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WATER SUPPLY AND IRRIGATION DEPARTMENT

ANNUAL REPORT FOR 1949

BY

I. L. WARD, B.E., M.I.C.E., M. INST. W.E.

Water Engineer

NICOSIA

PRINTED AT THE CYPRUS GOVERNMENT PRINTING OFFICE

—

1950

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Annual Report of the Water Supply and Irrigation Department for the Year 1949.

All Government water supply work in Cyprus is in the hands of the Water Supply and Irrigation Department whose activities cover the whole range of water supply including the search for new sources, irrigation, and the provision of water for domestic purposes. On the irrigation side the department's duties are confined to the engineering problems of the *supply* of water while the agricultural problems involved in its economic *use*, are considered to fall within the province of the Department of Agriculture.

2. The year 1949 has been one of record achievement in water development. Irrigation works continue to be carried out at the pace set by the post-war development plan ; more work has been done on village water supplies than in any previous year in spite of a continued shortage of pipes ; and the drilling of boreholes has proceeded 50% faster than in 1948 which was itself a record year.

3. The work of the irrigation branch of the Water Supply and Irrigation Department deals chiefly with the following :—

(*a*) Gravity irrigation schemes developing small springs by excavation at source, by lining channels in masonry to prevent loss of water, and by constructing masonry tanks for night storage.

(*b*) Gravity irrigation schemes involving the diversion of seasonal or perennial flow from rivers and watercourses by means of weirs and channels.

(*c*) Pumped irrigation from boreholes and open wells,—a means of utilizing the natural underground water resources.

(*d*) Gravity irrigation from infiltration galleries constructed in slow yielding aquifers, in fissured rock or in river gravels,—a means of tapping natural underground reservoirs without the expense of pumping.

(*e*) Water conservation in artificial reservoirs for periods of a few days to several months.

The above types of schemes fall into two major categories, viz. gravity irrigation works and pumped irrigation works. In the former, the water flows by gravity without mechanical assistance but in the latter the water is raised from boreholes and wells by some form of machinery.

4. The rate of progress in irrigation since the commencement of the Ten-Year Programme of Development in 1946 is shown in the following table.

	Gravity Irrigation		Mechanical Irrigation (i.e. Pumped).	Total
	Perennial. Donums	Seasonal. Donums	Donums	
1946 Census	59,409 or say 59,500	284,977 or say 285,000	53,131 or say 53,000	397,517 or say 397,000
Estimated additional since 1946	8,000	25,000	9,500	42,500
Estimated total at the end of 1949	67,500	310,000	62,500	440,000
Percentage increase.. ..	13.5%	9%	18%	11%

5. In the domestic water section most attention is given to village supplies and the work comprises the development of water sources, the laying of main pipe lines to villages and the installation of piped distribution systems including storage tanks and public " fountains ". A " fountain " is a combined public standpipe, trough and drainage soak-pit. The sources may be springs, infiltration galleries, boreholes, or wells and the water is frequently partly for domestic use and partly for irrigation. Town water supplies are (under the Municipalities Law) the responsibility of the Municipalities, but these latter have difficulty in finding their own technical advisers and frequently seek the help of the Water Department whose assistance is rarely refused.

6. The number of villages in Cyprus with piped domestic water supplies was estimated to be 346 in the census of 1946. Since then some 98 schemes have been completed but many only improve or replace old installