grade, was transferred from this Department to the office of the Accountant-General, with effect from 1.3.1979.

Georghios Theophilou, Clerical Assistant, G.C.S., was transferred from this Department to the Ministry of Agriculture and Natural Resources, with effect from 16.4.1979.

Georghios Laoutaris, Clerical Assistant, G.C.S., was transferred to this Department from the Ministry of Agriculture and Natural Resources, with effect from 16.4.1979.

Maroulla Panaouri, Clerical Assistant, G.C.S., was transferred from this Department to the Department of Civil Aviation, with effect from 11.5.1979.

Maria Mia, Clerical Assistant G.C.S., was transferred from this Department to the Office of the Accountant General, with effect from 1.6.1979.

Antonios Hangoudes, Storeman 2nd Grade, was transferred from this Department to the Central Stores, with effect from 4.6.1979.

Savvas Gounaris, Storeman 1st Grade, was transferred to this Department from the Geological Survey Department, with effect from 28.5.1979.

Christos Toumbas, Clerical Assistant, G.C.S., was transferred from this Department to the Department of Agriculture, with effect from 13.6.1979.
Rita Moustaka, Clerical Assistant, G.C.S., was transferred from this Department to the Department of Veterinary Services with effect from 2.12.1979.

Retirements

Christos Konteatis, Director, voluntary retirement from the Government Service, with effect from 2.4.1979.
Charalambos Palantzis, Executive Engineer Class I, retirement on public interest, with effect from 2.8.1979.
Costas HjiStavrou, Assistant Chief Foreman, retired from the Government Service, with effect from 1.4.1979.
Charalambos Louca, Foreman 1st Grade, retired from the Goverment Service with effect from 31.12.1979.

SCHOLARSHIPS, DUTY ABROAD

Scholarships

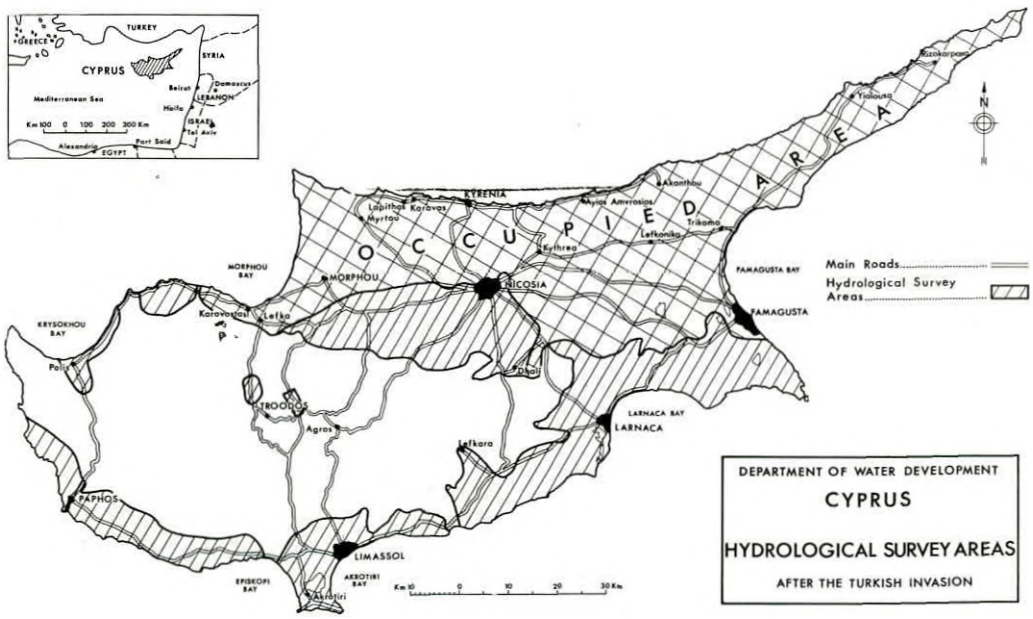
Christos Ioannou, Hydrologist Class I, who has been granted a scholarship by the Fulbright Programme in Cyprus, in Water Resources Management at the University of Idaho, U.S.A., completed his studies and was awarded the M.Sc., in Hydrology. He resumed his duties on the 16th August, 1979.

Conferences and Duty Abroad

Michalakis Peppis, Geologist Class I, attended a training course sponsored by the British Technical Cooperation Training Programme, 1978/1979, in Management of Water Resources and Industrial Training, held in London from October 1st to December 20th, 1979.
Christos Marcoullis, Senior Water Engineer, travelled to Kuwait on the 13st January 1979, for four days on official duty in connection with financing arrangement of the Vasilikos-Pendaskinos Project.
Christodoulos Artemis, Executive Engineer, Class I, participated in the Water Supply and Waste Water Disposal Course at the Economic Development Institute of the World Bank, held in Washington D.C., U.S.A. from the 12th March up to the 18th May, 1979.

Grant of leave, without Pay, to Government Employees who have Secured Temporary Employment Overseas

Kyprianos C. Hassabis, Assistant Director, who has been granted leave without pay, not on ground of public policy, from 19.12.1976, returned and resumed his duties on 30.6.1979.



II DIVISION OF WATER RESOURCES

by
D.C. Kypris
Engineer Hydrologist
Head of Division

General

During 1979 again no hydrological data could be collected by this Department in the Northern part of Cyprus, because this area amounting to 40% of the Cyprus land is for six years under the occupation of the Turkish troops. So the behaviour of both surface runoff and groundwater bodies could not be followed or recorded there during the year under examination.

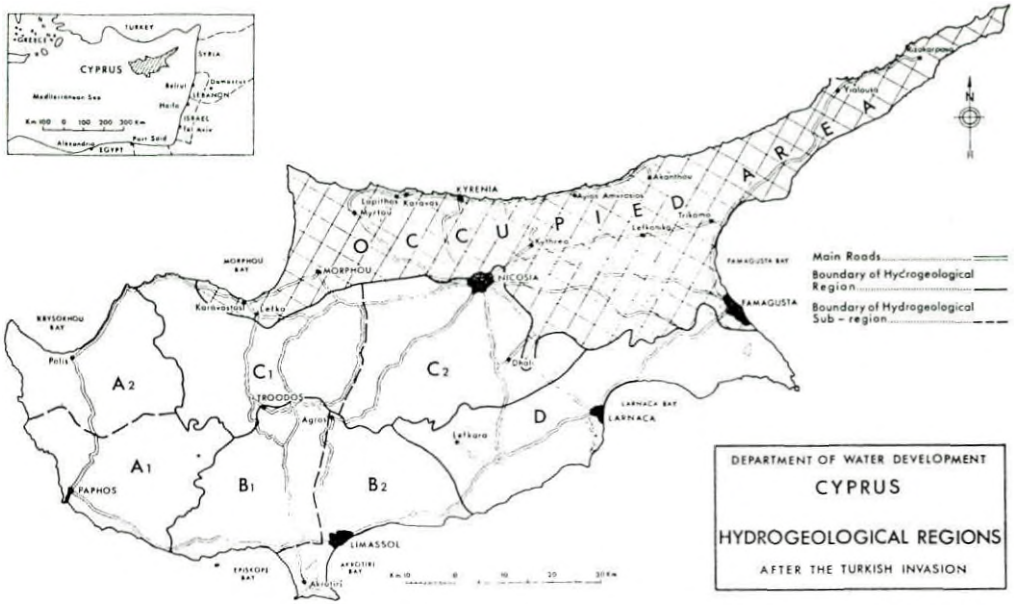
During the year, new areas have been brought under hydrological observation in addition to the reconstruction of our hydrogeological archives, which were destroyed during the events of July, 1974, or lost in the area occupied by the Turkish troops. A number of 1076 wells/boreholes and springs were plotted or replotted in an area of 147 sq. Kilometers, with their relative information recorded.

INTRODUCTION

The main tasks assigned to the Division of Water Resources are the collection and interpretation of Hydrological and Hydrogeological data, regarding both ground and surface water, to deal with the engineering geology problems as connected with the planning and execution of water projects, to carry out ancillary drilling operation and to control groundwater extraction and use.

Cyprus has been divided into eleven hydrogeological regions based on both hydrogeological and administrative criteria, which were followed for reasons of better control on the collection of hydrogeological data and hydrogeological studies, till 1974 when the Turkish invasion occurred. For the year under examination since the Turkish troops are still occupying part of Cyprus, a new arrangement is followed as on map page. 33

During 1979, D C Kypris, Engineer Hydrologist, was the Head of Division, M Peppis, Geologist, Class I, was the Assistant Head. He was also Head of the Drilling Permits and Water Control Branch. M Peppis acted also as the president of the specially formed advisory committee for the issue of well permits.



DRILLING OPERATIONS

Drilling operations for water continued this year on a small scale. One drilling rig Ruston Bucyrus 22W was engaged with which the following operations were carried out :

- Cleaning of 10 existing boreholes.
- Drilling of three boreholes one for earthing and two for irrigation purposes. Penetrated depth 75m.
- Removing pumps stuck or broken in boreholes.
- Enlarging, deepening and casing of three boreholes drilled for irrigation purposes. Penetrated depth 227m.

TEST PUMPINGS

In order that the Department will be in position to express views on the water supply sources proposed to be used for the division of land into building plots or the erection of hotels, industries or other establishments, it undertakes to carry out pumping tests the results of which are communicated to the appropriate authorities.

Pumping tests are also carried out for Government works.

During 1979, 57 test pumpings were carried out as follows:–

- 11 for division of land with total hours pumped 434
- 30 for building permits with total hours pumped 616
- 11 for irrigation divisions with total hours pumped 484
- 5 for town and village water supplies with total hours pumped 106

METEOROLOGICAL SUMMARY

As it is not possible for the Meteorological Services of the Republic of Cyprus to obtain measurements of various meteorological elements in the Northern part of the Island because of its being occupied by Turkish troops, the data given below relate to the weather experienced in the Southern part of the Island during the hydrometeorological year 1978-1979.

Precipitation

The yearly total precipitation averaged over the Southern part of the Island during the hydrometeorological year October 1978 to September 1979 was 439 mm which is 82% of normal (see diagram on page 36)

The total precipitation amounts during the period were slightly above normal over the Central Mesaoria plain and parts of eastern Troodos slopes and eastern coastal areas. Over the remaining areas they were lower than normal and ranged mainly between 70% and 90% of normal (see isohyetal map below).

Regarding the monthly distribution of precipitation, it was above normal in the months of October, May, June and August, around normal in December and lower in the remaining months.

The following table giving the incidence of rainfall during the hydrometeorological year 1978-1979, illustrates the situation (see also graphical representation on page 35).

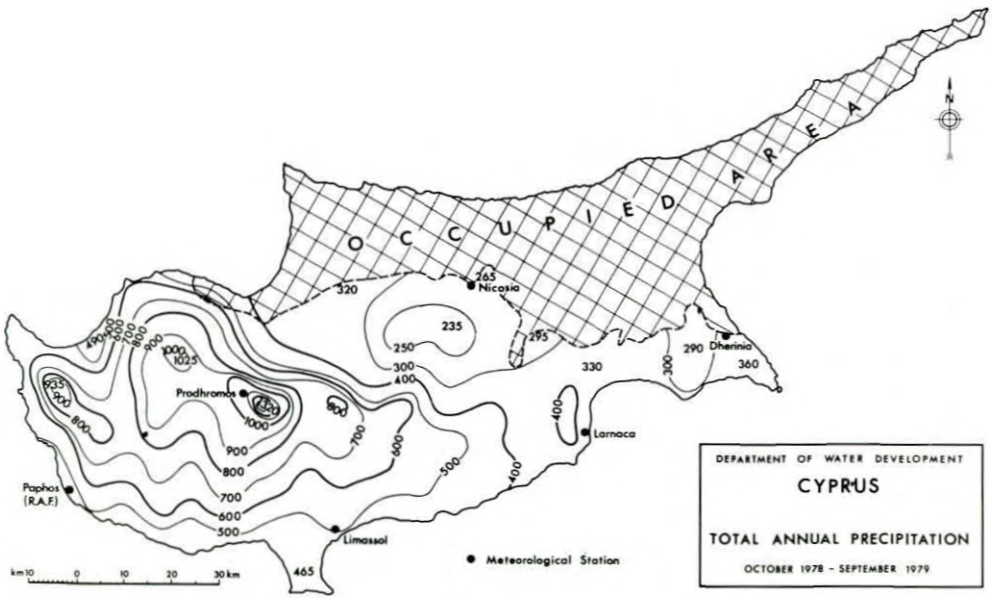
TABLE II–1

INCIDENCE OF RAINFALL DURING THE HYDROMETEOROLOGICAL YEAR 1978 1979

Months	Rainfall (in mm)	Rainfall (in inches)	Percetage of yearly total	Percentage of monthly normal
October	42.6	1.67	9.7	124
November	19.8	0.78	4.5	41
December	131.3	5.17	30.0	101
January	68.6	2.70	15.7	57
February	61.0	2.40	13.9	78
March	40.8	1.60	9.3	66
April	11.3	0.44	2.6	48
May	27.1	1.06	6.2	145
June	29.2	1.15	6.6	498
July	1.4	0.06	0.3	85
August	1.9	0.07	0.4	136
September	3.5	0.14	0.8	53
Totals	438.5	17.24	100.0	–

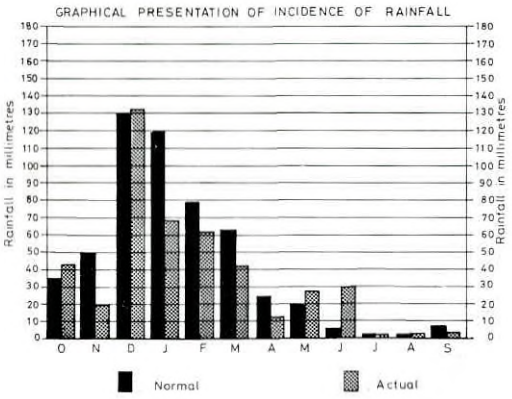
Note:– Yearly total as percentage of yearly normal:– 82%

The maximum amount of rainfall reported in a 24 - hour period during the hydrometeorological year was 104.7 mm repor-



ted by Ayios Ioannis (Malounda) on 18th May, 1979.

The first snowfall occurred on Mount Olympus on 2nd of December 1978 which is the median date for the first snowfall in Cyprus, subsequently snowfalls occurred during the ensuing months of January 1979 to April, the last of which was a slight one reported on 14th April 1979, about the median date for the last snowfall in Cyprus.



Temperature

During the hydrometeorological year 1978 - 1979 the air temperature as a whole was slightly above normal. In particular monthly mean air temperature was above normal in October, January, February, March, April, June and September, below normal in November and August; around normal in December, May and July.

Evaporation

Values of monthly evaporation in mm as measured with the use of class «A» pans during the hydrometeorological year 1978-1979 at selected stations is given on page 37.

SURFACE WATER

Permanent Stream Gauging Stations

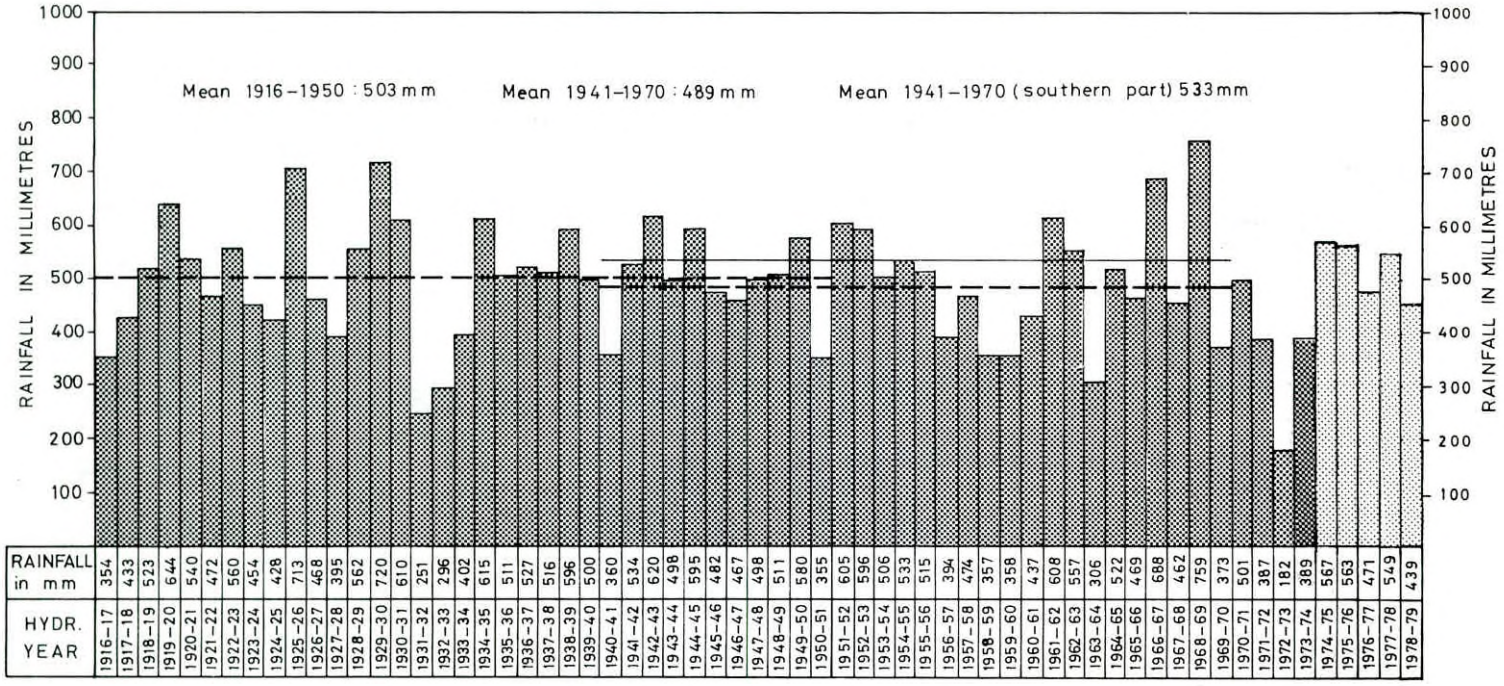
On important streams and diversion intakes for irrigation, at selected places, permanent flow gauging stations equipped with automatic water level recorders have been established for the purpose of calculating the quantity of water flowing

TABLE II–2
MAXIMA AND MINIMA OF TEMPERATURES RECORED, 1979

Station	Maximum value and date		Minimum value and date	
	°C		°C	
Nicosia	41.7	20th June and 5th July	1.2	5th January
Limassol	37.8	12th June	2.6	10th January
Larnaca Airport	38.5	16th July	1.2	10th January
Paphos*	34.6	19th June	5.4	5th January
Panayia Bridge	38.0	15th July	−1.4	10th January
Saittas	37.7	5th July	−1.5	5th January
Amiandos	31.3	22nd August	−5.6	5th January
Prodhromos	31.8	22nd August	−6.0	5th January
Stavros Psokas	37.2	21st August	−2.8	9th January
Kornos	38.6	5th July	0.5	5th January
Platania	34.5	22nd August	−5.5	5th January
Phassouri	37.0	11th June	0.5	10th January

* R.A.F.Station

ANNUAL AVERAGE RAINFALL OF CYPRUS
FROM 1916 – 1979



HYDR. YEAR	RAINFALL in mm
1916–17	354
1917–18	433
1918–19	523
1919–20	644
1920–21	540
1921–22	472
1922–23	560
1923–24	454
1924–25	428
1925–26	713
1926–27	468
1927–28	395
1928–29	562
1929–30	720
1930–31	610
1931–32	251
1932–33	296
1933–34	402
1934–35	615
1935–36	511
1936–37	527
1937–38	516
1938–39	596
1939–40	500
1940–41	360
1941–42	534
1942–43	620
1943–44	498
1944–45	595
1945–46	482
1946–47	467
1947–48	498
1948–49	511
1949–50	580
1950–51	355
1951–52	605
1952–53	596
1953–54	506
1954–55	533
1955–56	515
1956–57	394
1957–58	474
1958–59	357
1959–60	358
1960–61	437
1961–62	608
1962–63	557
1963–64	306
1964–65	522
1965–66	469
1966–67	688
1967–68	462
1968–69	759
1969–70	373
1970–71	501
1971–72	387
1972–73	182
1973–74	389
1974–75	567
1975–76	563
1976–77	471
1977–78	549
1978–79	439

Note: Annual average as from 1974–75 refers to southern part of Cyprus only

TABLE II–3
TOTAL MONTHLY EVAPORATION 1978–79

Station	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Yearly total
Nicosia	132	75	40	44	56	88	149	201	258	299	253	201	1 796
Athalassa	140	71	47	43	59	93	152	191	256	304	258	209	1 823
Saittas	121	72	31	37	68	98	158	177	219	264	236	204	1 685
Akhelia	136	112	82	73	57	85	162	190	233	253	218	194	1 795
Yermasoyia	153	88	49	52	77	108	193	202	246	281	232	193	1 874
Polemidhia	162	79	63	59	84	109	166	186	241	263	222	196	1 830
Prodhromos	132	36	32	21	54	73	130	138	193	216	217	161	1 403

through each station. All these stations have to be inspected regularly i.e. every week, fortnight or month for the purpose of checking and maintenance of equipment, change of charts, velocity measurements of flowing water with current meter for calibration purposes, etc. During the wet season the visits are more frequent for high flow measurements and sampling for suspended sediment and chemical analysis. The condition of float wells and weirs is also checked and cleaned when necessary.

Out of our 97 stations only 54 on streams and 8 on intakes could be regularly inspected because, in the northern part of the Island we have not been able to attend any flow gauging stations, due to the presence of Turkish invasion troops, still occupying almost 40% of Cyprus for the sixth year now.

The general conclusion obtained from the study of this years records of the above flow gauging stations, is that the flow at most of them was low, just because of the below normal rainfall during the current hydrological year.

The position of our flow gauging stations and the annual flow of some selected streams at selected flow gauging stations are presented in the tables that follow.

Flood Discharges

The rainfall during the hydrological year 1978-1979 was below normal. The most noteworthy floods recorded at the flow gauging stations during the same period were as follows:-

* Xeros river near Phinikas about 20m^3 per second on 25th December, 1978. Its catchment area is 218.9 km^2.

* Zyghos river near Khalassa about 15m^3 per second on 9th February, 1979. Its catchment area is 124.1 km^2.

* Peristerona river near Panayia bridge Forest Station about 23m^3 per second on 9th February, 1979. Its catchment area is 78.5 km^2.

* Akaki river near Malounda about 15m^3 per second on 7th February, 1979. Its catchment area is 92.5 km^2.

* Yialias river near Kochati about 15m^3 per second on 7th February, 1979. Its catchment area is 73.2 km^2.

* Vathys river near Athalassa about 15m^3 per second on 7th February, 1979. Its catchment area is 30.3 Km^2.

New Flow Gauging Stations

During the year under review eight new flow gauging stations were constructed.

* Syrkatis River upstream of Dhypotamos Dam site. Construction of a «V» sha-

ped structure 8 m wide, slope 1:10, 12 m long.

* Maroni River near Khirokitia station. Construction of «V» shaped structure, 5 m wide, slope 1:5, in replacement of the existing station which will be covered by the new Nicosia – Limassol road.

* Stavros – tis – Psokas River near the coast. Construction of a «V» shaped structure 10 m wide, slope 1:10.

* Magounda River on Argaka – Magounda Dam Spillway. Construction of an earth bank on the spillway of the dam 26.5 m long, 1.5 m high, for the reduction of the width of the spillway to 10 m, for more accurate recording of the overflow, and installation of a water level recorder.

* Yialias River (Paphos) on Yialias river Dam site. Construction of a «V» shaped structure 5 m wide, slope 1:5 on the existing irrigation weir.

* Livadhi River upstream of Pomos Dam. Construction of a half «V» shaped structure 5 m wide, slope 1:10.

* Mavrokremmos Tributary upstream of Pomos Dam. Construction of a «V» shaped structure 3 m wide, slope 1:5.

* Livadhi River on Pomos Dam spillway. Installation of a water level recorder on the spillway of the dam.

TABLE II–4
FLOW GAUGING STATIONS ON STREAMS

Station No	Stream	Location	Co-ordinates
1–1–3–95	Khapotami	Kissousa	VD805513
1–1–7–95	Khapotami	Kouklia	VD627383
1–2–4–95	Dhiarizos	Philousa	VD754575
1–2–7–90	Dhiarizos	Kouklia	VD601411
1–3–5–05	Xeros	Lazaridhes	VD725652
1–3–8–60	Xeros	Phinikas	VD615470
1–4–2–15	Ayia	Ayia F S	VD659712
1–4–4–50	Ezousas	Kannaviou	VD610633
1–4–9–80	Ezousas	Akhelia	VD524444
1–8–2–80	Avgas	Toxeftra (Akamas)	VD394644
2–2–3–95	Khrysokhou	Skoulli	VD497709
2–2–6–90	Stavros tis Psokas	Evretou	VD520705
2–8–3–10	Limnitis	Limnitis Sawmill	VD737822
2–9–3–40	Marathos*	Varisha	VD770872
2–9–4–90	Kambos*	Potamos tou Kambou	VD826892
3–1–3–95	Xeros*	Karavostasi	VD852889
3–2–4–95	Marathasa*	Karavostasti	VD863895
3–3–1–70	Ay. Nikolaos	Kakopetria	VD900707
3–3–2–60	Plantania	Kakopetria	VD927698
3–3–3–95	Karyotis	Evrykhou	VD906773
3–3–5–95	Karyotis*	Pendayia	VD883902
3–4–2–90	Atsas	Evrykhou	VD931810
3–5–1–50	Lagoudhera	Adhelphi Forest	WD029722
3–5–4–40	Elea	Vyzakia	WD018806
3–7–1–20	Platanistasa	Platanistasa	WD042682
3–7–1–50	Peristerona	Panayia Br. FS	WD075754
3–7–3–90	Akaki	Malounda	WD163783
3–7–5–95	Merika*	Avlona	WD093924
3–7–7–85	Skylloura*	Ay. Vasilios	WD156969
3–7–8–60	Ovgos*	Kyra	WD050964
3–7–8–65	Ovgos*	Ovgos Dam	WD034973
3–7–8–90	Ovgos*	Morphou	VD 973974
3–7–9–05	Serrakhis*	Masari Dam	WD080930
3–7–9–50	Serrakhis*	Morphou Dam	WD007948
3–8–6–50	Aloupos*	Aloupos Chiftlik	VE980018
4–2–3–70	Panagra*	Panagra	WE077119
4–4–2–50	Boghaz*	Kyrenia Road Forest	WE296077
5–2–3–50	Melini*	Ayia Trias	XE125337
5–9–4–90	Kharangas*	Boghaz (F)	WE883100
6–1–1–80	Ay. Onoufrios	Kambia	WD225735
6–1–1–85	Pedhieos	Kambia	WD224741
6–1–2–95	Pedhieos*	N'sia Railway Br.	WD319941
6–1–3–84	Makedonitissa Upper	Makedonitissa	WD283908
6–1–3–85	Makedonitissa Lower	Engomi	WD291915
6–1–4–20	Tengelis*	Kythrea	WE415010
6–1–4–50	Pedhieos*	Mia Milea	WD376958
6–1–5–50	Vathys	Athalassa	WD345867
6–1–7–15	Kephalovryso Spring*	Kythrea	WE445030
6–1–7–40	Ak Sou*	Petra tou Dhigeni	WE499001
6–5–1–85	Yialias	Kochati	WD306727
6–5–3–15	Yialias	Nisou	WD360755
6–5–3–95	Yialias*	Pyroi	WD446824
7–1–7–50	Kolopannes*	Kalopsidha	WD746842
7–2–3–50	Liopetri	U/S Liopetri Dam	WD806732
7–2–6–60	Vathys	Paralimni Lake inflow	WD895776
7–2–7–05	Paralimni Lake Outflow	Paralimni	WD892801
8–2–1–90	Aradhippou	N'sia–L'ca Road	WD517683

8–2–2–90	Aradhippou	Panayia Yematousa	WD516689
8–4–3–40	Tremithos	Ayia Anna	WD442668
8–4–5–30	Tremithos	Klavdhia	WD490615
8–4–5–40	Tremithos	Kiti Dam	WD510590
8–5–1–90	Pouzis	Mazotos	WD472518
8–7–3–60	Mylou	Kornos	WD332613
8–7–3–80	Syrkatis	Skarinou	WD343535
8–8–2–50	Maroni	Vavla	WD261558
8–8–3–30	Maroni	Khirokitia	WD317503
8–9–1–70	Akapnou	Melini	WD159577
8–9–7–50	Vasilikos	Kalavasos	WD275472
8–9–7–95	Vasilikos	Vasiliko	WD292425
9–2–3–85	Yermasoyia	Phinikaria	WD093475
9–2–4–95	Akrounda	Yermasoyia Dam U/S	WD078460
9–4–3–80	Garyllis	Polemidhia Dam U/S	VD977450
9–6–2–90	Kryos	Khalassa	VD911474
9–6–4–95	Kouris	Khalassa	VD920470
9–6–5–10	Zavos	Khandria	VD994672
9–6–5–30	Agros	Agros	WD017629
9–6–7–75	Zyghos	Khalassa	VD941471
9–8–1–95	Evdhimou	Evdhimou	VD780397

* Situated within Turkish occupied areas

TABLE II–5
FLOW GAUGING STATIONS ON IRRIGATION INTAKES

Ser No	Intake	Location	Co-ordinates
1.	Mylos	Peristerona	WD077856
2.	Astromeridhiano	Peristerona	WD078855
3.	Orounda	Orounda	WD083837
4.	Riatikon	Meniko	WD144854
5.	Afxenti	Meniko	WD152848
6.	Vathys*	Masari Dam	WD077925
7.	Avlona*	Avlona	WD091913
8.	Masari*	Masari	WD071934
9.	Kyra*	Kyra	WD057942
10.	Katakrous*	Kyra	WD053945
11.	Zavrazis*	Morphou Dam	WD023951
12.	Polemios*	Pendayia	VD885888
13.	Kritikos*	Pendayia	VD891881
14.	Nikoklia	Nikoklia	VD618433
15.	Kouklia	Kouklia	VD612419
16.	Akhelia	Akhelia	VD533449

* Situated within Turkish occupied areas

Repairs and Improvements to the Existing Flow Gauging Stations

Khapotami River near Kouklia. Alterations to the lower section of the weir by the construction of a half «V» shaped structure 10 m wide slope 1:10 and a retaining wall 10 m long.

Ezousa River near Akhelia. Alterations to the lower section of the weir by the construction of a «V» shaped structure 26 m wide slope 1:10, and river training upstream of the station.

Pyrgos River near Phlevas Saw Mill. Alterations to the lower section of the weir by reducing the width by 3 m (with metal sheet) and re-installation of a water level recorder which was removed in 1975.

TABLE II–6
DISCHARGE OF SELECTED RIVERS AS MEASURED AT SELECTED FLOW GAUGING STATIONS FOR THE YEAR 1978 - 79

Ser. No	Station	Stream	Location	Annual flow $m^3 X 10^6$
1	2–2–3–95	Khrysokhou	Skoulli	1.0
2	2–2–6–90	Stavros–tis–Psokas	Evretou	2.5
3	2–8–3–10	Limnitis	Saw Mill	7.8
4	3–3–1–70	Ay. Nikolaos	Kakopetria	8.3
5	3–3–3–95	Karyotis	Evrykhou	7.5
6	3–5–4–40	Elea	Vizakia	2.4
7	3–7–1–50	Peristerona	Panayia Br.	8.6
8	6–1–1–80	Ay. Onoufrios	Kambia	1.3
9	6–1–1–85	Pedhieos	Kambia	2.6
10	6–5–3–15	Yialias	Nisou	1.8
11	8–4–3–40	Tremithos	Ayia Anna	o.6
12	8–8–3–30	Maroni	Khirokitia	0.9
13	8–9–7–50	Vasilikos	Kalavasos	3.4

Inflow of water in Dams

During 1979 a number, out of 48, most important dams in Cyprus which were in previous years under regular observation, could not be attended, as being in the northern part of Cyprus, under occupation by the Turkish troops.

The water accumulated in 31 dams which were under regular observations was satisfactory being in volume at its maximum 27.25 MCM, or 63.4% of the total capacity of these dams, being 43.01 MCM.

During this year 18 dams overflowed most of which during January, whilst in the case of 3 dams of Larnaca and Famagusta Disricts the maximum accumulation was1.1% of their capacity.

Analytically the situation is shown on table II—7 on page 40.

TABLE II–7

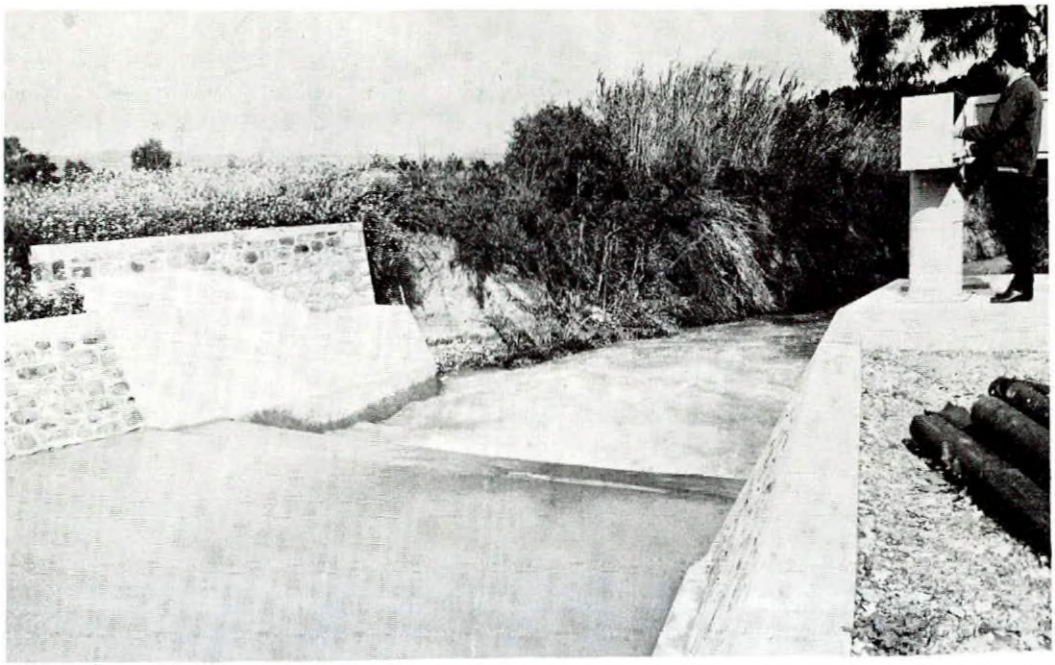
VOLUME OF WATER ACCUMULATED AND COMMENCING DATE OF INFLOW FOR VARIOUS DAMS DURING THE YEAR 1979

Ser. No.	Dam	Capacity $10^3 \times m^3$	Inflow commencing date (1979)	Maximum Volume acumulated $10^3 \times m^3$	Date of maximum accumulation (1979)	Minimum Volume accumulated $10^3 \times m^3$	Date of minimum accumulation (1979)	Remarks
1.	Agros	72	January	42	June	15	October	
2.	Agrounda	22	January	22	January	Empty	September	Overflowed
3.	Arakapas	130	January	130	January	Empty	October	Overflowed
4.	Argaka	1 150	January	1 150	February	216	November	Overflowed
5.	Athalassa	790	January	241	February	29	October	
6.	Ay. Marina	300	January	221	April	37	October	
7.	Kalo Khorio	81	January	81	January	Empty	September	Overflowed
8.	Kalopanayiotis	390	January	390	March	86	October	Overflowed (Gate closed 16.2.79)
9.	Kandou	38	January	26	May	9	October	
10.	Kiti	1 500	February	330	December	Empty	June	
11.	Kyperounda	60	January	60	March	Empty	November	Overflowed
12.	Lefka (Marathasa)	360	January	360	Janauary	132	October	Overflowed
13.	Lefka (Kafizes)	110	January	110	Janauary	25	October	Overflowed
14.	Lefkara	14 000	January	5 403	April	2 781	December	
15.	Liopetri	340	–	–	–	–	–	No inflow in 79
16.	Lymbia	220	January	220	February	137	October	Overflowed
17.	Lythrodhonda Upper	32	January	32	January	Empty	August	Overflowed

TABLE II–7

VOLUME OF WATER ACCUMULATED AND COMMENCING DATE OF INFLOW FOR VARIOUS DAMS DURING THE YEAR 1979.(Continued)

Ser. No.	Dam	Capacity $10^3 \times m^3$	Inflow commencing date (1979)	Maximum Volume acumulated $10^3 \times m^3$	Date of maximum accumulation (1979)	Minimum Volume accumulated $10^3 \times m^3$	Date of minimum accumulation (1979)	Remarks
18.	Lythrodhonda Lower	32	January	32	February	8	November	Overflowed
19.	Mavrokolymbos	2 200	January	338	March	90	June	
20.	Ormidhia (Vathys) . .	100	–	–	–	–	–	No inflow in 79
21.	Palekhori (Kambi) .	640	January	640	February	15	October	Overflowed
22.	Paralimni Lake	1 365	February	20	February	Empty	February	
23.	Perapedhi	55	January	55	January	Empty	October	Overflowed
24.	Petra Upper	22	January	22	January	Empty	July	Overflowed
25.	Petra Lower	32	January	32	January	Empty	September	Overflowed
26.	Pomos	860	January	682	April	18	October	
27.	Polemidhia	3 400	January	1 945	March	460	November	
28.	Prodhromos	110	January	70	February	Empty	October	
29.	Pyrgos	270	January	270	January	15	October	Overflowed
30.	Trimiklini	330	January	330	April	18	September	Overflowed (Gate closed 5.3.79)
31.	Yermasoyia	14 000	January	14 000	February	5 650	December	Overflowed



Measuring weir on the Khrysokhou river built in 1979 and equipped with an automatic water level recorder. It is the third measuring weir to be built on this river and is situated very near the sea, north of Polis village. The other two measuring weirs were built in 1956 just upstream of the confluence of Stavros tis Psokas tributary and Khrysokhou main respectively.

Spring discharges

Most of the springs and minor streams are gauged on a routine basis while a number of them are gauged for a short period after the request of another division of the Department.

During the hydrological year 1978-79, 2,430 springs and minor stream ı discharges were taken on 205 springs and minor streams 1,080 discharges were taken on 90 springs which are under regular monthly observations and 1,450 discharges were taken on 115 springs and minor streams for a certain period at various intervals.

As the precipitation during the hydrological year under review was below normal most of the springs had a below normal flow throughout the whole year.

GROUND WATER HYDROLOGICAL WORK

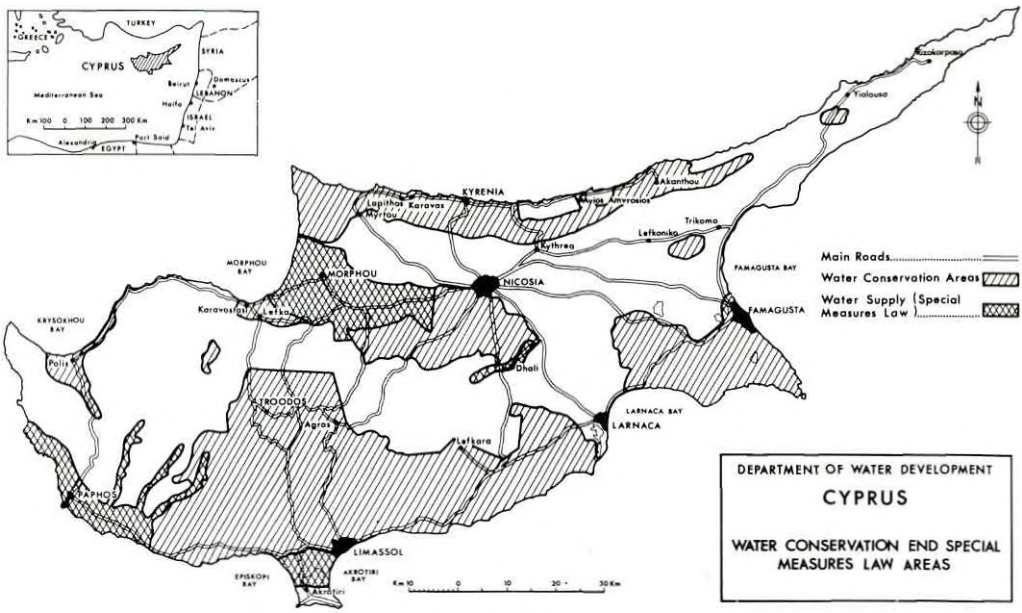
Hydrological surveys of the ground water bearing systems were carried out on small scale by this Department before 1960. Since then, they were rapidly amounting in scale until the most important known aquifer systems were brought in a few years time under Hydrological Observation. It is unfortunate that most of our maps with the well location and other information were destroyed by fire, during the events of 1974, or lost in the area occupied by the Turkish troops. So, during the year under review, the plotting of boreholes/wells and the collection of other hydrological information continued in the free areas, where hydrological work was being carried out before. The area

during the current year where such work has been carried out was 2540 km² (see map on page 31

The springs, wells/BHs which were on register at the end of 1979 were 21668.

tored twice during 1979 is 1372 and every month or fortnight 370.

For the purpose of establishing the quantity of water pumped from our aquifers a questioning program is carried out once a



Through the Hydrological Surveys all wells/boreholes, springs and chain-of-wells are registered and plotted on maps. A dense network of observation boreholes, is being levelled. Through these observation boreholes/wells, the water level is being measured twice a year, at the end of the dry season (November), when it is expected to be at lowest and at the end of the wet season (March), when it is expected to be at highest level. In areas where more detailed information is necessary, a network has been established of observation boreholes where monthly or bimonthly measurements are taken. The number of observation boreholes monitored twice during 1979 is 1372 and every month or fortnight 370.

For the purpose of establishing the quantity of water pumped from our aquifers a questioning program is carried out once a year, through which information from our farmers is sought as regards the extent and type of plantations, the irrigation system used and other relative information from which the amount of water used is determined, cross checked wherever possible from water meter readings, or electricity meter readings and pump output. It has been established through questioning that during 1979 9332 wells/boreholes and springs were in use.

Out of a large portion of the above network of wells and boreholes, water samples are obtained twice a year (November and March), for chemical analysis to evaluate the trends of any quality change of

the water in each aquifer. During 1979 the number of groundwater samples from observation boreholes analysed for Cl was 1300.

As regards the groundwater situation, there was no improvement. On the contrary due to the low rainfall the situation became grave especially in the Kokkinokhoria and Yalias areas. In the other aquifers the water table fell as well. Details may be seen in the following table of selected observation boreholes.

CONTROL AND CONSERVATION OF GROUND WATER

The Advisory Committee for the issue of well permits established by the Ministry of Agriculture and Natural Recourses operated this year with M. Peppis, as president, on behalf of the Director of Water Development Department. Representatives of the Directors of Geological Survey and Agricultural Departments are members of this committee, whose task is to advise the Director of Water Development Department on matters related to well sinking permits. At the meetings, the Legal Advisor of this Department, Ch. Kyriakides and the District Engineer of the district where applications were to be examined, participated.

The committee performed during 1979, 36 meetings and examined 1977 applications sent to the Director, WDD by the District Officers, as follows:-

Water Supply (Special Measures) Law areas	36
Water Conservation areas	1685
Non Water Conservation areas	256

Water Conservation Areas (Wells Law Cap 351)

An area is declared as a Water Conservation Area, when the exploitation of its water resources is such, that it may affect the quantity or quality of the water of that area.

On map on page **43** the areas which have been declared as "Water Conservation Areas" under the wells Law Cap 351 are shown. Particulars of these areas are also shown on the following table.

Applications for well permits falling within a Water Conservation Area, are being sent by the District Officers to the Water Development Department for technical advice and recommendations. These recommendations which are based on the knowledge of the existing water situation of each aquifer, the development in the area and the existence of other wells or boreholes, chain-of-wells and springs, as well as any other Government water works are mandatory to the District Officer.

Water Supply (Special Measures) Law 32/64

The major aquifers of Western Mesaoria and Akrotiri Peninsula, which were declared as water conservation areas in the past, have been covered by the water supply (Special Measures) Law, since 1965, whose purpose is to further and more efficiently protect and control the water resources. The Paphos coastal area and the Paphos Major river valleys, which will be covered by the Paphos Irrigation Project, have also been covered by that Law in 1974 and 1975.

The areas covered by this Law are shown on map page **43** and particulars given in the table below.

For the above areas :-

the District Officer, with the concurrence of the Director of Water Development Department, can withdraw any permit for any well or can apply any modifications on the extraction of water as required.

TABLE II–8

SELECTED OBSERVATION BOREHOLES

Ser. No.	Hydr. No.	Village	March 1978	Nov. 1978	March 1979	Nov. 1979	Water level increase (+) or decrease (–) March 78–79	Nov. 78–79
56/56	192	Liopetri	–0.22	–0.02	+0.95	+0.38	+1.17	+0.40
20/63	1 516	Paralimni	+19.93	–19.73	+19.68	+19.38	–0.25	–0.35
22/63	1 518	"	+5.97	+5.97	+5.96	+5.80	–0.01	-0.17
51/51	774	Phrenaros	+5.42	+3.95	+4.49	+3.47	–0.93	–0.48
79/56	975	"	+8.08	+8.04	+8.18	+8.21	+0.10	+0.17
88/54	24	Kolossi	+3.15	+0.70	+2.60	–0.45	–0.55	–1.15
51/63	813	Limassol	+1.28	+0.90	+1.13	+0.78	–0.15	–0.12
45/63	811	Zakaki	+1.08	+0.58	+0.86	+0.38	–0.22	–0.20
107/61	17	Yermasoyia	+16.18	+2.18	+8.13	+1.18	–8.05	–1.00
108/59	8	"	+35.75	+17.85	+30.00	+16.65*	–5.75	–1.20
7/60	22	"	+7.28	+0.81	+1.48	+0.28	–5.80	–0.53
134/59	27	"	+13.78	+0.46	+5.81	+0.76	–7.97	–0.70
161/50	180	K. Trimithia	+187.53	+187.34	+187.35	+187.34	–0.18	0.00
160/50	222	"	+195.27	+194.35	+194.83	+194.25	–0.44	–0.10
125/60	15	Episkopi	+30.01	+19.86	+26.19	+17.36	–3.82	–2.50
EB94/70	1 236	Akrotiri	+2.11	+0.22	+1.66	–0.29	-0.55	–0.51

* Measurement of December 1979.

* On the permits which are renewed yearly, conditions are imposed regarding the quantity of water to be extracted, the method of extraction, the area to be irrigated the measurement of water, the conveyance of water and the utilization of water.

The areas covered by this Law are shown on map page 43 and particulars given in the table on page 47.

Water Meters

The preservation of the aquifers through the close control of the groundwater extraction and use, which is the object of the declaration of an area under the provisions of the Water Supply (Special Measures) Law, cannot be effected without metering the water pumped from each borehole or well.

According to the provisions of the above referred law, water meters should be installed in the Water Supply (Special Measures) Law areas. Information about the installation and operation of water meters are not available for Western Mesaoria area, since this area is still under Turkish occupation. For Paphos area the Law has not yet been enforced. In Limassol–Akrotiri area 400 water meters have been installed of which 290 in continuous operation. The total volume of water recorded is 11.1MCM. During the year 165 illegal pumpings have been reported to the District Officer, out of which 58 were presented to Court.

Private Drillers (Wells Law, Section 36)

According to the above law, no one is allowed to operate a drilling rig without

TABLE II–9 **WATER CONSERVATION AREAS**

Ser. No	Water Conservation Area	Order No	Date	Gazette No	Date
1	Kokkinotrimithia–Ayii Trimithias, Paleometokho, Mammari	556	31.10.51	3 584	31.10.51
2	Nicosia	556	31.10.51	3 584	31.10.51
3	Tersephanou – Klavdhia	376	18. 8.52	3 639	27. 8.52
4	Laxia	374	18. 8.52	3 639	27. 8.52
5	F'sta, Phrenaros, Paralimni Ormidhia, Xylotympou, Kouklia, Avgorou, Pergamos, etc	164	3. 3.56	3 924	8. 3.56
6	Akrotiri, Phasouri, etc	165	3. 3.56	3 924	8. 3.56
7	Morphou, Syrianokhori, Prastio, Nikitas, Elea, Pendayia	1 052	30.10.56	3 995	8.11.56
8	Dhali, Potamia	1 194	29.11.56	4 008	6.12.56
9	Ayios Andronikos, etc	916	26. 9.57	4 081	3.10.57
10	Morphou, Peristerona, Astromeritis, Akaki, etc	314	3. 5.58	4 133	15. 5.58
11	Vasilia, Lapithos, Kyrenia, Ayios Epiktitos, etc.	245	28. 4.59	4 228	30. 4.59
12	Makedhonitissa, etc	544	16.11.59	4 277	26.11.59
13	Moni Pyrgos	226	27. 7.61	75	27. 7.61
14	Yermasoyia	443	8.12.61	112	8.12.61
15	Dhiorios (Djipi Loc.)	324	21. 6.62	163	21. 6.62
16	Yialia, Ayia Marina, Argaka, Polis	359	7. 7.62	168	7. 7.62
17	Yialias River (Potamia, Dhali, Nisou, Mathiati)	189	25. 4.63	245	25. 4.63
18	Kiti, Perivolia, Meneou, Dhromolaxia	50	28. 1.65	384	28. 1.65
19	Kouklia, Anarita, Timi, Akhelia	529	26. 8.65	435	26. 8.65
20	Lapathos, Gypsos	545	9. 9.65	438	9. 9.65
21	Moni (Extension)	642	14.10.65	444	14.10.65
22	Lakatamia, Dheftera, Anayia, Pera etc.	744	21.11.65	453	25.11.63
23	Ayia Erini	280	19. 5.66	499	2. 6.66
24	Paramali, Evdhimou	S.B.A. 68	29. 7.67	S.B.A. 212	29. 7.67
25	Lysi, Kondea	776	7. 9.67	599	22. 9.67
26	Akanthou	777	7. 9.67	599	22. 9.67
27	Pergamos (Extension)	889	19.10.67	606	3.11.67
28	Ayios Amvrosios	890	19.10.67	606	3.11.67
29	Kyrenia Range Limestone Mass	817	7.11.68	693	22.11.68
30	Vasilikos, Xeropotamos	862	28.11.68	697	13.12.68
31	Yeroskipos, Konia, Ktima, Peyia	741	4. 9.69	748	19. 9.69
32	Karavostasi, Peristeronari	50	29.12.69	771	16. 1.70
33	Yeri	75	8. 1.70	773	23. 1.70
34	Neokhorio, Androlikou	845	14.10.71	904	29.10.71
35	Yiolou, Loukrounou, Skoulli	845	14.10.71	904	29.10.71
36	Pissouri, Evdhimou	576	10. 8.72	958	25. 8.72
37	**Kormakitis,** Myrtou, Dhiorios	851	7.12.72	979	15.12.72
38	Akanthou (Extension)	288	15.11.73	1 054	30.11.73
39	Ayios Ioannis (Malounda)	307	25.11.74	1 158	25.11.74
40	Kambos Chakistra	–	–	1 180	4. 4.75
41	Parekklisha	206	23.10.75	1 233	7.11.75
42	L'ssol–Paphos– L'ca Extension of W Con Areas	215	30. 9.77	1 429	3. 3.78

TABLE II–10 WATER SUPPLY (SPECIAL MEASURES) LAW AREAS

Ser No	Area	Order No	Date	Gazette No	Date
1	Western Mesaoria (Pendayia–Morphou–K'trimithia)	–	–	331	9. 7.64
2	Akrotiri peninsula..	–	–	331	9. 7.64
3	South–Eastern Mesaoria (F'sta–Paralimni–Ormidhia–Akhna), later withdrawn	–	–	331	9. 7.64
4	Potami	89	12. 2.66	479	24. 2.66
5	Dhiarizos River	196	23. 5.74	1 104	21. 6.74
6	Xeropotamos River	196	23. 5.74	1 104	21. 6.74
7	Ezousas River	196	23. 5.74	1 104	21. 6.74
8	Peyia–Aspros River (Ext. of Yeroskipos–Peyia W C A West of Peyia village)	196	23. 5.74	1 104	21. 6.74
9	Mavrokolymbos River (Ext. of Yeroskipos–Peyia W C A)	196	23. 5.74	1 104	21. 6.74
10	Kouklia–Paphos–Peyia	111	6. 6.75	1 193	6. 6.75
11	Nisou–Potamia valley	274	15.12.78	1 488	15.12.78

a Driller's licence. Such a licence is issued by the Director of the Water Development Department, after the interested person to become a Driller applies for it and when the Director of the Department is satisfied that the applicant is competent to carry out such a job. A fee is paid for the licence and each year for its renewal.

According to the same law, every driller has to notify the Director of the Water Development Department of his intention to drill a borehole, to keep samples from the rocks penetrated and sent to the above said Director, together with a technical report on each borehole drilled.

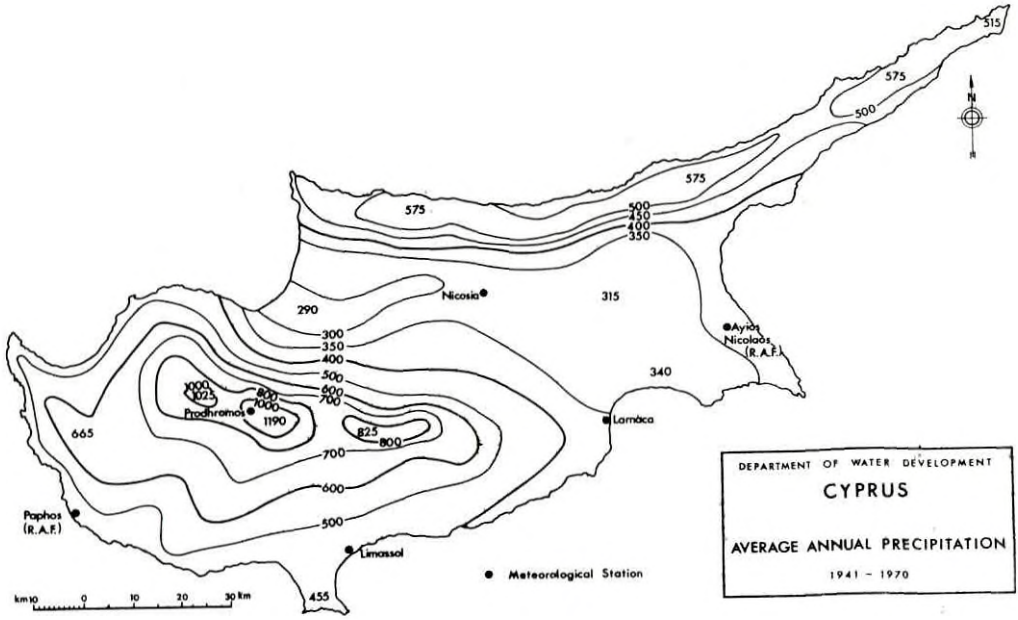
During 1979, this Department issued 3 drillers licences and renewed 36 others. The number of private drilling rigs which drilled for water during 1979, was 59 and this Department has been notified about the drilling or cleaning of 170 boreholes. Information from private drillers has been received by this Department for 88 boreholes.

During 1979, 27 private Drillers were reported to the District Officers for illegal drilling.

WATER QUALITY

Chemical Analyses

During the year, 584 samples of water were sent to the Government Analyst and 1239 to the WDD Laboratory for chemical analysis. Out of these, 649 samples were taken from springs, wells or boreholes,



which are used or proposed as water supply sources. The remaining 1174 samples were taken from rivers, springs, observation boreholes and other miscellaneous sources.

In addition to the above, 1300 samples of water taken from observation boreholes in the hydrological survey areas, were analysed by the Water Resources Division for chloride content.

Bacteriological Analyses

During the year, 400 samples were sent to the Pathological Laboratory for bacteriological analysis with results as follows:-

Water Supply	No. of samples	Unsat. samples
Nicosia	90	32
Limassol	152	35
Larnaca	158	20
Total	400	87

The unsatisfactory samples at Nicosia, Limassol and Larnaca were of unchlorinated water. All chlorinated samples at main reservoirs were highly satisfactory.

Suspended Sediment Analyses

In view of the future construction of large dams in Cyprus and the problem arising from reservoir sedimentation, the sediment sampling programme was continued. Though not very intensive, the programme provided for sampling during routine visits to the flow gauging stations and additional sampling during floods in as many rivers as possible.

During the year, 132 samples of river water were taken for suspended sediment analyses.

TABLE II–11

APPLICATIONS EXAMINED AND LOANS ISSUED FOR THE REACTIVATION OF TURKISH CYPRIOT WELLS ABANDONED BY THEIR OWNERS

Particulars	Nicosia	Limassol	Larnaca	Paphos	Totals
Applications approved (Number)	–	–	7	6	13
Wells/boreholes allocated (Number)	–	–	7	6	13
Farmers benefited (Number)	–	–	10	9	19
Area to be irrigated (Donums)	–	–	70	93	163
Loans granted (Number)	–	–	4	6	10
Loans granted (Pounds £)	–	–	3 370	6 275	9 645
Loans issued (Pounds £)	–	–	2 370	770	3 140
T/C pumping plant allowed to be used (Number)	–	–	–	–	–
Estimated value of T/C pumping plants (Pounds £)	–	–	–	–	–
Amortization rate (Pounds £/Year)	–	–	–	–	–

CENTRAL COMMITTEE FOR THE ISSUE OF LOANS AND THE REACTIVATION OF TURKISH CYPRIOT OWNED WELLS

The Council of Ministers, at its meeting of the 19th February, 1976 — Decision No. 14694 — decided the establishment of the above said Committee. The terms of reference of the committee are to accept and examine applications from Greek Cypriot displaced farmers to use wells/boreholes abandoned by their Turkish - Cypriot owners and to grant loans for the purchase, repair and installation of pumping plants and pipelines for the irrigation of abandoned fields of Turkish Cypriot ownership. For this purpose, the Government placed at the disposal of the Committee, the sum of £457,500 for the above said loans.

According to the above said decision of the Council of Ministers, the Committee is presided by the Director-General, Ministry of Agriculture and Natural Resources, who transferred the chairmanship to the Director Water Development Department.

Other members are the Director-General, Ministry of Interior, the Director-General, Ministry of Finance, the Director-General, Planning Bureau, the Commissioner for Co-operative Development, the Director, Department of Agriculture and the representatives of the Ministry of Agriculture and Natural Resources at the District Committees for the protection of Turkish Cypriot properties, or their representatives.

The committee convened at its first session 27th March, 1976, and at the beginning, the rules and procedures have been decided upon which it would function.

Accordingly special application forms have been prepared, obtainable from the District Offices of the Water Development Department, which displaced farmers could fill when applying to be granted a loan to purchase and install pumping plant and pipelines and /or permission to utilise existing pumping equipment on the specific well/borehole for which application was made. The applications which in most

cases are from groups of farmers at the first stage are examined by the District Officer and the District Agricultural Officer. When the applicant or applicants are lawful tenants of abandoned by their owners Turkish Cypriot fields, leased to them by the Central Committee for the protection of Turkish Cypriot Property - the District Engineer transmits the application with suggestions as to which fields may be irrigated from the same boreholes or group of boreholes accompanied by an irrigation scheme, where necessary, with estimated cost, to the Committee which decides as to the kind of equipment to be installed, the amount of water to be pumped, the fields to be irrigated and the loan to be granted.

The decisions of the Committee are then notified to the Loan Commissioner who releases the proper amount so that it may be distributed by the local cooperative Banks to the interested farmers. In case of groups of farmers the loan remains in the hands of the local cooperative Banks which undertake to purchase, install and run the pumping plant and to deliver water for irrigation to the interested farmers, who sign an agreement for the repayment of loan and the running expense as well.

The repayment period for the loans has been set to seven years with an interest of 4.5%.

When part or the whole pumping unit of Turkish Cypriot owneship exists on the borehole/well, a loan may be granted for the purchase of what is missing and the value of the existing equipment with its anticipated life is calculated. Taking into account these parameters and after subtracting the residual value which the pumping plant is expected to have after a maximum of eleven years or at the end of its expected life, an amortization rate is calculated which has to be repaid every year by the involved farmer or farmers.

From its establishment the Central Committee for the issue of loans and the reactivation of Turkish Cypriot owned wells/boreholes had 51 meetings during which it approved 419 applications from 1213 displaced farmers for the irrigation of 11851 donums of land. The amount of loans granted by the end of this year was £350,959 and the pumping plant of Turkish Cypriot ownership to £42,190.

During the year under examination, the Committee had 4 meetings during which it approved 13 applications from 19 farmers for the irrigation of 113 donums of land. The amount of loans granted is £3,140 and the value of pumping plants of Turkish Cypriot ownership to £300.

Details are given on Table II—11 on page 49.

SPECIAL STUDIES

Use of computer techniques for the storage and retrieval of hydrological and hydrogeological data

Work was initiated in 1975 for storing and retrieving our hydrological and hydrogeological data in a computer readable form. The purpose and scope was given in the 1975 Annual Report of this Department.

Work continued since then, although at small paces due to the lack of enough personnel to devote fully its time on this job and the progress made each year was presented in summary in the annual reports of the Department.

This year contacts were made with the Federal Institute for Geosciences and Natural Resources, Hannover, Federal Republic of Germany, through the German working group on water and soils in Cyprus, with the purpose of utilizing their experience in the discussed sub-

ject. Unfortunately the experience gained by the institute was not extending to surface waters.

Another effort was then directed to the Natural Environment Research Council of U.K. for securing people that worked with a computerized filing system known as GEXEC for assisting us to apply the system on our own data. Unfortunately again the problem remains because due to financial restrictions on behalf of U.K. Government no assistance could be offered to us by the above said agency.

Research carried out in cooperation with the Institute of Geological Sciences (London)

The project which started in 1977 with the objective of finding the effect of rainfall on recharge by means of lysimeters entered its third year.

The research is being carried out in association with the IGS which is providing both financial and technical assistance.

Further to the $100m^2$ Lysimeter which was constructed in situ at the Paralimni site for the evaluation of the rainfall recharge an additional one of similar size was constructed at the same locality. The new lysimeter is to be cultivated with crops normally planted in the area (potatoes and vegetables) and irrigated with similar irrigation systems currently being used in the area for the purpose of assessing the return flow to the aquifer from irrigation. By September, the lysimeter was planted with potatoes and irrigated with furrows for the second experiment.

Already a large amount of information has been gathered which is being evaluated regarding the recharge from rainfall. This, along with data on return flow will be used in the water balance studies of local aquifers and aquifers of similar conditions. J. Jacovides, Hydrologist is working on this project with Dr. R. Kitching of the IGS (London).

Pitsilia Project

Measurements are taken from all springs and wells situated at a distance of about 1000 feet from boreholes drilled by Government for the above Project.

It covers 30 villages most of them under Pitsilia Project and quite a few in Troodos — Marathasa area.

Regular flow or water level measurements were taken twice a year from 285 springs or weirs and 85 wells and monthly measurements from 45 boreholes.

Observations every one or two weeks on boreholes, springs or wells situated close to boreholes at the villages of Polystipos, Pelendria, Kato Mylos, Ayios Ioannis, Agros, Potamitissa, Louvaras, Arakapas and Kalokhorio which have been or were proposed to be extensively tested.

A total of 2,630 measurements were taken during 1979 as follows :—

Flow measurements from 285 springs or weirs	570
Static Water Level from 130 boreholes of wells	710
Measurements of springs, weirs and wells in the vicinity of the test pumped boreholes at the above villages	1310

III DIVISION OF PLANNING

by
Dr C A Christodoulou
Senior Water Engineer
Head of Division

INTRODUCTION

The Planning Division of the Water Development Department consists of the following two branches:

* *Reconnaissance and Feasibility Reporting*
* *Investigations and Laboratories*

RECONNAISSANCE AND FEASIBILITY REPORTING BRANCH

SOUTHERN CONVEYOR PROJECT

General

As originally proposed the Southern Conveyor Project (SCP) will cover an area beginning west of Limassol and extending to the Kokkinokhoria area. Its main objective is the optimum utilization of the surface and groundwater resources of the area, which is to be achieved by linking together all the significant sources of water with all the main areas of water use.

The project would provide enough water to satisfy the domestic and industrial needs of the towns of Limassol, Larnaca and Nicosia up to year 2010 and at the same time provide water for the irrigation of around 55,000 donums of land.

The project is carried out in cooperation with the Land Resources Development Centre (LRDC) of the U.K. Ministry of Overseas Development which has provided the Water Development Department (WDD) with the Project Manager as well as three experts to augment the local team.

The SCP study will be carried out in two stages; during the first stage different development options would be identified and their economic viability would be appraised. During the second stage a detailed feasibility study would be carried out of the option which the Government will choose on the basis of the findings of Stage 1.

HYDROLOGY

The revision of the surface hydrology which started in 1978 continued during the year. Besides the Lazaridhes and Phinikas gauging sites on Xeropotamos river and the runoff at Philousa, the proposed

diversion point on Dhiarizos river, the hydrology of the following rivers was revised:

* Ezousas river at Kannaviou, Pitargou and Akhelia
* Dhiarizos at Kouklia weir
* Khapotami river at Kissousa and Kouklia
* Kouris river at Zyghos, Kryos and Kouris at Khalassa
* Maroni river at Vavla and Khirokitia

The calibration of the Mero rainfall-runoff model for the above river gauging sites was done by using the observed runoff for the period of 1970 to 1977. Simulation of the runoff on mean daily basis was made for the period of 1916 to 1977 using the observed rainfall during this period.

Besides the above, the basic data for Vasilikos river at Kalavasos and at the coast has been prepared.

The departmental report H/47 titled "The Runoff and Divertible Quantities of the South West Paphos Rivers" has been issued in May 1979.

Also, in view of the revised Xeropotamos hydrology, the presently considered future demand on the Paphos Irrigation Project and the diversion of part of the flow of Dhiarizos by the SCP, the operation of the Paphos Project was reviewed. A study on the conjunctive use of the Asprokremmos reservoir and the Ezousas and Dhiarizos wellfield was done in the latter part of the year and the following report no. H/48 was issued:

"Operation of the Asprokremmos Reservoir Conjunctively with the Dhiarizos and Ezousas Wellfields."

In the future, the hydrology of Garyllis, Yermasoyia and Pendaskinos rivers is also expected to be revised for the purposes of the SCP.

HYDROGEOLOGY

In the field of hydrogeology the collection and processing of information continued for the three major aquifers that fall within the SCP area, the Kokkinokhoria, Kiti-Perivolia and Akrotiri.

This information consisted of monthly water levels, questioning of farmers to determine the amounts of extracted water per month, running of pumping-tests for determining aquifer characteristics etc.

The Kokkinokhoria groundwater was model calibrated for the period of June 1978 to May 1979 and the water balance was determined. The 172 Km^2 aquifer is being overpumped by some 75 per cent of the annual replenishment for a number of years.

The model was successfully calibrated with some 60 per cent of the simulated water levels falling within ± 1.5 m of the observed. This will be improved in the future with additional data.

The intended purpose of the mathematical groundwater models is to enable the Project to forecast the "no-project" situation in the future and also to provide comparative figures from the simulation of different alternative management proposals that the SCP might like to examine. All the work is done by digital computer.

The Kiti-Perivolia groundwater model has also been calibrated for the period of June 1978 to May 1979. The area studied has a 30 km^2 extent and the indications here are also that the system is being overpumped. This aquifer, although still of some local importance, is a minor one compared to the Akrotiri and Kokkinokhoria aquifers.

The Akrotiri aquifer was originally modelled in 1972 for the period of 1967—72. This calibration was extended in 1979 to cover the period of 1972—77. The model will enable us to simulate several managemental alternatives that would

come up with the construction of Kouris dam and the Limassol waste water availability.

This system is quite sensitive to climatologic and management changes thus a good knowledge of how the aquifer responds is quite essential.

CIVIL ENGINEERING

During 1979 the engineering team of the SCP directed its efforts towards the following: First, to the determination of the approximate costs of (a) an open canal conveyor from Kouris dam to Kokkinokhoria area within the range 1.5. m^3/s and 2.5 m^3/s (b) a pipeline conveyor allowing gravity flow from Kouris to Kokkinokhoria area within the range of 0.3 m^3/s - 2.0 m^3/s (c) Dhiarizos to Kouris diversion, open canal conveyor and tunnel (d) pipeline conveyor allowing gravity flow from Kouris to Evdhimou-Paramali area. Second, to the preliminary design and approximate costing of the proposed Alaminos and Akhna dams for a range of sizes. Third, to the preliminary design and approximate cost estimate of the distribution network in the Kokkinokhoria, Kiti-Mazotos-Perivolia, and Evdhimou-Paramali areas. Fourth, to domestic water supply and more specifically to the determination of the projected demands of the four main cities of the island and allocation of SCP water in order to cover future deficits. Also to the determination of approximate cost estimates of the connecting pipelines required, treatment plants and pumping stations. Finally, the team involved itself with the development of a digital computer model for the SCP which simulates the operation of the system and then determines its economic viability. It also determines, through a systematic search technique the optimal sizing and timing of hydraulic structures involved.

AGRICULTURE

With the completion of soil, land use and farm surveys west of Kouris, efforts were concentrated on field operations to the east. These included soil surveys with particular emphasis on Parekklisha (1500 ha) and Kokkinokhoria (19,500 ha); identification of areas with potential for irrigation development; land use surveys; farm surveys with the objective of relating crop yields to technical inputs; and a district-by-district investigation of rates of irrigation application. An initial selection of 35 crops with potential for irrigation was reduced in the light of project demands and computer capacity. The Tropical Products Institute (UK) presented its report on the market opportunities for a range of crops and crop products in three EEC and three OPEC countries. In the light of these results, appropriate cropping patterns were devised for each project area.

A new procedure was established for calculating crop irrigation requirements taking more accurate account of effective rainfall by means of a daily soil moisture balance. Crop production functions were prepared in relation to water consumption taking account of research data in Cyprus and elsewhere, with a view to quantifying the effects of computed soil moisture deficits, on consuptive use and crop yield. The planned flexibility in irrigation demand with associated variation in crop yields, aims to ensure more effective utilization of water which, in wetter years at least, would otherwise be lost to the project. Excessively frequent soil moisture deficits can be accommodated by reducing the areas planned to be irrigated; water allocation is to be based on the relative economic returns to water from each crop.

Much of the latter quarter of the year was spent in project design, data analysis and report preparation in conjuction with the

Southern Conveyor team in the closing phases of Stage 1. Reports and maps were received from the Plant Nutrition and Soils Section of the Department of Agriculture relating to a number of surveys in the project area; from the Water Use Section, relating to on-farm irrigation application rates; and from the Department of Fisheries with recommendations for fisheries and recreational use on the reservoirs to be created by the SCP.

Consultants

Dr Brian Eavis visited the project to offer his advice on cropping patterns and the determination of crop water requirements.

AGRICULTURAL ECONOMICS

The work of the section has been directed towards providing the data necessary for the economic appraisal of the SCP contained in the computer model. In particular, work has been directed towards analysis and interpretation of the results of the farm survey conducted for the Project by the Agricultural Economics Section of the Agricultural Research Institute, and of the marketing survey conducted for the Project by the Tropical Products Institute, London. The input/output and other data provided (eg concerning labour wage, farm costs, yields, market constraints, crop prices) have been used to estimate the profitability of potential crops and appropriate cropping patterns and water application policies have also been given to the computer to help determine the viability of the overall project options.

Work has also been conducted on a number of other fronts, including assessment of the demand for domestic water for the 40 years of the Project and the valuation of this water. Much time has also been spent on consideration of the conceptual and methodological problems of comparing the "with" and "without" project situations in the analysis and treatment of these problems in the computer model.

Consultants

Dr S Carruthers visited the project to discuss project design and operation. Also J Winter (Tropical Products Institute) visited the project to present and discuss the draft marketing report prepared by the Tropical Products Institute.

KHRYSOKHOU WATERSHED IRRIGATION PROJECT

General

The Khrysokhou Watershed Irrigation Project (KWIP) became operational in March 1979; it is to be executed with the cooperation of the FAO with financial assistance from the United Nations Development Programme (UNDP).

The area of study of KWIP covers about 900 km^2 and includes Khrysokhou Bay, Akamas, Tylliria, Marathasa and the uplands in the upper Khrysokhou basin.

The main long term objectives of the Project are the optimum development of agriculture in the area through irrigation and the creation of employment.

Its shorter objective is the preparation of a feasibility report for the irrigation of between 2500 - 4500 ha of land depending on the option. This will be achieved through the construction of dam/dams, water conveyance structures, new irrigation network and land development.

The project will be carried out in two stages: (a) preliminary studies which will determine the various development options - to be completed by the summer of 1980 - and (b) the feasibility study to be completed by September 1981.

The project team consists of both local and FAO staff; During 1979 the following staff was working for the KWIP.

FAO Staff

Project Manager and consultant services, on dam irrigation engineering. Two asso-

ciated experts are expected to join the project team in early 1980.

Local Staff

2 engineers
1 hydrogeologist
2 hydrologists
1 Agronomist
6 technical assistants (4 at Polis' offices)

During 1979 significant services were also provided by the following:

Water Development Department
Geological Survey Department
Department of Agriculture
Agricultural Research Institute

Work Progress

WATER RESOURCES INVENTORY GROUP

The activities of this group were mainly centred on field work (new hydrometric network) and on the preparation of computer models for stream flow prediction.

WATER RESOURCES SYSTEMS

The main activity of this group has been the preparation of computer simulation models.

ENGINEERING

Irrigation Engineering
The assesment of present irrigation developments and techniques was the main activity of this group.

Dam Engineering

The main activities of this group were the inventory of dam sites, the assessment of existing dam engineering reports, the preparation of dam site investigations, including start of the drilling programme.

AGRONOMY

A preliminary study was carried out on population, employment and labour availability, showing that a high degree of under - employment exists in the area. Also a study of present land use was completed showing that out of a total cultivated area of 1300 ha, about 500 ha are at present under perennial or seasonal irrigation and another 600 ha under spate irrigation. A soil survey was carried out showing the existence of 5,500 ha of Class I, II and III soils in the Khrysokhou Bay area.

During 1979 the Peristerona-Akaki emergency scheme was completed conveying some 6,000 cubic meters of water per day to the capital. The 24 km long pumping main consists of 300 and 350 mm dia AC pipes. Another 6 km of 250 and 200 mm dia AC pipes connect the boreholes to the pumping main.

INVESTIGATION AND LABORATORY BRANCH

General

In 1979 the work of the Site Investigation, Laboratories and Grouting Sections of the Division of Planning, related to a number of major and more minor projects undertaken by the Department. Furthermore, at the request of other Government Departments and private organizations, a number of projects were undertaken and completed during the year.

The increased volume of work noted in the previous years, persisted in 1979 and this led to the full utilization of available machinery and personnel throughout the year.

Site investigation work performed was mainly involved with subsurface geological, foundation and construction material investigations at the feasibility and design study stages.

Departmental projects for which site investigation work was carried out were as follows:

* Paphos Irrigation Project: Asprokremmos Dam, Storage Reservoirs.
* Pitsilia Rural Development Project: Melini Pond, Vavla Pond, Arakapas Pond, Eptagonia Pond, Pharmakas Pond.
* Southern Conveyor Project: Akhna and Alaminos Terminal Storage Reservoirs, Main Western Tunnel.
* Khrysokhou Watershed Irrigation Project: Evretou Dam.
* Solea Valley Irrigation Project: Kako petria Dam.
* Lania Regional Irrigation Scheme: Dhoros-Monagri Pond.
* Larnaca Orini Scheme: Pavlias (Ayii Vavatsinias) Dam.
* Pissouri Project: Pissouri Pond.
* Paralimni Lake Project.

Site investigation or drilling work undertaken for other Departments and private organisations was of a very diverse nature and included:

* Foundation investigations for refugee housing estates at the request of the Department of Town Planning and Housing.
* Foundation investigations for the new Administration building, Limassol Port, at the request of the Ports Authority.
* Foundation investigations for the new Larnaca Hospital, at the request of the Ministry of Health.
* Subsurface geological investigations for the Tsirion stadium.
* Subsurface geological investigations for the Anatolikon Dam, at the request of the Cooperative society.
* Subsurface geological investigations for Avgas proposed damsite, at the request of the Cooperative society.
* Foundation investigations performed in two building sites at the request of Kermia and Joannou & Paraskevaides.

Following the example of previous years and for site investigations, a very close collaboration was maintained with the Engineering Geology Section and in certain cases with the Geophysical Section of the Geological Survey Department.

The work of the Laboratories Section may be distinguished into that of the main and field laboratories. In the main (soils/concrete) laboratories in Nicosia, tests were performed in connection to foundation and construction materials investigations relating to Departmental projects. Tests were also performed at the request of other Government Departments, private organizations and the Nicosia Municipality.

TABLE III–1 **1979 SITE/MATERIAL INVESTIGATIONS AND GROUTING**

Ser No	Project	Aim of Investigation	Fieldwork as Carried out	Machinery Used	Expenditure £
A	DEPARTEMENTAL PROJECTS				
1	Ayii Vavatsinias Dam (Orini Larnaca) From 2.1.1979 to 1.2.1979	Subsurface geological investigation to establish foundation conditions and permeability	Five boreholes coredrilled with core recovery and insitu permeability tests	Core Drill Flush Pump Backactor Digger Bouldozer & Traxcavator	7 100
2	Lania Regional Irrigation Scheme From 2.1.1979 to 11.5.1979	Subsurface geological investigation to establish permeability and foundation conditions	Four boreholes coredrilled for Dhoros Monagri Pond. Six trial pits for Dhoros Monagri Pond Six trial pits for a Ayios Yeoryios (Silikou)	Core Drill Flush Pump Water Tanker Backactor Digger	5 500
3	Solea Valley Project From 12.6.1979 to (15.8.1979)	Fill material investigation	Excavation of 6 No. trial pits	Backactor Digger	200
4	Asprokremmos Dam (Paphos Irrig. Project)	To establish the contact between the concrete diaphragm wall and bedrock	Twelve boreholes core drilled through the stand pipes of the diaphram wall to establish the contact between the concrete and rock	Core Drill Flush Pump	1 030
5	Melini Pond Pitsialia Rural Development Project (PIRDP) From 16.2.1979 to 18.2.1979	To establish excavation conditions and extent of weathering	Two trenches 40–50 m long and 5–6 m deep excavated	Traxcavator	200

TABLE III–1 **1979 SITE/MATERIAL INVESTIGATIONS AND GROUTING.(Continued)**

Ser No	Project	Aim of Investigation-	Fieldwork as Carried out	Machinery Used	Expenditure £
6	Pissouri Pond From 23.2.1979 to 18.3.1979	Subsurface geological investigations to establish excavation conditions and availability of fill material	Twelve trial pits and fifteen boreholes	Auger Drill Backactor Digger	700
7	Alaminos storage reservoir Southern Conveyor Project From 19.3.1979 to 6.4.1979	Subsurface gelogical investigations to establish the availability of fill meterial	Seven boreholes with disturbed/undisturbed samples	Auger Drill Core Drill	500
8	Vavla Pond (Orini–Larnaca) From 26.10.1979 to 3.11.1979	Subsurface geological investigations to establish excavation conditions	Two trenches	Traxcavator with ripper	565
9	Paralimni Lake From 5.6.1979 to 20.6.1979	Subsurface geological investigations to establish bearing capacity permeability and fluctuations of water table	Three boreholes with associated S.P.T. Testing and disturbed/ undisturbed sampling Three trial pits with sampling Installation of piezometer	Auger Drill Backactor excavator	380
10	Akhna terminal reservoir Southern Converyor Project From 13.8.1979 to 14.8.1979	Subsurface geological investigations to establish the availability of fill meaterials and the foundation conditions of the abutments of the reservoir	Two boreholes with associated S.P.T. Testing and disturbed/ undisturbed sampling Two boreholes coredrilled with pressure testing	Auger Drill Backactor Digger	830

TABLE III–1 **1979 SITE/MATERIAL INVESTIGATIONS AND GROUTING.(Continued)**

Ser No	Project	Aim of Investigation	Fieldwork as Carried out	Machinery Used	Expenditure £
11	Main western tunnel Southern Conveyor Project	Subsurface geological investigation to establish the type of rock, permeability, hardness, regarding the design of the main western tunnel	Three boreholes	Core Drill 555 Core Drill 557	5 060
12	Evretou damsite Khrysokhou Watershed Irrigation Project	Subsurface geological investigations at pre–feasibility stage in order to determine most suitable dam–axis	Two boreholes	Core Drill Flush Pump	3 400
13	Arakapas Pond (PIRDP) From 17.9.1979 to 30.9.1979	Excavation of trenches to establish the excavation condition type of rock and the possibility to use the rock for fill material	Four trenches	Traxcavator with rippers	1 010
14	Ephtagonia Pond (PIRDP) From 2.10.1979 to 11.10.1979	Excavation of trenches to establish the excavation conditions, type of rock and the possibility to use the rock for fill material	Two trenches	Traxcavator with rippers	515
15	Vavla Pond (PIRDP) From 26.10.1979 to 3.11.1979	Excavation of trenches to establish the excavation conditions, type of rock and the possibility to use the rock for fill material	Two trenches about 30 m long 7 m wide and 5 m deep	Traxcavator with rippers	510

TABLE III–1 **1979 SITE/MATERIAL INVESTIGATIONS AND GROUTING.(Continued)**

Ser No	Project	Aim of Investigation	Fieldwork as Carried out	Machinery Used	Expenditure £
16	Pharmakas Pond (PIRDP)	Excavation of one trench to establish the excavation condition, type of rock and the possibility to use the rock for fill material	One trench 20 m long, 4 m wide, 6 m deep	Boulldozer with ripper	140
B.	OTHER GOVERNMENT AND SEMI–GOVERNMENT PROJECTS				
1	Cyprus Ports Authority Administration Building Limassol From 15.5.1979 to 26.6.1979	Subsurface geological investigations to assess the foundation conditions for the proposed structures	Four boreholes, total depth 20 m with associated S.P.T. Testing and disturbed/ undisturbed sampling Installation of Piezometers	Light Percussion	1 980
2	Larnaca New Hospital From 5.6.1979 20.6.1979	Subsurface geological investigation to assess the foundation conditions	Five boreholes with associated S.P.T. testing and disturbed/ undisturbed sampling	Mobile Auger Drill	2 000
3	Kophinou - Refugee Housing Estate	Subusrface geological investigation in order to establish the extend of gypsum for foundation purposes	Four boreholes, total depth 28 m	Mobile Auger Drill	400

TABLE III–1 **1979 SITE/MATERIAL INVESTIGATIONS AND GROUTING.(Continued)**

Ser No	Project	Aim of Investigation	Fieldwork as Carried out	Machinery Used	Expenditure £
C.	PRIVATE AND BOARD PROJECTS				
1	Tsirion Stadium From 9.4. 1979 to 24.4.1979	Subsurface geological investigation to establish bearing capacities and settlements	Three boreholes with associated S.P.T. testing and disturbed/undisturbed sampling. About 30 cores were taken from the concrete structure of the stadium for testing	Auger Drill	1 040
2	Anatolikon Dam – Co–operative Society From 25.4.1979 to 29.5.1979	Subsurface geological investigation through existing embankment	Three boreholes through the already built embankment with associated S.P.T. testing and disturbed/ undistrubed sampling	Auger Drill Flush Pump	2 000
3	Avgas Dam Co–Operative Society From 2.7.1979 to 21.8.1979	Subsurface geological investigation to establish foundation conditions	Two boreholes core drilled with associated pressure tests	Core Drill Flush Pump	1 300
4	Kermia– From 4.10.1979 to 17.10.1979	Subsurface geological investigations to establish bearing capacities, presence of cavaties	Five Boreholes Auger drilled with disturbed and U4 sampling and S.P.T.	Auger Drill	517
5	J & P Akropolis–Nicosia	Subsurface geological investigation to establish the extent of cavities, and bearing capacity of the foundation strata	Three boreholes Auger drilled with disturbed and U4 sampling and S.P.T.	Auger Drill	400

Site/Materials Investigations, Grouting Works

Table III—1 gives relevant details of all site construction material and grouting works performed during the year giving also duration of work for each project.

Laboratories

The work performed in the Soils Laboratory is analysed in Table III—2 with relevant details as to the type and number of tests performed for each project.

The work of the concrete and field laboratories is presented in the same way in Table III—3.

Personnel

On the 31st of December 1979 the total number of personnel employed with the section was 36. The number of, title or speciality and function of personnel employed are shown on the following Table:

Title	Sup.	Function	Dril.
Executive Engineer I	1	—	—
Executive Engineer II	1	—	—
Inspector of Works	2	—	—
Technical Assistant	—	7	—
Laboratory Technicia	—	7	—
Foreman	1	—	1
Driller	—	—	5
Casual Labour	—	2	9

Machinery and Equipment

During 1979 the Soils Laboratory acquired the following additional equipment:

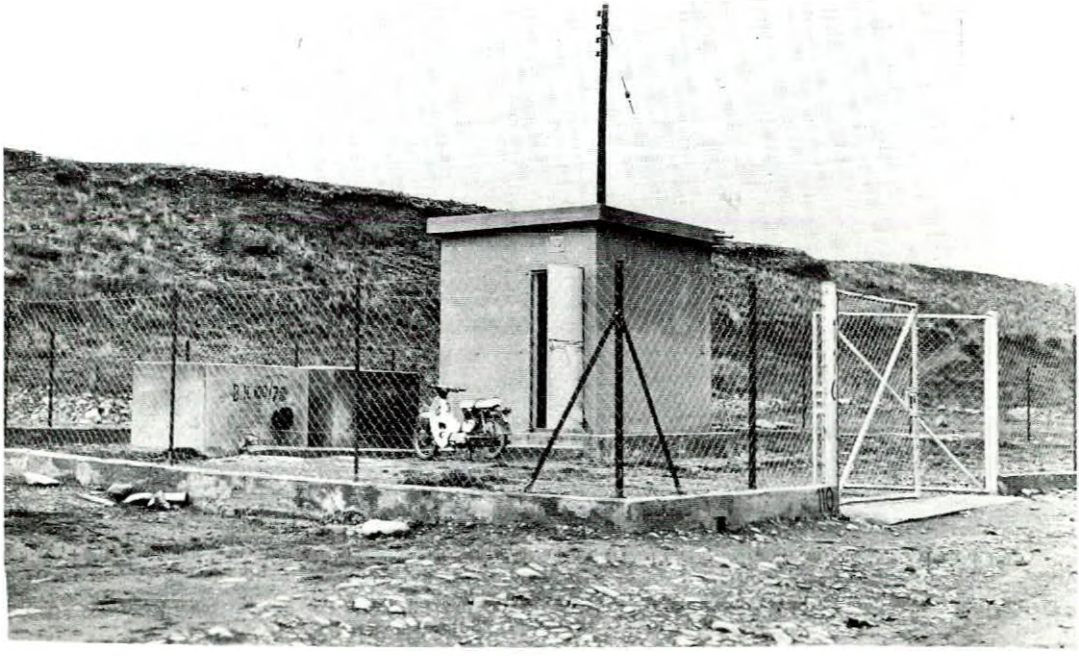
One triaxial machine, one accelerated curing tank for concrete cube testing and one flexural testing machine.

TABLE III–2 SOILS LABORATORY TESTS DURING 1979

Type of Test	Asprokremmos Dam (PIP)	Ephtagonia Pond (PIRDP)	Pelendria Pond (PIRDP)	Khandria Pond (PIRDP)	Pissouri Pond	Akhna Pond (SCP)	Melini Pond (PIRDP)	Tsirion Stadium	Larnaca New Hospital	Cyprus Port Authority	Private Frims	Miscellaneous	Total of each Test
Sieve Analysis (Wet/Dry)	294	7	12	6	—	—	5	—	4	—	3	4	335
Hydrometer Analysis	5	6	6	—	23	32	—	8	19	8	5	4	116
Atteberg Limits	42	—	—	—	23	32	—	8	10	8	3	4	130
Specific Gravity	12	6	4	—	23	32	—	8	—	8	5	4	102
Natural Density	481	241	304	—	—	—	2	8	—	2	—	—	1 038
Monisture Content	587	241	308	4	25	26	—	8	19	4	6	—	1 222
Compaction	153	20	18	2	5	—	2	—	—	—	5	4	209
Permeability	3	—	—	—	5	—	—	—	—	—	—	—	8
Undrained Triaxial	—	—	—	—	1	—	—	3	—	—	1	—	5
Drained Triaxial	2	—	—	—	—	—	—	—	—	—	2	2	6
Large Shearbox	—	—	—	—	—	—	1	—	—	—	1	—	2
Consolidation	6	—	—	—	2	—	—	3	—	2	1	2	16
Suspended Sediment	31	—	—	—	—	—	—	—	—	—	—	121	152
Total	1 610	521	652	12	107	122	10	46	52	32	32	145	3 341

TABLE III–3 CONCRETE AND FIELD LABORATORIES TESTS DURING 1979

Tests	Paphos Project Aspro-kremmos Dam	New Lakatamia Reservoir	Kokkini Trimithia channels Control	Pitsilia Project	Tenders for concrete aggregate	For private sector	Miscel-laneous	Total
Mix design	4	3	–	–	7	–	–	14
Density of aggregates								
Sieve analysis	74	306	–	15	32	21	17	465
Silt content	79	161	–	15	32	21	10	318
Organic inpurities	79	161	–	15	32	21	10	318
Specific gravity	12	4	–	–	15	–	22	53
Water absorption	8	4	–	–	15	–	22	49
Moisture content	56	18	–	–	7	–	–	81
Aggregate washing value	4	3	–	–	10	–	5	22
Bulking of sand	4	3	–	–	–	–	–	7
Cube crushing	1 672	932	–	34	–	67	–	2 705
Slump	648	107	–	–	–	–	–	755
Core washing strenght	–	–	–	–	–	–	51	51
Test of channels	–	–	61	–	–	–	–	61
Flakiness and elongation tests	–	–	–	–	–	–	12	12
Total	2 644	1 705	61	79	157	130	149	4 925



Typical pumphouse over the 7 boreholes of the Peristerona-Akaki emergency scheme for Nicosia water supply.

IV DIVISION OF DESIGN

by
Chr. Marcoullis
Senior Water Engineer
Head of Division

Introduction

The Design Division of the Water Development Department deals mainly with the preparation of detailed designs of all major projects undertaken by the Department. These projects involve the design of dams, ponds and other hydraulic structures, irrigation networks and domestic water supply schemes.

In case such works are to be constructed by contract the designs are supplemented with all necessary contract documents.

Although in principle the activities of the Design Division are within the above mentioned frame of works, it is however, often required to extend its activities by undertaking the preparation of feasibility studies for projects of minor or local importance, which cannot be undertaken by the Planning Division or to proceed with the necessary financial arrangements for project implementation, before such projects are handed over to the Construction Division for construction.

Furthermore, in addition to the Branches particular to the above mentioned kind of works, this Division includes the Topography and the Drawing and Records Branches of the Department. The first undertakes all topographical works of the Department, whereas the second carries out all drawing work of all major and minor projects, keeps the technical records, helps in the preparation of technical reports, runs the library of the Department and undertakes all photographic, reproduction and the photo--process lab work.

By the end of 1979 the following qualified personnel were working with the Design Division.

One Senior Water Engineer, Head of the Division

Three Executive Engineers, Class I

Five Executive Engineers, Class II

Two Topographer Engineers

The personnel of the Topography and Drawing and Records Branches are given in the respective sections.

MAIN ACTIVITIES

The main activities of the Design Division continued during 1979 to be focussed on the implementation of Pitsilia Integrated Rural Development Project. However,

since the Division Head was appointed in July 1979 on a temporary basis as the Project Manager of the Vasilikos-Pendaskinos Project, the Division continued working on the implementation of this project and particularly with what concerns the Nicosia Water Supply component of the project. Also the design of another Nicosia Water Supply Scheme, the Peristorona-Akaki Emergency Scheme was completed and passed over for construction during 1979. Finally the feasibility studies of some other projects were initiated during the same year.

The main component .... of the Pitsilia Integrated Rural Development Project, which is also the main input of the Department into the Project is irrigation. A part of this component provides for the rehabilitation of existing irrigation works which along with the village water supply schemes constitute the input of the Division of Small Projects Planning. The rest of this component, which is the direct responsibility of this Division, includes the construction of Xyliatos Dam and of several pond and borehole schemes.

The implementation of a pond or borehole scheme, involves a very complex procedure which includes a preliminary but quite advanced design and cost estimate, which form the basis for a preliminary approval of the scheme by the interested farmers, the preparation of a feasibility study, an appraisal and approval of the scheme by the Planning Bureau and the World Bank and the preparation of the final designs and construction drawings together with all necessary contract documents. As it is provided in the loan agreement with the World Bank the construction of ponds is carried out by local contractors whereas all other works are undertaken by the Division of Construction of the Department. In the case of borehole schemes, before embarking the above mentioned procedure, a prolonged pumping test is carried out by the Department assisted by the Geological Surveys Department, in order to verify the results of the short period test, which is performed right after the drilling of the borehole.

As it is known the overall coordination of the project works has been undertaken by the Ministry of Agriculture and Natural Resources, whereas the coordination of the W D D input into the project is handled by the Division of Design. An account of the progress achieved during 1979 on pond and borehole schemes is given in a tabular form below.

A more detailed description of the works carried out by each Branch of the Division is given below:

DAMS BRANCH

Xyliatos Dam

A detailed description of the technical features of the dam was given in the 1978 annual report.

During 1979 the whole design work was accelerated so that by the end of April, all calculations and drawings were substantially completed. The contribution to this end of the appointed consulting engineer Mr J. M. Reid of Howard Humphreys and Sons was quite beneficial.

At the same time the preparation of the contract documents, for the invitation of international tenders for the construction, in accordance with the provisions of the loan agreement with the World Bank, was advanced and completed by the end of May.

The progress in the preparation of the contract documents, allowed in the meantime the accelaration of the complex procedure of tendering, which in accordance with the standing regulations, involves, as a first step, an approval by the

Council of Ministers of the prequalification stage. Right after this approval, which was obtained by the middle of April, contractors were invited to submit their proposals for the prequalification stage by the middle of June. The evaluation of the proposals, their examination by the Tender Board and the final approval of the 12 proposed firms -six local and six foreign - by the Ministerial Committee lasted until the middle of September.

In the meantime, the contract documents were approved by the World Bank, so that on the 20th of September the prequalified contractors were invited to submit their tenders by the 22nd of November. The evaluation of the tenders, which were eventually submitted by only six of the prequalified contractors - four local and two foreign - was almost completed by the end of the year pending only the report of the consulting engineer.

During the period of the tendering procedure the Division was also working on the finalization of the reinforcement drawings, which were substantially completed by the end of the year.

Melini Pond

Melini Pond is the fourth pond to be constructed within the Pitsilia Project. It is located east of Melini village, where the road leading to Odhou village joins with the main Ora-Melini road.

The storage capacity of the pond is about 58,000 m^3. The pond will be impounded with water diverted from the nearby stream, which is a tributary of the Vasilikos river, through a 920 m long 100 mm dia A C and G I pipeline. A net area of 90 donums (105 gross) cultivated mostly with citrus and few table olives will be irrigated by the pond.

Geologically, the site is situated in a valley of weathered diabase, which will be easy to excavate. The total volume of earthwork is estimated at about 67,000 m^3 and the total area of PVC lining membrane to be used for watertightness is about 12,500 m^2.

The detailed design and the contract documents of the pond were completed by May 1979 after which tenders were invited, which led to the award of the construction of the pond to Messrs Jacovou Bros Ltd for a cost of £54,000. The total cost of the pond after including materials and supervision by W D D. will reach £69,000.

Ayii Vavatsinias Scheme

This scheme involves the construction of a small diversion-storage dam and a pond. The pond will draw water from the dam by gravity through a 536 m long, 200mm dia, and 126 m long and 100mm dia pipeline which will also be used as the irrigation pipeline from the dam. The total provided storage of about 103,000 m^3 will allow the irrigation of about 155 net donums (180 gross) of mainly citrus plantations.

A more detailed description of the scheme was given in the 1978 annual report.

This scheme, the detailed design of which along with all other necessary arrangements were completed, early in 1979, could not be put under construction due to administrative problems emanating from the fact that there was a strong opposition against its implementation from a part of the village. These problems were still under consideration by the end of the year inspite of the fact that the Tender Board had awarded the construction of the pond to Messrs Jacovou Bros Ltd for a cost of £53,935. The construction of the dam as well as the laying of the diversion pipeline will be carried out by the W D D.

Akapnou-Ephtagonia Pond

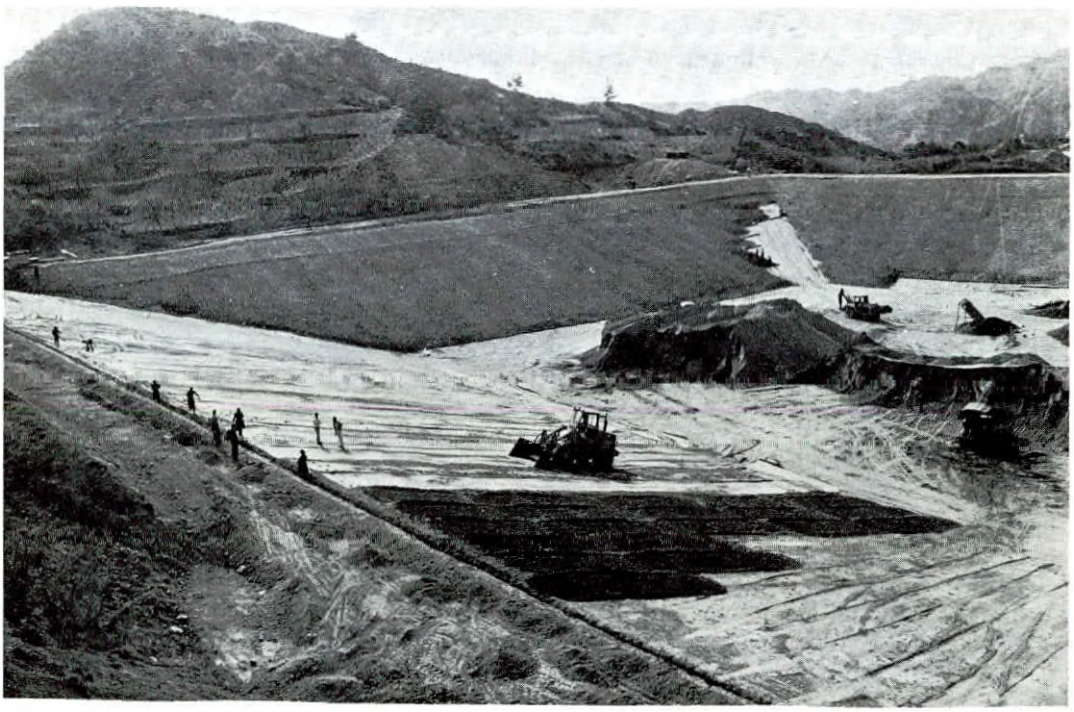
This is another scheme where administrative problems resulted into the delay of its implementation.

As it was stated in the 1978 annual report, two ponds were studied to irrigate land which belongs to Akapnou village. A detailed description of the ponds was also given in the above mentioned report. The study led to the preparation in March 1979 of a feasibility report which proved the scheme to be economically viable and quite attractive.

The interested farmers, however, who in 1978 had expressed reservations as to the capacity of the scheme which could not cover the whole of an existing Irrigation Division, in 1979 rejected the scheme on almost the opposite grounds. As they claimed the total cost involved was too high which made it impossible for them to cope with their share which is fixed to one-third of the total cost.

The scheme had then to be abandoned until October 1979, when the neighbouring village of Ephtagonia expressed interest into utilizing the scheme to irrigate their own land. However, only one pond was allowed to be used by Ephtagonia, the second being reserved for use by Akapnou village in case they change their mind in the future.

The new scheme, which is known as Akapnou-Ephtagonia scheme, includes a pond with a storage capacity of 132,000 m^3 and when constructed it will



Placing of polythene membrane at Pelendria pond belonging to Pitsilia Integrated Rural Development Project. The 123,000 cubic metres of water to be stored in this pond during winter months will irrigated, together with a borehole scheme, some 480 donums of deciduous trees and vegetables.

irrigate a net area of 163 donums (185 donums gross) cultivated mainly with citrus.

By the end of November a new feasibility study was prepared which proved the scheme to be economically viable according with the criteria set by the World Bank.

Ephtagonia Pond No. 2

This is another pond to be constructed in the Ephtagonia valley. The pond site is located about ½ km west of Ephtagonia village.

The storage capacity of the pond is about 127,000 m^3. Water will be diverted from the stream, which runs east of the village and which is a tributary of Vasilikos river, through a 2,170 m long, 200mm dia A C and steel pipeline.

The same stream will supply water for the impoundment of Ephtagonia Pond No 1. A net area of 153 donums (175 gross) cultivated mainly with citrus (mandarines) and few table olives will be irrigated by the pond.

Geologically the site is situated in weathered diabase. The total volume of earthwork will be about 145,000 m^3 and the total area of PVC lining membrane to be used for watertightness about 28,000 m^2.

The detailed design of the pond and the contract documents were completed by October 1979. A feasibility study was prepared in November 1979. According with the World Bank's criteria the scheme seems to be economically viable.

Ephtagonia Pond No 3

This is the smallest pond to be constructed in the Ephtagonia valley with a storage capacity of 65,000 m^3. The pond site is located about one km south of the village.

Water for the impoundment of the pond is to be taken from the two streams which run the Kellaki village north valley. The hydrological study, however, is yet not completed and alternatives are under consideration. A 1430 m long, 200 mm dia steel pipeline, which will be connected with two other, 150 mm dia steel pipelines are at present considered to divert the stream flow to the pond. A net area of 79 donums (90 gross) cultivated mostly with citrus and few olives will be irrigated by the pond. This area will form a part of a compact area to be irrigated by both Ephtagonia Pond Nos 2 and 3. The whole area will undergo land consolidation before the irrigation network is constructed.

Geologically, the pond site is situated in weathered lavas. The total volume of earthwork will be about 70,800 m^3 and the total area of PVC lining membrane to be used for watertightness will be about 15,600 m^2.

A feasibility study prepared in December 1979 proved the scheme to be economically viable according to the criteria set by the World Bank. The detailed design of the pond as well as the contract documents, which were quite at an advanced stage of preparation, will be completed very early in 1980.

Arakapas Pond

This scheme is located in the Arakapas valley upstream of the existing Arakapas dam which was constructed in 1974. The pond, which is located about three km west of the village, was originally intended to be constructed in combination with two boreholes which were drilled in the same area. However, in order to expedite the construction of the pond, since the boreholes should undergo a long duration pumping test before development, it was decided to proceed with an independent scheme based on the pond.

The storage capacity of the pond, which is

the biggest pond within the Pitsilia Project, is 192,000 m^3. The pond will be impounded with water diverted from a nearby stream, which is a tributary of the Yermasoyia river, through a 670 m long, 200 mm dia steel pipeline. A net area of 240 donums (270 gross), which will undergo land consolidation before irrigation, will be cultivated mostly with citrus (mandarines) and few table olives.

Geologically the site is situated in weathered gabbro and diabase. The total volume of earthwork is estimated around 151,000 m^3 and the total area of PVC lining membrane to be used for watertightness is about 34,000 m^2.

The detailed designs of the pond and the contract documents were almost completed by September 1979. A feasibility study, which was prepared in December 1979 proved the scheme to be economically viable in accordance with the World Bank set criteria.

Kato Mylos Pond

This pond is located about one km north of Kato Mylos village. The pond along with a nearby borehole are intended to form a single scheme.

The storage capacity of the pond is about 104,000 m^3. A steel pipeline 2 km long, 150 mm dia, will be used to divert the flow of a stream which springs from Agros village and which is a tributary of Kouris river to the pond. A net area of 152 donums (180 gross), cultivated with deciduous, table olives, potatoes and vegetables will be irrigated by the pond.

Geologically the pond site is situated in a valley of weathered gabbro. The total volume of earthwork is about 98,000 m^3 and the total area of PVC lining membrane to be used for watertightness is about 22,000 m^2.

The feasibility study which was prepared in December 1979 indicated an economically viable scheme in accordance with the criteria set up by the World Bank. The detailed design of the pond and the contract documents were almost completed by the end of the year.

Pharmakas Pond

This scheme consists of two ponds to be constructed in the same valley very close to each other. Mainly the topography but also the geology of the pond sites make the ponds quite costly. Also, because the second of the ponds is not an off stream pond as such, it is necessary for the flow of the stream on which the pond will be situated, to be diverted downstream, and this contributes considerably to the cost of the pond.

A preliminary design and a cost estimate of the scheme prepared by the end of the year, has been put forward for the interested farmers to decide on its implementation. The pond will be impounded with water from the Koschinas Spring, the flow of which is wasted during winter.

IRRIGATION BRANCH

This Branch deals in general with the designs of the conveyance works from a storage facility or borehole and the distribution network up to the farm gate. During 1979 most of the work undertaken by this Branch was also mainly connected with the pond and borehole schemes of the Pitsilia Project.

In particular and, as shown on Table IV-1 the following work was carried out by the Branch.

DETAILED DESIGNS OF IRRIGATION NETWORKS

(a) Pelendria Pond and Borehole Scheme

The borehole, which is one of the most successful ever drilled in the igneous rocks of the Troodos range, had undergone

TABLE IV–1

PITSILIA INTEGRATED RURAL DEVELOPMENT PROJECT

Major Irrigation Works – Progress during 1979

Scheme	Pre/ary Design– Pumping	Approval by Farmers	Feasi-bility Studies	Final Designs Contract Docum	Approval by P.B. and W.B.	Tender-ing	Cons-truc-tion
Pelendria Pond							X
" D.S. & B/H				X			
Ephtagonia P.No. 1							X
" D.S.				P.L.C.			
Khandria Pond							X
" D.S.				X			
Melini Pond	X	X	X	X	X	X	X
" D.S.				X			
Ayii Vavatsinias, Pond		X	X	X	X	X	
" D.S.				X			
Akapnou–Ephta-gonia Pond		X	X	X			
" D.S.	X			P.L.C			
Ephtagonia P.No.2	X	X	X	X			
" D.S.	X						
Ephtagonia P.No.3	X	X	X				
" D.S.	X			P.L.C			
Kato Mylos Pond		X	X	X			
" D.S. & B/H	X						
Arakapas Pond	X	X	X	X			
" D.S. & B/H	X			P.L.C			
Pharmakas Ponds	X						
" D.S.	X						
Platanistasa Pond	X						
Kalokhorio B/H		X	X	X	X		X
Potamitissa B/H	X	X	X	X			
Agros B/H	X						
Ayios Ioannis B/H	X						
Polystipos	X						

X: Work done not necessarily completed.

P.L.C: Pending due to Land Consolidation.

W.B.: World Bank

P.B.: Planning Bureau

D.S. : Distribution System

B/H : Borehole

P. : Pond

a long duration pumping test during summer 1978. Average yield 102 m^3/hr. Water pumped: 163452 m^3. The gross area to be irrigated after land consolidation will be 510 donums.

(b) Khandria Pond Scheme
The gross area to be irrigated will be 140 donums.

(c) Melini Pond Scheme
The gross area to be irrigated will be 110 donums.

(d) Ayii Vavatsinias Scheme
The gross area to be irrigated by this scheme, which consists of a storage--diversion dam and a pond will be 180 donums.

(e) Kalokhorio Boreholes Scheme
A long duration pumping test had been carried out in summer 1978 on the two boreholes which were drilled in the Kalokhorio area. The total average yield was 100 m^3/hr, and the total quantity of water pumped was 117,500 m^3. The gross area to be irrigated after land consolidation will be donums.

(f) Potamitissa Borehole Scheme
This is another borehole, which was tested during 1978. Since, however, the average yield of 63 m^3/hr was far below the yield of the short test (100 m^3/hr) and because of insufficient water level recovery, it was decided the test to be repeated in 1979. The design of the irrigation network was, however, prepared as soon as the progress on the land consolidation work made it possible and any revisions if necessary will be effected next year. The gross area to be consolidated and irrigated will be about 210 donums.

PRELIMINARY DESIGNS FOR FEASIBILITY STUDIES

Preliminary designs for the purpose of deriving costs for the preparation of feasibility studies, were prepared for the following schemes. Except for Kato Mylos the areas to be irrigated by the rest of the schemes will undergo land consolidation before irrigation.

(a) Akapnou-Ephtagonia Pond Scheme
(b) Ephtagonia Nos 2 and 3 Pond Schemes
(c) Arakapas Pond Scheme
(d) Kato Mylos Pond and Borehole Scheme

PUMPING TESTS

For reasons explained in the 1978 annual report, prolonged pumping tests are carried out on drilled boreholes in order to verify the technical feasibility of borehole schemes, before embarking into their implementation.

Such tests are planned and carried out by the WDD during summer and autumn and the tests are completed by observations on water level recovery during spring of next year.

During 1979 such tests were performed on seven boreholes. The tentative results – pending verification by water level recovery – versus those of the short duration test which is carried out during the drilling of the borehole are as follows:

TABLE IV–2
BOREHOLE PUMPING TESTS

Village	B/H No.	Prolonged test average yield m^3/hr	Short duration test yield m^3/hr
Ayios Ioannis	65/76	94	136
Kato Mylos	66/76	41	51
Agros	63/76	53	112
Arakapas	106/76	37	108
Arakapas	107/76	29	81
Potamitissa	67/76	47	104
Polystipos	21/77	13	23

The considerable difference observed in the yield of most of the boreholes between the long and short duration tests indicate the significance of the long duration tests in determining the yield on which such schemes are to be designed.

MAJOR PROJECTS

In addition to Pitsilia Project, this Division continued during 1979 being involved in the administration of the Vasilikos--Pendaskinos Project. In addition to the loan of 11 million dollars secured by the World Bank, the loan agreement of which was signed in February 1979, another loan of about £3,275,000 (2.5 million Kuwait dinars) was offered by the Kuwait Fund for Arab Economic Development. In this respect a Mission of the Fund visited Cyprus in June 1979 for the appraisal of the Project. This led to the negotiation of the loan and the preparation of a draft loan agreement which will be signed in 1980.

At the same time action was taken towards the appointment of consulting engineer who will prepare the detailed designs, construction drawings and contract documents for the implementation of the project works. Because of the complexity of the regulations concerning the procedure to be followed for the appointment of consultants, the involvement of two financing agencies and the shortage of personnel, the progress achieved was quite slow. This procedure involves a proposal to the Council of Ministers to allow deviation from the Store Regulations, and invite proposals by interested firms for prequalification. Invitation documents should comply with the basic requirements of the two financiers and should be approved by both of them before publishing them. Eventually all proposals reached WDD by the end of September. Because of the surprisingly great number of interested consulting firms, which reached the number of 86 groups of firms, the evaluation of the proposals was only concluded by the end of the year.

DOMESTIC WATER SUPPLIES

During 1979 the Division continued working on two schemes which are intended to provide supplementary water quantities to Nicosia. The first, is part of the Nicosia Water Supply component of the Vasilikos-Pendaskinos Project whereas the second is an emergency scheme to convey water from boreholes drilled in the Peristerona-Akaki area.

Vasilikos - Pendaskinos Project - Nicosia Water Supply. Phase 1

A brief description of this scheme was given in the 1978 annual report. The scheme provides for the temporary connection of the Nicosia Water Supply to that of Larnaca-Famagusta Water Supply system so as to enable the first to draw any treated water surpluses from the second. After the implementation of the Vasilikos -Pendaskinos Project this scheme will draw water from it.

The detailed designs and the contract documents, which were undertaken by the British Consulting Firm Lemon and Blizard, were prepared by the first quarter of 1979. However, for the materials i.e. pipes, valves, fittings etc. tenders had been invited in December 1978.

Offers for the execution of the civil works were only invited in July 1979, because in the meantime an approval of the scheme by the Council of Ministers deemed necessary, which was given early in July. The evaluation of the tenders, which were submitted by prequalified contractors, was almost completed by the end of 1979. The award of the contracts for the supply of materials was made in September 1979 and the first delivery of A C pipes will be made early in 1980.

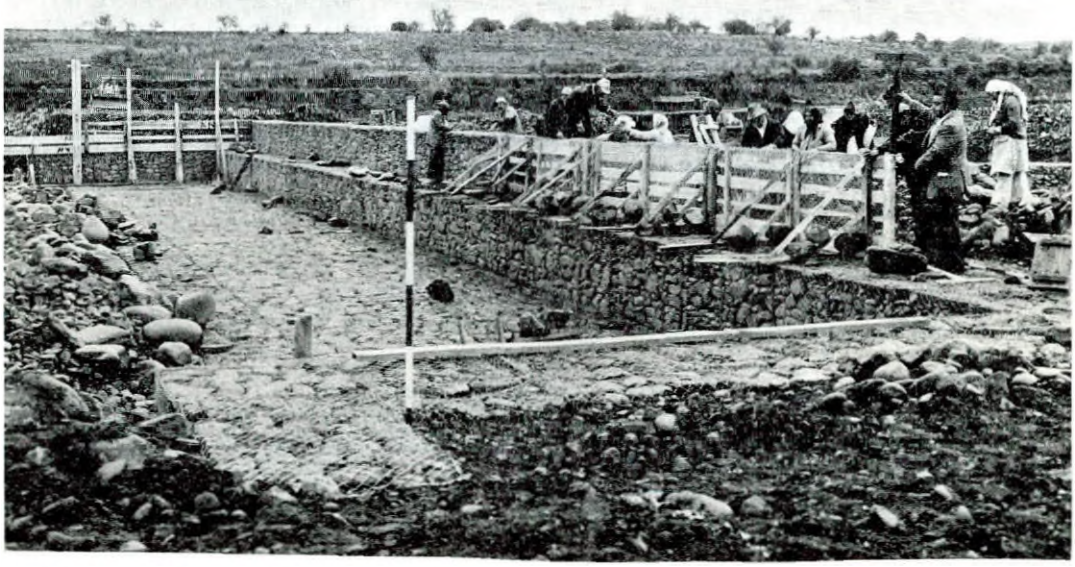
Nicosia Water Supply - Peristerona-Akaki Emergency Scheme

As mentioned in 1978 annual report this scheme provides for the delivery to Nicosia of groundwater from boreholes drilled in the Peristerona-Akaki area.

The drilling of boreholes by the Geological Surveys Department continued during the first months of 1979, so that by March 8 successful boreholes with yields ranging from 30 m^3/hr to 75 m^3/hr were available for use.

The detailed designs for the main conveyor which consists of a 9.8 km, 350 mm dia. A C pipeline up to the Paleometokho elevated tank and another 14.0 km, 300 mm dia. A C pipeline up to Engomi balancing reservoir, were completed by March, that is in four months after their commencement in December 1978. This made possible the immediate invitation of tenders for the supply of the A C pipes. The pumping system eventually selected provides for the direct pumping of the water from the submersible pumps into the main pipeline, instead of through a booster pumping station which was originally envisaged. Tenders for the procurement of pumps were invited in March 1979.

In order to further expedite the works and have water running to Nicosia early in summer it was decided to accelarate the installation of the first part of the main pipeline upto Paleometokho elevated tank and use the extra capacity of the pipeline which connects the tank with Engomi reservoir in order to convey to Nicosia at



One of three gabion weirs being built on the Peristerona river, by decision of the Council of Ministers, to recharge the local aquifer in view of water being pumped to Nicosia through the Peristerona - Akaki emergency scheme.

least 2,000 to 2,500 m^3 additional quantity of water daily.

The scheme was officially passed to the Division of Construction for execution in March 1979.

Closely related to the above scheme was the next assignment of the Division to prepare the designs and drawings for the construction of two recharge dams on the Peristerona river. This was decided by the Council of Ministers in view of the adverse effects, that the pumping to Nicosia would have on the local aquifer, which is used for irrigation. The designs were completed in September and passed over to the Construction Division for execution.

OTHER PROJECTS

As earlier mentioned, in addition to the detailed designs in connection with the above described projects, the Division has undertaken the preparation of feasibility studies and detailed designs of some projects of minor and rather local importance, such as the Larnaca Orini Project, the Pissouri Pond and by the end of 1979 the Solea Valley Project. Except for some preliminary studies on the type of lining of the 400,000 m^3 capacity Pissouri Pond, no substantial design work was carried out on this and the Solea Valley Project as to justify any further details in this report.

Larnaca Orini Project

This project was originated in 1978, when the Government decided to investigate the possibility of having a project in the Larnaca Orini region similar to that under implementation in the Pitsilia region. The main component of the project would also be irrigation and the schemes eventually selected to be studied were:

(a) The Pavlias Dam to provide irrigation water for the villages of Ayii Vavatsinias, Ora and Vavatsinia.

(b) The Vavla Pond to provide irrigation water for the villages of Kato Dhrys and Vavla.

(c) The Khirokitia Pond and one borehole to provide irrigation water for Khirokitia village.

With regard first to the Pavlias Dam most of the work done during 1979 was in connection with foundation investigations and only the last three months were devoted to actual design work. The dam site is located about 2 km north of Ayii Vavatsinias village, on a tributary of the Maroni river. Three different sizes of dam started been examined in an effort to eventually prepare a cost versus storage and versus height of dam curves. A concrete gravity type of dam was selected, based on the prevailing geological and topographical conditions, with an overflow section ending to a flip bucket. The study will be continued and completed in 1980.

Most of the time used for the Vavla pond was devoted to preliminary studies such as location of the pond site and the diversion works, topographical and geological surveys and site investigations. Work on actual design was limited and will continued next year.

No definite design work was carried out on Khirokitia scheme during 1979, except for the study of possible locations for the pond.

TOPOGRAPHY BRANCH

This Branch operates within the Design Division and conducts all the major surveys required by the Department. These surveys are of the Engineering type and are carried out during the investigation, design, construction and post construction stages of a project under investigation. All modern surveying instruments and equipment are available and normally this Branch deals with the

following assignments:

Profile-levelling, cross-sectioning, contour surveys, setting-out of project outlines, instrumental observations for detection of movement and deformation of constructed structures and determination of sediment loads in existing reservoirs etc.

The Topography Branch is staffed with one Senior Inspector, 7 Technical Assistants (monthly paid), five T/A's (hourly paid), five regular Rod-men and four casual labourers. The staff is iterdepartmentally trained on the surveying methods and the procedures employed during the field operations and office work. They are all liable to transfer to other Divisions or Branches of the Department.

Main areas of activities during the year 1979 were the Pitsilia Rural Development Project, Nicosia Town Water Supply Scheme and the Southern Conveyor Project.

A detail list of surveys conducted during the year is given below:

TABLE IV – 3

SURVEY WORK CARRIED OUT DURING 1979

PROJECT	TYPE OF SURVEY
Pitsilia Project	
1 Xyliatos	setting out
2 Melini I	Contouring
3 Melini II	"
4 Melini III	"
5 Ayii Vavtsinias	Setting out
6 Handria	Contouring
7 Kato Mylos	Setting out
8 Akapnou I	"
9 Vavla	Contouring
10 Eftagonia	"
11 Akapnou II	"
12 Dhoros Monagri	Profile—levelling
13 Yermasoyia	Contouring
14 Platanistassa I & II	"
15 Lagoudhera	"
16 Sarandi	"
Routine Works	
17 Khirokitia–N'sia pipeline	Setting out—Levelling
18 Peristerona–N'sia "	—do—
19 Pissouri Pond	Contouring
20 Potamia pipeline	Setting out—Levelling
21 Lefkara Dam	
22 Kalopanayiotis Dam	Instrumental
23 Khirokitia Theatment	Observations
24 Amiandos Mines	
Southern Conveyor Project	
25 Klavdhia Reservoir	Contouring
26 Alaminos Reservoir	"
27 Arminou Diversion Site	"
28 Arminou Canal	Setting out levelling
Khrysokhou Project	
29 Pomos Dam	Sedimentation
30 Ayia Marina Dam	Studies
31 Argaka–Magounda Dam	Cross sectioning

DRAWING AND RECORDS BRANCH

This branch is made up of the following sections:

* *The Drawing and Chartography section*
* *The Plan Reproduction section and Plan Registry section*
* *The Photographic section and Photo process Laboratory and,*
* *The Technical Library and Technical information section*

At the end of 1979 the staff of the Drawing and Records Branch numbered 20 i.e. 12 Draughtsmen scale 5, one Technical Assistant scale 5, four daily paid Draughtsmen and 3 hourly paid assistants of the print room. Three of the daily paid draughtsmen were transferred to the Southern Conveyor Project building and were mostly employed in the Agricultural survey activities of the Project.

Seven students of the Higher Technical Institute (HTI) were also employed during the summer months to carry out drawing work within their training programme.

An effort, during 1979, to establish a new set up for report making of the Department was frustrated by the Planning Bureau which cancelled our Tender for office duplicating equipment and plain paper copier which the Department had planned to replace the existing cyclostyle

machine effort. No alternative was suggested and we are therefore left to struggle with antiquated means and the Government Printing Office which obviously cannot cope with all government departments printing work.

The work carried out by the Drawing Branch is listed as follows:

TABLE IV–4
WORK CARRIED OUT BY THE DRAWING BRANCH

Ref	Description	Time spend in hours	Man months	% of total
a	Existing and proposed dams	828	5.3	2.3
b	Irrigation distribution systems for dams	122	0.8	0.3
c	Routine irrigation schemes	1 551	10.0	4.3
d	Domestic water supplies	3 620	23.4	9.9
e	Recharge schemes	126	0.8	0.3
f	Antiflood schemes	106	0.7	0.3
g	River training works	—	—	—
h	Hydrological	109	0.7	0.3
j	Programmes and organisation	193	1.2	0.5
k	Paphos project	1 659	10.7	4.6
l	Vasilikos–Pendaskinos project	971	6.3	2.7
m	Pitsilia project	5 231	33.7	14.4
n	Southern conveyor project	7 838	50.6	21.6
o	Solea valley	68	0.4	0.9
p	Khrysokhou project	491	3.2	1.4
q	Completion plans	1 029	6.6	2.8
r	HTI students vacation training	1 306	8.4	3.6
s	Completion reports	54	0.3	0.1
t	Report making	669	4.3	1.8
u	General	518	3.3	1.4
v	Odd jobs	171	1.1	0.5
w	Auxialiary servises			
	(i) Library	804	5.2	2.2
	(ii) Plan registry	443	2.9	1.2
	(iii) Plan reproduction	1 860	12.0	5.1
	(iv) Drawing materials store	203	1.3	0.5
	(v) Photographic section and photo process lab	1 872	12.1	5.2
	Total for consultancy services	5 182	33.4	14.2
x	Leave, sick leave etc.			
	(i) Leave paid	2 344	15.1	6.5
	(ii) Leave without pay	326	2.1	0.9
	(iii) Sick leave	1 030	6.6	2.8
	(iv) Maternity leave	376	2.4	1.0
	(v) D.C	399	2.6	1.1
	Total for leave, sick leave etc	4 475	28.9	12.3
	Grand Total	36 317	234.0	100%

Drawing and Cartography Section

As can be seen from the above table 45% of the time was taken by the various major projects i.e. the Southern Conveyor, Pitsilia, Paphos, Khrysokhou and Vasilikos - Pendaskinos. Nearly 30% was taken by auxiliary services and leave. The remaining 25% was taken by routine irrigation and domestic water supply schemes mainly for refugee estates in all parts of the Government controlled areas.

Plan Reproduction and Plan Registry Section

As from September 1979 a new continuous process plan printing machine was put into operation in the Nissen hut that used to house the soils lab. The old continuous process machine will be kept as standby and the existing old still machine is to be sent to the WDD Limassol Regional Office.

During 1979 2860 orders were sent to the print room for 37,900 prints of various types and sizes.

The plan registry work is being shared by the Drawing Office staff but II out of 19 plan bins have been transferred to the Nissen hut.

The Photographic Section and Photo Process Lab.

During 1979 the photographic section continued the coverage of construction works of the Department in black and white and colour still photography as well as in cinematography. Monthly visits to Paphos Project and Asprokremmos damsite have continued throughout the year and albums of Colour and black and white photos are kept in the Library at W D D HQs.

The work of the photo process laboratory continued smoothly during 1979 for the reproduction, reduction and enlargement of maps.

Technical Library and Technical Information Section

During 1979 £534 was spent for the purchase of 58 new books.

The U.K. Ministry of Overseas Development provided 20 books through the Southern Conveyor Project.

The Library continued to issue monthly notes on material received and of articles of special interest in periodicals.

Lists of books purchased, W D D reports and books provided by ODM are listed below:

BOOKS PURCHASED DURING 1979

USA DEPARTMENT OF THE NAVY. Design manual. Civil engineering USA, April, 1974. Book No. 8498. £2,500 mils.

USA DEPARTMENT OF THE NAVY. Design manual. Structural engineering USA, October 1970. Book No. 8499. £2,500 mils.

USA DEPARTMENT OF THE NAVY. Design manual. Soil mechanics foundations and earth structures. USA, March 1971. Book No. 8500. £2,500 mils.

USA DEPARTMENT OF THE NAVY. Design manual Architecture, USA, October 1974. Book No. 8501. £2,500 mils.

THE ROYAL INSTITUTION OF CHARTERED SURVEYORS AND THE NATIONAL FEDERATION OF BUILDING TRADE EMPLOYERS. SMM6. Standard method of measurement of building works: sixth edition. England, 1978. Book No. 8575. £6,400 mils.

ROCKEY - EVANS - GRIFFITHS - NETHERCOT. The finite element method. A basic introduction. London, 1975. Book No. 8576. £7,500 mils.

R P JOHNSON. Composite structures of steel and concrete. Volume 1. Beams, columns, frames and applications in building. London, 1975. Book No. 8577. £10,000 mils.

G H OGLESBY. Highway engineering. USA, 1975. Book No. 8578. £14,750 mils.

H ENTERKIN-G REYNOLDS. Estimating for builders and surveyors. London, 1972. Book No. 8579. £4,750 mils.

A J WILLIS-CH J WILLIS. Practice and procedure for the quantity surveyor. Great Britain, 1975. Book No. 8580. £6,000 mils.

D H SEELEY. Civil engineering quantities. SI edition, London, 1975. Book No. 8581. £4,950 mils.

CEB/FIP. Manual of buckling and instability. England, 1978. Book No. 8583. £2,500 mils.

R CLARKE. Technological self-sufficiency. Great Britain, 1976. Book No. 8584. £2,950 mils.

G H RYDER. Strength of materials. Third edition in SI units. London, 1978. Book No. 8586. £3,950 mils.

CV Y CHONG. Properties of materials, England 1977. Book No. 8585. £3,000 mils.

J S FOSTER - R HARINGTON. Structure and fabric. Part 2. London, 1976. Book No. 8587. £4,500 mils.

BUILDING RESEARCH ESTABLISHMENT (BRE). Practical studies from the building research establishment. Concrete. Great Britain, 1978. Book No. 8590. £17,500 mils.

BRE. Practical studies from the building research establishment. Fibre reinforced materials. Great Britan, 1978. Book No. 8588. £13,500 mils.

P P NEHAM - F V WARNOCK. Mechanics of solids and structures. SI units. London, 1978. Book No. 8591. £6,000 mils.

B P HUGHES. Limit state theory for reinforced concrete design. Great Britain, 1977. Book No. 8589. £6,950 mils.

G P MANNING. Design and construction of foundations. London, 1972. Book No. 8592. £5,000 mils.

BRE. Practical studies from the building reserach establishment. Foundations and soil technology. London, 1978. Book No. 8593. £17,500 mils.

F G H BLYTH - M H de FREITAS. A geology for engineers. Great Britain, 1976. Book No. 8595. £6,950 mils.

H KIRSCH. Applied mineralogy for engineers, technologists and students. USA, 1968. Book No. 8596. £4,500 mils.

G. DOHR. Appied geophysics. Germany, 1975. Book No. 8597. £4,500 mils.

IRISH-WALKER. Foundations for reciprocating machines. Great Britain, 1969. Book No. 8594. £2,500 mils.

A C WALSHAW. SI units and worked examples. Great Britain, 1970. Book No. 8582. Stg. £1.00.

DAVIS-BELFIELD-EVEREST. Spon's mechanical and electrical services price book. London, 1979. Book No. 8598. £9,950 mils.

L J ROSE. Pipe work and pipe welding. Questions and answers. London, 1973, Book No. 8599. £1,150 mils.

J GARDNER. Welding engineering science and metallurgy. London, 1972. Book No. 8607. £0,900 mils.

A E DICKASON. Sheet metal drawing and pattern development. Book No. 8608. £5,200 mils.

R B ROSS handbook of metal treatments and testing. London, 1977. Book No. 8609. £15,000 mils.

FRANCIS. A textbook of fluid mechanics. London, 1971. Book No. 8600. £2,100 mils.

F HARRIS - R McCAFFER. Worked examples in construction management. Great Britain, 1978. Book No. 8601. £3,950 mils.

J BOWYER. Small works contract documentation and how to administer it. London, 1976. Book No. 8602. £5,950 mils.

THE AQUA GROUP. Contract administration for architects and quantity surveyors. London, 1975. Book No. 8603. £3,750 mils.

THE AQUA GROUP. Which builder? Tendering and contractual arrangements. London, 1975. Book No. 8604. £3,500 mils.

H KIND - D NIELD. Building techniques. Vol. I Structure SI edition. London, 1976. Book No. 8605. £3,950 mils.

HORNER. Dictionary of mechanical engineering terms. London, 1967. Book No. 8606. £4,500 mils.

MORGAN-GRAMPIAN (PUBLISHERS) LTD. The engineer buyers guide 1979. London, 1979. Book No. 8626. Stg. £9.00.

INTERNATIONAL ATOMIC ENERGY AGENCY. interpretation of environmental isotope and hydrochemical data in ground water hydrology. Proceedings of an advisory group

meeting. Vienna 27-31 January 1975. Austria, 1976. Book No. 8627. £6,000 mils.

CH E REYNOLDS - J C STEEDMAN. Examples of the design of buildings to CP 110 and allied codes. London, 1978. Book No. 8658. Stg £14.00.

D J DOWRICK. Earthquake resistant design. A manual for engineers and architects. Great Britain, 1978. Book No. 8656. Stg £16.25.

AMERICAN SOCIETY OF CIVIL ENGINEERS. Stability and performance of slopes and embankments. New York. Book No. 8661. Stg £7.00.

THE INSTITUTION OF CIVIL ENGINEERS. Floods and reservoir safety. London, 1978. Book No. 8660. Stg. £5.00.

THE INSTITUTION OF CIVIL ENGINEERS. Reservoir flood standards. Discussion paper. London 1975. Book No. 8657. Stg £3.50.

A H ALLEN. Reinforced concrete design to CP 110 -simply explained. London, 1977. Stg. £5.00.

B VICKERS. Laboratory work in civil engineering soil mechanics. London, 1976. Book No. 8662. Stg £5.25.

A R GOLZE. Handbook of dam engineering. USA, 1977. Book No. 8655. Stg £58.00.

AMERICAN SOCIETY OF CIVIL ENGINEERS. Engineering foundation conference safety of small dams. New York, 1975. Book No. 8663. Stg £9.00.

G N GOLUBEV - A K BISWAS. Water development, supply and management, Vol. 6. Interregional water transfers. Problems and prospects. Great Britain, 1979. Book No. 8695. $19.80.

A ROBERTS. Geotechnology. An introductory test for students and engineers. USA, 1977. Book No. 8694. $44.00.

D T F MUSNEY. Tacheometric tables for the metric user. London, 1971. (4 copies) Book Nos 8677, 8678, 8679, 8680. £3,750 mils each.

S VASILIEF. Nicosia and suburbs. Road Map - Map. Nicosia, 1975. Book No. 8675. £2,000 mils.

S VASILIEF. Limassol and suburbs. Road Map - Map. Nicosia, 1978. Book No. 8676. £2,350 mils.

P ACKERS - W R WHITE - S A PERKINS - A J M HARRISON. Weirs and flumes for flow measurement. Northern Ireland, 1978. Book No. 8697. Stg £19.50

H H THOMAS. The engineering of large dams (2 volumes) Part 1 & 2. London, 1979. Book Nos 8698, 8699. Stg £42.35

WDD REPORTS

J F LAURENCE. Southern Conveyor Project. Third quarterly progress report. October 1 - December 31, 1978. Nicosia, January, 1979. Report No. P/10. Book No. 8552.

B M MILINUSIC. Paphos irrigation project. Progress report No. 15 Covering period from 1.7.79 to 1.10.79 Nicosia, October 1979. Report No. D/66 Book Nos. 8666, 8667.

G PETROCOSTAS - CH KRIDIOTIS. Cyprus ports authority. New administration building - Limassol. Site investigation, Nicosia, September 1979. Report No. F/70. Book Nos 8668, 8669.

P ELIADES. Pitsilia integrated rural development project. Akapnou-Ephtagonia irrigation scheme. Mini feasibility study. Nicosia, November 1979. Report No. D/67. Book Nos. 8681, 8682.

P ELIADES. Pitsilia integrated rural development project. Ephtagonia ponds. Nos. 2 & 3 Mini feasibility study. Nicosia, November 1979. Report No. D/68. Book Nos. 8683, 8684.

C KRIDIOTIS. Xiliatos dam. Site and fill material investigations. Nicosia, October 1979. Report No. F/71. Book Nos. 8685, 8686.

VASILIKOS-PENDASKINOS PROJECT. Nicosia water supply 1st phase. Tender No. 39/78/40. Nicosia, December 1979. Book No. 8687.

WATER DEVELOPMENT DEPARTMENT. Annual report 1978. Nicosia November 1979. Book No. 8700.

J S JACOVIDES. Southern conveyor project. Operation of the Asprokremmos reservoir conjuctively with the Dhiarizos and Ezousas welfields. Nicosia November, 1979. Report No.H/46 Book Nos. 8701, 8702.

P ELIADES. Pitsilia integrated rural development project. Kato Mylos pond. Irrigation scheme. Report No. D/69. Book Nos 8703, 8704.

P ELIADES. Pitsilia integrated rural development project. Arakapas pond. Irrigation scheme. Nicosia, December 1979. Report No. D/70. Book Nos. 8705, 8706.

BOOKS PROVIDED by the U.K. MINISTRY OF OVERSEAS DEVELOPMENT FOR THE SOUTHERN CONVEVOR PROJECT

R L PEURIFOY. Estimating construction costs: USA, 1975. Book No. 8515.

DAVID A WISMER. Optimization methods for large scale systems with applications. USA, 1971. Book No. 8516.

R M STARK - R L NICHOLLS. Mathematical foundations for design. Civil engineering systems. USA, 1972. Book No. 8517.

AMERICAN SOCIETY OF CIVIL ENGINEERS. The evaluation of dams safety. USA, 1977. Book No. 8518.

AMERICAN SOCIETY OF CIVIL ENGINEERS. Pipeline design for water and waste water. USA, 1975. Book No. 8519.

W H GRAF. Hydraulics of sediment transport. USA, 1971. Book No. 8520.

B WITHERS - S VIPOND. Irrigation design and practice. Great Britain, 1974. Book No. 8521.

AMERICAN SOCIETY OF CIVIL ENGINEERS. Proceedings of the conference on interdisciplinary analysis of water resource systems. USA, 1975. Book No. 8522.

Y Y HAIMES. Hierarchical analyses of water resources systems. Modeling and optimization of large scale systems. USA, 1977. Book No. 8523.

A K BISWAS. Systems approach to water management, USA, 1976. Book No. 8524.

SERGE LELIAVSKY. Design textbooks in civil engineering. Vol. 4. River and canal hydraulics. Great Britain 1965. Book No. 8525.

CH CHATFIELD. Statistics for technology. A course in applied statistics. London, 1978. Book No. 8526.

NEUFVILLE-STAFFORD. Systems analysis for engineers and managers. UK, 1974. Book No. 8527.

J L RIGGS. Engineering economics. USA, 1977. Book No. 8528.

A NELSON - K D NELSON. Dictionary of water and water engineering. Hungary, 1973. Book No. 8529.

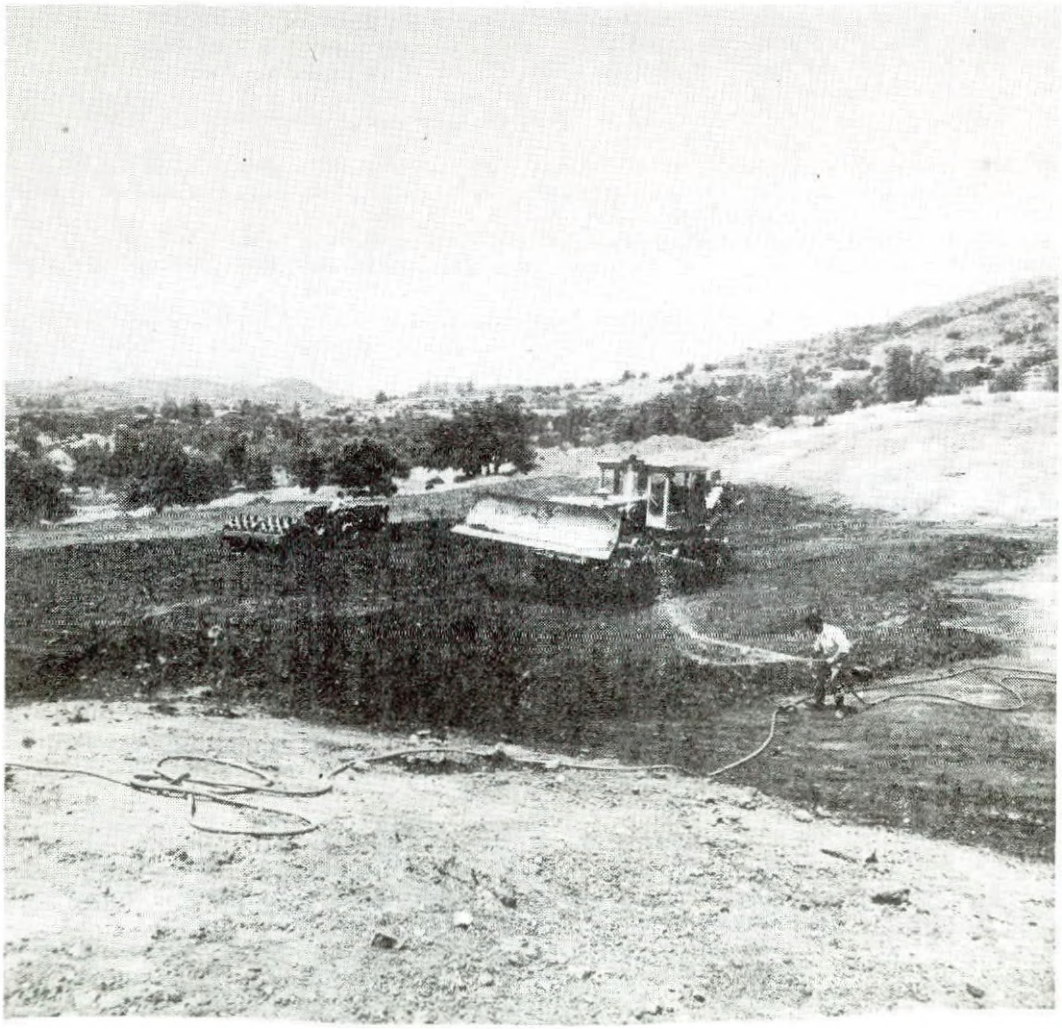
TH J SCHRIBER. Fundamentals of flowcharting USA, 1969. Book No. 8530.

KERNIGHAM-PLAUGER. The elements of programming style. USA, 1978. Book No. 8531.

D D McCRACKEN. Fortran with engineering applications. USA, 1967. Book No. 8532.

J L KUESTER - J H MIZE. Optimization techniques with fortran. USA, 1973. Book No. 8533.

W D MAURER. Programming. An introduction to computer techniques. USA, 1972. Book No. 8534.



Progress of work on compaction of fill for the Ephtagonia off-stream pond - Pitsilia Integrated Rural Development Project.

V DIVISION OF CONSTRUCTION

by
A.P. Georghiades
Senior Water Engineer
Head of the Division

Introduction

The Division of Construction is one of the major divisions of the Department, and it deals with the planning, supervision and control of all constructional activities of the Department by direct labour, or by contract. The Division is sub-divided into four main branches:-

* *The planning and Control Branch (including the Tenders Section).*
* *The Major Projects Branch*
* *The Minor Projects Branch, and*
* *The Workshops.*

During 1979 the Division consisted of the following staff:-

1	Senior Water Engineer - Head
1	Mechanical Engineer, class I
2	Executive Engineers, class II (on contract)
1	Superintendent of Works
3	Senior Inspectors of Works
10	Inspectors of Works
3	Chief Foremen
6	Assistant chief Foremen
2	Technical Assistants
50	Monthly paid Foremen
35	Weekly paid Foremen
114	Total staff

In addition to the above techical staff, the Division engaged 520 regular employees of various trades and an average daily number of 332 casual employees, mostly unskilled, for the execution of the schemes, all over the Island.

During the year the Division continued the collection of data regarding actual rates, standards of materials and equipment, and the results were appraised and utilized for the preparation of a manual in this respect for use in future planning and cost estimating.

As usual the commencement of execution of the new schemes included in the 1979 Budget started after the Spring season, soon after the approval of the Budget by the House of Representatives and the availability of the funds, which represent the Government share and the Village share which is made available through the Public Loan Commissioners.

CONSTRUCTION PROGRAMME AND PROGRESS

For all the new schemes included in the 1979 Development Budget as well as for other water works schemes approved in the Budgets of other Government Department the Division prepared a Construction Programme early in the Spring having in mind all available information about the availability of funds, administrative formalities, obstacles, requisition formalities, etc.

Water works projects included in other Government Departments budgets and executed by the Department constitute a great proportion of the Division's activities, more so in 1979 with the construction of Pitsilia Integrated Rural Development Project water schemes budgeted with the Ministry of Agriculture and Natural Resources which allocates each Department allotments of money for the execution of the various project components. Such schemes were:-

* Water Supply Schemes for Refugee housing or self-housing estates included in the Budget of the Department of Town Planning and Housing,
* The Pitsilia Integrated Rural Development Project water works, which represent water supply schemes to villages, rehabilitation irrigation schemes and major irriagation schemes involving the construction of ponds and dams.
* Water supply schemes for new industrial areas for the Ministry of Commerce and Industry
* Water supply schemes of new stock farms for the Department of Agriculture
* Water supply schemes for water boards or municipalities
* Water supply and irrigation schemes undertaken for village water commissions, irrigation divisions or irrigation associations from funds deposited direct by them,
* Water supply schemes undertaken for privated developers from deposits.

Eventually, during 1979 projects of an estimated cost of £3,572,340 were undertaken for construction, and the expenditure incurred on all these schemes reached the amount of £2,368,900.

Here it should be stated that this enormous volume of construction work justified the engagement of a much larger number of technical staff, especially at the lower grades, i.e. Technical Assistants, and in order to attend to all the urgent needs the staff had to work hard with its utmost efficiency and zeal, so as to respond to all the emergency schemes.

Again, this year the recruitment of casual, skilled and unskilled labour force, for the construction of the schemes, was a great problem, and this as a result of the great demand for labour force in the private sector, for the housing of Refugees and other development schemes.

Table V-1 shows in detail the volume of works undertaken for construction by the Department. Other detailed lists showing separately the schemes undertaken for construction during the year appear elsewhere in this Report.

PLANNING BRANCH

Although no progress was made during 1979 in respect of adequately staffing this branch, its activities were enlarged and its role for the implementation and satisfac-

†Not including Paphos Irrigation Project

tory progress of the construction programme proved to be of vital importance.

It is believed that this branch can play an important role in the field of planning and coordination of construction, and unless it is reorganized and staffed properly, it will not be able to respond to its role.

TABLE V–1
SCHEMES UNDERTAKEN FOR CONSTRUCTION DURING 1979

Ser. No.	Description	No. of schemes	Amount allocated £	Expenditute incurred £
1	Rural Domestic Water Supplies.	59	584 117	209 954
2	Minor Irrigation Works.	50	411 542	212 049
3	Major Irrigation Works.	15	356 843	294 392
4	Town Water Supply Schemes	12	764 766	626 208
5	Water Supply and Irrigation Schemes Included in the Pitsilia Project.	25	471 542	338 305
6	Water Supply Schemes for Housing the Refugees.	79	555 627	339 666
7	Schemes undertaken for other Government Departments.	38	258 303	178 826
8	Rural Domestic W S schemes from village deposits	110	30 625	30 625
9	Minor Irrigation Schemes from village deposits	25	10 064	10 064
10	Works executed for Private Developers (mainly distribution main for land development)	183	128 911	128 911
	Total	596	£3 572 340	£2 368 900
N.B.	Paphos Project expenditure not included in the above figures is.			£6 450 936
	Grand total			£8 819 836

The main activities of this branch are mainly the following:-

* The programming and cost control of all schemes under construction,
* The checking of the estimates of the schemes designed by other Divisions of the Department so as to comform with the current rates, and to ensure their execution within estimated cost.
* The distribution of resources, such as labour force plant, and materials to the various schemes under construction in all districts,
* The assessement of the Divisions requirements in materials and equipement, such as, pipes, pipe-fittings, pumping units etc and their order in time, through the Government Central Stores.
* The invitation of direct tenders for their supply of other materials not available in the Central Stores, such as building materials etc and the hiring of machinery from the Private Sector, when there are no such machinery available at the E.M.S.
* The acquisition of immovable property which is affected by the construction of the schemes.
* The supply of services towards the installation of electricity supply, and telephone, at the site of various works.

CONTROL BRANCH

The main activity of this Branch is to exercise control over the execution of all the schemes. It has to follow up and see that all construction programmes are adhered to, by the Technical Supervising staff, that the progress of the works is attained at reasonable standards and as planned.

The quality standard of all schemes under execution has also to be followed up and be kept always at the highest possible standards.

Another objective of this branch is to ensure that schemes are executed within the estimated cost and locate problems and excesses where this is unavoidable and take the appropriate action to remedy the situation.

During 1979 this branch was also understaffed and the main burden fell on the shoulders of the Head of the Division assisted by a Superintendent of works. This branch too has to be strengthened, be staffed adequately and be reorganized so as to be able to cope with the expanding programme of the Division.

The officers of the branch work in association with the Technical supervising staff for the execution of one scheme, for the solving of problems that might arise regarding the execution of the schemes, or on any modifications that become inevitable, in the light of local conditions with the least repercussions on estimated cost of the scheme.

The supervision of schemes under construction in Limassol, Paphos, Larnaca and Famagusta districts was undertaken by the respective Regional Offices, of the Department, with a Technical Officer from the main Division Offices acting as Co-ordinator. The Head of the Division carries periodic visits to the Regional offices and at the site of the works, and is also kept informed on the progress of each shceme through the Co-ordinator and periodic progress reports from the Regional offices.

LABOUR FORCE

For the construction of one scheme the Division usually engaged a gang consisting of a monthly or weekly paid Foreman, regular artisans of the Department of various trades, and casual skilled or unskilled labour who were recruited locally through the Government labour offices.

TABLE V–2 LABOUR FORCE–1979

* Average daily

Month	Skilled	Semiskilled	Unskilled	Regulars	Casuals	Total
Jan.	658	109	48	484	331	815
Feb.	669	123	49	519	322	841
March	667	120	56	517	326	843
April	674	115	55	521	323	844
May	697	114	43	519	335	854
June	677	122	46	521	324	845
July	659	115	72	528	318	846
August	689	131	85	525	380	905
Sept.	674	148	67	526	363	889
Oct.	674	135	50	526	333	859
Nov.	657	143	30	528	302	830
Dec.	674	140	34	530	318	848
	79%	15%	6%	61%	39%	852*

The average daily labour force engaged by the Division during 1979 for the construction of all the schemes was 852 persons, out of which 520 were regular employees of various trades, mostly builders, pipelayers, carpenters etc, and 332 were casual, skilled or unskilled labourers.

The table V-2 shows in detail the monthly average labour force engaged by the Division during 1979.

The total expenditure incurred during 1979 was £1,097,151 on wages alone on schemes executed by direct labour.

The recruitment of casual labour force during 1979 continued to be an acute problem for the execution of the schemes. The great demand for casual labour force in the big towns and the great competitions from the private sector caused enormous difficulties for the Division for the early construction of the schemes. In some cases unskilled labour force had to be transported from distant villages i.e. Pitsilia and Solea areas to the site of the schemes.

The lack of casual labour force is mostly attributed to the great demand for the Housing of the refugees and the reconstruction after the Turkish Invasion, the employment of a number of Cypriot employees in the Arab States.

PIPES AND PIPE FITTINGS

The practice followed for many years is to purchase pipes and pipe-fittings of all types from the Government Central Stores.

In order to have all pipes and fittings in stock and in time for the early and uninterrupted execution of the schemes, the Department puts an order of all its needs early, prior to the approval of the Budget, as soon as the schemes proposed for execution are known.

During 1979 a length of 238090* m of pipes of various types were laid all over the island at an expenditure of £409267.

Table V-3 that follows shows in detail all types of pipes laid in 1979.

* Not including Paphos Project.

TABLE V–3
PIPES LAID DURING 1979
GALVANIZED IRON PIPES – CLASS B

Dia inches	Length m	Value £
½	15 220	5 233
3/4	1 830	719
1	8 334	3 762
1 1/4	9 816	5 669
1½	8 016	5 808
2	6 906	7 361
2 ½	17 688	18 060
3	11 748	21 364
4	37 608	84 634
Total. . . .	117 666	£152 610

PVC PIPES CLASS B

Dia inches	Length m	Value £
6	2 514	3 686

STEEL PIPES

Dia inches	Length m	Value £
6	636	2 570
6 5/8	3 900	15 753
8	132	710
8 5/8	3 594	19 367
10	590	4 412
10 ¾	102	750
18	18	294
18 ½	6	53
Total.	8 978	£43 909

STEEL PIPES

Dia inches	Length m	Value £
6	900	2 636
6 5/8	12	35
Total.....	912	£2 671

ASBESTOS CEMENT PRESSURE PIPES – CLASS B

Dia inches	Length m	Value £
3	6 584	3 847
4	17 374	16 897
6	20 248	26 449
8	5 492	16 282
10	3 807	12 899
12	12 091	7 339
14	4 304	31 894
Total.....	69 900	£115 607

ASBESTOS CEMENT PRESSURE PIPES – CLASS C

Dia inches	Length m	Value £
3	4 460	2 620
4	16 884	15 742
6	7 556	13 667
8	2 161	8 160
10	4 055	17 827
12	80	663
14	2 432	31 894
Total.....	37 628	£ 90 573

CAST IRON PIPES

Dia inches	Length m	Value £
½	360	144
1/4	132	67
Total.....	492	£211

Ser. No.	Type	Length m	Value £
1	Galvanized iron pipes. . . .	117 666	152 610
2	Cast iron pipes	492	211
3	PVC pipes – Class B	8 978	43 909
4	Asbestos cement pipes Class B	69 900	115 607
5	Asbestos cemnet pipes Class C	37 628	90 573
6	PVC pipes – Class B . . .	2 514	3 686
7	Steel pipes.	912	2 671
	Total.	238090m	£409 267

CONSTRUCTION PLANT

For all machinery essential for the execution of any one scheme, the Department has to apply primarily to the EMS for the hiring of Government machinery. If however, Government machinery is not available at the time, the Department hires machinery from the private sector through open tenders. During 1979 for the execution of all the schemes the Department hired machinery of all types from the EMS at an expenditure of £46,811 and from the private sector through open tenders at an expenditure of £117,836 and for other items at an expenditure of £52,687. The types of machinery hired by the Department from the EMS as well as from the private sector and other items showing also the expenditure incurred during 1979 is given in Table V-4.

BUILDING AND OTHER MATERIALS

All building materials, such as cement, shingle, sand, etc. are purchased by the Department from the private sector through open tenders. Cement is purchased from the two local cement factories and during the year 2771 tons of cement were purchased at a value of £40,153.

For all the other materials purchased by the Department* during 1979 the expenditure reached the amount of £103,721 and in total the expenditure was £143,874.

All materials purchased during the year by the Department are given on Table V-5.

*** Not including Paphos Project.**

TABLE V–4

MACHINERY HIRED DURING 1979

MACHINERY FROM THE EMS

Ser. No.	Description	Working days	Value £
1	Drilling Machines. . .	142	1 454
2	Core Drill.	458	1 374
3	Concrete Mixers . . .	2 335	8 172
4	Air Compressors . . .	431	3 066
5	Excavators 70 HP . .	83	955
	" 130 HP . .	33	660
	" 160 HP . .	68	1 496
6	Catterpillar 977. . . .	82	2 088
7	Dumpers	533	2 132
8	Diggers	98	1 078
9	Smith	10	180
10	Overburden	40	210
11	Centrifugal Pump . .	23	23
12	Light Percussion . . .	12	18
13	Land Rovers.	6 588	19 200
14	Saloon Cars	1 882	4 705
			Total. . . . £46 811

MACHINERY HIRED FROM PRIVATE SECTOR

Ser. No.	Description	Working days on hours	Value in £
1	Diggers	15 783 ½ hours	35 363
2	Tractors.	10 268 "	22 566
3	Cranes.	1 467 ½ "	7 197
4	Electrowelding machines.	969 "	861
5	Caterpillars	532 ½ "	3 121
6	Compressors.	6 031 ½ "	6 197
7	Tipper Lorries.	1 926 "	4 193
8	Mixers.	144 "	327
9	Elevators	agreed "	570
10	Salon cars	3 340 "	12 582
11	Buses	1 005 days	5 372
12	Mini Buses	118 "	708
13	Land Rovers.	3 295 "	15 863
14	Dumpers	37 ½ "	225
15	Drilling Machinery	93 ½ hours	436
16	" "	1 617 feet	1 240
17	" "	agreed	1 015
		Total.	£117 836

OTHER ITEMS

1	Trenchers. . . . . 54 090 m	38 851
2	Tippers & Lorries	13 836
	Total.	£ 52 687

TABLE V–5

BUILDING AND OTHER MATERIALS PURCHASED DURING 1979

Ser. No.	Description	Ouantities	Value £
1	Cement	2 771 tons	40 153
2	Havara.	655 m^3	367
3	Clay	247 m^3	301
4	Stones.	616 m^3	397
5	Sand for pipe bedding	15 153 m^3	10 610
6	Sand.	4 618 m^3	10 788
7	Shingle	6 270 m^3	10 799
8	Aggregate.	2 843 m^3	4 458
9	Soil.	622 m^3	296
10	Mild steel	526 tons	57 883
11	Gabion wire netting (m^3) . . .	No. 916	7 822
		Total.	£103 721

WATERS METERS INSTALLED DURING 1979

Ser. No.	Dia inches	Number	Value £
1	½	4 643	14 288
2	¾	8	28
3	1	31	263
4	1 1/4	5	36
5	1 ½	7	87
6	2	12	384
7	2 ½	—	—
8	3	48	1 726
9	4	28	1 349
10	6	8	512
11	8	2	262
Total		4 792	£18 935

RURAL DOMESTIC WATER SUPPLY SCHEMES

The construction programme for 1979 included 59 Rural Domestic Water Supply Schemes of an estimated cost of £584.117 and were split in the five free districts of the island as follows:

District	No of Schemes	Amount approved for 1979 in £	Expenditure incurred in 1979 in £
Nicosia	19	160 770	92 430
Limassol	17	164 704	25 439
Famagusta	5	139 448	21 980
Larnaca	9	59 388	33 112
Paphos	9	59 807	36 993
Total	59	£584 117	£209 954

The overall expenditure incurred on all the above Rural Domestic Water Supply Schemes during the year reached the amount of £209,954. The biggest expenditure incurred in one district was £92,430 for Nicosia.

Lists showing in detail all 59 schemes undertaken for construction, are shown on Table V-6.

MINOR IRRIGATION WORKS

The construction programme for 1979 included 50 Minor Irrigation Schemes of an estimated cost of £411,542 and were split in the four free districts of the island as follows:-

District	No of Schemes	Amount approved for 1979 in £	Expenditure incurred in 1979 in £
Nicosia	34	281 886	158 989
Limassol	9	12 726	7 442
Larnaca	3	29 344	6 276
Paphos	4	87 586	39 342
Total	50	£411 542	£212 049

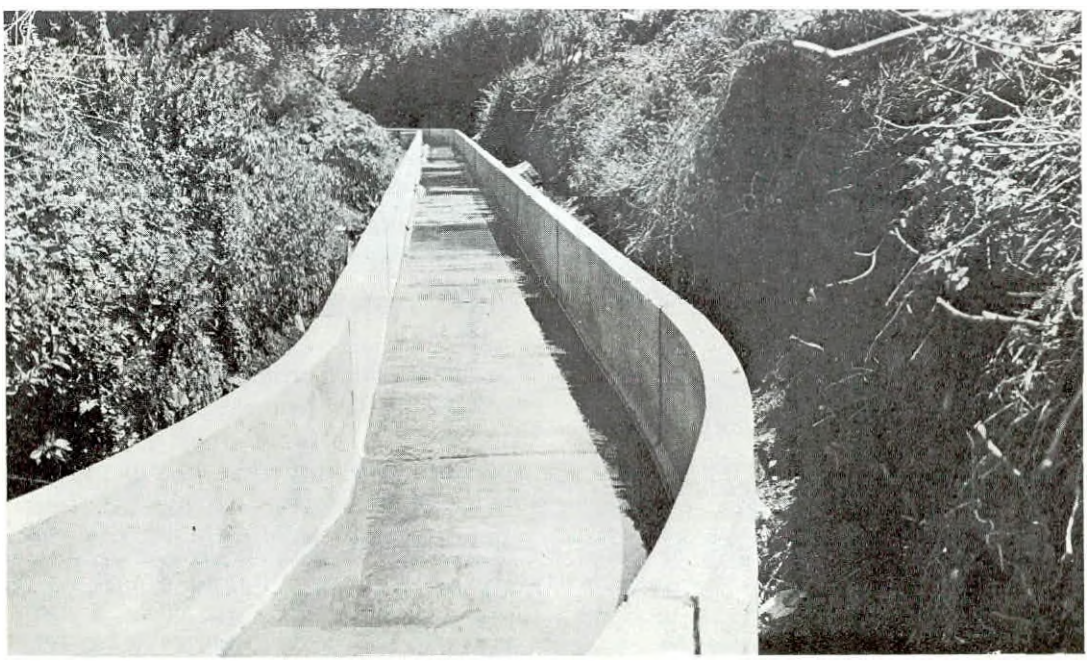
The overall expenditure incurred on all the above Minor Irrigation Works during the year reached the amount of £212,049.

The biggest expenditure incurred in one district was £158,989 for Nicosia. A short description of some of the most important schemes is given elsewhere in this report

Lists showing in detail all 50 schemes undertaken for construction, are shown on Table V-7.

Chakistra - Yerakies - Kambos Irrigation pumping schemes

After long study of many alternative proposals put forward for the solution of the



Lining of earth channels in reinforced cement concrete is a continuous process in the Solea valley and other areas of Cyprus.

irrigation problems of the above villages, a final decision was taken late in Summer 1979 that the best schemes to be unplemented were the ones which included the pumping of the required water, from the rivers of the area.

Briefly, the schemes, which are very similar to each other, can be described as follows.

Chakistra Irrigation Scheme

An amount of 120m³ of water per hour will be pumped, through 1500 m X 6'' dia steel pipes, from 'Mavres Sykies' area, by two double stage pumping 160 H.P. booster pumps, to irrigate 330 dons of land. The scheme also includes the construction of a diversion weir at the river, 3 balancing tanks, two pump-houses and distribution system within the proposed irrigated area. The scheme was estimated to £84,000.

Yerakies Irrigation Scheme

The quantity of water to be pumped from the Xeros River will be 70 m³/hour. The two booster pumps to be used will be of 140 H.P. and the length of the pumping main 3000 m X 6'' dia steel pipes. The land to be irrigated is about 200 dons and the cost of the scheme was estimated at £108,000.

Kambos Irrigation Scheme

The point of the intake weir is also in Xeros River and is called 'Kamenon Pedhi'. The amount of water required is 75 m³/hour and it will be pumped by a combined boosting plant of 130 H.P. capacity each. The pumping main will be of 6'' dia steel pipes 4,000 m. long and the land to be developed 270 dons. The estimated cost of the scheme is at £86,500.

The schemes of Chakistra and Kambos were put in hand early in Autumn whilst that of Yerakies - due to technical difficulties was due to be started early in 1980.

PITSILIA INTEGRATED DEVELOPMENT PROJECT

The Pitsilia Integrated Rural Development Project construction programme for 1979, included 25 schemes at an estimated cost of £471, 542.

The expenditure incurred during the year reached the amount of £338,305.

All the schemes that were included in the construction programme for execution in 1979 are shown in detail on Table V-8.

Construction of Ponds

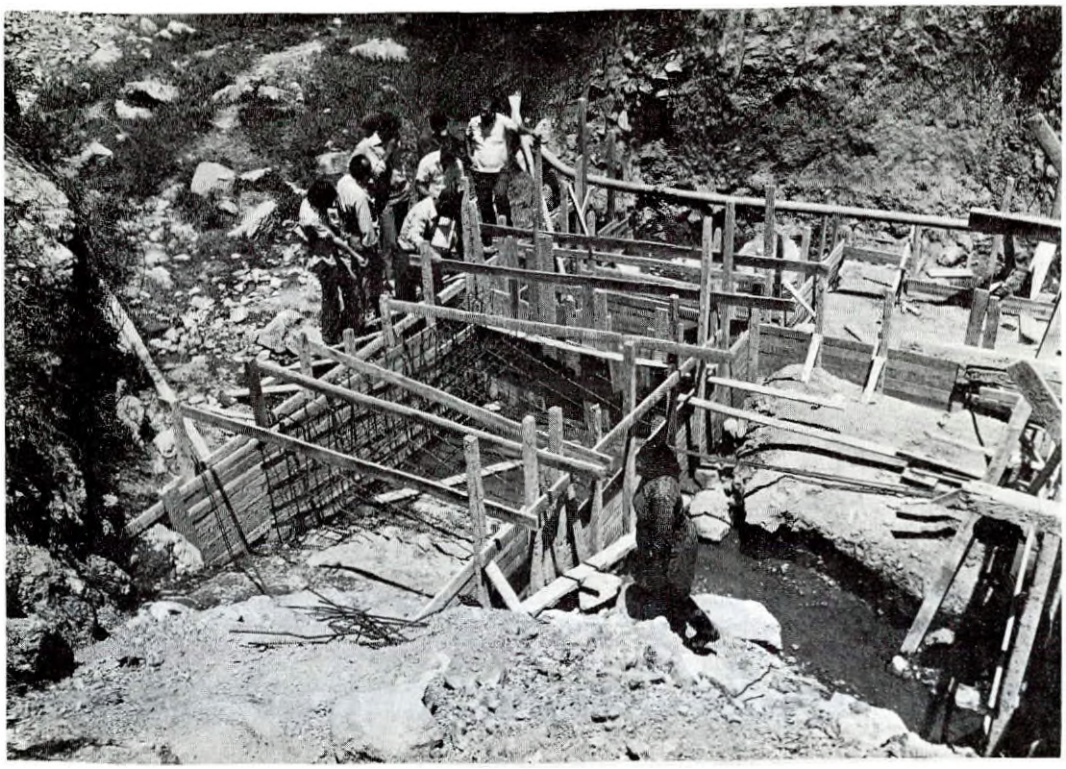
In 1979 WDD commenced the execution of the works of four ponds which are: Pelendria Pond, Ephtagonia Pond No. 1, Khandria Pond and Melini Pond No. 1. The construction of the Ponds was carried out through the employment of Contractors. The supervisory staff of WDD was one Site Engineer, and one Inspector of Works for all the Ponds, and one foreman, one laboratory assistant and one surveyor for each pond.

Every scheme constitutes of the Pond, the diversion weir, the diversion pipeline and the distribution system. The works for distribution system will be carried out directly by the Construction Division of WDD.

Pelendria Pond

The works for this Project started in February 1979 by the Contractor "Fysko Contracting Ltd". The storage capacity of the Pond is 123,000 m³ and the net irrigated area is 290 donums. In a second phase, with the use of a nearby borehole an additional net area of 190 donums will be covered with this scheme.

The earthworks for the Pond were completed at 6/11/1979. The excavations were about 53,500 m³ and the fills about 55,500 m³. The lining of the membrane



Construction of typical diversion weir on small streams in the Pitsilia Integrated Rural Development Project, feeding off-stream polythene lined earth ponds.

commenced at 12/11/1979 and an area of 12,500 sq.m. of the Pond (the total area is 23,500 sq.m) was covered and back filled up to 5/12/1979. The torrential rains and snowfall in the area, in the first week of December caused the failure of the backfill material which slided on the slopes of the Pond towards the base of it.

The Department after several site tests and in view of lack of any similar experience in Cyprus or overseas, decided that the backfill material should be compacted, for all the Ponds in order to increase its shear strength and reduce the possibility of sliding if similar conditions as those of December 1979 will prevail again in future.

The most works for the diversion weir and pipeline have been done in 1979.

The estimated cost for the whole project was £126,315 The total expenditure up to end 1979 was £65,707.

Ephtagonia Pond

The works for this Pond commenced in February 1979 by the Contractor "Iacovou Brothers" the storage of the Pond is 92,000 m^3 and the net area to be irrigated is about 135 donums.

The stripping of the permanent works as well as excavations and embankment operation were completed by the end of August. The excavations were about 44,000 m^3 and the fills about 43,000 m^3

The membrane lining started at 16/10/1979 and an amount of 17,000 sq.m of membrane (the total amount is 20,000 sq.m) were placed and backfilled upto the end of 1979. The high rainfall in December 1979 caused some damages to the backfill material in an area of about 1,500 sq.m.

The most work for the diversion weir and pipeline was carried out.

The estimated cost for the whole project was £92,650.

The total expenditure up to end of December was £59,802.

KHANDRIA POND

The works for this Pond commenced in July 1979 by the Contractor "Cybarco Ltd" The storage capacity of the Pond is 70,000 m^3 and the net area to be irrigated is 100 donums.

The Contractor after the satisfactory completion of the stripping started the excavation for the Pond. The Construction of the embankment started in September 1979 up to end 1979 the excavation was 32,000 m^3 and the fills 36,500 m^3.

The concrete works for diversion weir and the laying of the pipeline were done.

The estimated cost for the whole project was £120,500.

The total expenditure up to end 1979 was £52,768.

Melini Pond

The works for this Pond commenced in November 1979 by the Contractor "Iacovou Brothers". The storage capacity of the Pond is 58,000 m^3 and the net area to be irrigated is 20 donums.

The works executed up to the end of 1979 were: a) Erection of offices b) stripping of permanent works and c) the excavation of the foundations of the embankments.

Distribution system

This work was carried out directly by WDD. It started at 7/11/1979 and 65% of the total work was done.

The estimated cost for this Project was £82,217

The total expenditure up to end 1979 was £11,990

Remarks

All the projects are expected to be completed before end 1980 where the filling of the Ponds could take place during the 1980-1981 rainy season.

MAJOR IRRIGATION WORKS

The 1979 construction programme included 17 major irrigation schemes of a total estimated cost of £356,843.

The overall expenditure incurred during the year reached the amount of £294,392.

Details of all 15 major irrigation schemes included in the 1979 construction programme are given on Table V-9.

WATER SUPPLY SCHEMES TO REFUGEE HOUSING AND SELF-HOUSING ESTATES

As already mentioned in addition to its usual activities the Department during the year under review, had to respond to the urgent demand for the supply of water to refugee housing and self-housing schemes. 79 such schemes of an estimated cost of £555627 were involved 58 of these schemes of an estimated cost of £293768 were related to self-housing and 21 to housing estates of an estimated cost of £261859.

The overall expenditure incurred on the execution of all these schemes during the year reached the amount of £339666.

It should be noted that the Department always dealt with these schemes with the utmost urgency, giving them top priority

over the execution of all other works and this of course caused enormous difficulties having in mind the shortage of skilled and unskilled labour force.

Table V-10 shows in detail all 79 refugee housing schemes undertaken for execution during 1979.

TOWN WATER SUPPLY SCHEMES

During the year the Department had to deal with 12 town water supply schemes of an estimated cost of £764,766.

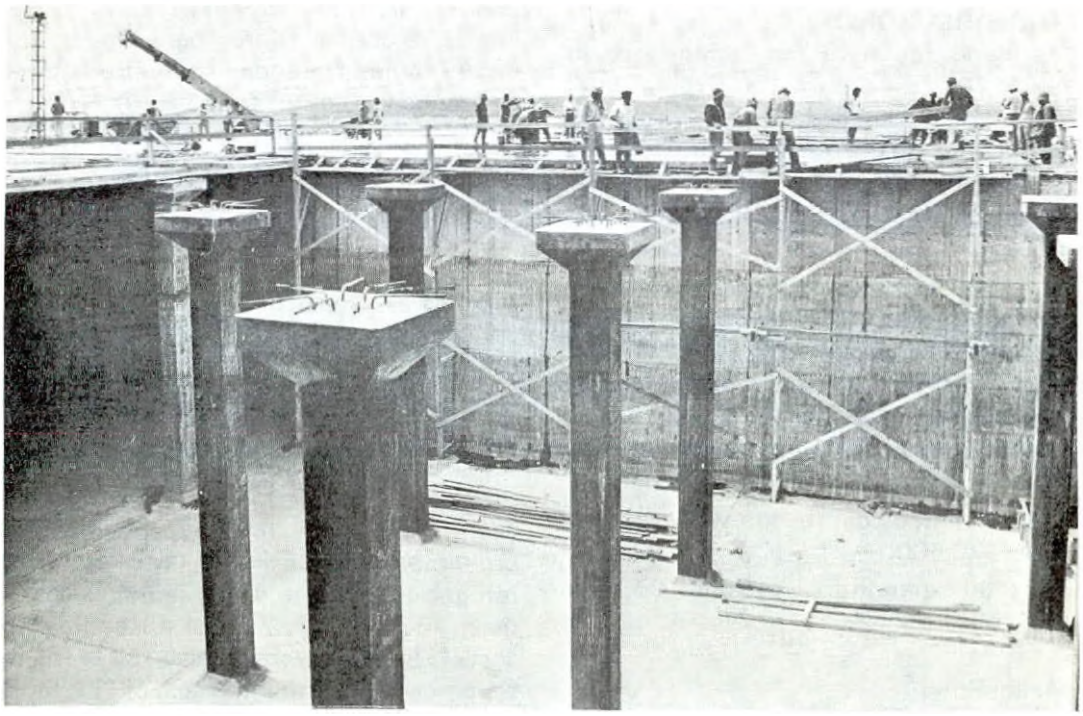
The overall expenditure incurrred on all these schemes during the year reached the amount of £626,208. The biggest expenditure incurred on one project alone was £359,016 on the Nicosia Water Supply from Akaki-Orounda-Peristerona area. A short description of this project is given elsewhere in this report.

A list showing the 10 Town Water Supply Schemes that were undertaken for construction by the Department during the year is given on Table V-11.

SCHEMES UNDERTAKEN FOR CONSTRUCTION FOR OTHER GOVERNMENT DEPARTMENTS

During the year 1979 the Department undertook 38 schemes for construction on behalf of other Government Departments.

The funds were allocated by the Ministry of the Interior, the Ministry of Commerce and Industry, the Ministry of Agriculture,



Work in progress on the new Lakatamia reservoir - Nicosia water supply to receive water from the Vasilikos - Pendaskinos Project. The 40,750 m³ capacity reservoir will be completed by mid 1981.

the Department of Forests the Public Works Department the Ministry of Communications etc.

Table V-12 shows all 38 schemes that were undertaken for execution in 1979.

In total, on all schemes executed for other Departments the expenditure incurred during 1979 reached the amount of £178,726.

New Lakatamia Reservoir

The New Lakatamia Reservoir is the third supplementary reservoir which was proposed in the MacLaren Report for the planning and development of Nicosia water supply in order to meet the present and future demands of the town and suburbs.

It is a reinforced concrete reservoir with free standing cantilivered walls with the roof designed as a flat slab.

The capacity of the New Lakatamia Reservoir is 40750 m^3 and it is expected that the whole project, estimated to cost £680,000 will be completed by the end of 1981.

Work started on the 9th October 1978 and the various stages of construction until the end of the year of 1979 were as follows:-

Mass excavation

About 98% of the whole excavation completed. The total mass excavation is about 30,000 m^3.

Limited space excavation

The limited space excavation mainly carried out by hand and with the use of pneumatic drills and in some cases with digger with stone breaker. Work done until the end of 1979 was about the 60% of the whole work.

Concreting

Structural concrete 1:1.5:3 of total quantity 7520 m^3 started on the 1st February 1979 and until the end of the year of 1979 40% of the whole concreting was done.

Reinforcement

The preparation of steel reinforcement for all items of the project is carried out at the site.

As far as the fixing of the reinforcement is concerned the rate of progress until the end of 1979 can be considered satisfactory.

General Remarks

The overall progress of the works of the New Lakatamia Reservoir until the end of 1979 was satisfactory. About 40% of the actual work has been done. The whole project is anticipated to be completed by the end of 1981.

NICOSIA WATER SUPPLY SUPPLEMENTARY SUPPLY FROM PERISTERONA - AKAKI - OROUNDA TRIANGLE

This scheme was submitted for approval early in February 1979 and was put in land early in May. The chief object of the scheme was the conveyance to Nicosia of about 6000 to 7000 $m^3$3 per day of water from the boreholes drilled in the above area, by the Geological Department and the estimated cost was £580,000.

The scheme was approved to be constructed in two Phases. Phase "A" was the conveyance, the soonest possible an amount of 2500 m^3 of water per day to the Paleometokho existing elevated tank of Nicosia to meet to some extent the acute shortage of water and Phase "B" the laying of the main conveyor from Paleometokho to Engomi reservoir.

The work was put in land at the beginning of May and was executed according to schedule. The 2500 m^3 per day was delivered on the 20th July.

TABLE V–6

RURAL DOMESTIC WATER SUPPLY SCHEMES APPROVED FOR EXECUTION IN 1979

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	NICOSIA DISTRIC			
	a) Carry Over Scheme			
1	Agrokipia. Extensions	3 400	–	Scheme revised
2	Astromeritis. Supplementary supply	950	140	Completed
3	Dhali. Distr.system	5 861	92	Completed
4	Kambi (Pharmakas) storage tank	572	572	Completed
5	Kannavia. Supplementary supply	4 200	–	Scheme revised
6	Klirou Pumping unit	695	274	Completed
7	Laxia–Yeri Improvements	284	153	Completed
8	Paleometokho Storage tank.	3 944	2 014	Completed
9	Peristerona Storage tank.	752	743	Completed
10	Pitsilia Reg. Scheme Part I Supplementary supply	9 000	–	Revised
11	Pitsilia Regional Scheme	8 738	8 738	Village contribution refunded by Govt.
12	Tseri Supplementary supply storage tank & distr. system.	45 756	37 952	In progress
13	Psomolophou New storage tank, distr. system & pumping unit	15 422	13 498	
	b) New Schemes			
14	Anayia storage tank & distr. system	10 000	10 000	Completed
15	Astromerits New storage tank and pumping unit	20 300	–	Scheme rejected
16	Ayii Trimithias Supplementary supply from new borehole	17 000	9 936	In progress
17	Ayios Epiphanios (Orini) Suppliementary supply from new B/H.	11 500	5 922	In progress
18	Piyenia Replace pumping unit	2 200	2 200	Completed
19	Pedhoulas Add expenditure for borehole	196	196	Completed
	Total for Nicosia district	£160 770	£ 92 430	

RURAL DOMESTIC WATER SUPPLY SCHEMES APPROVED FOR EXECUTION IN 1979 (Continued)

Ser.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	LIMASSOL DISTRICT			
	a) Carry Over Scheme			
1	Amathous I B New water supply scheme (Phase A for 1978)	27 787	16 641	In progress
2	Amathus I. B. (Phase B for 1979)	115 000	–	Only £40 000 dedaggered for 1979
3	Episkopi storage tank & distr system	568	290	Completed
4	Moutayaka Regional scheme St. tank & tank main coveyor	1 644	1 664	Completed
5	Pano Platres storage tank, distr. system & supplementary supply	1 570	1 406	Completed
6	Sotira supplementary supply	351	340	Completed
7	Vasa (Kilani) Pumping unit	484	484	Completed
	b) New Schemes			
8	Ayios Tykhonos Extensions	2 400	–	Rejected
9	Yerasa Extensions	450	382	Completed
10	Kolossi–Erimi Extensions	2 000	–	Issue of funds delayed
11	Kouka storage tank & distr. system	3 100	–	Add. funds required
12	Mathikoloni Pumping unit	1 200	471	In progress
13	Palodhia Extensions	250	–	Rejected
14	Paramytha- Palodhia- Spitali. Improvements	1 050	980	Completed
15	Parekklisha	3 400	–	Rejected
16	Phinikaria	450	–	Rejected
17	Panayia tou Glossa Monastery. New supply	3 000	2 781	Completed
	Total for Limassol district	£164 704	£ 25 439	

TABLE V-6

RURAL DOMESTIC WATER SUPPLY SCHEMES APPROVED FOR EXECUTION IN 1979 (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	FAMAGUSTA DISTRICT			
	a) Carry Over Schemes			
1	Dherynia. Improvements to distr. system.. .	5 670	5 525	Completed
2	Paralimni–Ayia Napa. Supplementary supply from F'sta pipeline.	11 678	11 353	Completed
	b) New Schemes			
3	Liopetri. Improvements & extensions of distr. system	5 600	5 102	Completed
4	Paralimni 'Protaras'. New W S scheme for the tourist area	100 000	–	Pending decision by Ministerial Council
5	Ayia Napa. New W S to 'Makrynysos' and 'Ayios Epiphanios'	16 500	–	–do–
	Total Famagusta district.	£139 448	£ 21 980	
	LARNACA DISTRICT			
	a) Carry Over Schemes			
1	Anaphotia Aplanda–Menoyia. Supplementary supply	2 367	608	Completed
2	Xylophagou Supplementary supply	4 000	–	Executed by village
3	Odhou. Supplementary supply.	1 922	228	Balance for compensations
4	Troulli–Kellia. Supplementary supply . . .	26 115	16 872	Completed
5	Kiti–Meneou–Dhromolaxia Perivolia. Supplementary supply	4 984	4 703	Completed
6	Khirokitia. Supplementary supply	1 500	–	Rejected
	b) New Schemes			
7	Kornos	4 000	–	Rejected
8	Layia	3 000	2 123	Completed
9	Ormidhia.	11 500	8 578	In progress
	Total for Larnaca district	£ 59 388	£ 33 112	

RURAL DOMESTIC WATER SUPPLY SCHEMES APPROVED FOR EXECUTION IN 1979 (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	PAPHOS DISTRICT			
	a) Carry Over Schemes			
1	Arminou Regional scheme Improvements.	12 446	1 800	Only £1 800 dedaggered for 1979
2	Kilinia. Supplementary supply from spring.	1 029	115	Completed
3	Kholi. New house—to—house distr. system.	1 147	410	Completed
4	Paphos Lower villages Improvements.	2 549	—	Completed
5	Statos—Ayios Photios. Supplementary supply from spring.	13 691	13 380	Completed
	b) New Schemes			
6	Nata. Supplementary supply from borehole	7 400	6 228	In progress
7	Peristerona. Supplementary supply from borehole	7 800	1 351	In progress
8	Philousa (Kelokedhara). New house—to—house distric. system.	7 445	7 409	Completed
9	Khlorakas. Extensions of distr. system. . . .	6 300	6 300	Completed
	Total for Paphos district.	£ 59 807	£ 36 993	

TABLE V–7

MINOR IRRIGATION SCHEMES APPROVED FOR EXECUTION IN 1979

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	NICOSIA DISTRICT			
	a) Carry Over Schemes			
1	Akaki – Meniko R C C channels	1 803	1 006	Completed
2	Anayia R C C channels	6 900	6 782	Completed
3	Astromeritis R C C channels	3 000	2 977	Completed
4	Dhali R C C channels	7 200	6 654	Completed
5	Evrykhou Phase A, RCC channels	375	375	Completed
6	Kakopetria R C C channels	1 052	1 021	Completed
7	Kaliana 'Neron Tsappas' Phase A. RCC channels	2 603	2 579	Completed
8	Mosphiloti Pumping unit	2 174	1 548	Completed
9	Orounda R C C channels	2 801	–	Completed
10	Orounda 'Maoutsos' pumping scheme & piped distr. systems	9 976	9 895	Completed
11	Pera (Orini) 'Vyzakia' Pumping scheme & piped distr. systems	149	78	Completed
12	Pedhieos River Recharge–works near Anayia–Psomolophou. Two gabions weirs	14 991	12 996	Completed
13	Yialias River Recharge works near Potamia	2 340	2 332	Completed
14	Moutoullas Phase A storage tank & piped distr. system.	736	736	Completed
	b) New Schemes			
	(i) Pumping Schemes			
15	Yerakies 'Xeros' Phase A Weir storage tanks, Pumping unit & piped distr. system.	30 000	65	Scheme to be revised
16	Kambos 'Kameno Pedhi' Pumping unit. & distr. system.	20 000	4 044	In progress
17	Orounda 'Limni' Pumping scheme & piped distr. system.	13 600	7 827	In progress
18	Chakistra 'Yephiri' - 'Mavres Sykies' Phase A Weir, storage tanks, Pumping unit & distr. system	20 000	9 801	In progress
	(ii) Minor Irrigation Schemes			
19	Akaki–Meniko 'Riatiko' R C C channels	8 000	6 886	In progress
20	Astromeritis R C C channels	10 000	8 153	Completed
21	Ayios Ioannis (Malounda) 'Pitsillia' Main conveyor	6 000	2 128	In progress
22	Evrykhou Phase B Lining of channels	11 000	11 000	Completed
23	Evrykhou–Phlasou–Korakou 'Kousouliotis' R C C channels	12 000	12 000	Completed

MINOR IRRIGATION SCHEMES APPROVED FOR EXECUTION IN 1979 (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
24	Kaliana 'Neron Tsappas' Phase B R C C channels	2 000	2 000	Completed
25	Kakopetria Phase B R C C channels	2 000	2 000	Completed
26	Meniko 'Litharkies' R C C channels	4 000	12	Scheme to be started soon
27	Moutoullas Phase B storage tank, & piped distr. system	1 700	1 112	In progress
28	Peristerona R C C channels	10 000	9 142	Completed
29	Pera (Orini) 'Phassera' R C C channels	16 000	–	Scheme to be revised
30	Phlasou–Katydhata 'Karydhis'	16 000	5 981	In progress
31	Vyzakia R C C channels	1 050	974	Completed
32	Pedhoulas	513	513	Completed
	(iii) Recharge Schemes			
33	Ayii Trimithias–Paleometokho–Recharge gabions	8 035	6 956	Completed
34	Peristerona Recharge gabions	33 888	19 416	In progress
	Total for Nicosia district	£281 886	£158 989	
	LIMASSOL DISTRICT			
	a) Carry Over Schemes			
1	Agros 'Anastashia' Piped distr. systems	580	–	Completed
2	Ayios Ioannis (Agros) 'Teratsia' piped distr. system	563	497	Completed
3	Mandria 'Mylaris' storage tank	400	400	Completed
4	Pera Pedhi Lining of channels	1 696	1 001	Completed
5	Prodhromos 'Kyparissi' storage tank	1 632	–	Pending
6	Trimilini 'Fraktis' Intake pipe	1 100	–	
	b) New Schemes			
7	Kolossi	600	–	Rejected
8	Tris Elies 'Kaminoudhi' piped distr. system	5 700	5 544	In progress
9	Ayios Theodoros (Agros) 'Kouphes' piped distr. system	455	–	Scheme will be revised
	Total for Limassol district	£ 12 726	£ 7 442	

TABLE V-7

MINOR IRRIGATION SCHEMES APPROVED FOR EXECUTION IN 1979 (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
LARNACA DISTRICT				
	b) New Schemes			
1	Alaminos 'Latourou' Recharge works	23 000	–	Rejected
2	Khirokitia 'Anefantis' Pumping scheme & distr. system	3 344	3 344	Completed
3	Kalavasos Vasilikos River Recharge gabions	3 000	2 932	Completed
	Total for Larnaca district	£ 29 344	£ 6 276	
PAPHOS DISTRICT				
	a) Carry Over Schemes			
1	Polis (Khrysokhou) Pumping scheme & piped distr. system.	1 698	286	Completed
2	Yialia – Ayia Marina Piped distr. system with A C pipes 8" & 12"	43 600	26 782	In progress
	b) New Schemes			
3	Anarita (Phase A & B) Pumping scheme.	30 000	–	Rejected
4	Paphos Lower Villages Kissonerga.	12 288	12 274	Completed
	Total for Paphos district	£ 87 586	£ 39 342	

TABLE V–8

PITSILIA INTERGRATED RURAL DEVELOPMENT PROJECTS

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	a) Carry Over Schemes			
	i) Water Supply Schemes			
1	Kambi (Pharmakas)	1 650	1 431	Completed
2	Kyperounda	18 000	17 357	In progress
	ii) Irrigation Rehabilitation Schemes			
1	Agros 'K. Taliou' spring	4 100	3 993	Completed
2	Agros 'Kaouros' spring	1 600	1 578	Completed
3	Agros 'Pano Lambadha' spring	980	975	Completed

PITSILIA INTERGRATED RURAL DEVELOPMENT PROJECTS (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
4	Askas 'Themelios' spring	3 600	3 483	Completed
5	Ayios Ioannis–Kato Mylos 'Angoulos –Dhymotamia' Diversion and reservoirs & distr. system	27 700	13 474	In progress
6	Kambi–(Pharmakas) 'Kokkinoyia'–'Pera' 'Perivolia' & 'Yerambela'	15 000	7 047	In progress
	b) New Schemes			
	i) Water Supply Schemes			
7	Zoopiyi Extensions to existing system	1 000	756	In progress
	ii) Irrigation Rehabilitation Schemes			
8	Kyperounda 'Appis'–'Avlaki tous Palazides' springs. Improvements to existing distr. system	2 500	1 927	In progress
9	Kyperounda 'Klima' springs	1 000	929	Completed
10	Khandria 'Panayia' springs	1 200	993	In progress
11	Agridhia 'P & K. Leftina'	9 300	6 606	In progress
12	Ayios Ioannis 'Yerambelos' springs	4 250	2 795	In progress
13	Odhou–Springs	2 250	1 453	In progress
14	Pelendria 'Potamoulia' Springs	3 300	2 977	In progress
	c) Pond & borehole schemes			
1	Ephatagonia scheme			
	i) Pond	51 100	59 902	Revoted for completion
	ii) Distribution system	14 355		
2	Pelendria scheme			
	i) Pond	106 145	65 707	In progress
3	Khandria scheme			
	i) Pond	55 500	52 768	In progress
4	Ayii Vavatsinias scheme			
	Distribution system	26 000	9 726	In progress
5	Melini scheme			
	i) Pond	15 000	2 932	In progress
	ii) Distribution system	15 000	9 058	In progress
6	Kalokhorio B H scheme	22 500	12 996	In progress
7	Ayios Ioannis (Agros)			
	Operation of pump expenses	392	232	Completed
8	Purchase of pumping units	6 120	3 684	Completed
9	Purchase of membrane	37 000	36 237	Completed
10	Test pumping	18 000	12 871	In progress
11	Xyliatos Dam	7 000	4 418	In progress
	Total	£471 542	£338 305	

TABLE V–9

MAJOR IRRIGATION SCHEMES UNDETAKEN FOR EXECUTION IN 1979

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
1	YERMASOYIA–POLEMIDHIA PROJECT			
	i) Yermasoyia Irrigation Division			
	Extensions of distrib. system	18 200	17 856	Completed
	ii) Polemidhia Dam			
	Extensions of distr. system	55 000	53 045	Completed
	iii) Polemidhia Dam			
	Compensations	1 513	1 513	Completed
	iv) Yermasoyia–Akrounda			
	Phinikaria distrib. system	800	680	Completed
	v) Trakhoni–Ypsonas			
	Extension & distr. system	44 409	35 662	Completed
	vi) Ayios Nikolaos extension			
	of distr. system	12 000	9 208	Completed
2	Masari Dam compensation	695	695	Completed
3	Lefkara Dam distribution system	400	108	Completed
4	Mavrokolympbos Dam Phase III Lemba & Khlorakas			
	distr. system	6 000	–	Work suspended
5	Lymbia Dam	3 216	30	Completed
6	Pissouri Irrigation distr. system	78 000	76 344	In progress
7	Pakhyammos Irrig. Scheme and piped distr. system	16 610	16 610	
8	Vasilikos–Pendaskinos			
	i) Ayios Theodhoros pumping scheme & distrib.			
	system	40 000	29 774	In progress
	ii) Kalavasos	20 000	–	Pending
	New Schemes			
	Khrysokhou Valley	60 000	52 867	In progress
	Total	£356 843	£294 392	

TABLE V–10

WATER SUPPLY SCHEMES TO REFUGEE HOUSING AND SELF HOUSING ESTATES

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
A. REFUGEE HOUSING ESTATES				
1	Ayios Mamas at (Kato Lakatamia)	11 059	3 468	Completed
2	Anthoupolis (Pano Lakatamia)	8 477	9 240	Completed
3	Platy I (Eylenja)	15 313	9 342	Completed
4	Platy II (")	9 000	7 177	Completed
5	Ayios Yeoryios (Pallouriotissa)	3 120	2 544	Completed
6	Ayia Varvara (Pallouritissa)	4 134	2 244	Completed
7	Athalassa	21 800	1 460	In progress
8	Kokkines (Strovolos)	50 000	10 350	In progress
9	Laxia	2 500		
10	Strovolos III	5 318	250	Completed
11	Ayios Nikolaos (Pallouriotissa)	61	188	"
12	Linopetra (Ayios Athanasios Limassol)	21 000	19 175	
13	Ayia Napa (Famagusta)	990	302	Completed
14	Kapsalos (Limassol)	35 635	12 954	
15	Ayios Ioannis (Limassol)	13 100	2 432	
16	Ayios Yeoryhios (Limassol)	3 678	—	
17	Ayii Anargyri II (Larnaca)	18 000	13 183	In progress
18	Zyyi (Larnaca)	19 674	13 472	"
19	Kamares II (Larnaca)	1 000	676	"
20	Makarios III (Larnaca)	16 000	15 139	"
21	Kophinou (Larnaca)	2 000	1 500	In progress
	Total	£261 859	£125 096	
B. REFUGEE SELF–HOUSING ESTATES				
	(i) Nicosia District			
1	Agrokipia "A"	4 557	3 703	In progress
2	Akaki "C"	4 955	1 420	In progress
3	Akaki "D"	103	107	Completed
4	Astromeritis "B"	3 850	3 923	In progress
5	Kokkini Trimithia "B"	7 910	108	Completed
6	Kokkini Trimithia	4 474	169	In progress
7	Ayii Trimithias "B"	4 853	4 659	Completed
8	Paleometokho "B"	770	145	In progress
9	Peristerona "D"	1 199	895	In progress
10	Meniko "A"	240	57	Completed

TABLE V-10

WATER SUPPLY SCHEMES TO REFUGEE HOUSING AND SELF HOUSING ESTATES (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
11	Tseri "B"	623	418	Completed
12	Tseri "C"	5 968	5 946	In progress
13	Tseri "D"	1 150	617	Completed
14	Aredhiou "C"	368	57	Completed
15	Aredhiou "B"	1 138	980	Completed
16	Klirou "A"	2 019	1 932	Completed
17	Laxia "B"	544	364	Completed
18	Yeri "B"	5 100	3 749	Completed
19	Yeri "C" & "D"	3 333	2 692	In progress
20	Yeri "A"	433	351	Completed
21	Perakhorio "A" & "B"	495	356	Completed
22	Perakhorio "C"	3 892	3 717	Completed
	Total	£ 57 974	£ 36 365	

(ii) Larnaca district

1	Pervolia "B"	1 067	604	Completed
2	Dhromolaxia "C"	1 747	963	Completed
3	Dhromolaxia "D"	9 363	5 274	Completed
4	Voroklini "B"	1 036	240	Completed
5	Xylophagou "D"	2 170	396	Completed
6	Anglisidhes "B"	1 543	692	Completed
7	Kophinou "B" & "A"	6 443	2 011	Completed
8	Kalokhorio (L'ca)	1 803	1 447	Completed
9	Kalokhorio (L'ca)	1 000	61	Completed
10	Livadhia "C"	1 877	592	Completed
11	Livadhia "D"	4 936	4 227	Completed
12	Meneou "A"	15 000	6 034	In progress
13	Ormidhia "A"	25	23	–
14	Kiti "C"	1 059	75	Completed
	Total	£ 49 069	£ 22 639	

WATER SUPPLY SCHEMES TO REFUGEE HOUSING AND SELF HOUSING ESTATES (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	(iii) Famagusta District			
1	Dherinia "A"	3 286	2 909	Completed
2	" "B"	7 601	7 245	"
3	Sotera "A"	15	3	"
4	Sotera "B"	15	3	"
5	Sotera "C"	1 138	176	"
6	Liopetri "C"	75	30	–
7	Phrenaros "B"	15	3	Completed
8	Vrysoulles "C"	349	84	"
9	Vrysoulles "B"	30	11	"
10	Avgorou "E"	105	200	"
	Total	£ 12 629	£ 10 664	
	(IV) Limassol district			
1	Kolossi "B"	4 722	3 731	Completed
2	Episkopi "A"	200	183	Completed
3	Episkopi "B"	1 570	197	
4	Moutayiaka "A"	2 379	2 233	Completed
5	Trakhoni "B"	36 603	34 334	In progress
6	P. Polemidhia "C"	49 536	48 165	In progress
7	Ay. Phyla "A"	34 207	14 784	In progress
8	Kolosssi "D"	29 340	29 054	Completed
9	Trakhoni	482	498	Completed
10	Pano Polemidhia "A"	1 254	1 001	Completed
11	Pano Polemidhia "B"	1 438	1 208	"
12	Kato Polemidhia "A"	12 365	9 514	"
	Total	£174 096	£144 902	

SUMMARY OF ALL DISTRICTS

1	Housing Estates		
(i)	Nicosia District	261 859	125 096
2	Self Housing Estates	57 974	36 365
(i)	Nicosia Distric		
(ii)	Larnaca District	49 069	22 639
(iii)	Famagusta District	12 629	10 664
(iv)	Limassol District	174 096	144 902
	Total	£555 527	£339 666

TABLE V–11

TOWN WATER SUPPLY SCHEMES UNDERTAKEN FOR EXECUTION IN 1979

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £	Remarks
	A. NICOSIA WATER SUPPLY			
1	Lakamatia Reservoir	245 558	239 304	In progress
2	Peristerona Akaki–Oround Phase A (Supplementary Supply for Nicosia from 7 B/Hs located at – Peristerona–Akaki–Orounda. Phase A includes pumping mains from B/Hs and pumping main up to Paleometokho elevated balancing tank with 350 mm dia. class "B"& "C" pipe)	250 000	243 520	In progress
3	Peristerona–Akaki–Orounda Phase B (Main conveyor from Paleometockho to Engomi reservoir with 300 mm dia–pipe)	150 000	115 496	In progress
4	Vasilikos–Pendaskinos Phase A	15 500	1 242	In progress
5	Supplementary supply from borehole 48/78 (Nicosia Airport)	4 000	2 786	Completed
6	Supplementary supply from Kokkini Trimithia B/H 2/76	6 000	1 442	Completed
7	Supplementary supply from Tseri B/H 46/78	2 300	1 578	Completed
8	Supplementary supply from Tseri B/Hs 39/73 & 88/75	8 000	7 807	Completed
9	Supplementary supply from Kokkini Trimithia B/H 91/78	9 000	5 085	Completed
10	Nicosia Water Board. . . . . (from deposits) (Strovolos reservoir – old mental Hospital main conveyor)	9 951	5 171	Completed

TOWN WATER SUPPLY SCHEMES UNDERTAKEN FOR EXECUTION IN 1979 (Continued)

No.	Description	Amount allocated for 1979 £	Expenditure incrurred in 1979 £	Remarks
B. PAPHOS WATER SUPPLY				
1	Paphos Town	45 000	1 657	In progress
C	LARNACA W S			
1	Larnaca Water Board (from deposits)	1 457	1 120	Completed
	Totals	£764 766	£626 208	

TABLE V–12

SCHEMES UNDERTAKEN FOR CONSTRUCTION FOR OTHER GOVERNMENT DEPARTMENTS

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £
1	Akaki livestock area W S	13 668	12 426
2	Akhna livestock area W S	733	686
3	Athalassa livestock area W S	3 800	3 413
4	Xylotymbou livestock area W S	12 000	5 805
5	Kandou livestock area W S	3 300	1 813
6	Strovolos Industrial area W S	6 250	3 553
7	Ayios Athanasios Indust. area W S	30 807	13 662
8	Saittas–Karvounas road	19 800	13 788
9	Clearing of T/C B.Hs	1 200	830
10	Paramali W S	3 800	2 405
11	Klavdhia W S	250	224
12	Margi W S	200	205
13	Potamos tis Yermasoyias W S.	800	753
14	Akhna forest W S	1 854	1 769
15	Pano Polemidhia livestock area W S	16 000	11 335

TABLE V-12

SCHEMES UNDERTAKEN FOR CONSTRUCTION FOR OTHER GOVERNMENT DEPARTMENTS. (Continued)

Ser. No.	Description	Amount allocated for 1979 £	Expenditure incurred in 1979 £
16	Pera Pedhi W S	1 480	1 131
17	Peristerona W S	2 940	2 395
18	Kophinou Livestock area W S	13 500	11 950
19	Dhromolaxia Livestock area W S	22 000	6 543
20	Anglisidhes livestock area W S	450	412
21	Aredhiou W S	1 800	782
22	T/C villages W S	3 000	1 563
23	Meniko Livestock area W S	2 500	1 768
24	P. Polemidhia livestock area W S.	10 825	6 610
25	Astromeritis W S	1 500	933
26	New Paralimni Hospital W S	4 300	3 528
27	Peristerona W S	500	427
28	Pano Polemidhia Livestock Area W S.	6 000	4 203
29	Kellia W S	5 000	4 217
30	Theletra W S.	15 198	15 198
31	Menoyia—Anaphotia W S	450	346
32	Aplanda W S.	390	293
33	Palodhia—Paramytha, Spitali W S	525	490
34	New Nicosia—L/sol road	12 000	11 997
35	Tsirion stadium investigation	1 040	526
36	New Nicosia—L/sol road	23 000	22 071
37	New Lambousa reform school	9 494	5 799
38	New Larnaca Hospital	2 000	465
39	School for retarted children.	3 949	2 412
	Total.	£258 303	£178 726

V/1 PAPHOS IRRIGATION PROJECT

by
K Spanos
Executive Engineer I
Deputy Project Manager

General

As it has been scheduled during the year 1979 the first irrigation supplies were distributed from the Project works to the farmers of the Eastern Area of the Project. This has been possible after the completion of the well pump installation, of the construction of the Wellfield Conveyance System and of the Main Canal. Altogether about 3 MCM of water were pumped from the 20 completed project boreholes into the Main Canal most of which were used by the farmers for irrigation purposes directly from the Canal and some small quantities were supplied to the industries of Cooperative in the Anatolikon and to the Contractor for testing the pipes laid for the Irrigation Network of the Eastern Area.

From the 7 contracts which were in progress during the year 1979 only 3 were fully completed within the same year while the remaining were continued into the following year as shown on the progress chart on page .... A brief description of the works carried out under each contract is given under the next heading.

The 1979 Development Estimates provisions for the Paphos Irrigation Project amounted to £4,700,000 plus an additional amount of £1,896,321 for which a special warrant was issued at the end of the year.

For the supervision of the execution of the contract works the following number of staff were occupied at the end of the year 1979.

Technical Staff	Administrative Staff
1 Executive Engineer I, Project Manager	1 Administrative Officer
1 Executive Engineer I, DPM	1 Accounting Officer
3 Executive Engineers II, (monthly)	3 Clerical Assistants
3 Executive Engineer II, (daily or contract)	2 Secretary - typists
3 Technical Assistants (monthly)	1 Telephonist
18 Technical Assistants (daily)	2 Messengers
4 Surveyors	10 No. total administrative staff
2 Ass. Chief Foremen	
5 Draughtsmen	
3 Foremen	
43 No. total technical staff	

In addition to the above staff the services of 2 F.A.O. Experts were utilised as well as of 3 expatriate Civil Engineers from the Consultants who were assisting the work of the 2 Resident Engineers.

PAPHOS IRRIGATION PROJECT

PROGRESS CHART FOR WORKS UNDER CONTRACT

10 20 30 40 %
Scheduled
10 20 30 40 %
Actual Progress

LOT No	DESCRIPTION OF WORKS	CONTRACT SUM	GROSS PAYMENT TO DATE
		£	£
S 20 S 21 S 22	Supply of Laboratory Equipment Survey Equipment and Vehicles	66,602	67,083
D 1	Drilling, Casing, Testing of B. Hs.	82,000	81,914
1 C 1 S	Main Canal Construction	992,826	904,829 *
2	Supply and installation of Well Pumps	142,372	131,820
	SUPPLIES FOR WELLFIELD CONVEYANCE SYSTEM		
3 S1	1 Canaletti	66,850	59,272
3 S2 3 S3	2 A.C. Pipes with Fittings and Valves	208,402	216,534
4 C1 & 4 C2	Installation of Wellfield Conveyance System and Eastern Main Pipeline	162,889	238,000
6 C	Main Contract—Supply and Installation of Pumping Stations Western Conveyor and Remote Indication	2,606,603	2,220,000 *
	SUPPLIES FOR DISTRIBUTION NETWORK OF EASTERN AREA		
S 51	1 A.C. Pipes and Fittings	1,267,257	1,199,562
S 52	2 Valves	113,868	70,151
S 53	3 Hydrants	251,052	242,321
7 C1 7 C2	Installation of Irrigation Network and Construction of Reservoirs for Eastern Area	1,640,984	1,065,000 *
10	Central Offices Temporary Buildings	40,413 (31,185)	71,598
12	ASPROKREMMOS DAM		
	1 Dam Construction	6,743,837	3,420,114 *

Note * Including adjustment of cost due to variation of prices

Months Year

1977 1978 1979 Reporting Period 1980

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

PROGRESS OF WORKS

During the year 1979 works for 7 Contracts were continued from the previous year of which 3 were completed during the reporting period.

Details on each one of them is given herebelow:

1 Supply and Installation of Well Pumps. Contract No S1 39/76/28

In the year 1979 the Contractor Caramondani Bros Ltd proceeded mainly with the testing of the 20 submersible electrical pumps and their hydraulic equipment which were all installed during the previous year. The results of the testing were generally satisfactory. Most of the flow regulators had to be adjusted in order to minimise friction losses through the delivery pipe so that the required yields could be obtained from the boreholes. Most of the well pumps were commissioned to WDD before May 1979 so that the 1st phase of the Project became operational on temporary basis by filling the Main Canal with water from the boreholes so that a lot of farmers in the Eastern Area could irrigate their fields. The water supplies were estimated on the basis of the irrigated areas and crops and the water charges were fixed at 15 mils/cubic meter.

The total quantities of the water pumped into the Canal from the boreholes during the period May-November 1979 was about 3.0 million cubic meters. Some problems, however, were encountered with most of the wells due to the very low water tables in the river gravels and hence in order to secure the maximum possible utilisation of the ground water resources it was decided to lower the well pumps to the lowest possible level in the boreholes before the next irrigation season.

For his work during the year 1979 the Contractor had received payment amounting to a total of £43,299 bringing the total payments up to the end of the year to £131,819 as compared to the contract sum of £142,372. The reason for the difference being that 3 of the Project boreholes were not equippedas they were still utilised by the Agriculture Department.

2 Installation of Wellfield Conveyance System and Eastern Main Pipeline. Contract No. C1 39/76/27

The works for the above contract were continued from the previous year by the Construction Section of the Water Development Department and were finally completed by the end of the reporting year. The canalletti flumes and their structures in Dhiarizos valley were completed by the end of March 1979 so that supplies for irrigation from the Dhiarizos boreholes were possible from the beginning of the irrigation season. Construction works were then concentrated on the canalletti of the Ezousas river which was completed and put in operation as well in July 1979.

In all about 7.5 km of canalletti from R45 to R80 size have been installed, 1.5 km open rectangular concrete canal has been constructed, about 14.4 km of A C pipes from 200 to 800 mm dia have been laid and about 720 m^3 of concrete class 350/25 for structures have been poured.

The total expenditure for the Installation of Wellfield Conveyance System Lot 4C1 and Lot 4C2 had reached the amount of £251,939 out of which £17,680 was spent by the ASPEM Construction Co. before its forfeiture and the remaining £234,259 was spent by the Construction Section of WDD. From this amount the sum of £125,062 was spent during the year 1979.

3 Supplies for Wellfield Conveyance System - Lot 351 Canalletti

The supply of the canalletti with their necessary cradles, footings and supports by the suppliers J & P Ltd was continued and completed in 1979. The quality of the canalletti and cradles was improved following a modification on their design by the manufacturer. In total 8,025 meters of canallettei type R45, R50, R60 and R80 were delivered with all their necessary appurtenance by the supplier of total value of £56,579.

4 Installation of Irrigation Network and Construction or Reservoirs for Eastern Sectorss. Contract No. C7 39/77/38-39.

The works for the above contract which were undertaken by the French Contractor SOCEA and started in October 1978 were continued through the whole of the year 1979. The total length of the A C pipes of variable diameters from 80 mm to 600 mm, to be laid under this contract was reduced from the original 450 km to 385 km as a result of excluding from irrigation the new areas intended for touristic development and the future Paphos Port in Timi. In order to achieve completion of the pipe laying as originally planned i.e. by the end of the year 1979 the Contractor had to lay in trench about 30 km of pipes every month. Due to unforseen difficulties, however, especially at the beginning of the works, the Contractor's output was generally lower than the expected one and by the end of December 1979 the total length of pipes laid in the trench was 327 km which represents about 85% of the total quantity and this work fell behing schedule by about 3 months. The Sectors over which pipe laying was substantially completed by the end of the year were Akhelia, Kouklia East, Kouklia West, Koloni, Yeroskipos and Paphos while the Sectors of Timi, Mandria and Ayia Varvara were delaid and expected to be completed by the middle of 1980. The major plant of the

Construction of elevated reservoir in eastern area of Paphos Irrigation Project in progress. Water will be pumped into these reservoirs from the 11.5 km main cannal and from there it will feed the irrigation networks of the valley.

Contractor engaged for this work included the following machinery. One trenching machine, ten JCB back hoe diggers, one Pocluin excavator one Schwing excavator and two cranes. The quality of the pipelaying work was generally good.

The work of constructing the 6 balancing reservoirs and one storage reservoir which are included in the same contract, were subcontructed by SOCEA to the local Contractor HARCON Co Ltd. The progress on this work has been always

slower than planned due to poor working methods for the construction and inadequate number of employed manpower.

By the end of the year 1979 the total delay on the reservoir construction was estimated at 6 months. Altogether one storage reservoir in Ayia Varvara and 3 ground balancing reservoirs in Akhelia, Kouklia East and Koklia West were substantially completed. The 3 elevated balancing reservoirs in Timi, Koloni and Yeroskipos, were completed only by about 75% and no work was started for Mandria ground reservoir. The total quantities of concrete poured for the above reservoirs up to the end of the year 1979 were 550 cubic meters of class 300/25. The final quality of the work was good.

Up to the end of the year 1979 the Contractor has been paid a total amount of £1,073,665 for the installation and construction works he carried out, excluding the supply cost for A.C. pipes, fittings, valves and hydrants.

5 Supplies for Irrigation Networks of Eastern Area

5.1 Lot 5S1 Supply of Pipes and Special Pieces. Contract No. 551 39/77/31

The supplier for the above contract "The Cyprus Pipes Industry Ltd" continued from the previous year to deliver at the site storage yards of the Project the asbestos cement pipes and cast iron fittings required for the irrigation networks of the eastern area.

Problems with regard to the delivery of the pipes and fittings on time so that to avoid disruption of the installation works were faced during the first six months of the reporting year. Particular problems were faced with the cast iron fittings. Their shipment was constantly behing schedule and many of the delivered ones had to be rejected by the WDD inspectors for having cracks or pinholes. In order to reduce disruption of the laying works efforts were made by CPI to replace with steel pieces the rejected fittings or to repair some of them by welding. The delivery of the AC pipes which were manufactured by CPI except the 450 mm and 80 mm was generally within the schedule with the exception of one occasion during the month of May when the manufacturers could not meet their obligations and in order to avoid stoppage of the laying works about 22 km of pipes 100 mm dia were imported from Greece to compensate for the limited capacity of their factory in Cyprus. The delivery of the 80 mm dia and 450 mm dia which were manufactured by Hellenit of Greece was always on schedule. The quality of all the AC pipes delivered to the Project was generally quite good and the percentage of their failures during the pressure test in the trench was below the anticipated limit of 1%.

Nearly all the supplies of the above contract were delivered by CPI and checked and accepted by WDD before the end of the year 1979. In total the amount of £1,235,969 was paid to the supplier up to the end of the year 1979. Quite a large amount of pipes and fittings supplied for the eastern area is expected to remain in excess due to the reduction of the irrigated areas and hence they will have to be transported to the western area which will follow with installation of its irrigation network within the years 1980/1981.

5.2 Lot 5s2 Supply of Valves. Contract No S5-2 39/77/32

The first shipment of 500 valves 80 mm dia from the manufacturers UPADAYA of India was delivered to the laying Contractor by his subcontractor for the above supplies Caramondani Bros Ltd in

February 1979 which was about 3 months behind the delivery schedule. Delivery of the remaining valves which included another 6,500 units of 80 mm dia continnued at very slow rate due to serious problems faced by the Indian manufacturers as a result of big floods and power cuts in West Bengal. In order to be able to complete the supply of 80 mm dia valves the Sub-Contractor made arrangements to import some quantities from Greece as well which unfortunately could not solve the problem entirely either due to a complete closing down of the factory Chytiria Volou. Finally by the end of the year1979 Caramondani Brow Ltd managed to deliver about 4,000 valves and a balance of about 3,300 units were still to be delivered. Due to the shortage of supplies many of the farm rises with valves 80 mm dia could not be installed by the laying Contractor SOCEA and left behind for completion at a late time. The total amount paid for the delivery of valves up to the end of the year 1979 was £70,151 which is only 62% as compared to the £113,868 of the total contract sum.

Typical dual outlet farma nydrant of the Paphos Irrigation project.

5.3 Lot 5S3 Supply of Hydrants. Contract No S5-3 39/77/33

The supply of Hydrants to the laying Contractor by his Sub-Contractor Neophytos Demetriou was continued from the previous year and was always ahead of the delivery schedule. In fact by the end of Jannuary deliveries were substantially completed so that no problems were encountered with the progress of the installation works. Total payments to the Sub-Contractor for the above work reached the amount of £242,322.

6 Main Contract:

Construction of pumping stations and western conveyor. Contract No 6C 39/77/37

Detailed description of the works involved in the above contract was given in the annual report of the year 1978. Execution of the works was subcontracted by the main contractor COSTAIN Civil Engineering Ltd to the following three companies: (1) FYSKO Co. Ltd for the civil works of the Pump Houses and other structures, (2) "Worthington Simpson Ltd" for the supply and intallation of the electromechanical equipment, and (3) SOCEA for the installation of the Western Conveyor. The following progress has been achieved by each of the above subcontractors during the reporting year.

Civil Works

The civil works of the pump houses of Kouklia East, Kouklia West and Akhelia were nearly completed although according to the revised program of the contractor they should have been completed by the end of August 1979. A lot of the finishing work on these houses were still uncomplete by the end of the year, like painting work, doors and

windows, sanitary fittings, roofing, land scaping and fencing. The delay on these stations by the end of the year was about 8 to 9 months.

The pump houses of Mandria, Timi and Koloni were by the end of the year 1979 complete up to the concrete work of their skeleton while blockwork, plastering and installation of doors and windows were in progress. Although according to the revised program of the Contractor these stations were to be completed in the beginning of the year 1980 the total delay on the civil works in December 1979 were estimated at about 7 months.

The civil works of the Main Pumping Station and of Ayia Varvara were also advanced as far as the reinforcedconcrete of the major structures. In the revised program of the Contractor the completion of these two stations was scheduled in June 1980 and March 1980 respectively.

As far as the western area the sub-contractor proceeded only with the excavation of the pump houses of Kissonerga, Emba North and Emba South before the end of the year 1979. No work was started on the three extension pumping stations for Mandria, Koloni and Kissonerga sectors.

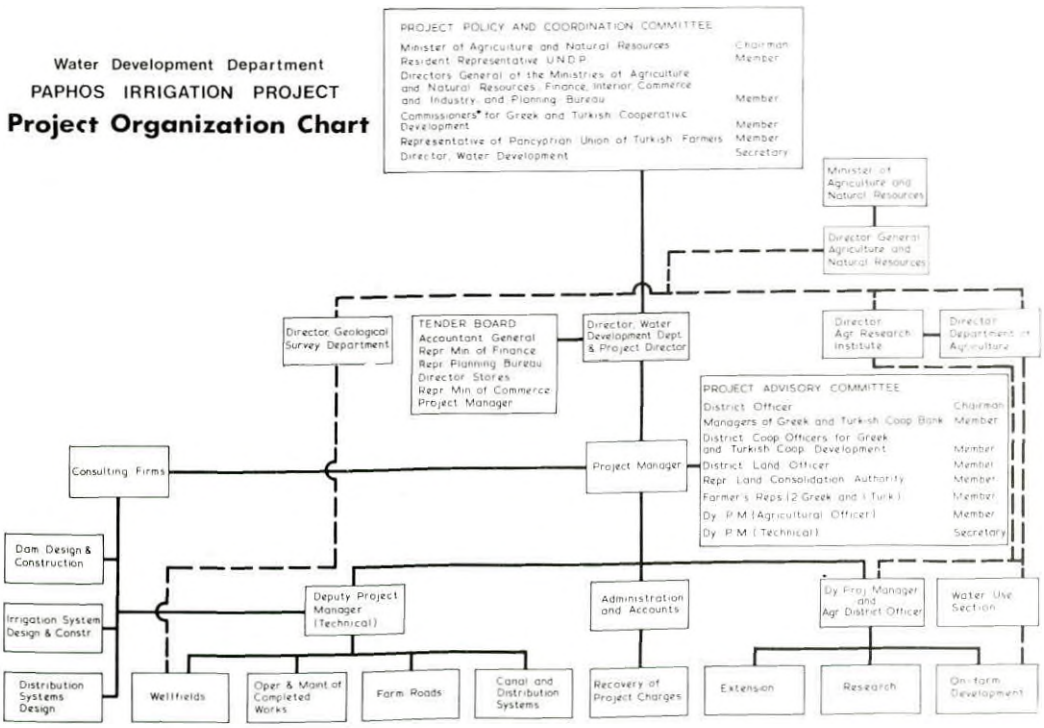
With regard to the quality of the work by FYSKO Co., in many occassions it could not meet the specification requirements and the Resident Engineer had to give many instructions to the Contractor in order to remedy the situation. Generally the works quality was described as average.

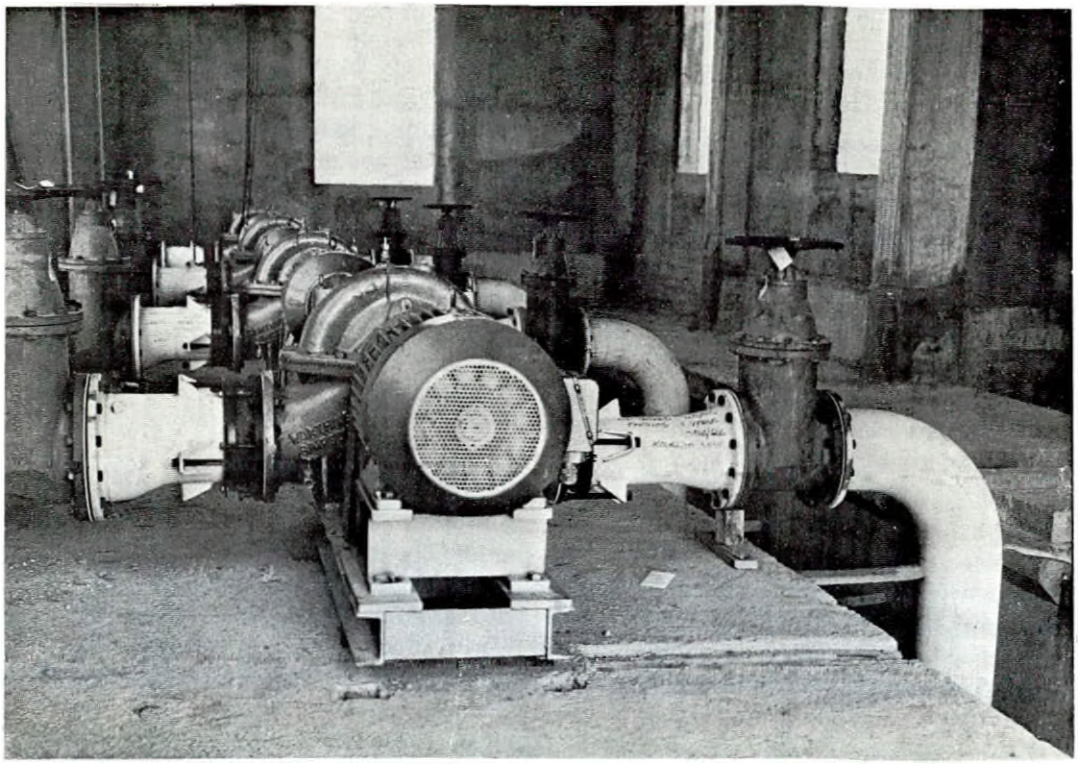
The main reasons for the slow progress in the civil works of the pumping stations and their average quality were the lack of proper site supervision and control by the Main Contractor as well as due to unexperienced site management and

Water Development Department

PAPHOS IRRIGATION PROJECT

Project Organization Chart





Kouklia West pumping station under construction.

supervision and lack of skilled labourers from the sub-contractor's site.

Electromechanical Work:

During the year 1979 the electromechanical equipment of Kouklia East, Kouklia West and Akhelia were supplied and installed except the final cable connections. Testing of the above work was scheduled for the beginning of 1980. The shipment and delivery to site of many of the electromechanical equipment of the remaining pumping stations was also in progress by the end of the year 1979. Some delays were noted also in this work due to strikes in U.K. which affected manufacturing of the equipment as well as their transport and shipment. The quality of the work by Worthington Simpson was generally good.

Western Conveyor

The delivery to the site of the ductile iron pipes of the Western Conveyor from Pont-a-Mousson of France of 900mm dia, 800mm and 700mm dia. started in February 1979 and was nearly completed by the end March 1979. In total about 16.5 km were delivered and stored in five different storage yards located along the route of the Western Conveyor. The supply of the remaining 5.5 km of pipes which are of Asbestos Cement 500 and 400mm dia. was undertaken by the Cyprus Pipes Industry Ltd and was nearly completed by the end of the year 1979. The installation of the Western Conveyor was subcontracted to the French Company SOCEA which had already on the site all necessary plant and experienced staff for this work. Survey

work for the verification of the Conveyor's alignment started in March 1979 and trench excavation works followed in May 1979. By the end of the year 1979 about 17.4 km of trenches have been excavated which represented about 77% of the total length. This work was a little behind schedule (about 3 weeks) mainly because of much larger quantity of hard rock excavations than anticipated. Pipe laying work started in June 1979 and followed very closely the trench opening. By the end of the year about 15.3 km of ductile iron pipes and 780 m of AC pipes were installed. Out

Installation of the western conveyor ductile iron pipes in progress.

of this length of pipes about 6.5 km have been successfully tested. It was scheduled that the Western Conveyor would be completed by the middle of 1980 which is about 3 months ahead of contract completion time. The quality of this work has been always quite good.

The total payments to the Main Contractor for the supplies and construction works under the contract No. 6C have reached the amount of £1,935,243 by the end of December 1979, including the payment due to the increases of costs.

7 Asprokremmos Dam. Contract No C2 39/77/26

The Main Contractor for this contract, the "Joint Venture" of "J & P" and Medcon Construction, continued from the previous years the works on the Asprokremmos Dam in cooperation with their subcontractors specialists Colcrete and ICOS of U.K. on the Geotechnical Works. During the year 1979 the following work was carried out.

Diversion Tunnerl

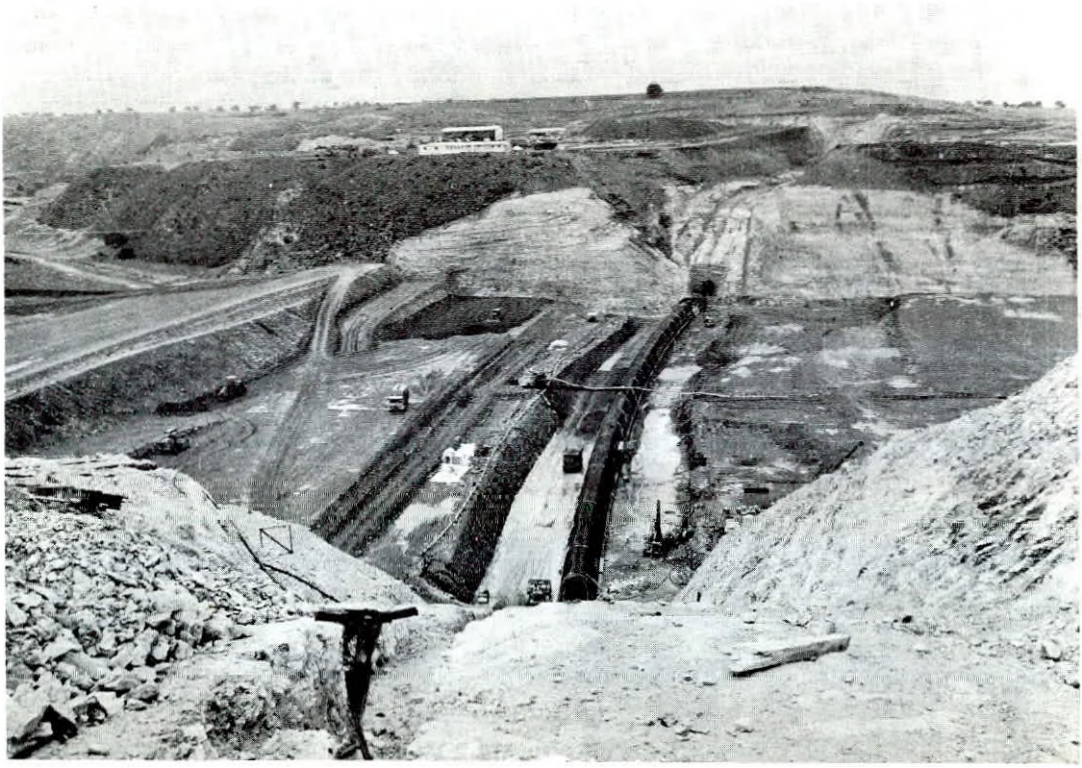
By providing a different diversion scheme along the river channel on the left abutment site, the Contractor has been able to continue opening of the Diversion Tunnel throughout the winter time. The Contractor started with the widening of the pilot shaft which was opened during the previous year. During the months of January and February the first 60 metres length of the total 314 meters of tunnel starting from its upstream end were widened up to the minimum of 4 meters diameter. Concrete lining over this section of tunnel commenced during March 1979 while progress on the widening of the rest of the tunnel continued ahead of the concreting sufficiently advanced not to hinder concreting progress. The Contractor managed to achieve an average output of about 15 meters of tunnel complete per week and achieve completion of its concreting, ex-

cept the last five meters, in August 1979, with a total delay from the original contract program of about 9 months and 2 months from the revised program. The slow progress on the diversion tunnel works was attributed mainly to the lack of experience from the Contractor on such type of work.

as from November 1979 with cavity grouting remaining uncomplete by 25%.

Intake Tower Base

The intake tower base was successfully concreted up to the invert level of the diversion tunnel in February 1979. Diversion



Asprokremmos dam - General view of the dam construction works. The cap gallery over the concrete cut-off wall can be seen along the dam-axis.

The most serious problem in constructing the tunnel was the large amount of overbreak occured during its excavation by controlled blasting. Although the Contractor blamed the poor geological formations for the overbreaks, it was generally felt that it was the result of lack of care and skill in carrying out blastings.

The diversion tunnel became operational

arrangements through the tower base as intented by the Contractor have not been realised and hence concreting to a higher level was left for the next dry season.

Drainage Galleries

Excavation of the drainage galleries of 750 meters total length have been completed by the end of the reporting year and start has been made on the concrete lining in

the left abutment system of galleries. Progress on this work has been very slow due to the inefficiency of the contractor.

Diaphragm Cut Off Concrete Wall

Concreting on the diaphragm wall was continued from the previous year and was completed by the end of February 1979. From investigations, however, carried out by the Resident Engineer on the contact zone with the underlying bedrock it was found that the contact has not been properly effected due to a layer of deposits consisting of loose materials mixed with bentonite formed between the concrete wall and the bedrock. In order to avoid future leakages through this layer which was of thickness up to 40 cm in some places, it was decided to carry out remedial works through groutings in the alluvial deposits.

The final design of the remedial work as prepared by the Consultants provided for grouting a zone called "D" downstream of the diaphragm wall at its bottom and zones "B" and "C" upstream of the diaphragm wall. The grouting works of the alluvial zone "D" was completed by the end of September using cement bentonite grout only. Proof grouting has been also completed by the end of the year 1979 and the results indicated that a grout take of approximately 5% cement-bentonite and 10% chemical grout will be required in the grouted zones of "B" and "C". With regard to the financial liabilities for the above remedial works efforts were continued by WDD and the Contractors in order to reach a settlement by negotiations and avoid arbitration proceedure.

Rock Grouting

Rock grouting below the diaphragm wall was completed as well as on the left abutment. A start has been made on right abutment under the spillweir.

Cofferdam

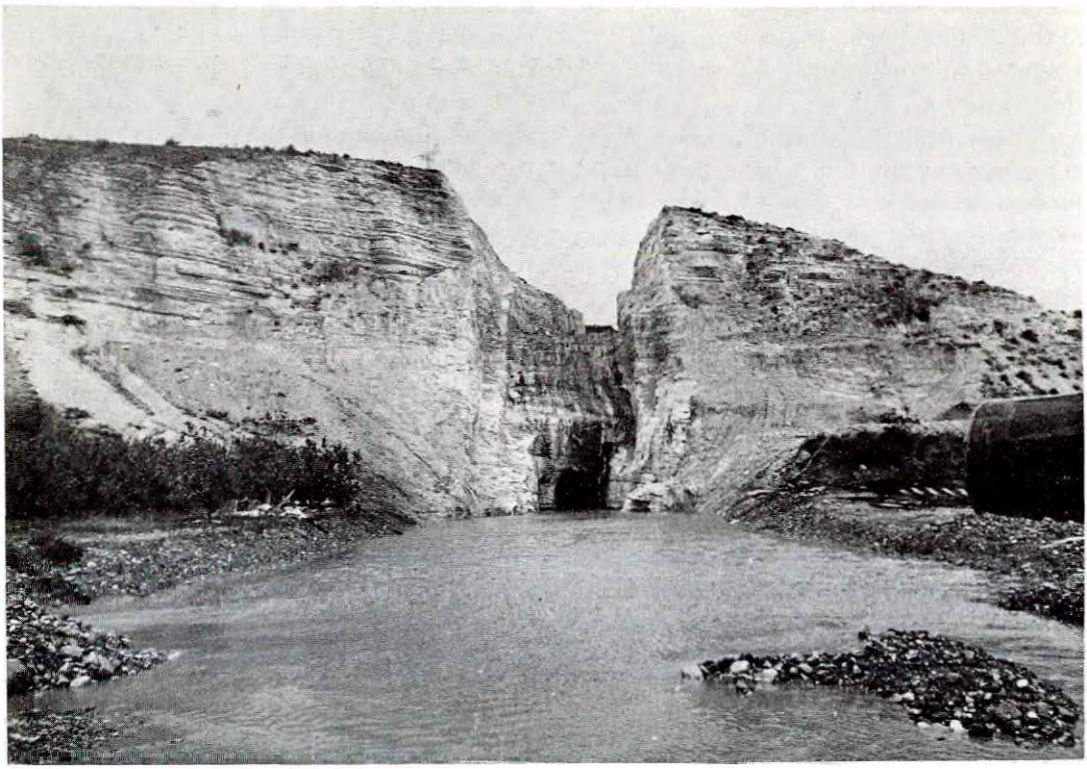
construction of the cofferdam started in June using granular material. The work progressed quite satisfactorily and was completed in October which was about one month behind the revised program. Total volume of fill was about 81,300 cubic meters. Stepping of the grunular material has been accepted on the site to allow work to proceed on main embankment as well up to the level of the first instrumentation house.

Cap Gallery

Concreting on the cap gallery over the diaphragm wall commenced at the beginning of August 1979 which was about 3 months behind the revised program of the Contractor. The main reason for the delay was the Contractor's failure to install effective dewatering system on time. The well points dewatering system which was installed by the Contractor could not function properly and in order to lower the water level to the minimum required an open trench arrangement was provided. The cap gallery was completed by the middle of October 1979 except the connecting sections of the gallery into the main drainage adits. This uncomplete part have caused delay in the earthworks and grouting works in the area.

Spillway

The revised spillway alignment was given to the Contractor who continued ahead of schedule rock and soft excavation of the spillway and spillweir. Spillweir excavation was completed in March 1979 and rock anchor testing was carried out. Excavation of the spillway chute was slowed down in April due to difficulties in removing spoil from the downstream tunnel portal, and it was managed to be completed in September 1979. In the same time the spillweir base slab has been concreted and mass concreting of the spillway retaining wall commenced. The Contractor has im-



Excavation for Asprokremmos dam spillway in progress. Low flows in the spillway will be channelled through the dam outlet tunnel seen in the middle of the photograph through which river flow is diverted as can be seen, to facilitate construction of the dam embankment.

mediately encountered temperature control problems which could be alleviated at the beginning by the use of lower cement content and night-time concrete pouring. "Production" concreting, however, of the spillway could not start by the end the reporting year because the crane for the concrete pouring was not yet on the site. In all 26,000 cubic meters of concrete were required to construct the spillway.

Finance

The amount of work certified up to the end of December was £2,457,000 and the total payments to the Contractor including the advance payment reached the amount of £3,420,110. Extrapolation of the financial progress chart shows a completion of the Dam to be approximately one year late i.e. May 1982. The Contractor was by the end of the reporting year 7 months behind the original program and 4 months behind the revised program, and that was in 18 months of work.

FINANCIAL INFORMATION

A total amount of £4,055,000 has been allocated as a daggered provision in the 1979 Development Estimates for the Paphos Irrigation Project which was the highest amount for one single year allocated so far for this project. In fact the actual commitments for the various project works during the year 1979 exceeded the above amount and a special warrant was issued to cover the additional expenditure which brought the total amount spent in 1979 to £6,450,936 which re presents about 27% of the total estimated cost of the Project. The total amount spent for the Project up to the end of 1979 since its start reached the sum of £11,067,622 which represents about 47% of the total estimated cost of the Project.

As it is shown in the summary of expenditure given in the table below the amount paid for the major construction and supply works under contract during the year 1979 was £6,120,736 which represents about 37% of the total amount to be finally spent for this purpose up to the completion of the Project. This figure shows that the reporting year was the most active one as far as construction is concerned. According to the latest estimates full completion of the construction works of the Project would be achieved by the middle of the year 1982.

TABLE V/1 – 1

PAPHOS IRRIGATION PROJECT – ACTUAL EXPENDITURE INCURRED – YEAR 1979

Ser No	Scheme – Item	Expenditure incurred up to 31.12.78 £	Expenditure incurred in 1979 £	Cumulative expenditure 1977–1979 £	Remarks
A	**Contract Works:**				
1	Main Canal	842 249	62 579	904 828	Completed
2	Central Offices	39 605	1 631	41 236	Completed
3	Supply and Installation of Well Pumps	88 520	43 299	131 819	Completed
4	Installation of Wellfield Conveyance System	126 877	125 062	251 939	Nearly Completed
5	Supplies for Wellfield Conveyeance System	227 435	41 679	269 114	Completed
6	Installation of Irrigation Network and Construction of Reservoirs for Easter Area	273 782	799 883	1 073 665	Continued
7	Supply for Irrigation Network for Eastern Area	459 881	1 088 561	1 548 442	Continued
8	Main Contract – Pumping Stations and Western Conveyor	260 660	1 918 003	2 178 663	Continued
9	Asprokremmos Dam	1 380 071	2 040 039	3 420 110	Continued
	Total	£3 699 080	£6 120 736	£ 9 819 816	

TABLE V/1 – 1

PAPHOS IRRIGATION PROJECT – ACTUAL EXPENDITURE INCURRED – YEAR 1979 (Continued)

Ser No	Scheme – Item	Expenditure incurred up to 31.12.78 £	Expenditure incurred in 1979 £	Cumulative expenditure 1977–1979 £
B	**Engineering and Administration**			
1	Consulting Firms and Experts	367 769	157 800	525 569
2	Project Organization and Management.	86 878	68 950	155 828
	Total. . . . . £	454 647	£ 226 750	£ 681 397
C	**Other Works**			
1	Construction of Premises	43 197	–	43 197
2	Purchase of Equipment.	66 143	4 486	70 629
3	Inspection of Pipes and Fittings . . .	16 729	22 348	39 077
4	Investigations, Surveys and Laboratory works	76 641	15 896	92 537
5	Diversion of Services and Compensations	10 713	12 997	23 710
6	Extension Services, Training and Agr. Research	33 555	23 936	57 491
7	Electricity supply	131 472	16 507	147 979
8	Other works by WDD.	–	8 902	8 902
9	Works completed by 1977.	82 887	–	82 887
	Total. . . . . £	461 337	£ 105 072	£ 566 409
	Grand total £4	616 686	£6 450 936	£11 067 622

Note: For breakdown of the above expenditure see table I–5 on page 20

VI DIVISION OF OPERATION AND MAINTENANCE

By
N. Tsiourtis
Executive Engineer I
and
G. Charalambous
Superintendent of Works

Indroduction

This Division includes the Branches dealing with:

* *The management, operation and maintenance of Government irrigation works*
* *The maintenance of contributory irrigation projects, and*
* *The operation and maintenance of Town Water Supplies.*

Definitions

Government Waterworks: These are the projects constructed under the Government Waterworks Law Cap 341. These projects are listed in Table VI – I.

Contributory Waterworks: These are projects constructed under the Irrigation Division Law Cap 342. A list of these projects is given in Table VI – 6.

MANAGEMENT AND OPERATION PROCEDURES

The management and operation of the various categories waterworks are carried out as follows:

1 **Government Waterworks**: The management and operation of these projects are carried out by Waterworks Committees established according to the provisions of the relevant Law. The Waterworks Committees are usually composed of the following:

Chairman

District Officer of the district in which the project is situated.

Members

Director of the Water Development Department or his representative

Director of the Agricultural Department or his representative

Director of the Lands and Surveys Department or his representative.

Two or more farmers eleced by the farmers.

The Committee is responsible for the overall administration and management of the Government Waterworks Projects such as:

* *to make recommendations on the development, conservation, management and efficient use of the available water resources of the project,*
* *to manage and operate the project with a view to :–*

(a) *improve the standard of agricultural practices*

(b) *improve the methods of irrigation*

(c) *increase the revenue from land and water utilization to the full economic value*

(d) *to sell the water at the nominal rates approved by the Government and see that the fees and charges are collected. (See Table VI-1)*

The Committees have their own budgets, approved by the Minister of Finance.

The Water selling rates approved by the Council of Ministers are shown on Table VI—3.

2 Contributory Irrigation Projects (Major and Small): The operation of the contributory projects is carried out by the Irrigation Division Committees. These committees are chaired by the District Officer and as members to the committees are beneficiaries elected by the general assembly meetings of the Irrigation Division beneficiaries. The Water Development Department in such cases gives technical advice both to the District Officer and to the Committee. The costs of the operation of these projects is borne in total by the beneficiaries. (See Table VI-6)

3 Government Recharge Waterworks: These are managed directly by the Water Development Department. (See Table VI-7)

MAINTENANCE PROCEDURES

The maintenance of the irrigation waterworks is carried out by the Water Development Department but depending on the type of the Project the expenses are either paid in full by the Government or are shared between the Government and the Irrigation Divisions. The procedures are as follows:

TABLE VI–1 GOVERNMENT IRRIGATION PROJECTS–DATA FOR 1979

No.	Project	Capacity m3 x 10³	Area Commanded Donums	Water Available for Utilization m3 x 10³	Water used for irrigation m3 x 10³	Water used for D. W. S. m3 x 10³	Water used for recharge m3 x 10³	Total Quantity used m3 x 10³	Evaporation Losses m3 x 10³	Seepage Losses m3 x 10³	Area Irrigated Donums	Water Utilized index %	Land Utilized index %
1.	Argaka	1 150	2 340	1 596	932	NIL.	100	1 032	99	6	1 735	64.7	74.1
2.	Ayia Marina	300	1 500	366	240	NIL.	NIL.	240	45	20	309	65.6	20.6
3.	Kalopanayiotis	363	435	450	176	NIL.	NIL.	176	39	90	435	39.1	100.0
4.	Kiti	1 610	6 200	130		NIL.	130	130	NIL.	NIL.	NIL.	–	–
5.	Lefkara**	13 850	615	6 338	57	2 936	NIL.	2 993	384	40	100	47.2	16.3
6.	Mavrokolymbos	2 180	3 355	815	593	NIL.	NIL.	593	200	NIL.	1 060	72.7	31.6
7.	Pomos	860	2 850	1 028	693	NIL.	NIL.	693	80	92	765	67.4	26.8
8.	Polemidhia	3 430											
9.	Vermasoyia	13 500	15 440	17 318	7 935	NIL.	1 393	9 328	1 542	776	15 440	53.9	100.0
10.	Athalassa	791	310	241	221	NIL.	NIL.	241	20	NIL.	240	91.7	77.4
	Total	38 061	33 045	28 282	10 847	2 936	1 623	15 426	2 409	1 024	20 084	60.7	54.5

* This is the water that possibly may be utilized: initial storage & inflow after deducting losses (evaporation and seepage) & overflow

** Water allocated mainly for domestic water supply.

A Government Waterworks: The maintenance of these projects is carried out by the Water Development Department being the Government Agency for waterworks and the costs are borne in full by the Government. By the term maintenance we mean routine dam and pipeline maintenance, valves and water meters repair or replacements, paintings of metal works or woodworks etc.

B Contributory Irrigation Projects: The maintenance of these projects is carried out by the Water Development Department but the costs are shared between the Government and the specific Irrigation Division usually at a ratio of 2 to 1.

Water Development Data

Cyprus is an island and all available water resources are those that result from overall precipitation. The total precipitation in an average year is estimated at 4,600 MCM where 1,270 MCM/annum are lost in the form of evaporation, 900 MCM/a are lost in the form of evapotranspiration from cultivated crops, 1,480 MCM/a are lost in the form of evapotranspiration from forest pasture and grass and irrigated crops. The annual surface runoff is estimated at 600 MCM and the groundwater and springs another 350 MCM. As it is seen from the above only 950 MCM or 21% of the total precipitation are available for development both surface and groundwater. The groundwater resources being easier to develop are at present overpumped. The annual extraction from the boreholes is estimated at 370 MCM and the total springs yield is around 30 MCM. Out of these quantities 300 MCM are used for irrigation where the rest 100 MCM are used for domestic and industrial uses.

The surface water resources being much more expensive to develop remained undeveloped until the begining of the 1960's. By the beginning of 1960 the total water storage capacity of dams all over the island amounted to 6.2. MCM commanding an area of 11400 donums of irrigated land. Soon after this (after independance) the Government of the Republic started a construction program to develop as much as possible more surface water resources. Many projects were constructed which increased the water storage capacity of dams to 64.1 MCM, 45.4 MCM for irrigation or domestic water supply and the rest 17.7 MCM for recharge purposes.

Details on the projects and the rate of storage development are given in Drg. No. AG/IR/37 «Cyprus Dam Projects and Regional Development» page 7 and «Progress in Dam Construction» page 12.

Summary of Managemet, Operation and Maintenance Data

The overall average precipitation during the year under review was 439 mm or 82% of the 51 year average of the Government controlled area, where the total volume of water available in the dams in the Government controlled area amounted to 30.382 MCM. From this quantity 12.482 MCM was used for irrigation, 2.936 MCM was used for domestic water supplies. 2.720 MCM was used for recharge or seeped through or below the dams and another 2.564 MCM was lost as evaporation. The rest 9.653 MCM remained in the dams for over year storage or lost as overflow. Projects in the Turkish occupied area are not included here as we cannot collect the necessary information.

The total area commanded by the irrigation projects is estimated at 67,703 donums where an estimated area of 22,699 donums has been irrigated, planted with citrus, bananas, deciduous, vegetables, potatoes etc.

Maintenance works totalling £9,533 were

carried out on fourteen projects. These include routine maintenance on the dam structures and the distribution systems. For the Government waterworks (irrigation and recharge works) a total of £8,165 were spent where for the rest £1,368 were spent on the contributory projects.

A Government Waterworks

Summary of Management, Operation and Maintenance Data. In the year under review, the total quantity available from government irrigation projects reached the figure of 28.282 MCM.

From this total, a quantity of 15.426 MCM or 38.3% was utilized, 10.847 MCM for irrigation, 2.936 MCM for the domestic water supply and 1.623 MCM for recharge purposes. The rest of the water remained in storage or lost in the form of overflow. In the same period 2.409 MCM was lost in the form of evaporation where another 1.024 MCM were lost as seepage or deep percolation (see Table VI—1).

The irrigation water was used to irrigate fully or partly 20,084 donums of land planted with citrus, bananas, vines, deciduous, vegetables, potatoes, cereals and olives (see Table VI—2).

The gross income from the sale of water amounted to £128,281 being the income from the sale of water at the rates shown on Table VI—3. The operational expenses amounted to £55,197 being the cost for the payment of the watermen, the bill collectors etc. which amounted to 4.37 mils/m^3 of water sold or 3.58 mils/m^3 of water utilized. The maintenance expenses on government projects amounted to £7,202 i.e. 0.56 mils/m^3 of water sold or 0.47 mils/m^3 of water utilized. The total annual operation and maintenance expences amounted to £62,399 which amounts to 4.94 mils/m^3 sold or 4.05 mils/m^3 utilized.

TABLE VI—2

CROPS AND AREAS IRRIGATED BY GOVERNMENT IRRIGATION PROJECTS

Ser No	Crop	Area in Donums
1	Citrus	7 971
2	Bananas	1 036
3	Vines	3 946
4	Deciduous	664
5	Vegetables	5 818
6	Potapoes	413
7	Cereals	216
8	Olives	20
	Total	20 084

TABLE VI—3

GOVERNMENT IRRIGATION PROJECTS AND APPROVED WATER CHARGES in mils/m^3

Ser No	Project	Overflow	Vegetables	Vines	Deciduous	Citrus	Flat Rate
1	Argaka	Free	10	15	15	15	—
2	Ayia Marina	5	—	—	—	—	10
3	Kalopanayiotis	—	—	—	—	—	18
4	Kiti	—	—	—	—	—	10
5	Lefkara	—	—	—	—	—	10
6	Mavrokolymbos	—	10	15	15	15	—
7	Polemidhia	3	10	15	15	15	—
8	Pomos	5	—	—	—	—	10
9	Yermasoyia	3	10	15	15	15	—

Evaporation losses from the reservoirs amounted to 2.409 MCM or 7.3% of the total storage capacity available. The seepage losses were estimated at 1.024 MCM or 3.1% of the total storage mostly from the Polemidhia and Yermasoyia dams.

The overall water utilization and land utilization indexes are 60.7% and 54% respectively. Of the 10.847 MCM used for irrigation 9.706 MCM was sold at the

TABLE VI–4 DATA ON MANAGEMENT, OPERATION AND MAINTEMANCE OF GOVERMENT IRRIGATION PROJECTS FOR 1979

Ser. No.	Project	Dam Reservoir Capacity $m^3 \times 10^3$	Area Command. Dons	Water Available* $m^3 \times 10^3$	Water Used $m^3 \times 10^3$	Water Sold $m^3 \times 10^3$	Area Irrigated Donums	Gross Income	Expenditure			Income Net
									Operat.	Maint.	Total	
								£	£	£	£	£
1.	Argaka	1 150	2 340	1 596	1 032	705	1 735	9 354	2 676	725	3 401	5 953
2.	Ayia Marina	300	1 500	366	240	240	309	2 387	2 158	288	2 446	– 59
3.	Kalopanayiotis	363	435	450	176	176	435	3 168	2 100	579	2 679	489
4.	Kiti	1 614	6 200	130	130	NIL	NIL	NIL	NIL	475	475	– 475
5.	Lefkara	13 850	615	6 338	2 993	2 993	100	570	NIL	–	–	570
6.	Mavrokolymbos	2 180	3 355	815	593	513	1 060	11 991	11 867	879	12 746	– 755
7.	Pomos	860	2 850	1 028	693	693	765	6 929	5 575	1 103	6 678	251
8.	Polemidhia	3 864	15 440	17 318	9 328	7 322	15 440	93 882	30 821	3 153	33 974	59 908
9.	Yermasoyia	13 500										
10.	Athalassa	791	310	241	221	NIL	240	NIL	–	–	–	–
	Total	38 061	33 045	28 282	15 406	12 642	20 084	128 281	55 197	7 202	62 399	65 882

This is the water that may be utilized: initial storage & inflow [Losses (evaporation - seepages) and overflow]

TABLE VI–5 DATA ON WATER USE FOR THE LAST 10 YEARS FOR THE GOVERNMENT PROJECTS

No	Description	Unit	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1.	Capacity	1000 m^3	23 420	23 420	23 420	2 340	37 890	37 890	37 890	37 890	38 061	38 061
2.	Water available	"	6 160	5 352	3 777	1 858	6 367	27 612	28 000	32 003	27 380	28 282
3.	Water utilized for irrigation on	"	NA	NA	NA	NA	NA	7 776	8 388	9 704	9 457	10 847
4.	Water used for DWS	"	NIL	NIL	NIL	NIL	NIL	1 000	1 365	2 058	2 856	2 936
5.	Water used for recharge	"	NA	NA	NA	NA	NA	NA	6 016	3 323	1 982	1 623
6.	Total water used	"	NA	NA	NA	NA	NA	8 776	15 769	15 085	14 295	15 426
7.	Evaporation losses	"	NA	NA	NA	NA	NA	2 854	2 570	2 662	2 683	2 409
8.	Seepage losses	"	NA	NA	NA	NA	NA	NA	428	359	3 367	1 024
9.	Water sold	"	1 961	2 467	2 757	11 137	26 138	60 600	73 747	93 485	8 447	12 642
10.	Gross income	£	22 594	26 891	29 391	971	2 544	5 522	6 624	7 999	101 367	128 281
11.	Operation cost	£	5 849	7 688	7 282	6 450	11 048	12 619	18 627	34 500	33 592	55 197
12.	Maintenance cost	£	5 328	3 342	4 849	4 278	4 603	3 174	4 496	8 059	8 165	7 202
13.	Total expenditure	£	11 177	11 030	12 131	10 728	15 651	15 793	23 123	42 559	41 757	62 399
14.	Net income	£	11 417	15 861	17 260	409	10 487	44 808	50 264	50 926	59 610	65 882
15.	Area irrigated	Donums	NA	NA	NA	NA	NA	12 458	17 376	15 459	14 905	20 084

TABLE VI–6 DATA ON CONTRIBUTORY IRRIGATION WORKS

Ser. No.	Project	Capacity m³x103	Area command. Dons	Water available for util. m³x103	Water used for irrigat. m³x103	Water used for DWS m³x103	Water used for recharge m³x103	Total quantity used m³x103	Evapor. losses m³x103	Seepage losses m³x103	Area irrigated Dons
1	Arakapas	130	200	130	120	–	–	120	10	–	171
2	Palekhori	640	1 000	640	580	–	–	580	44	–	828
3	Prodhromos	110	170	170	170	–	–	63	7	–	120
4*	Morphou	2 000	6 740	–	–	–	–	–	–	–	–
5*	Lefka Marathasa	360	1 300	–	–	–	–	–	–	–	–
6*	Geunyeli	1 000	850	–	–	–	–	–	–	–	–
7*	Kanli	1 100	4 000	–	–	–	–	–	–	–	–
8*	Mia Milea	330	1 300	–	–	–	–	–	–	–	–
9*	Ovgos	250	6 370	–	–	–	–	–	–	–	–
10*	Lefka Kafizes	110	770	–	–	–	–	–	–	–	–
11*	Pyrgos	270	1 600	270	245	–	–	245	25	–	307
12	Trimiklini	330	650	330	304	–	–	304	26	–	400
13	Lythrodhonta (Upper)	32	115	32	29	–	–	29	3	–	105
14	Kalokhorio (Klirou)	81	1 350	81	73	–	–	73	8	–	300
15	Akrounda	22	60	22	20	–	–	20	2	–	29
16*	Galini	22	1 300	–	–	–	–	–	–	–	–
17*	Petra Upper	22	4 690	–	–	–	–	–	–	–	–
18*	Perta Lower	32	–	–	–	–	–	–	–	–	–
19	Lythrodhonta (Lower)	32	115	32	29	–	–	29	3	–	105
20	Kandou	38	563	26	23	–	–	23	3	–	46
21	Perapedhi	55	195	55	50	–	–	50	5	–	71
22	Agros	72	300	42	38	–	–	38	4	–	53
23	Kyperounda	60	80	60	54	–	–	54	6	–	80
24	Lymbia	220	940	220	–	–	–	–	–	–	–
	Total	7 318	34 658	2 010	1 635	–	–	1 628	146	–	2 615

* Project in Turkish occupied areas

nominal rates, (89.47%) where the rest 1.141 MCM, (10,51%) was given free of charge as water right or overflows.

A summary of the above data in detail is given in Tables VI—1, VI—4, and VI—5 where more details are given for each project under separate headings.

Table VI—5 gives data on the operation and maintenance of the government irrigation projects for the last 10 years.

Table VI—8 gives data on the operation and maintenance for the last two years.

B Contributory Irrigation Projects

In general there are 24 contributory irrigation projects with total capacity of 7.318 MCM commanding an area of 34,658 donums. Ten projects of total capacity of 5.204 MCM or 71% of the total capacity of contributory schemes, commanding an area of 26,020 donums are situated in the Turkish occupied area and on which no data is collected. From the rest of the projects the total water collected amounted to 2.010 MCM out of which 1.635 MCM was used for the irrigation of 2,615 donums where the rest was lost in the form of evaporation (see Table VI—6).

C Recharge Works

In the island there are about 33 recharge works of total capacity 17.738 MCM. Out of these projects 20 of the total capacity 15,694 MCM or 88.5% of the total recharge capacity are situated in the Turkish occupied areas, or in no mans land. On these no government control is possible and no data on their use is available. For more information on projects in the government control areas. See Table VI-7.

TABLE VI—7

RECHARGE WATERWORKS DATA

Ser No.	Project	Capacity $m^3 \times 10^3$	Water avail. $m^3 \times 10^3$	Water used for recharge $m^3 \times 10^3$	Water lost in evaporation $m^3 \times 10^3$
1*	Kouklia	4 545	—	—	—
2*	Ayios Loucas	455	—	—	—
3	Sotira	45	10	9	1.0
4	Panayia Fam.	45	10	9	1.0
5	Paralimni	115	20	18	2.0
6	Ayia Napa	55	10	9	1.0
7**	Famagusta Antiflood	50	—	—	—
8	Phrenaros	115	15	13.5	1.5
9	Dherinia	23	5	4.1	0.5
10	Phrenaros	45	5	4.5	0.5
11	Avgorou	68	5	4.5	0.5
12*	Kondea	82	—	—	—
13	Xylophagou	86	5	4.5	0.5
14	Sotira	32	5	4.5	0.5
15*	Lysi	77	—	—	—
16*	Ayios Yeorgios Kyr.	68	—	—	—
17*	Ayios Epiktitos	34	—	—	—
18*	Akanthou	45	—	—	—
19**	Akhna	40	—	—	—
20	Xylotymbou	50	—	—	—
21*	Syngrasis	1 115	—	—	—
22*	Ayios Yeorgios Fam	90	—	—	—
23*	Famagusta Recharge	165	—	—	—
24*	Ayios Nicolaos Fam.	1 365	—	—	—
25*	Paralimni Lake	1 365	—	—	—
26*	Ayios Loucas Lake	4 545	—	—	—
27*	Makrasyka	195	—	—	—
28*	Akhna Mesania	90	—	—	—
29**	Vrysoulles Fam.	140	—	—	—
30*	Morphou Recharge	130	—	—	—
31*	Morphou Protopapas	90	—	—	—
32	Ormidhia	100	—	—	—
33*	Masari	2 273	—	—	—
	Total	17 738	90	72.6	9.0

* Projects in Turkish occuped area. Gate constatly open for recharge.

** Projects in No Man's Land

TABLE VI–8

DATA ON MANAGEMENT AND OPERATION OF GOVERNMENT IRRIGATION PROJECTS FOR THE LAST TWO YEARS

Item No	Data	Unit	1978	1979	% change on 1978
1	Capacity	1 000m³	38 061	38 061	NIL
2	Water Available	"	27 380	28 282	+ 3.3
3	Water utilized for irrigation	"	9 457	10 847	+14.7
4	Water utilized for D.W.S.	"	2 856	2 936	+2.8
5	Water utilized for recharge	"	1 982	1 623	−18.1
6	Total water used	"	14 295	15 426	+7.9
7	Evaporation losses	"	2 683	2 409	−10.2
8	Seepage losses	"	3 367	1 024	−69.6
9	Water sold	"	8 447	12 642	+49.7
10	Gross income	£	101 367	128 281	+16.3
11	Operation cost	£	33 592	55 197	+64.3
12	Maintenance cost	£	8 165	7 202	−11.8
13	Total expenses	£	41 757	62 399	+49.4
14	Net income	£	59 610	65 882	+10.5
15	Area irrigated	donums	14 905	20 084	+35.9
16	Area commanded	"	28 655	33 045	+15.3

DETAILS ON OPERATION OF GOVERNMENT IRRIGATION PROJECTS

ARGAKA PROJECT

The Argaka Irrigation Project consists of a dam reservoir of maximum capacity at spillway crest 1 150 MCM and a distribution system made of closed conduits commanding an area of 2340 donums (312 Ha.). Irrigation in the Project area started early in January and terminated late in November. During this period an area of 200 don. was irrigated by utilizing about 0.932 MCM of water. The area irrigated was planted with citrus, bananas, vines deciduous, vegetables cereals and melons.

Out of 0.932 MCM utilized 0.705 MCM were sold to the farmers at the nominal rates where the remaining 0.227 MCM were taken from the overflow free of charge. The gross income from the sale of water was £9,354, the expenditure on managements and operation was £2,676 and the maintenance cost amounted to £725 Total annual cost amounted to £3,401. Net income to the project was £5,953.

TABLE VI–9

ARGAKA DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m³	%of storage capacity
1	Initial amount in storage	502 500	43.69
2	Inflow during the year	1 757 566	152.83
3	Total release	705 000	61.30
4	Leakages	5 740	0.50
5	Evaporation	99 000	8.61
6	Overflow	558 826	48.59
7	Final amount in storage	891 500	77.52
8	Minimum quantity in storage	216 000(Nov)	18.78
9	Storage capacity	1 150 000	100.00

Project Hydrology

The project hydrologic data, as recorded during the year are tabulated on Table VI-9. The dam reservoir was filled to spillway crest on first of March and started overflow until first of may 1979. During this period a total quantity of 0.558 MCM had overspilled. The minimum level of water in storage ever reached was in November with total water in storage around 0.216 MCM.

Water Utilization and Crops Irrigated

The project is built for irrigation purposes and as such, a quantity of 0.932 MCM of water was utilized for the irrigation of 1,735 donums of land planted with various crops as indicated in Table VI-II.

Further to this quantity of water used for irrigation, an additional quantity of 0.100 MCM of water overflowing the spillway crest had recharged the aquifer downstream of the dam.

The water utilization from the Argaka dam project is shown on Table VI-10.

TABLE VI–10
ARGAKA DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	%of storage capacity
1	Water used for irrigation	932 268	81.07
2	Water used for recharge	100 000	8.69
3	Total water utilized . .	1032 268	89.76
4	Water lost in pipe bursting	NIL	NIL

TABLE VI–11
ARGAKA DAM – CROPS IRRIGATED

Ser. No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus.	375	375	375
2	Bananas	206	206	206
3	Vines	35	–	35
4	Deciduous	–	25	25
5	Vegetables . . .	475	220	695
6	Potatoes	175	8	183
7	Cereals	216	–	216
		1507	834	1735

Water Sale, Income, Management Operation and Maintenance Costs

The water utilized for irrigation from the project amounted to 0.932 MCM out of which 0.705 MCM was released from the dam and sold to the farmers at the nominal rates where the rest was taken from the overflow free of charge. From the sale of water a total of £9,354 was collected. For the management and operation of the project an amount of £2,676 was paid to the water men, dam attendant and bill collectors where for the maintenance of the project an amount of £725 was spent. Net income from the sale of water, after subtracting annual costs, amounts to £5,953. Details, on the management, operation and maintenance cost are shown on Table VI-12.

TABLE VI–12
ARGAKA DAM – INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	705 000	9 354
2	Water sold at reduced rates	NIL	NIL
3	Water given free of charge	227 000	NIL
4	Total quantity utilized and gross income . .	932 000	9 354
5	Operation cost . . .		2 676
6	Maintenance cost . .		725
7	Net income		5 953

ARGAKA DAM — INCOME AND EXPENDITURE DATA

Project Performance for the Last Two Years

Table VI-13 shows the performance of the project for the last two years. The last column shows the percentage variation in the quantities of 1979 in comparison of the year 1978.

TABLE VI–13
ARGAKA DAM – DAM ON PROJECT FOR THE LAST TWO YEARS

Item No.	Data	Unit	1978	1979	%change On 1978
1	Capacity	$1000m^3$	1150	1150	NIL
2	Water available .	"	1150	1596	38.78
3	Water utilized for irrigation . .	"	1092	932	-14.65
4	Water sold . . .	"	677	705	4.14
5	Water given free	"	415	227	-45.30
6	Water used for recharge	"	100	100	NIL
7	Gross income . .	£	8663	9354	7.98
8	Operation cost. .	£	2088	2676	+28.20
9	Maintenance cost	£	936	725	-22.54
10	Total expenses. .	£	3024	3401	+12.47
11	Net income . . .	£	5312	5963	+12.25
12	Area irrigated . .	dons	1746	1735	-0.63

AYIA MARINA PROJECT

The Ayia Marina Irrigation Project consists of a dam reservoir of capacity at spillway crest of 0.300 MCM and a distribution system commanding an area of 1,500 donums. The distribution system consists of a main canal at the terminal of which tertiary pipes branch-off to distribute water to each individual plot within the project perimeter. Irrigation in the project area started early in January and continued throughout the year, until late in November. An area of 309 donums was irrigated by utilizing 0.240 MCM. The area irrigated was planted with citrus, bananas, vines, deciduous and vegetables. The water utilized was sold to the farmers at the approved rates. The dam reservoir did not fill to spillway. The max amount ever collected was 0.220 MCM in March 1980. The total gross income from the sale of water amounted to £2,387. The expenditure for the management and operation amounted to £2,158 where the maintenance costs were £288. Net income of the project from the sale of water was **£59**.

Project Hydrology

The project hydrologic data as recorded during the year are tabulated on Table VI-14.

TABLE VI–14
AYIA MARINA DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	%of storage capacity
1	Initial amount in storage	104 090	34.70
2	Inflow during the year	328 035	109.35
3	Total release	240 378	
4	Leakages	20 293	6.76
5	Evaporation	45 000	15.00
6	Overflow	NIL	NIL
7	Final amount in storage	126 454	42.15
8	Minimum quantity in storage	37 045(Oct.)	12.35
9	Storage capacity	300 000	100.00

The dam did not fill to spillway crest. The maximum quantity of water ever stored reached the point of 0.219 MCM late in March and the minimum quantity ever stored during the year was in October with an amount of 0.037 MCM.

Water Utilization and Crops Irrigated

During the year under review, a total quantity of 0.240 MCM was utilized for the irrigation of 309 donums planted with citrus, bananas, vines, deciduous and vegetables, details of which are shown on Table VI-16.

All the available water from the project was utilized for the purposes shown on Table VI-15.

TABLE VI–15
AYIA MARINA DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	%of storage capacity
1	Water used for irrigation	240 358	80.12
2	Water used for recharge	NIL	NIL
3	Total water utilized . .	240 358	80.12
4	Water lost in pipe bursting	NIL	NIL

TABLE VI–16
AYIA MARINA DAM – CROPS IRRIGATED

Ser. No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus.	45	45	45
2	Bananas	45	45	45
3	Vines	15	–	15
4	Deciduous	4	4	4
5	Vegetable	200	–	200
6	Potatoes	–	–	–
7	Cereals	–	–	–
		309	94	309

Water Sale, Income, Operation and Management and Maintenance costs

From the sale of 0.240 MCM of water the gross income to the Project, amounted to £2,387. Management and Operation expenses, being the wages for the water man and that of the dam attendant, amounted to £2,387. Maintenance costs on the dam and the distribution system were £288. Net income to the project, from the sale of water, after deducting management, operation and maintenance expenses, adds to a negative of £59.

Details on sale of water, income, and expenses are shown on Table VI-17

TABLE VI–17
AYIA MARINA DAM – INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	240 000	2387
2	Water sold at reduced rates	NIL	NIL
3	Water given free of charge	NIL	NIL
4	Total quantity utilized and gross income . . .	240 000	2387
5	Operation cost	––	2158
6	Maintenance cost . . .	––	288
7	Net Income	––	59

Project Operation Data for the Last two Years

Table VI-18 shows the data on the operation of the project for the last two years. The last column shows the percentage variation of the quantities of 1979 in comparison of those of 1978.

TABLE VI–18
AYIA MARINA DAM – DATA ON PROJECT FOR THE LAST TWO YEARS

Item No.	Data	Unit	1978	1979	%change On 1978
1	Capacity	$1000m^3$	300	300	NIL
2	Water available . .	"	300	366	+22.00
3	Water utilized for irrigation . . .	"	330	240	-27.27
4	Water sold	"	380	240	-36.84
5	Water given free .	"	NIL	NIL	NIL
6	Water used for recharge	"	50	NIL	–
7	Gross income . . .	£	3555	2387	-32.85
8	Operation cost . .	£	1290	2158	+67.29
9	Maintenance cost	£	720	288	-60.00
10	Total expenses . .	£	2010	2446	-21.69
11	Net income	£	1545	59	-103.81
12	Area irrigated . .	dons	508	309	-39.17

KALOPANAYIOTIS PROJECT

The Kalopanayiotis Irrigation Project consists of a dam reservoir of capacity at spillway crest of 0.363 MCM and a distribution system of closed conduits commanding an area of approximately 435 donums. Irrigation in the project area started early in May and continued through, up to the end of September. During this period a total quantity of 0.176 MCM of water was used for the irrigation of an area of approximately 435 donums planted mainly with deciduous. All the water was sold to the farmers at a fixed rate of 18 mils/m^3 and the gross income amounted to £3,168. The operation expenses were £2,100 where the maintenance costs on routine and emergency works amounted to £579. The net income from the sale of water after deducting operational and maintenance expenses is £489.

Project Hydrology

The Project Hydrologic data as recorded

during the year under review are tabulated in Table VI-19. The dam scouring gate was opened late in December 1978 and the dam was completely emptied by the 18th of January 1979. The scouring gate was again closed on February 15th, 1979 and the dam reservoir started filling reaching spillway crest on the 16th of March 1979. The dam was overflowing during the period 16th March to 29th April 1979 and again in the period 21st May - 28th May and in June 4th to June 11th 1979. The dam started overflowing again in December 17th. The smallest quantity ever remained in storage was 0.080 MCM and occured on October the 2nd 1979.

TABLE VI–19
KALOPANAYIOTIS DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	212 000	58.40
2	Inflow during the year	6 000 000	1 652.89
3	Total release	90 000	24.79
4	Leakages	90 000	24.79
5	Evaporation	39 502	10.88
6	Overflow	221 790	61.10
7	Final amount in storage	363 000	100.00
8	Minimum quantity in storage (Jan. Feb.)	NIL	NIL (Jan, Feb)
9	Storage capacity	363 000	100.00
10	Flow through scouring gate	5 411 000	1 490 .63

TABLE VI–20
KALOPANAYIOTIS DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation	176 054	58.68
2	Water used for recharge	–	–
3	Total water utilized	176 054	88.68

TABLE VI–21
KALOPANAYIOTIS DAM – CROPS IRRIGATED

Ser. No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus	NIL	NIL	NIL
2	Bananas	NIL	NIL	NIL
3	Vines	NIL	NIL	NIL
4	Deciduous	435	435	435
5	Vegetables	NIL	NIL	NIL
6	Potatoes	NII	NIL	NIL
7	Cereals	NIL	NIL	NIL
	Total	435	435	435

TABLE VI–22
KALOPANAYIOTIS DAM – INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	176 054	3 168
2	Water sold at reduced rates	NIL	NIL
3	Water given free of charge	NIL	NIL
4	Total quantity utilized and gross income	176 054	3 168
5	Operation cost		2 100
6	Maintenance cost		579
7	Net income		489

Water Utilization

During the year under review a total quantity of 0.126 MCM was utilized for the irrigation of 435 donums of deciduous, plantations in the project area. The plantations are mainly apple trees, pear trees and peach trees. Part of the water utilized was taken from the seepage collection weir downstream the dam. See Tables VI-20 and VI-21 for water utilization and crops irrigated.

Water Sale, Income, Operation and Management and Maintenance Costs

From the sale of water the gross income amounted to £3,168 Operation and management expenses including

dam attendant waterman and bill collector amounted to £2,100 and the maintenance cost totalled £579. Details on these data are shown on Table VI-22.

Project Operation Data for the last two years

Table VI-23 shows the data on the operation of the project for the last two years. The last column shows the percentage variation of the quantities of 1979 in comparison to those of 1978.

TABLE VI–23
KALOPANAYIOTIS DAM – DATA ON PROJECT FOR THE LAST TWO YEARS

Item No.	Data	Unit	1978	1979	%change On 1978
1	Capacity	1000m^3	363	363	–
2	Water available in storage. . . .	"	363	450	+23.97
3	Water utilized for irrigation. .	"	180	176	-2.22
4	Water sold . . .	"	180	176	-2.22
5	Water given free	"	NIL	NIL	–
6	Water used for recharge	"	NIL	NIL	–
7	Gross income .	£	3 240	3 168	-2.22
8	Operation cost.	£	2 048	2 100	+2.54
9	Maintenance cost	£	432	579	+34.03
10	Total expenses	£	2 480	2 679	+8.02
11	Net income . .	£	760	489	-35.65
12	Area irrigated	dons	435	435	NIL

KITI DAM

The Kiti dam irrigation project consists of a dam reservoir of storage capacity 1,610,000m^3 and a distribution system, made of open canals commanding an area of approximately 6,200 donums in the Kiti, Perivolia and Tersephanou villages. Due to the fact that no water was available for irrigation the project did not function. The water collected was released for recharge purposes.

purposes.

The maintenance expenses of the dam and distribution system were of the order of £475. The project presents a loss of £475.

The dam was empty by mid March and was completely dry until October 1979. A total quantity of 0.130 MCM was collected, all of which were released for recharge of the aquifer downstream.

Project Hydrology

The project hydrologic data as recorded dyring the year under review are shown in Table VI-24.

Inflow to the reservoir occured in January-March and in October in intermitent periods. Maximum amount in storage ever reached was 100,000m^3 in October 1979.

Water from the reservoir was released for recharge of the aquifer downstream the dam.

TABLE VI–24
KITI DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	NIL	NIL
2	Inflow during the year .	130 000	8.07
3	Total release(For irrig. &recharge)	130 000	8.07
4	Leakages(downstream aquifer).	–	–
5	Evaporation	NIL	NIL
6	Overflow.	NIL	NIL
7	Final amount in storage	NIL	NIL
8	Minimum quantity in storage.	NIL	NIL
9	Storage capacity.	1 610 000	100.00

TABLE VI–25
KITI DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	%of storage capacity
1	Water used for irrigation	--	--
2	Water used for recharge	130 000	8.07
3	Total water utilized	130 000	8.07

Water Utilization and Crops Irrigated

No irrigation was carried out.

Water Sale, Income, Operation and Maintenance Cost

No sales, of water took place. The maintenance cost was £475. The project presents a loss of £475.

TABLE VI–26
KITI DAM – CROPS IRRIGATED

Ser. No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus	NIL	NIL	NIL
2	Bananas	NIL	NIL	NIL
3	Vines	NIL	NIL	NIL
4	Deciduous	NIL	NIL	NIL
5	Vegetables	NIL	NIL	NIL
6	Potatoes	NIL	NIL	NIL
7	Cereals	NIL	NIL	NIL
	Total	NIL	NIL	NIL

TABLE VI–27
KITI DAM – INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	NIL	NIL
2	Water sold at reduced rates	NIL	NIL
3	Water given free of charge	NIL	NIL
4	Total quantity utilized and gross income	130 000*	NIL
5	Operation cost		NIL
6	Maintenance cost		475
7	Net loss		475

*For recharge purposes

TABLE VI–28
KITI DAM – DATA ON PROJECT FOR THE LAST TWO YEARS

Item No.	Description	Unit	1978	1979	%change on 1978
1	Capacity	1000m^3	1 610	1 610	NIL
2	Water available	"	–	–	–
3	Water utilized for irrigation	"	54	NIL	-100
4	Water sold	"	54	NIL	-100
5	Water given free	"	447	NIL	-100
6	Water used for recharge	"	1 004	130	-87
7	Gross income	£	542	NIL	-100
8	Operation cost.	£	100	NIL	-100
9	Maintenance cost	£	739	475	-35
10	Total expenses.	£	839	475	-43
11	Net loss.	£	297	475	+50
12	Area irrigated	dons	200	NIL	-100

Project Operation Data for the last Two Years

Table VI-28 shows data on the operation of the project for the last two years. There can be no comparison of the data since the water inflow to the reservoir is not steady and dependable.

LEFKARA PROJECT

The Lefkara dam project is a dual purpose project, mainly for the supply of domestic water to Famagusta town and partly for the irrigation of agricultural land downstream the dam. The project consists of (a) a dam reservoir whose capasity is 13.85 MCM (b) an irrigation distribution system for the supply of irrigation water to an area of approximately 615 donums (c) a feeder pipeline conveying water from the dam reservoir to the Khirokitia treatment plant, (d) the Khirokitia water treatment plant and (e) the pipeline extending from Khirokitia to Famagusta town.

As a result of the Turkish invasion and the occupation of the Famagusta town by the Turkish troops and the expulsion of its population the water reserved for Famagusta town has been reallocated so as to satisfy the demand of the created refugee camps and settlements and the increased demand of the town of Larnaca and some villages on route to Famagusta which increase was the result of settlement of refugees from the occupied (by the Turkish Troops) territories. However still an appreciable quantity of water is supplied to the occupied town to meet the demand of the local Turkish population.

This part of the report will deal only with the dam reservoir and water utilization for irrigation and water supply in general, where details regarding domestic water supply will be given in the secion dealing with domestic water supply.

From the sale of irrigation water the gross income for 1979 would amount to £572.

Project Hydrology

The project hydrologic data as recorded during the year under review are tabulated in Table VI-29.

The water in the reservoir did not reach the spillway crest but remained much below with maximum quantity in storage around 5.403 MCM. The average inflow to the dam reservoir during the year was estimated to be 1.937 MCM. The minimum water level ever reached was in December with quantity in storage of 2.781 MCM.

TABLE VI–29
LEFKARA DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	4 401 368	31.78
2	Inflow during the year	1 937 336	13.99
3	Total release	2 993 432	21.61
4	Leakages	40 000	2.88
5	Evaporation	383 943	2.77
6	Overflow	--	--
7	Final amount in storage	2 921 329	21.09
8	Minimum quantity in storage	2 781 454	20.08
9	Storage capacity	13 850 000	100.00

Water Utilization and crops irrigated

As stated above the Project was constructed mainly for the supply of domestic water to towns and villages and to a less extent to provide irrigation water for an area of 615 donums. The utilization of the water release from the dam during 1979 is shown on Table VI-30.

Water utilized for irrigation in 1979 was very limited due to the fact that the agricultural development of the area downstream the dam is very slow. A total of only 100 donums of land has been irrigated as shown on Table VI-31.

TABLE VI–30
LEFKARA DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	%of storage capacity
1	Water used for irrigation	57 263	4.13
2	Water used for domestic WS	2 936 169	21.20
3	Water lost in pipe breakage	NIL	NIL
	Total	2 993 432	21.61

TABLE VI–31
LEFKARA DAM – IRRIGATED CROPS

Ser. No.	Crop	Area (Donums)
1	Citrus	85
2	Vegetables	15
	Total	100

TABLE VI–32
LEFKARA DAM – PROJECT OPERATION DATA FOR THE LAST TWO YEARS

Item No.	Description	Unit	1978	1979	%change On 1978
1	Capacity	$1000m^3$	13 850	13 850	–
2	Water available	"	7 884	6 338	-19.6
3	Water used for irrigation	"	35	57	+62.85
4	Water used for domestic WS.	"	2 856	2 936	+2.80
5	Total water utilized	"	2 891	2 993	+1.02
6	Inflow (estimated)	"	2 561	1937	-24.36
7	Area irrigated	dons	100	100	–

Water Sale Income

The water was sold either for irrigation or domestic use at fixed rates. Details on water sales for domestic purposes are given in the section on Domestic Water Supply. The irrigation water was sold at 10 mils/m^3 and the total income from the sale of irrigation water amounted to £572.

Project Operation on Data for the last two years

Table VI-32 shows the data of the operation of the project for the last two years. The last column shows the percentage variation of the quantities of 1979 in comparison to those of 1978.

MAYROKOLYMBOS PROJECT

The Mavrokolymbos dam irrigation project consists of a dam reservoir of capacity 2.180 MCM at spillway crest and a distribution system of canals and pipes commanding an area of approximately 3,355 donums.

Irrigation in the project area started early in January and continued until late in October 1979. During this period a quantity of 0.553 MCM of water was utilized for the irrigation of 1,060 donums of bananas, citrus, vines, deciduous potatoes etc. of the 0.553 MCM utilized 0.513 MCM was sold at nominal rates where the rest 0.040 MCM was given free of charge to the Potima Chiflik farmers as water right. To satisfy the water demand of the Project water was bought from the Lower Villages water supply at 20 mils/m^3. Also another quantity was pumped from the Potima Chiflik boreholes.

The total gross income from the sale of water amounted to £11,991 where the operation and management cost totalled £11,867 including the cost for operating the pumps for pumping water from the Potima boreholes. The maintenance expenses were £879 thus giving a negative net income to the project of £755.

TABLE VI–33
MAVROKLYMBOS DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	230 000	10.55
2	Inflow during the year	561 807	25.77
3	Total release	371 807	17.05
4	Leakages	--	--
5	Evaporation	200 000	9.15
6	Overflow	NIL	NIL
7	Final amount in storage	24 000	1.10

Project Hydrology

The project hydrologic data including Potima boreholes and the water bought from the Lower Villages water supply scheme as recorded are shown on Table VI-33.

Water Utilization and Crops Irrigated

During the irrigation season of 1979 a total of 0.553 MCM of water was utilized for the irrigation of 1,000 donums of land planted with various crops. The water was taken either from the dam or from the Potima boreholes (2 boreholes). Details about the water utilization, and water resources and the crops irrigated are shown on Tables VI-34, 35.

Water Sale, Income Operation Management and Maintenance costs

From the sale of water the gross income amounted to £11,991. The water sold from the dam reservoir was at the rates of 15 mils and 10 mils/m^3. However the water pumped from the boreholes and from the L.V. W.S.S. was sold at higher

TABLE VI–34
MAVROKOLYMBOS DAM–WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation	553 000	25.37
2	Water used for recharge	NIL	–
3	Total water utilized	553 000	25.37
4	Water taken from dam	332 807	15.27
5	Water taken from boreholes	200 000	9.17
6	Water bought from L V W S S	21 193	0.97

TABLE VI–35
MAVROKOLYMBOS DAM – CROPS IRRRIGATED

Ser. No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus	60	60	60
2	Bananas	500	500	500
3	Vines	40	40	40
4	Deciduous	40	40	40
5	Vegetables	190	–	190
6	Potatoes	230	–	230
7	Cereals	–	–	–
	Total	1 060	640	1 060

rates 25 mils/m^3 due to its high pumping cost. The operation expenses amounted to £11,867 including the operation cost for the pumps, where the maintenance works costs were £2,394 Net income to the project was a negative of £2,270. Details regarding the income, expenditure and operational costs are shown on Table VI-36.

Project Performance Data for the Last Two Years

Table VI-37 shows the data of the operation of the project for the last two years. The last column shows the percentage variation of the quantities of 1979 in comparison of those of 1978.

TABLE VI–36
MAYROKOLYMBOS DAM–INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	63 195	743
2	Water sold at high rates	449 921	112 480
3	Water given free of charge	40 000	–
4	Total quantity utilized and gross income	593 000	11 991
5	Operation cost		11 867
6	Maintenance cost		879
7	Net income		-755

TABLE VI–37
MAVROKOLYMBOS DAM–DATA ON PROJECT FOR THE LAST TWO YEARS

Item No.	Data	Unit	1978	1979	% change on 1978
1	Capacity	1 000 m^3	2 180	2 180	–
2	Water available in storage	"	1 791	591	–67.00
3	Water utilized for irrigation	"	1 425	553*	–61.19
4	Water sold	"	1 331	503	–62.22
5	Water given free	"	93	40	–56.99
6	Water used for recharge	"	NIL	NIL	–
7	Gross income	£	17 410	11 991	–31.12
8	Operation cost	£	4 370	11 867	–171.55
9	Maintenance cost	£	1 203	755	–37.24
10	Total expenses	£	5 573	12 746	+128.71
11	Net income	£	11 837	– 755	–106.38
12	Area irrigated	Donums	1 315	1 060	–18.63

* Including water pumped from boreholes

POMOS PROJECT

The Pomos irrigation project consists of a dam reservoir of maximum capacity at spillway crest of 0.860 MCM, and a distribution system, made of a main canal and pipes as secondary and tertiary conduits, commanding an area of 2,850 donums.

Irrigation in the Project area, started early in February 1980, and continued throughout the year until the end of November 1980.

An area of 765 donums of land planted with citrus, bananas and vegetables was irrigated by utilizing 0.694 MCM of water. The total gross income from the sale of water amounted to £6,929. The expenditure for the maintenance was £1103 whereas the operation and management costs were £5,575. Net income to the project for the year under review was £251.

TABLE VI–38
POMOS DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	empty	–
2	Inflow	1 200 000	139.53
3	Total release	693 000	80.58
4	Leakages	92 525	10.76
5	Evaporation	80 000	9.30
6	Overflow	NIL	NIL
7	Final amount in . . . . storage	171 000	19.88
8	Minimum amount in storage(19th October 1979)	18 181	2.11
9	Storage capacity	860 000	100.00

Project Hydrology

The project hydrologic data as recorded during the year are tabulated in Table VI-38. The reservoir did not fill to spillway crest. Minimum water level in the reservoir occured in October 19 with total volume in storage around 0.018 MCM. The reservoir was emptied in January for cleaning (scouring gate opened on 11th and closed on the 25th of January 1979).

Water Utilization and Crops Irrigated

The 0.693 MCM of water was utilized for the irrigation of 765 donums within the project area. Details about the water utilized and the crops irrigated are shown on Tables VI-39 and VI-40.

TABLE VI–39
POMOS DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation	693 000	80.58
2	Water used for recharge	NIL	NIL
3	Total water utilized	693 000	80.58

TABLE VI–40
POMOS DAM – CROPS IRRIGATED

Item No.	Crop	1st period donums	2nd period donums	Total area donums
1	Citrus.	150	150	150
2	Bananas	285	285	285
3	Vines	–	–	–
4	Deciduous	30	30	30
5	Vegetables	200	100	300
6	Potatoes	–	–	–
7	Cereals	–	–	–
	Total	665	565	765

Water Sale, Income, Operation and Maintenance Costs

From the sale of water (see details on Table VI-41) the total gross income amounted to £6,929 whereas the management and operation costs were £5,575. Maintenance works on the dam and distribution system were £1,103. Net income to the project for the year under review amounted to £251.

TABLE VI–41
POMOS DAM – INCOME AND EXPENDITURE DATA

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	693 000	6 927
2	Water sold at reduced rates	NIL	NIL
3	Water given free of charge	NIL	NIL
4	Total quantity utilized and total income	693 000	6 929
5	Operation cost	–	5 575
6	Maintenance cost	–	1 103
7	Net income	–	251

TABLE VI–42
POMOS DAM – DATA GN PROJECT FOR THE LAST TWO YEARS

Item No.	Description	Unit	1978	1979	%change On 1978
1	Capacity	$1000m^3$	860	860	no change
2	Water available	"	1218	1028	-15.60
3	Water utilized for irrigation	"	1004	693	-30.97
4	Water sold	"	1004	693	-30.97
5	Water given free	"	NIL	NIL	NIL
6	Water used for recharge	"	NIL	NIL	NIL
7	Gross income	£	9127	6929	-24.08
8	Operation cost	£	4141	5575	+34.62
9	Maintenance cost	£	1087	1103	-1.47
10	Total expenses	£	5228	6678	+27.73
11	Net income	£	3899	251	-93.56
12	Area irrigated	dons	601	765	+27.28

Project Performance data for the last to years

Table VI-42 shows the data regarding hydrologic, water utilization, water sales, gross income, operation and maintenance costs, net income and areas irrigated for the last two years. The last column shows the percentage variation of the data of 1979 in comparison with those of 1978.

YERMASOYIA - POLEMIDHIA PROJECT

The Yermasoyia - Polemidhia project consists of the Yermasoyia dam, the reservoir of which has a capacity of 13.5 MCM and the Polemidhia dam with reservoir capacity of 3.43 MCM. Total storage capacity of both dam reservoirs is 16.93 MCM. The distribution system of the project made of A.C. and steel pipes commands an area of 15,440 donums.

Irrigation in the project area started in January, 1979 and continued throughout the year until late in December, 1979. A total quantity of 7.935 MCM of water was utilized from both dam reservoirs (1.137 MCM from Polemidhia and 6.798 MCM from Yermasoyia) for the irrigation of 15.440 donums in the Zakaki, Akrounda, Phinikaria, Yermasoyia, Polemidhia, Ayios Nicolaos farm and Trackhoni-Ypsonas areas. Of the 7.935 MCM of water utilized 7.322 MCM was sold at nominal rates where the rest (0.613 MCM) was given free of charge as water rights to the Yermasoyia Irrigation Division (0.466 MCM) and to the K. Polemidhia Irrigation Division (0.147MCM).

Overflow occured only from the Yermasoyia dam which started on the 17th of February 1979 and continued until the 22nd of March, 1979. During this period a total of 1.306 MCM of water overspilled and recharged the aquifer downstream. From this aquifer water is pumped for the supply of domestic water to the Limassol town and the Moutayiaka Region.

Total gross income from the sale of water amounted to £93,882 where the operating costs including pumping cost expenses amounted to £30,821. The maintenance works carried out by the

WDD were of the order of £3,153 details of which are given under the heading Maintenance of Government Irrigation Works. Net income to the project from the sale of water amounted to £59,908.

Project Hydrology

The project hydrologic data as recorded during the year under review are tabulated in the following table.

Polemidhia dam reservoir

The hydrologic data for this reservoir are tabulated in Table VI-43.

TABLE VI–43
POLEMIDHIA DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	985 000	28.72
2	Inflow during the year	1 943 000	56.65
3	Total release	464 700	13.55
4	Leakages	757 390	22.08
5	Evaporation	209 020	6.09
6	Overflow	NIL	NIL
7	Final amount in storage	916 000	26.71
8	Minimum quantity in storage (Nov.)	458 000	13.35
9	Storage capacity	3 430 000	100.00

Yermasoyia dam reservoir

The hydrologic data for this reservoir are shown on Table VI-44.

Water Utilization from both dam reservoirs

Details regarding water utilization from both dams separately and it combine are given on Tables VI-45, VI-46, and VI-47. In summary a total quantity of 9.329 MCM of water was utilized for irrigation and recharge purposes. Out of this quantity 7.936 MCM was utilized for irrigation of approximately 15,440

TABLE VI–44
YERMASOYIA DAM – HYDROLOGY FOR 1979

Item No.	Description	Quantity m^3	% of storage capacity
1	Initial amount in storage	9 277 000	68.72
2	Inflow during the year	9 201 641	68.16
3	Total release	6 684 000	49.51
4	Leakages	19 050	0.14
5	Evaporation	1 332 900	9.87
6	Overflow	1 306 200	9.68
7	Final amount in storage	7 790 000	57.70
8	Minimum quantity in storage (Dec.)	6 656 000	49.30
9	Storage capacity	13 500 000	100.00

donums planted with various crops as indicated on Table VI-48. The rest was used for the recharge of the Garyllis and Yermasoyia aquifers.

TABLE VI–45
POLEMIDHIA DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation	1 137 000	33.15
2	Water used for recharge	87 000	2.54
3	Total water utilized	1 224 000	35.68

TABLE VI–46
YERMASOYIA DAM – WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation	6 798 993	50.36
2	Water used for recharge(Overspilled and recharged D/S aquifer)	1 306 200	9.67
3	Total water utilized	8 105 193	60.04

TABLE VI–47
YERMASOYIA – POLEMIDHIA PROJECT WATER UTILIZATION

Item No.	Description	Quantity m^3	% of storage capacity
1	Water used for irrigation (Y&P)	7 936 000	46.87
2	Water used for recharge	1 393 000	8.23
3	Total water utilized . .	9 329 000	55.10

TABLE VI–48
YERMASOYIA – POLEMIDHIA PROJECT–CROPS IRRIGATED

Item No.	Crop	Area (Donums)
1	Citrus	7 256
2	Vines	3 856
3	Deciduous	130
4	Vegetables	4 178
5	Olive trees	20
	Total	15 440

TABLE VI–49
YERMASOYIA – POLEMIDHIA PROJECT – INCOME & EXPENDITURE DATA.

Item No.	Description	Quantity m^3	Amount £
1	Water sold at nominal rates	6 990 550	92 887
2	Water sold at reduced rates	331 879	996
3	Water given free of charge as water rights to:	613 000	–
	– Yermasoyia Irrigation Division	466 000	–
	– Polemidhia Irrigation Division	137 000	–
4	Total quantity income . .	7935 000	93 882
5	Operation cost		
6	Power cost(Akrounda–Phinikaria & Trakhoni). .	–	6 391
7	Maintenance cost	–	3 153
8	Total cost	–	39 974
9	Net Income	–	59 908

Water Sale, Income, Operation and Maintenance Costs

Details about the quantity sold at the nominal rates and water given free of charge are given on Table VI-49

On the same table details regarding the operational and maintenance costs are given

Project Operation data for the last two years

Table VI-50 given detail regarding the operational data for the last two years. The last column gives details about increases or decreases of the various quantities and costs that occured in 1979 as compared to those of 1978.

TABLE VI–50
YERMASOYIA – POLEMIDHIA PROJECT – DATA ON PROJECT FOR THE LAST TWO YEARS

Item No.	Description	Unit	1978	1979	%change On 1978
1	Capacity	1000m^3	16 930	16 930	–
2	Water available		18 780	17 318	-7.78
3	Water utilized for irrigation. .	"	5 265	7 935	+50.71
4	Water sold . . .	"	4 548	7 322	+60.99
5	Water given free	"	717	613	-14.50
6	Water used for recharge	"	828	1 393	+68.24
7	Total quantity used.	"	6 093	9 328	+53.09
8	Gross income .	£	58 477	93 882	+60.54
9	Operation cost	£	16 670	24 430	+46.55
10	Power cost . .	£	2 785	6 391	+129.47
11	Maintenance cost	£	2 502	3 153	+26.02
12	Total expenditure	£	21 957	33 974	+54.73
13	Net income . .	£	36 520	59 908	+64.04
14	Area irrigated .	Dons	10 050	15 440	53.63

OPERATION AND MAINTENANCE OF TOWN WATER SUPPLIES BRANCH

Introduction

This Branch deals mainly with the administration and operation of the Greater Nicosia Water Supply Scheme and the Famagusta Water Supply Project.

Greater Nicosia Scheme

This scheme was wholly financed by Government and it was first put into operation in 1958, providing water to the suburban area of Nicosia town. This scheme was so designed, that it could be amalgamated with that of the Nicosia Water Board, and provided, for this purpose, reservoir and trunk mains interconnections.

The main sources of this scheme are:-

(a) Morphou boreholes
(b) Kokkini Trimithia boreholes
(c) Dhali boreholes
(d) Dhikomo boreholes, and
(e) Sykhari adit.

The execution of Peristerona - Akaki water supply scheme was well in progress and by July 1979 3 No. boreholes were put into operation, with a total daily production of 2,000m³. Another successful borehole, No. 91/78, was drilled in the area of KokkiniTrimithia and was put into operation in July 1979. The daily output of this borehole was 500 m³.

Though sources of the Greater Nicosia Scheme can suffice the water requirements of its "area of supply" yet the water supply demand for Nicosia Town and Suburbs is faced in common with the Nicosia Water Board, and on this line of policy, Water Board's water requirements are being supplemented from Greater Nicosia Scheme sources.

The highest daily consumption in 1979 of Greater Nicosia areas of supply was 17,940 m³, on 13th May, 1979 (under restriction).

During the year under review, the distribution system of Greater Nicosia Scheme was extended by 4,200 M of 4" dia AC pipes and by 6,000 M of 6" dia AC pipes, in respect of new land developments by the private sector. During this year, 1556 new consumers were connected to the distribution system, bringing the total number of consumers to 17,936 by 31st December 1979.

A statement giving expenditure and revenue for Greater Nicosia Scheme for 1979 is given on table No. VI-51.

TABLE VI–51

GREATER NICOSIA SCHEME

Expenditure and Revenue account for 1978.

Expenditure

	£
(a) Pumping and maintenace charges	
(i) Wages	60 543
(ii) Electricity	24 356
(iii) Mate ials and others	7 858
(b) Morphou Bay Scheme	
(i) Wages	6 275
(ii) Electricity	100 710
(iii) Materials and others	388
(c) Tseri Scheme	
(i) Wages	7 741
(ii) Electricity	21 944
(iii) Materials and others	1 037
(d) Peristerone – Akaki Scheme	
(i) Wages	
(ii) Electricity and fuel	
(iii) Others	
(e) Purchase of water	8 761
(f) Collection charges	43 792
Total	£283 405

Revenue

(a) Sale of water	
(i) In bulk to NWB	73 922
(ii) To consumers	224 328
(b) Connection	3 198
(c) Usage of pipeline by NWB	4 425
(d) Other revenue	76 020
Total	£381 893

Nicosia Water Supply

Formalities for the amalgamation of the two "Areas of Supply" have reached the final stage and the approval of the Council of Ministers, to this effect, is expected early in the year 1980. It is believed that after amalgamation of the two "Areas of Supply", this branch will be responsible for the operation and maintenance of all sources of Nicosia Water Supply.

Although the Nicosia Water Supply was augmented by 2,500 m^3/ day this year, from the Peristerona - Akaki and Kokkiniтrimithia Schemes, still, due the habitation of Nicosia Town by Greek refugees and the re-activation of building industry, production of water could not meet the increased demand and restrictions on water supply had to be imposed again this year. The restrictions were imposed on 9.4.1979 and provided a 14 hours supply in every 48 hours.

It is estimated that the population of Nicosia Town and Suburbs, including refugees, is at present 180,000 - 200,000 persons and the water requirements without restrictions are estimated at 37,000 - 40,000 m^3 per day, during the summer months against a maximum capacity of 30,000 m^3 daily from all sources.

The total quantity of water conveyed from all sources during 1979 reached the figure of 9,171,663 m^3 as follows:-

		m^3
(a)	Greater Nicosia Scheme Sources	6 407 987
(b)	Nicosia Water Board Sources	401 296
(c)	Water Commision Sources	632 885
(d)	Private sources	1 729 495
	Total	9 171 663

This quantity less 'losses" was distributed to the three "Area of Supply" as follows:-

		m^3
(a)	Greater Nicosia Scheme	3 890 780
(b)	Nicos/a Water Board ...	4 020 936
(c)	Nicosia Water Commission ..... (Town within the walls)	647 468
	Total	8 559 184

The highest daily consumption for all areas was 38,690 m^3 and was observed on 17.8.1979 under restricted water supply.

As reported in previous years, in addition to the short-term supplementary schemes, for Nicosia and Suburbs, Government has approved the execution of a long-term supplementary one - that of Vasilikos -Pendaskinos Project and its execution in phases will start in 1980. The first phase, among others, will cover the laying of the main conveyor to Nicosia (Lakatamia Reservoir).

Famagusta Water Supply Project

This scheme is providing water to Famagusta and Larnaca towns as well as to several villages and Refugee Camps. The scheme provides both underground water being pumped from Vasilikos Pumping Scheme and from boreholes in the areas of Khirokitia, Psematismenos and Alethriko villages and surface water from Lefkara dam, the latter being treated at Khirokitia Treatment Plant. As long as demands in water by the communities served are met by the pumping of the various underground sources, the Treatment Plant remains idle, during which period maintenance work is carried out. Usually, operation of the Treatment Plant starts late in spring. During 1979 the Treatment Plant was put into commission on 6th April, 1979. By that time the water impounted into Lefkara Dam was 5,402,815 m^3 representing 39% of the capacity.

The total amount of water pumped

and/or treated from all sources of this project was 4,075,772m³ (including 475,865m³ "losses") and the quantity was distri buted as follows:-

		m³
(i)	Famagusta town	973 050
(ii)	Larnaca Waer Board	1 292 020
(iii)	Regional village water supplies	1 057 103
(iv)	Local Irrigators	51 623
(v)	Refugee Camps	226 111
(vi)	Losses	475 865
	Total	4 075 772

Statement showing expenditure and revenue of the Famagusta Water Supply Project for the year 1979 is given on the table No. VI-52.

TABLE VI–52

FAMAGUSTA WATER SUPPLY PROJECT

Expenditure and Revenue account for 1979

Pumping and Maintenance Charges

		£
(i)	Wages.	19 808
(ii)	Electiricity.	29 991
(iii)	Materials and others	9 510
	Total	£ 59 309

Running Expenses Khirokhitia and Lefkara Installations

(i)	Wages.	17 166
(ii)	Electricity	1902
(iii)	Materials and others	6 385
	Total	£ 25 453

Regional Scheme Water Supply Running Expenses

(i)	Wages.	–
(ii)	Electricity	8 521
	Total	£ 8 521
	GRAND TOTAL	£ 93 283

Revenue

Sale of water in 1979.	71 004
Outstanding payments for 1979	83 100
Total	£154 105

Outstanding Account

To 31.12.1978	264 466
Amount Outstanding on 31.12.79 from sale) . of water in 1979	83 100
Less amount collected in 1979 on account . .	22 293
Total outstanding on 31.12.1979	£325 274

Water Supply to Government Residences and Institutions

A regular supply of water for domestic use and irrigation to all Government Residences and Institutions was maintained throughout the year from existing sources. The sources used for irrigation, being located within inhabited areas of the town are liable to contamination and therefore it is not recommended that this water is used for drinking purposes.

Technical Advice

This branch offers technical advice to several Government and Semi-Government Organizations mainly to Water Boards and Improvement Boards, either by attending meetings or through exchage of correspondence.

FACTS ABOUT EACH OF THE TOWN WATER BOARDS

Nicosia Water Board

The main problem of this Board is the shortage of water making it impossible to meet demands during the summer months. More details are given below:-

a) The total quantity of water supplied from all sources was 2,763,380 m³.

b) The total quantity of water consumed as registered by area meters (including Nicosia Water Commission) was 4,668,404 m³.

c) The total maximum consumption (including Nicosia Water Commission) was 38,690m³ on 17.8.79 for 14-hour supply (under restrictions).

d) The total number of consumers on 31.12.79 was 17,670 (including

Turks).

e) (i) Extension of distribution system in **metres run:**

641 metres 100 mm dia.
924 metres 150 mm dia.

(ii) Total length of distribution system in metres run including extensions for 1979:

3 689 m of 300 mm dia.
7 622 m of 250 mm dia.
3 942 m of 200 mm dia.
26 144 m of 150 mm dia.
196 247 m of 100 mm dia.

f) The total number of fire hydrants installed up to 31.12.79 was 890.

Limassol Water Board

Existing sources were able to meet water requirements and a regular supply to consumers was maintained. Necessary formalities for the engagement of Consultants to study improvements of the existing distribution system and/or proposed new works for a satisfactory supply until the year 2,000 have been completed and it is expected that respective contract will be signed early next year. Additional data is recorded as under:-

a) Total quantity of water supplied from the sources ..... 6 660 048 m^3.
b) Total quantity of water consumed as registered by area meters ..... 6 560 782m^3
c) Total maximum summer consumption in one day ..... 25183m^3.
d) Total number of consumers as at 31.12.1979 ..... 23 840
e) Extension of distribution system in metres
9 102 m of 100 mm dia
155 m of 150 mm dia
9 257 m

f) Total length of distribution system as at 31.12.1979 ..... 317 604m
g) Number of fire hydrants installed in 1979 17

h) Total number of fire hydrants installed withing the "area of supply" by 31.12.1979 1122

Famagusta Water Board

Since the Turkish occupation of Famagusta, the Cyprus Government has been supplying water, free of charge, to meet requirements of the Turkish people and the troops in the area.

Larnaca Water Board

By the supplementation offered from the Famagusta Water Supply Project, demands were met satisfactorily and regular supply to the town was possible. More information as below:-

a) Total quantity of water supplied from all sources ..... 2 701 930m^3.
b) Total quantity of water consumed as registered by area meters ..... 2 669 100m^3
c) Maximum summer daily consumption ..... 9 500m^3
d) Total number of consumers as on 31.12.79 10578
e) Extension to distribution system during the year 1979:-
5 915 m of 100 mm dia.
2 805 m of 150 mm dia.
213 m of 200 mm dia
Total 8 933

Total number of fire hydrants installed within the «area of supply» 534 No.

Paphos Water Supply

The administration of water supply in this Town is in the hands of the Municipality. Existing sources could easily meet requirements. The maximum daily consumption was 2,602m^3. During the year a total quantity of 973,361m^3 was pumped to supply 3,851 consumers by 31.12.1979.

VII SMALL PROJECTS PLANNING DIVISION

By C. Andreou
Senior Water Engineer
Head of the Division

Introduction:

The Small Projects Planning Division is dealing especially, with the rural domestic water supplies, and the planning and design of small irrigation schemes. Other activities of the Division, is the rehabilitation of water-supply and irrigation schemes within the Pitsilia Integrated Rural Development Project, water supply schemes of touristic and livestock areas, encroachment in rivers and streams, quarrying in river beds, and the capital aid from the Federal Republic of Germany.

By the end of 1979 the staff of the Division was consisting of the following Officers.

One Senior Water Engineer - Head of the Division.
One Executive Engineer Class I.
One Superintendent of Works.
One Senior Inspector of Works.
Five Inspectors of Works.
Three Technical Assistants.
One Secretary - Typist.

VILLAGE WATER SUPPLIES

The general village water supply situation during 1979 is described in tables VII-1 and VII-2. There are no villages in Cyprus without piped water.

With the completion of 2 house to house supply systems during 1979 only 60 out of a total number of 619 villages remain with public fountains i.e. 1.73% of the total village population.

Out of 559 villages with house to house supply systems 509 enjoyed a per capita daily rate of over 90 litres (20 gallons).

Water supply schemes prepared during 1979.

A total number of 63 new schemes was prepared and submitted to the District Officers during 1979, of a total estimated cost of £1,786,425 as shown on table VII-3.

Another 56 schemes were in the course of preparation by the end of the year as per table VII-4.

Beside the above mentioned schemes, a total number of 26 projects have been prepared, concerning the water supply, for the housing of displaced persons (Self-housing- and Government housing estates), of a total estimated cost of £571,950 as per table VII-3a.

These schemes have been submitted to the Director of Town Planning and Housing.

Another 12 schemes were in the course of preparation by the end of the year, as shown on Table VII-4a.

In the above-mentioned schemes prepared by this Division, a certain number, concerning the domestic water supply for livestock areas, and touristic areas, is included.

In case where there are no established water boards the Division is dealing also with the design of town water supply schemes.

Brief description of Important Water Supply schemes prepared during 1979.

Paphos Water Supply: Due to the construction of the Asprokremmos Dam, within the Paphos Irrigation Project, the existing boreholes of the Paphos water-supply will be affected, and therefore a new scheme has been prepared in order to cover the needs of the town.

The scheme consists of two boreholes located upstream of the dam reservoir a boosting station and pipeline of 4 900 m long. The total estimate cost amounts to £182,000.

Ayia Varvara: A scheme has been prepared for the implementation of a house to house supply, at a total estimated cost of £46,000.

Yeri Livestock Area: This scheme has been prepared in order to supply the newly established livestock area, with domestic water, at a total estimated cost of £44,000.

Dhali Livestock Area: A scheme has been prepared in order to supply domestic water to the newly established area, at a total estimated cost of £53,000.

Kokkini Trimithia: The scheme prepared, consists of the extensions within the village boundaries at a total estimated cost of £35,000.

Amathus Improvement Board: This scheme provides the domestic Water Supply, of the newly established Amathus Improvement Board, along the beach of Limassol. This scheme is planned to be executed in three phases. The total estimated cost is £460,000.

Moniatis-Trimiklini: A scheme has been prepared, in order to provide supplementary water supply, to both villages, as well as improvements to the distribution system of Trimiklini, at a total estimated cost of £78,800.

Ypsonas - Polemidhia: A pumping scheme, has been prepared in order to provide supplementary water supply to the villages at a total estimated cost of £167,000.

TABLE VII–1 **VILLAGE WATER SUPPLIES**

	Villages with House-to-House distribution system				Villages with Public Fountains			Villages without a piped supply			
Year	Schemes completed	Total No. of villages	Villages %	Population %	Total No. of Villages	Villages %	Population %	Total No. of Villages	Villages %	Population %	Total No. of Villages
1960	–	90	14.33	–	441	70.23	–	97	15.44	–	628
1961	41	131	20.86	–	428	68.19	–	69	10.95	–	628
1962	59	190	30.25	–	380	60.55	–	58	9.20	–	628
1963	67	257	40.90	–	324	51.60	–	47	7.50	–	628
1964	39	296	47.13	66.71	323	51.43	32.29	9	7.44	1.00	628
1965	5	301	47.93	68.86	321	51.11	30.44	6	0.96	0.70	628
1966	7	308	49.05	69.81	316	50.31	29.95	4	0.64	0.24	628
1967	11	319	50.80	71.40	307	48.88	28.46	2	0.32	0.14	628
1968	27	346	55.10	75.72	282	44.90	24.28	–	–	–	628
1969	14	360	57.32	78.60	268	42.68	21.40	–	–	–	628
1970	32	392	62.42	83.23	236	37.58	16.77	–	–	–	628
1971	16	408	64.95	85.42	220	35.05	14.58	–	–	–	628
1972	29	437	69.60	88.70	191	30.40	11.30	–	–	–	628
1973	67	504	81.40	95.10	115	18.60	4.90	–	–	–	619
1974	22	526	85.00	97.20	93	15.00	2.80	–	–	–	619
1975	6	532	85.94	97.55	87	14.06	2.45	–	–	–	619
1976	11	543	87.72	97.60	76	12.28	2.40	–	–	–	619
1977	8	551	89.02	98.04	68	10.98	1.96	–	–	–	619
1978	6	557	89.98	98.20	62	10.02	1.80	–	–	–	619
1979	2	559	90.30	98.27	60	9.70	1.73	–	–	–	619

TABLE VII–2 Water Supply Situation at the end of 1979

	Satisfactory piped supply (supply rate 90 litres/head/day & over)								Unsatisfactory piped supply (supply rate below 90 litres/head/day)								Total No. of Villages	Total Population
	Villages with house to house				Villages with fountains				Villages with house to house				Villages with public fountains					
District	No	%	Pop.	%	No	%	Pop.	%	No.	%	Pop.	%	No	%	Pop.	%		
Nicosia	137	81.07	111 275	89.52	8	4.73	1 206	0.97	17	10.06	11 272	9.07	7	4.14	543	0.44	169	124 296
Kyrenia	39	82.98	30 869	93.76	2	4.25	55	0.16	1	2.13	540	1.64	5	10.64	1 463	4.44	47	32 927
Famagusta	81	82.66	82 990	92.50	3	3.06	100	0.11	7	7.14	5 693	6.35	7	7.14	934	1.04	98	89 717
Limassol	101	88.60	71 687	96.73	4	3.51	50	0.07	6	5.26	2 251	3.04	3	2.63	120	0.16	114	74 108
Paphos	102	77.27	45 801	88.59	13	9.85	1 874	3.63	12	9.09	3 510	6.79	5	3.79	510	0.99	132	51 695
Larnaca	49	83.05	36 525	90.11	2	3.39	3 156	0.38	7	11.87	3 713	9.16	1	1.69	140	0.35	59	40 534
Total	509	82.23	379 147	91.74	32	5.17	3 441	0.83	50	8.08	26 979	6.53	28	4.52	3 710	0.90	619	413 277

TABLE VII–3

VILLAGE WATER SUPPLY SCHEMES PREPARED IN 1979 AND SUBMITTED TO DISTRICT OFFICERS.

Ser No.	Village	Nature of scheme	Est. Cost. £
	NICOSIA DISTRICT.		
1	Avia Varvara	House to House	46 000
2	Agrokipia	Improvements	540
3	Agrokipia	Extensions	9 000
4	Astromeritis	Extensions	1 500
5	Alambra	Extensions	4 800
6	Askas	Extensions	200
7	Yeri	Livestock Area	44 000
8	Dhali	Extensions	900
9	Dhali	Additional supply	17 500
10	Dhali	Livestock Area	53 000
11	Dhenia	Building sites	7 000
12	Dheftera	Extensions	2 600
13	Evrykhou–Sina Oros–Tembria	Additional Supply	5 000
14	Kalokhorio	Extensions	750
15	Kokkini Trimithia	Extensions	35 000
16	Mathiati	Additional supply	12 000
17	Mathiati	Building sites	4 800
18	Malounda	New storage tank	2 600
19	Mammari	Building sites	24 500
20	Nisou–Perakhorion	Additional supply	28 000
21	Nisou	Installation of pump on borehole 115/77	7 800
22	Tseri	Pumping scheme	4 000
23	Politiko	Excavation of Well	1 300
24	Laxia	Additional supply	15 800
25	Psomolophou	Extensions	1 300
		Total	£330 090

Ser No	Village	Nature of scheme	Est Cost £
	LIMASSOL DISTRICT		
1	Amathous Improvement Board	Phase A	330 000
		Phase B	76 000
		Phase C	54 000
2	Asomatos	Improvements	860
3	Moniatis–Trimiklini	Combine W S scheme	78 800
4	Palodhia	Military camp	3 000
5	Kandou	Livestock Area	3 300
6	Pissouri	Improvements	16 000
7	Potamos Yermasoyias	Additional supply	21 500
8	Pyrgos	Extensions	10 100
9	Trakhoni	Livestock Area	4 700
10	Ypsonas – Polemidhia	Pumping scheme	167 000
11	Ypsonas – Kolossi	Livestock Area	19 900
		Total	£785 160

LARNACA DISTRICT

1	Alaminos–Ayios Theodoros	Replacement of main conveyor & storage tank	33 000
2	Dhromolaxia	Livestock area A	22 000
3	Dhromolaxia	Livestock area B.	15 000
4	Kalavasos	New system	31 000
5	Kellia	Livestock area	8 500
6	Mazotos	Improvements	22 500
7	Xylotymbou	Livestock area	12 000
8	Xylophagou	New scheme	34 000
9	Pyrga	New conveyor	3 500
10	Pyrga	Building sites	5 400
11	Ormidhia	Building sites	6 800
12	Goshi	Improvements	9 000
		Total	£202 700

PAPHOS DISTRICT

Ser No	Village	Nature of scheme	Est. Cost. £
1	"Anatolikon" Industrial Area	Distribution	24 000
2	Emba	Extensions & storage tank	37 000
3	Kissonerga	Improvements	57 500
4	Kritou Terra	Improvements	4 095
5	Peyia	Improvements	52 000
6	Polis (Khrysokhou)	Limni Distribution	4 080
7	Phasoula	Improvements	1 800
8	Kholetria	Livestock area	3 100
9	Paphos Town	New pumping scheme	182 000
10	Timi	New livestock area	1 400
11	Polis	Replacement of conveyor	66 000
12	Kritou Marottou	Installation of Water Meters	1 200
		Total	£434 175

FAMAGUSTA DISTRICT

1	Ayia Napa	Tourist area	23 000
2	Paralimni	Hospital Water Supply	4 300
3	Dherinia	Improvements	7 000
		Total	£ 34 300

SUMMARY OF TABLE VII–3

District	No. of Schemes	Estimated Cost £
Nicosia	25	330 090
Limassol	11	786 160
Larnaca	12	202 700
Paphos	12	434 175
Famagusta	3	34 300
Total	63	£1 786 425

TABLE VII–3A

WATER SUPPLY SCHEMES FOR REFUGEE HOUSING ESTATES PREPARED AND SUBMITTED IN 1979

Ser No	Village	Est Cost £
	NICOSIA DISTRICT	
1	Athalassa	19 000
2	Yeri	5 000
3	Yeri	93 500
4	Ayios Mamas (Lakatamia)	4 000
5	Pano Lakatamia	28 000
6	Plati (Athalassa)	9 000
7	Tseri	5 000
8	Tseri	1 150
9	Strovolos (Kokkines)	85 000
10	Athalassa	2 800
	Total	£252 450
	LIMASSOL DISTRICT	
1	Ayia Phyla (Kapsalos)	21 000
2	Ayia Phyla	32 500
3	Kolossi	23 300
4	Makarios III	18 400
5	Polemidhia (Ayios Ioannis)	10 200
6	Polemidhia (P)	47 200
	Total	£152 600
	LARNACA DISTRICT	
1	Ayii Anagriri	26 000
2	Zyyi	17 500
3	Kalokhorio	12 000
4	Kophinou	24 000
5	Livadhia	10 000
6	Makarios III (L'ca)	18 000
7	Meneou	45 000
8	Xylophaghou	5 000
9	Perivolia	5 000
10	Tersephanou	4 400
	Total	£166 900

TABLE VII–4

VILLAGE WATER SUPPLY SCHEMES UNDER PREPARATION DURING 1979

Ser No.	Village	Nature of scheme
NICOSIA DISTRICT		
1	Ayios Epiphanios	Development of springs
2	Astromeritis	Additional supply
3	Kokkini Trimithia	Building sites
4	Klirou–Mitsero	Additional supply
5	Moutoullas	Additional supply
6	Lythrodhonda	Additional supply
7	Linou	Replacement of pipeline
8	Meniko	Additional supply
9	Nikos	Additional supply
10	Dheftera	Additional supply
11	Lakatamia	Additional supply
LIMASSOL DISTRICT		
1	Plataniskia	Additional supply
2	Ayios Thomas	" "
3	Ayios Therapon	" "
4	Anoyia	" "
5	Spitali	Improvements
6	Akrounda	Improvements
7	Kellaki	Improvements
8	Evdhimou	Improvements
9	Omodhos	Additional supply
10	Kato Platres	Improvements
11	Troodhitissa Mon.	Additional supply
12	Kilani	New storage tank
13	Ayios Athanasios	Distribution system
14	Erimi	Improvements
15	Korphi	Livestock area
16	Monagri	Improvements
17	Prastion	Livestock area
18	Moutayiaka	Livestock area
LARNACA DISTRIC		
Ser No	Village	Nature of scheme
1	Aglisidhes	Improvements
2	Alaminos	Livestock area
3	Xylotymbou	Additional supply
4	Xylophaghou	Livestock area
5	Tersephanou	Livestock area
6	Khirokitia	Additional supply
7	Kiti–Perivolia–Meneou Tersephanou–Dhromo-laxia	Additional supply
PAPHOS DISTRICT		
1	Anavargos	Extensions
2	Kiti–Tsadha	Additional supply
3	Paphos Town	Paphos beach
4	Pelathousa	Main coveyor
5	Khlorakas	Extensions
6	Khrysokhou	Additional supply
7	Peyia	Coral Bay
8	Philousa	Imprvoements
9	Miliou	House to house
10	Theletra	Improvements
11	Akoursos	Additional supply
12	Kallepia	Additional supply
13	Kritou Terra	Improvements
14	Argaka	Main conveyor
15	Mesa Khorio	Improvements & Extensions
16	Lyso	Additional supply
17	Panayia	Additional supply
FAMAGUSTA DISTRICT		
1	Sotira	Livestock area
2	Ayia Napa	New Distribution
3	Paralimni	Improvements

TABLE VII–4A

WATER SUPPLY SCHEMES FOR GOVERNMENT OR SELF–HOUSING ESTATES UNDER PREPARATION IN 1979.

Ser No	Village	Nature of scheme
NICOSIA DISTRICT		
1	Ayios Pavlos	(N) Housing Estate
2	Athalassa	Housing
3	Laxia (Apostolos Loucas)	H.E.
4	Laxia (Ayios Andreas)	H.E
5	Peristerona	Self housing "E"
LARNACA DISTRICT		
1	Dhekelia	Self housing
2	Ayios Ioannis	Housing
3	Kamares	Housing
FAMAGUSTA DISTRICT		
1	Avgorou	Self housing
2	Dherinia	Self housing
3	Phrenaros	Self housing
4	Sotira	Self housing

IRRIGATION SCHEMES

The planning and design of irrigation schemes aims at increasing the irrigated area near the sources for self employed farming organizations such as village Irrigation Associations or Divisions.

The main target is to increase permanent irrigation by 1000 to 1500 donnums annually which can be implemented with the financial participation by the farmers.

As the main principles of this special programme is the quick and effective use of water at or near the source combined with intensive agriculture methods, design considerations are usually based on land and Water use data furnished by the District Agricultural Officers. Project evaluation is undertaken by a Joint Interdepartmental Committee.

The advantages of the Small Projects Programme, the beginning of which dates back to the creation of the Department is "speed of reaction" in all phases of Project Development, "wide participation" of farming communities, "greater flexibility" in budgetary procedure and "greater exploitation" of the existing agriculture and agroeconomic background of the island.

The planning and design of these schemes can be undertaken at a greater advantage by technical staff, whose skill has been acquired by long experience in construction methods and long friction with local problems and practices.

The main types of schemes planed and designed, postulated water conservation either by the improvement of the old obsolete intake and distribution system, the construction of small reservoirs for higher or seasonal storage, the exploritation of new boreholes and the artificial recharge of depleted aquifers.

During 1979 a total number of 23 schemes has been prepared and submitted to the District Officers, at a total estimated cost of £711,860 as per table VII-5.

Another 61 schemes were in the course of preparation or investigation by the end of 1979 as per table VII-7.

The most important schemes prepared during 1979, are briefly described below:

Yerakies: A two stage pumping scheme was prepared and submitted to the District Officer, for the irrigation of 216 donnums of cherrytrees at a total estimated cost of £86,000.

Potamia: In order to increase the grade of recharging within the Yialias River, a scheme has been prepared to divert the waters of Alykos river. The estimated cost is £34,000.

Milikouri: A pumping scheme from Platys river, has been prepared, in order to irrigate land under development at a total estimated cost of £66,000.

Dhrousha: This scheme consists the construction of a pond and distribution system, for the irrigation of 70 donnums of new land.

Orounda: A scheme has been prepared for the lining of channels of the Kakodhysha Irrigation Association at a total estimated cost of £45,000.

PITSILIA INTEGRATED RURAL DEVELOPMENT PROJECT.

The Division is dealing with the rehabilitation of rural domestic water supply and irrigation schemes within the Pitsilia Integrated Rural Development Project.

Water Supplies:

During 1979 a total number of 4 schemes

were prepared as per table VII-8, at a total estimated cost of £17,400.

By the end of the year a total number of 9 schemes were in the course of preparation as shown on table VII-8a.

Rehabilitation of Irrigation Schemes

The total number of schemes prepared and submitted to the co-ordinator of the Project is 32 at a total estimated cost of £115,300 as per table VII-9.

These projects are evaluated with the Internal Rate of Return Method.

By the end of the year 191 schemes were pending for investigations, as per table VII-9a.

Interdepartmental Committee for Small Irrigation Projects:

The Committee is functioning in conformity with directions of the Director General of the Ministry of Agriculture and Natural Resources, for the purpose of assessing project viability for budgeting purposes and co-ordinates the activities of the District Agriculture services, for the supply of Agroeconomic data in the preparatory stages of the projects. During 1979, 22 schemes have been considered by the Committee as per tables VII-6 and VII-6a.

CAPITAL AID FROM THE FEDERAL REPUBLIC OF GERMANY

During 1979 a total sum of £422,497 was reimbursed from the loan of 18 million D.M. for irrigation projects either completed or under construction as detailed below:-

Major Projects

Total number of projects 8

Investment cost of projects £2,080,849

Amount reimbursed upto the end of 1979 ..... £307,813

Minor Projects (Over £15,000)

Total number of projects 4

Investment cost of projects ... £123,300

Amount reimbursed up to end of 1979 ..... £12,432

Minor Projects (Up to £15,000)

Total number of projects 33

Investment cost of projects .. £190,1998

Amount reimbursed upto end of 1979 ..... £102,252

Total amount reimbursed from loan up to end of 1979 ..... £422,497

QUARRYING IN RIVER BEDS

In order to coordinate the activities of the Departments concerned, i.e. the District Officers, the Department of Mines and this Department and in order to bring about effective supervision and the enforcement of conditions included in the quarry licences issued by the Department of Mines or the District Officer an advisory Committee was set up in 1976.

During 1979 this committee examined 296 cases and advised the Senior Mines Officer and the District Officer accordingly.

ENCROACHMENT IN RIVERS AND STREAMS

Some 83 cases for land encroach-ment in rivers and streams were examined and the Director of Lands and Surveys was advised accordingly.

New Nicosia - Limassol Rd.

During 1979 committe examined 296 cases and advised the Senior Mines officer and the District Officer accordingly.

TABLE VII–5 Irrigation Schemes prepared in 1979 and submitted to District Officers

Ser No	File No	Village	Division or Assoc.	Locality	Nature of Proposed Work	Estimated Cost £	Village Contr. %	Irrigation Perm.	Irrigation Seas
1.	88/47	Ayios Ioannis (M)	Assoc.	Pitsillis	Lining of canals	34 000	40		
2.	88/47	Ayios Ioannis (M)	Division	Ay. Ioannis	Lining of canals	32 500	33		
3.	55/61	Yerakies	Div.	Xeros	Pumping scheme	75 000	33		
4.	27/39	Argates	Div.	Kounnapis	Extensions	11 000	33	200	60
5.	42/50	Evrykhou	Div.	Makronides	Raising of canals	400	33		
6.	127/40/127	Kambos	Div.		Pumping scheme	84 000	33	200	270
7.	61/66	Katydhata	Div.	Jiami	Lining of canals	17 000	33	130	570
8.	45/41/A	Kochati	Div.		Lining of canals	35 000	33	300	200
9.	147/39	Meniko	Div.	Kyra Diakou	Lining of canals	10 800	33	–	250
10.	127/40/92	Milikouri	Div.	Plati	Pumping scheme	66 000	33	–	200
11.	147/39	Meniko	Div.	Mesi	Raising of channels	900	33		
12.	44/42	Orounda	Div.	Kakodyshia	Lining of canals	45 000	33		
13.	127/40/160	Potamia			Recharge Works	34 000			
14.	51/54	Peristerona	Div.		Lining of canals	10 500	33	800	4 200
15.	31/46	Astromeritis	Div.		Lining of canals	10 500	33	1 000	3 000
16.	127/40/151	Chakistra	Div.	Mavres Sykies	Pumping scheme	81 000	33		
17.	61/66	Katydhata	Div.	Avlaki tis Limnas	Lining of canals	17 000	33	–	300
					Total	£564 600			
LIMASSOL DISTRICT									
1	42/43	Phini	Division	Mylos	Laying of pipes	7 300	33	80	100
2	103/52	Mathīkoloni	Division	Esso Perivolia	Improvements	820	33		
					Total	£ 8 120			
PAPHOS DISTRICT									
1	127/40/11	Ayios Ioannis			Pumping scheme	24 000	–		
2	127/40/74	Kato Akourdhalia	Division	Pitharolakos	Laying of pipes	11 340	33		
3	115/40	Yialia	Division		Laying of pipes	19 300	–		
4	54/40	Dhroushia	Division		Construction of pond & Distribution	84 500	33		
					Total	£139 140			

TABLE VII–6

SMALL IRRIGATION SCHEMES APPROVED BY THE INTERDEPARTMENTAL COMMITTEE IN 1979

Ser. No.	Village	Scheme
1	Ayios Ioannis (Mal)	Pitsillis
2	Phlasou–Katydhata	Karidhis
3	Yerakies	Xeros Potamos
4	Evrykhou	K. Atsas
5	Ayios Epiphanios	Maroullena
6	Agridhia	P & K. Leftina
7	Meniko	Litharkes
8	Dhroushia	Dhexameni
9	Pehdoulas	Lakotou
10	Pera–Politiko	Moulos
11	Kambos	Potamos tou Kaloyirou
12	Phini	Phini
13	Pera	Phassera
14	Tris Elies	Mylarka
15	Ayia Varvara	Ayia Varvara
16	Katydhata	Dhimma Tziamis
17	Linou	Linopsas
18	Katydhata–Linou–Skouriotissa	Avlaki tis Limnas

TABLE VII–6a

SCHEMES NOT APPROVED

1	Yerasa	Yerasa
2	Korakou–Phlasou	Dhimma Rodhias
3	Ayios Therapon	Koukoutas–Kephalovrysos

TABLE VII–7

SCHEMES IN THE COURSE OF PREPARATION UNDER INVESTIGATION OR PENDING

Ser No.	Village	Scheme
	NICOSIA DISTRICT	
1	Kalokhorio	Laying of pipes
2	Nikitari	Pumping scheme
3	Lythrodhonda	Kato Perivolia
4	Orounda	Kremmos
5	Orounda	Neron tou Philippou
6	Psomolophou	Lining of channels
7	Koutraphas	Mounnes & Kalianitika
8	Galata-Sina Oros	Lining of channels
9	Tembria	Lining of channels
10	Tembria-Sina Oros	Lining of channnels
	LIMASSOL DISTRICT	
1	Yerasa	Irrigation Division
2	Paramali	Irrigation scheme
3	Ayios Therapon	Koukoutas–Kephalovrysos
4	Kato Platres	Zanatzia
5	Parekklishia	Kambos tou Stratoura
6	Evdhimou	Irrigation scheme
7	Lemithou	Scheme from B H 49/77
8	Prastio	Plekou
9	Pissouri	Irrigation Division
10	Kilani	Scheme from B H 89/77
11	Kouka	Scheme from B H 69/74
12	Arsos	
13	Apsiou	
14	Ayios Dhimitrios	Scheme from B H 58/77
15	Ayios Mamas	Scheme from B H 53/77
16	Saittas–Moniatis	Irrigation Division
17	Ayios Dhimitrios	Kaminia–Krion Neron
	LARNACA DISTRICT	
1	Athienou	Scheme from BHs
2	Alaminos	Recharge works
3	Anaphotia	Recharge works
4	Khirokitia	Irrigation scheme
	PAPHOS DISTRICT	
1	Kritou Terra	Kremiotis
2	Kato Akourdhalia	Krommidhi
3	Kato Akourdhalia	Irrigation Division
4	Kedhares	Plistra
5	Tala	Mylari
6	Amargeti	Ziripillis
7	Kallepia	Mylos
8	Kritou Terra	Irrigation Division
9	Philousa	Yerondas
10	Kathikas	Drilling New B H
11	Kholetria	Irrigation Division
12	Nata	Irrigation Division
13	Mesana	Spring
14	Mesoyi	Mana tou Nerou
15	Kritou Terra	Irrigation Division
16	Pano Akourdhalia	B H 93/76
17	Yiolou	B H 55/78
18	Kholetria	Pumping unit
19	Steni	New B H
20	Nikoklia	B H 51/72
21	Lemona	Drilling of B H
22	Khoulou	Drilling of B H
23	Kelokedhara	B H 68/79
24	Skoulli	Kryos potamos
25	Vrecha	Kephalovrysos–Zandi
26	Theletra	Villourga
27	Mamonia	B H 4/63
28	Khoulou	Phyllarotos
29	Trakhypedhoula	B H 173/61
30	Polemi	B H 7/79
31	Pyrgos	Dam (Distribution)

TABLE VII–8

WATER SUPPLY SCHEMES WITHIN PITSILIA PROJECT PREPARED AND SUBMITTED IN 1979

Ser	Village	Nature of scheme	Est.Cost £
NICOSIA DISTRICT			
1	Kannavia	Additional supply	5 000
2	Lazania	New storage tank	2 000
		Total	£7 000
LIMASSOL DISTRICT			
1	Kyperounda	Extensions	6 500
2	Pelendria	Extensions	3 900
		Total	£10 400

TABLE VII–8A

VILLAGE WATER SUPPLY SCHEMES WITHIN PITSILIA PROJECT UNDER PREPARATION DURING 1979

Ser No.	Village	Nature of scheme
NICOSIA DISTRICT		
1	Apliki	Additional supply
2	Pharmakas	Additional supply
3	Palekhori	Additional supply—New system
4	Northern Pitsilia	Additional supply
LIMASSOL DISTRICT		
1	Agros	Additional supply—New system
2	Ayios Theodhoros	New tourist area
3	Pelendria	Additional supply
4	Khandria	Additional supply
LARNACA DISTRICT		
1	Ora	New scheme

TABLE VII–9A

SCHEMES WITHIN PITSILIA PROJECT IN THE COURSE OF PREPARATION OR UNDER INVESTIGATION AT THE END OF 1979.

Ser No.	Village	Scheme
NICOSIA DISTRICT		
1	Platanistasa	Pano Kokkina Khomata
2	"	Vasilias
3	"	Kontarka
4	"	Kato Kokkina Khomata
5	"	Pano Potamos
6	"	Kamila
7	"	Vrisi
8	"	Louvaras-Lagodhes
9	"	Paradhisi
10	"	Perva
11	"	Adhia
12	"	Ayiou
13	"	Kato mylos
14	"	Pano mylos
15	"	Pano & Kato Dhipotamia
16	"	Erou
17	Askas	Askas I D
18	"	Pano Ambelia I A
19	Kambi	Vasanosikia I A
20	Kambi	Angoulous I A
21	"	Myladhes I A
22	Phterikoudhi	Kountouri
23	"	Vartalis
24	"	Kamara
25	"	Pararkasia
26	"	Kalamithasa
27	"	Louvaras
28	"	Adhia
29	"	Dexameni stratas
30	"	Karaloizou
31	"	Troullous
32	"	Ayiasma
33	Palekhori	Maroullena I A
34	"	Apodochi
35	"	Milouri I D
36	"	Angoulous No 2 I A
37	"	Livadhia No. 1–2–3 I A
38	"	Angoulous No 3 I A
39	"	Livadheron I D
40	"	Stillari
41	"	Sklidhridhi – Kamini
42	"	Pano Avlaki–Maroullena I A
43	Apliki	Kalogyros I A
44	Pharmakas	Ayios Yeoryios I A
45	"	Dexamini tou Kaminou I A
46	"	Mangou I A
47	Gourri	Papadhes-Kaourkaridhes I D
48	Spilia	Kavallorotsos
49	"	Appidhes-Livadhia I D
50	Ayia Irini (Kannavia)	Lefas
51	"	Krion neron
52	"	Piyi tou Khoriou
53	"	Tsambin
54	"	Kolymbos
55	Kannavia	Potamos tou Kannaviou
56	"	Pizantzi
57	"	Pigadhi
58	"	Kumma
59	"	Fterika I D
60	Polystipos	Sierka
61	"	Milia tou Tourkou
62	"	Kato Manteli I D
63	"	Daphni
64	"	Louka

65	"	Solomou
66	"	Dexamini I D
67	"	Sknisi
68	Lagoudhera	Arkadja
69	"	Amfita
70	"	Tantourou
71	"	Pervolia
72	"	Potamia
73	"	Akhousa
74	"	Lagoudheron I D
75	Xyliatos	Xyliatos I D
76	Sarandi	Agrosytsia I A
77	"	Savandi I A
78	"	Madhari
79	"	Phonissa
80	"	Kato Dexameni
81	"	Kambi
82	Livadhia	Vasiliki
83	"	Livadhi
84	"	Gyros
85	Alithinou	Reximo
86	"	Kamini
87	"	Kountouri
88	"	Kalama
89	"	Erou
90	"	Avlakas

LIMASSOL DISTRICT

Ser No	Village	Scheme
1	Arakapas	Angoulos-Potamos Panayiotis I D
2	"	Skoli I D
3	"	Akriadhes I D
4	"	Perasma tis Koutsis I D
5	Agros	Sykamies
6	"	Vrysi ton Tourtzion
7	"	Pano Yitonia I D
8	"	Skalia–Ayiasmata
9	"	Pano Lambadha No 2
10	"	Kaoukkaris I D
11	"	Akros Dihalorotsos I A
12	"	Taliou–Esso Yitonia
13	"	Vournes I D
14	"	Platania I A
15	"	Paliolinos I D
16	"	Pano Kamara I D
17	"	Kato Erimos I A
18	Kato Mylos	Pervoloudhia
19	"	Koutsoullas
20	Akapnou	Khorafia I D
21	"	Kambos I D
22	"	Livadhia I A
23	Dhierona	Kamaroudhia I D
24	"	Mylos I D
25	"	Dhieronas
26	Ayios Konstantinos	Merika–Raeburn I D
27	K. Amiandos	Fyssouni–Kardama I D
28	Khandria	Zanou I A
29	Athrakos	Chalourakos I D
30	"	Mayrosikiotis I D
31	Ayios Ioannis	Sykari
32	"	Peroyia I D
33	"	Teratsia I D
34	"	Pano Vrisha
35	Ayios Ioannis	Karpasitis
36	"	Yerabela I D
37	"	Ay. Marina I D
38	Ephtagonia	Pothos I A
39	"	Koumenes I D
40	"	Kato Koumenes
41	Louvaras	Perivolia-Koutroutsou-Paskali I A
42	"	K. Perivolia–Maskalos
43	Agridhia	Kaminatsia I D
44	"	Vrysia
45	"	Kato Enetikos I D
46	"	Panayia I D
47	"	Kaouros I D
48	"	Dhimma tou Argyrou I A
49	"	Koniseron I A
50	"	Pano Enetikos I D
51	"	Pano Dhiploma
52	"	Kato Dhiploma
53	"	Pano Platanidhia I A
54	"	Vrisi tou Khoriou I A
55	Zoopiyi	Mesiakos
56	"	Kato Votanos
57	"	Zoodohos Piyi I D
58	"	Petrangoura I A
59	"	Pano Votanos I A
60	Potamitissa	Chasanis I D
61	"	Pano Potamos I A
62	"	Kato Potamos I D
63	Dhymes	Pano Piyi I A
64	"	Livadhia I D
65	Sykopetra	Kountourka I D
66	"	Agridhia–Konomidhes I D
67	"	Angoulos
68	Ayios Theodhoros	Lois I D
69	"	Ay. Yeoryios I D
70	"	Vasiliki Pinakas I D
71	Ayios Theodhoros	Fountoukia I D
72	Ayios Pavlos	Domes I D
73	"	Pitipas I D
74	"	Xiries I D
75	"	Ayios Pavlos I D
76	Pelendria	Sarakinos I D
77	"	Nikomitis I A
78	"	Pervoloudhia I A
79	"	Skamjoratos I D
80	"	Pano Phylagra I A
81	"	Kato Psilon Vrysin I A
82	"	Ayiasma I D
83	"	Kato Phylagra I D
84	"	Kato Englisis I D
85	"	Dhimma Koripi Kolokasi I D
86	"	Kountouridhes I D
87	Kyperounda	Chalospities I A
88	"	P. Stremma Mangouri I A
89	"	Peykos K Livadhi I A
90	"	Kyperoundas I D
91	"	Khasanis I A
92	"	Livadhi tis Mesis I A
93	"	Limni I A
94	"	Piyi Dhymon I A
95	"	Appis I A
96	"	Avlaki Koutsinas
97	"	Kardhama–Paranga I A
98	"	Frakti–Postani I A
99	"	Vasiliko I A
100	"	Lardhama – Solomies
101	"	Mavros Kolymbos I D

TABLE VII – 9

IRRIGATION SCHEMES WITHING PITSILIA PROJECT PREPARED IN 1979.

Ser. No.	File No.	Village	Division or Assoc.	Locality	Nature of Proposed Wprks	Estimated Cost £	Village Contr. %	Irrigation Perm.	Irrigation Seas.
	NICOSIA DISTRICT								
1.	88/52	Pharmakas	IA	Koskinas	Laying of pipes	3 000	40	80	–
2.	127/40/44	Polystipos	IA	Lefteri	Reservoir & distribution	2 500	50	2	–
3.	127/40/3	Alona	IA	Kolymbos–Pernias	Lining of channels	7 200	33	70	–
4.	127/40/3	Alona	IA	Kardhaki	Lining of channels	400	33	15	–
5.	127/40/3	Alona	ID	Alonas	Reservoir–channels–pipes	3 600	33	20	–
6.	127/40/130	Spilia	ID	K. Kleptis	Distribution pipes	1 700	33	4	6
7.	127/40/130	Spilia	ID	Stravarkako	Reservoir & pipes	10 300	33	10	–
8.	127/40/130	Spilia	ID	Kolympos	Reservoir & pipes	5 500	33	15	–
9.	127/40/130	Spilia	ID	Karidhi	Diversion & pipes	3 900	33	1	4
10.	127/40/130	Spilia	ID	Anastasis	Diversion & pipes	4 000	33	12	–
11.	127/40/130	Spilia	ID	P. Kleptis	Distribution pipes	2 000	33	6	–
12.	127/40/130	Spilia	ID	Arkokannavo	Reservoir–diversion–pipes	2 500	33	7	
13.	127/40/39	Palekhori	ID	Pera Avlaki Halkomatas	Distribution pipes	1 900	33	21	10
14.	127/40/39	Palekhori	IA	Kamini	Reservoir & pipes	2 200	50	6	4
15.	127/40/39	Palekhori	IA	Yiophyri	Distribution pipes	3 800	50	5	3
					Total.	£54 500			

TABLE VII – 9

IRRIGATION SCHEMES WITHING PITSILIA PROJECT PREPARED IN 1979. **(Continued)**

Ser. No.	File No.	Village	Division or Assoc.	Locality	Nature of Proposed Wprks	Estimated Cost £	Village Contr. %	Irrigation Perm.	Irrigation Seas
1.	127/40/59	Louvaras	I	Monastirka-Kyra	River Diversion	350	50	18	–
2.	127/40/18	Agridhia	I	P & K. Leftina	Distribution pipes	9 300	33	34	–
3.	127/40/52	Ayios Ioannis (Agros)	I	Yerambelos	" "	4 250	33	20	–
4.	127/40/59	Louvaras		Paralonia	" "	2 400	33	5	4
5.	127/40/22	Dhymes	ID	Hjipelendro	Diversion & pipes	3 200	33	8	–
6.	127/40/16	Kalokhorio	ID	Marammenos	Reservoir & pipes	10 000	33	33	–
7.	127/40/54	Athrakos	ID	Kalimera	Distribution pipes	3 250	33	10	11
8.	127/40/99	Agros		Kamara–Omiridhes		3 050			
9.	127/40/49	Kyperounda	IA	Ladja		600	40		
10.	127/40/99	Agros	ID	Kokkinoyi	Distribution pipes	1 900	33	4	–
11.	127/40/17	Ayios Paylos	ID	Dhimma tou Stiraka	Distribution pipes	4 800	33	15	5
12.	127/40/22	Dhymes	ID	Kambos–Kardhama	Distribution pipes	5 000	33		
13.	127/40/134	Pelemdri	IA	Poullos	Distribution pipes	1 600	50	4	–
14.	127/40/52	Ayios Ioannis (Agros)	ID	Makheras	Distribution pipes	6 000	33	60	–
15.	127/40/52	Ayios Ioannis (Agros)	ID	Spilios Koufo-rovon	Distribution pipes	1 400	33	39	–
	LARNACA DISTRICT				Total.	£57 100			
1.	53/42	Melini	ID	Mallouri	Distribution pipes	2 500	50	20	3
2.	127/41/14	Odhou	I	"B"	Distribution pipes	1 200	33	55	–

VIII LARNACA - FAMAGUSTA REGIONAL OFFICE

by T.N. Hamatsos
Executive Engineer I
Regional Engineer

General

By the end of the year the staff of the Regional Office was composed of the following officers:

1 Executive Engineer I, Head
2 Inspector of Works
5 Monthly paid Technical Assistants
1 Foreman Grade I
7 Regular Employees
1 Secretary-Typist
1 Driver

The technical staff of the office was engaged in Hydrology and Ground Water Resources, Investigations and Designs, Construction and Maintenance.

HYDROLOGY AND WATER RESOURCES

Stream Gauging

During the year 3 permanent gauging observation (one monthly at Liopetri Dam and two weekly at Paralimni Lake) stations equipped with automatic water level recorders were in operation and weekly or monthly visits were paid for observation and maintenance.

Ground Water Hydrology

The groundwater conditions of the two districts, Famagusta and Larnaca, were observed by means of 527 wells / boreholes.

The water levels (i.e. the distance from established bench marks on the top of the observation wells / boreholes to the ground water level) of 383 of them were taken twice this year i.e. in February before the irrigation period and in December after the irrigation period.

The water levels of 63 of them were taken every month and another 10 of them were taken every two months.

The water level of 16 boreholes round Larnaca Salt Lake were taken 4 times during the whole year.

The water levels of 55 boreholes used for village water supplies were also taken once in the whole year.

Chemical Analyses

A total number of 490 samples were taken from Government communal or private boreholes and sent to the Government Laboratory for chemical analysis.

Also a large number of samples were taken from wells and boreholes and were analysed in the Regional Office for chloride content.

Boreholes Test Pumping

During the year the test pumping of 21 boreholes for village water supply and for private use were carried out.

Plotting of boreholes

During the year the plotting of the wells/-boreholes in the Hydrological Area of Famagusta-Larnaca continued and the total number of wells/boreholes plotted was 1314.

During this year plotting in the village boundaries of Avgorou, Paralimni and Pyrga was completed.

Questioning

The annual questionnaire was carried out in the area where the plotting was completed. A total number of 5921 cases were carried out.

Village Water Supplies

During the year the water supply of each village in the two Districts was checked (i.e. was measured the flow of springs and boreholes used by each village, and a sample was sent to the Government Laboratory for chemical analysis.)

Quarries

A total number of 40 applications for quarries which were sent to the District Office by the Department of Mines were examined on the spot and returned to the above Department with the comments of this office.

Southern Conveyor

During the year three officers have completed a detailed questioning in the areas of Akhna, Avgorou and Sotira village boundaries.

Apart from this the ground water level of 109 wells/boreholes was taken in the area of South-Eastern Mesaoria and other 40 in the area of Kiti.

In addition the water levels were measured by 4 automatic recorders, situated at Kiti, Ormidhia, Liopetri and Phrenaros, and were visited once a month.

Well Sinking Permits

A total number of 810 applications for sinking, covering permits and the change of the condition of permits of wells/boreholes were examined in the two Districts, Famagusta and Larnaca, and were presented to the General Advisory Committee for wells/boreholes of the Ministry of Agriculture and Natural Resources.

754 applications are for cases lying in the conservation areas and the other 56 in the non-conservation areas.

Apart from the above applications 322 cases dealing with boreholes/wells were also examined direct from the District Office of the WDD Larnaca/Famagusta and were submitted to the District Officers of Larnaca and Famagusta.

The above applications concerned cases for the renewal of lease agreements of boreholes drilled on Government or Forest land, or cases of cleaning existing wells/-boreholes.

From the above 204 were approved and 118 were not, or some of them were returned to the District Officers for further explanations.

INVESTIGATIONS AND DESIGN

LARNACA DISTRICT

Troulli Village water supply improvement, water supply for new division of plots.

Ayios Theodoros Investigations for the irrigation of new citrus gardens from the Government borehole No. 64/73. Investigation for the repair of recharge work in the Pendaskinos river.

Ayios Theodoros-Alaminos village Water supply improvement.

Alaminos Investigations for the construc-

tion of recharge works and the water supply of a new proposed stock farming area.

Mazotos Investigations for the supplimentation of Village Water Supply, and the construction of a Dam on Pouzis river.

Kalokhorio Village water supply improvement.

Aradhippou Antiflood works.

Kalavasos Village Water supply improvement Recharge works on Vasilikos river for the recharge of the village water supply borehole.

Xylotymbou village water supply. Improvement from a new borehole. Water supply of the village stock farming area.

Kiti-Meneou-Dromolaxia-Pervolia-Tersephanou Improvement of the complex water supply from the new Government borehole No. 16/79.

Kiti Improvement of the village water sup ply.

Tersephanou Construction of recharge woks in Tremithos river. Water supply for a proposed stock farming area.

Dromolaxia Water supply for the two stock farming areas

Skarinou Improvement of village water supply. Expansion of the village irrigation division.

Mosphiloti Improvement of village water supply.

Xylophagou Improvement of village water supply. Water supply for village division plots.

Ormidhia Water supply for village division plots.

Kellia Improvement of village water supply . Water supply for the stock farming area.

Khirokitia Expansion of the Anophantis Irrigation Division.

Mari Improvement of village water supply. Creation of irrigation division. Water supply for the sheep.

Kophinou Improvement of village water supply.

Maroni - Zyyi - Psematismenos improvement of the complex water supply.

supply.

Ayii Vavatsinias Village Elementary School Water Supply.

Sophtadhes Water supply for the village flocks of sheep.

FAMAGUSTA DISTRICT

Vrysoulles improvement of the Refugee Self Housing Camp water supply.

Akheritou solution of irrigation problems. Transfer of rainfall water of Akheritou lake for recharge purposes.

Dherynia Improvement of village water supply.

Akhna Forest Improvement of the water supply of Refugee camp.

Sotira Improvement of self housing refugee camp water supply. Diversion of village rainfall water to good recharge areas. Damages done to Argaki dam.

Ayia Napa Improvement of village water supply. Improvement and expansion of village water supply network to Tourist Area.

Phrenaros settlement investigations of the Phrenaros Reservoir. Improvement of village water supply from Famagusta pipeline.

Paralimni new Paralimni hospital water supply. Water supply for new division of plots. Improvement of the river bed flowing through the village.

APPLICATION TO INSTALL PUMPING UNITS ON T/C WELLS

A total number of 11 applications were submitted to Larnaca Regional

Office for installing pumping units on T/C wells/boreholes, thus raising the total number from the year 1976 to 1979 to 138.

These applications after being examined on the spot were submitted to the central committee for approval or rejection.

CONSTRUCTION

During the year the Larnaca Regional Office of the Department undertook the construction of various domestic water supply and irrigation schemes. For all construction works see tables under CONSTRUCTION DIVISION.

DESIGNS SUBMITTED TO THE HEAD OFFICE FOR APPROVAL

LARNACA DISTRICT

Village	Scheme	Est.cost
		£
1. Ay. Theodoros-Alaminos	Improvement of Water supply	33 000
2. Mazotos	Improvement of water supply	22 500
3. Kalokhorio	Improvement of water supply	8 000
4. Xylophagou	Improvement of water supply network	39 000
5. Xylophagou	Water supply of village div. plots	5 000
6. Ormidhia	Water supply of village div. plots	7 500
7. Kalavasos	Impovement of village water supply	31 000

FAMAGUSTA DISTRICT

1. Paralimni	Improvement of village water supply	14 500
2. Paralimni	Water supply for Hospital	4 300
3. Ay. Napa	Improvement and expansion of village water supply	94 000
4. Ay. Napa	Water supply for tourist area	167 000
5. Sotira	Improvement of self-housing Refugee camp	20 000

B. STOCK FARMING AREAS WATER SUPPLY

1. Dhromolaxia	Water supply for A and B areas	22 000
2. Xylotymbou	Water supply for stock farming	12 000
3. Kellia	Water supply for stock farming	8 500

IX LIMASSOL REGIONAL OFFICE

by
A. Symeou
Executive Engineer II
Regional Engineer

General

This Office is responsible for the activities of the District of Limassol. Its functions are devided into five main categories as follows:

Hydrology Surface and groundwater measurements and studies.

Design routine Irrigation and Water Supply Schemes.

Construction of Major Irrigation, routine Irrigation and Water Supply Schemes.

Maintenance This Office is also responsible for the maintenance of all existing irrigation and water supply schemes.

The Limassol Regional Office is manned by 34 staff who serve in the various sections as folows:

* Hydrology 8
* Planning and Design 11
* Construction 11
* Registry-Accounts 3

For the execution of the construction works 20 foremen and 183 workers were engaged.

HYDROLOGY

Surface Water Hydrology

Rivers

The flow of the rivers is gauged by means of Automatic Water Level Recorders and the results are calibrated by means of current meter measurements.

Eleven gauging stations equipped with automatic water level recorders are established on main rivers of Limassol District, including two on Vasilikos river, lying in the Larnaca District.

Springs

The discharge of sixty six springs were measured at monthly of weekly intervals for the benefit of village water supplies, Limassol water supply, the design of routine irrigation and water supply schemes and for hydrological observations.

Water samples from the above springs were taken once during the year, for chemical analysis.

Groundwater hydrology

Hydrological measurements were carried out in the Special Measures Law area of Akrotiri and the water conservation areas of Yermasoyia, MoniPyrgos, Paramali-Evdhimou, PissouriEvdhimou, Parekklisha and the rest of Limassol District as well as Kalavasos, Zyyi and Tokhni areas in Larnaca District.

Special Measures Law - Akrotiri Aquifer

Hydrological observation and control is exercised by means of 190 No. wells or boreholes strategically situated in the area.

Water level measurements are taken twice a year from the above wells or boreholes except from 106 No. wells/boreholes where water levels are observed monthly, so that the behaviour of the water table in the aquifer, is observed more closely. Contour map showing the water situation in the main aquifer, at the area of Phasouri and Lanitis Farms, is drawn monthly.

Sea intrusion in the aquifer is observed and studied by means of 55 wells or boreholes at Zakaki-Assomatos area and 23 wells or boreholes at Akrotiri area.

Water pumped from the aquifer for irrigation, domestic and industrial purposes is noted monthly for each individual licenced well, by means of water meter, (total 392) attached to each pumping unit in order to ensure that the quantity pumped does not exceed the quantity allogated.

It is thus ensured that pumping is kept at the level necessary to preserve the existing plantations in good and productive condition and at the same time ensuring that the aquifer is not damaged.

Water for irrigation was also supplied in this area from Yermasoyia and Polemidhia Dams, through the distribution system, of the Dams, and from Kouris River, through the irrigation intakes, up to April 1979.

Water extracted from Akrotiri Aquifer

Purpose	Quantity MCM
Irrigation	10.39
Domestic	2.10
Industrial	0.90
Total	13.39
Water supplied from Dams	6.36
Total supplied for irrigation from the aquifer and from the Dams	16.75

Water Conservation Areas

The water situation within the Water Conservation Areas is also observed by means of a number of wells/boreholes, the water level of which is measured twice a year and the total of water extracted is estimated by the method of questioning.

Especially the Yermasoyia Aquifer is observed more closely, by means of 20 wells/boreholes, the water level of which is measured once every month.

Salinity is also observed taking samples for analysis twice a year.

Well Sinking Permits

Well sinking permits granted and applications to transfer water to other plots, or permits to install engine or adjustment of pumping permits were investigated. Out of 300 applications investigated 173 permits were granted.

DOMESTIC WATER SUPPLIES

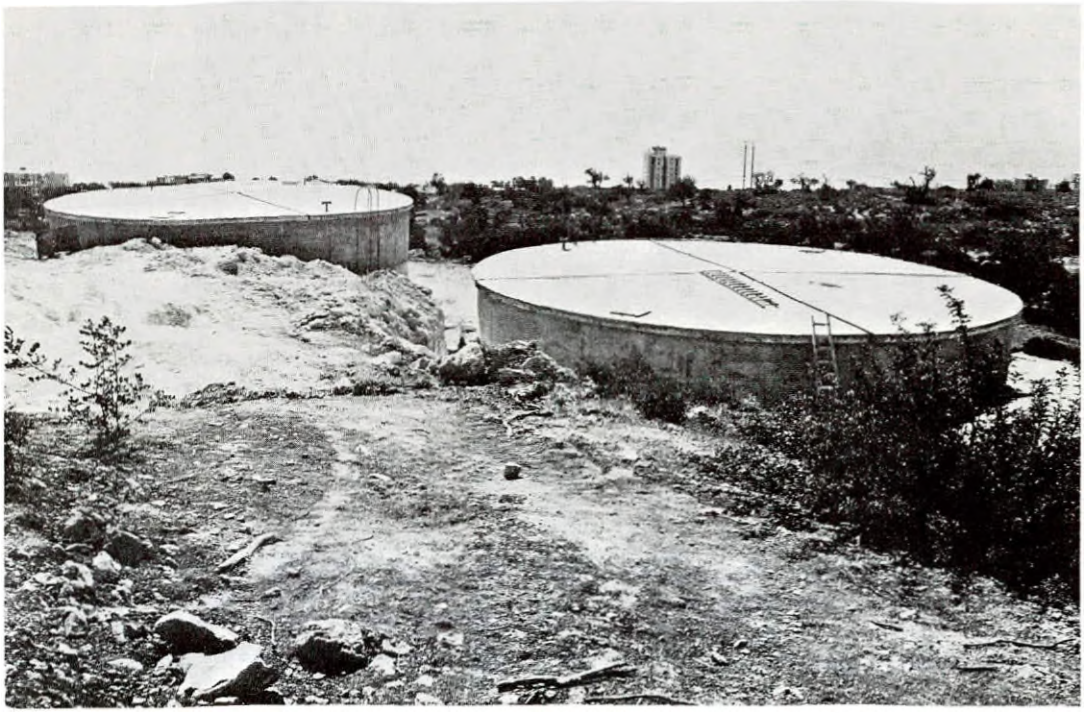
Limassol Water Supply

Water supply to Limassol, for domestic purposes from the springs and boreholes is gauged and monthly samples are taken both at the water source and at the two reservoirs, for chemical and bacteriological analyses.

Village Water Supply

The water supply of 106 No. villages was measured during the period September - November, when springs and boreholes are at their minimum output or maximum draw down, respectively.

Water samples were taken from each of the above source, for chemical analysis.



Amathus Improvement Board domestic water supply storage tanks of 1 000 m^3 total capacity.

Metereological Observations

Daily records were kept for rainfall (Max. 51.8 mm on 22/5/79), water evaporation (Max 13.5mm on 28/4/79) temperature (Max. 41.2 on 5/7/79), wind velocity and sun reflection, at Yermasoyia Dam.

Records were also kept for rainfall (Max. 29.7 mm on 4/12/79) and water evaporation (Max. average 9.0mm for ten days period, 11-20/6/79) at Polemidhia Dam.

Quarry and Gravel pits permits

Twenty six applications for quarries and gravel pits licences, were examined and submitted to the Senior Mines Officer.

PLANNING AND DESIGN

Irrigation Schemes

For the development of irrigation systems eighty six applications were examined and designs were prepared for twenty of them.

Water Supply Schemes

Thirty four applications were examined and designs were prepared.

CONSTRUCTION

In the Construction works 20 foremen, 111 skilled and 72 unskilled workers were engaged.

Major Irrigation Projects

Trachoni Extension

An extension of Polemidhia - Yerma-

soyia Project for the irrigation of 4,390 donums of citrus and vines.

Trakhoni Extension is divided to the following four main sub-schemes:-

Pumping Plant, Pumping Main, Night Storage Reservoir and Distribution System.

The project was completed by the end of 1979. The cost of the works up to the end of the year 1979 amounted to £872,420.

Yermasoyia Irrigation Division Distribution System.

The Scheme Comprising 1045 donums of citrus and vegetables. The pipeline consists of various sizes of AC pipes 250,200 and 150 mm dia.

The project was completed by the end of May 1979 amounted to £100,000.

Polemidhia Irrigation Division Distribution System.

The Scheme Comprising 1210 donums of citrus and vegetables. The distribution System consists of various sizes of AC pipes 250,200 and 150 mm dia.

The project was completed by the end of June 1979 amounted to £96,000.

Pissouri-Khapotami Irrigation Scheme

A project for the irrigation of 3500 donums of vines, the Pissouri-Khapotami Irrigation Scheme comprises of piped distribution system, diversion weir and balancing tank.

The diversion weir and the balancing tank were completed. The distribution system is in progress.

The cost of the works up to the end of the year 1979 amounted to £78,843.

Construction of routine Irrigation and Water supply schemes.

All such schemes constructed are listed under CONSTRUCTION DIVISION.

Materials and Machinery

By the end of the year 1979 the following materials & machinery for minor and major projects have been used.

Material Used	Major Water Works	Minor Projects	Total
Asbestos cement pipes-km.	13 547	11 803	25 350
Concrete aggregates-m³	824	875	1 699
Cement-tonnes	108	171	279
Steel reinforcing bar-tonnes	6	23	29
Special fittings & joints – No.	2 198	34 429	33 627
Sluice valves - No	238	3 566	3 804

X PAPHOS REGIONAL OFFICE

A. Lambrou
Executive Enginner II
Regional Engineer

General

By the end of the year the staff of the Paphos District office was composed of the following:-

1 Executive Engineer II, Head
8 Monthly paid Technical Assistants
8 Daily paid Technical Assistants
1 Secretary-Typist

The technical staff of the office was engaged in water Resources, Construction, Disign and Investigation.

WATER RESOURCES BRANCH

The staff of the Water Resources Branch was engaged on the collection of hydrological data as follows:-

Surface Hydrology

During the year 14 permanent stream guaging stations equiped with automatic water level recorders were in operation and weekly visits were made for observation and calibration purposes by the use of current meter. A total number of 822 current meter measurements were taken during the year for calibration purposes. Also samples for suspended sediment and boron analysis were taken regularly.

Springs

During the year 31 springs were under observation and a total number of 478 spring discharges were gauged by current meter or volumetrically.

Village Water Supply

The water supply of 132 village was checked during the month of September, October and November and samples for Ionic & Nitrates analyses were taken. Also 33 water meters of Paphos lower villages water supply and 9 of Arminou water supply were installed during the year the reading of which were taken every month.

Rainfall Observing Stations

Six rainfall observing stations equiped with automatic raingauge recorder were in operation during the year, under weekly and monthly visits for observation.

Ground Water Hydrology

Ground water conditions in South Western Paphos and Polis areas, were observed with the help of 176 wells/BHs.

The distance from the established bench marks on top of every observation well/BH to the ground water level was measured twice a year at the end of the wet season (March) when it is expected to be at highest and at the end of the dry season (December) when it is expected to be at the lowest level.

In addition monthly or weekly measurements of the ground water level were taken from 84 wells/BHs during the year for special studies.

Analysis

A total number of 483 samples for analysis were taken from wells/BHs, springs and streams, 42 of which for Ionic & Nitrates, 106 for boron, 47 for suspended sediment, and 288 were analysed in the Paphos Regional office for Chloride content.

Questioning

The annual questioning was carried out in South Western Paphos and Polis Hydrological areas during summer for determinating the ground water extracted, area irrigated and kind of crops planted.

Well Sinking Permits

A total number of 167 applications for sinking and covering permits of wells/BHs were examined and submitted to the District Office of Paphos. These applications were finally examined by the Advisory Committee of the Ministry of Agriculture and Natural Resources and 121 of them were approved.

Encroachments on Government Land and Quarries

10 applications regarding encroachments on Government Land and 32 cases for quarry license were examined and reports were submitted to the Director of the Department.

Pakhyammos Reservoir

The construction of Pakhyammos earth reservoir just south of the homonymous village commenced in January 1978 and was completed in June 1979. The cost of the reservoir together with the distribution system, which is made up of pipes of a total length of 8 km, reached £89,000.

Pakhyammos reservoir has a storage capacity of 47,500 m^3. It draws water from winter flows of Avgousta stream. This water will be used to supplement the irrigation needs of an area of 400 donums of land including deciduous plantations, early vegetables and bananas, which are not fully covered by the existing summer soures (BHs and spring and summer stream flows).

The oval shaped clay blanketed reservoir has a structural height of 10.30 m and a water depth of 6.85 m.

Since the reservoir is situated in the stream valley it became necessary to relocate the stream bed, which was effected by excavating a channel along the right bank of the stream. All underground flow of the stream, however, which is concentrated upstream of the reservoir, is released into the reservoir through underground pipe.

INVESTIGATION, DESIGN AND CONSTRUCTION

Investigations

315 applications and complaints regarding routine water supply and irrigation problems were investigated and reports submitted to the District Officer Paphos.

Also 37 applications for removing water supply and irrigation pipelines from certain fields that might be levelled were investigated and relevant action was taken by the staff of this office.

Small Projects Investigations and designs

During 1979, 10 new schemes were designed and with estimated costs submitted to the headquarters for approved and inclusion in the budgets of next year.

Pumping Schemes on T/C boreholes

10 applications regarding improvement of T/C boreholes were received by this office and relevant investigations were carried out, pumping schemes were prepared and reports were submited to Central Committee for approval.

Plotting and Levelling

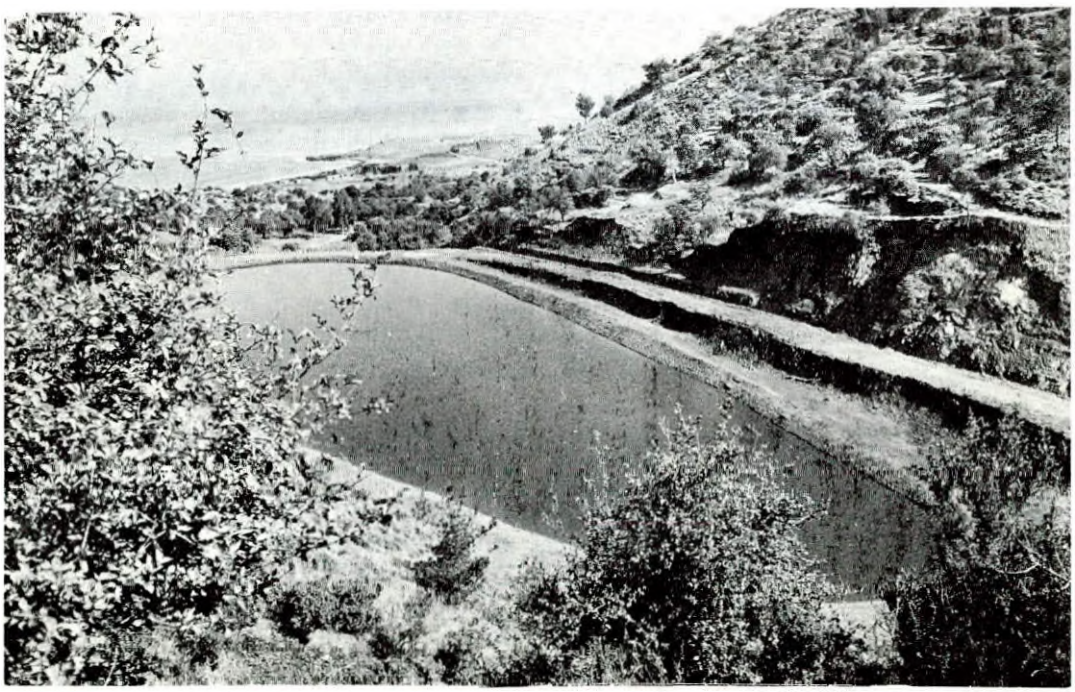
50 new wells/BHs were plotted and the settlement marks of Paphos Dams were levelled.

Operation and Maintenance of Paphos Dams

The operation and maintenance of Paphos Dams was carried out by the staff of this office and routine visits were carried out for this purpose. Detailed reports were prepared and submitted to the Director of the Department.

Construction Works

The construction works carried out in Paphos by the Paphos Regional Office are listed under CONSTRUCTION DIVISION.



Pakhyammos clay blanketed earth reservoir in northern Cyprus of 47,500 m³ capacity was completed in 1979.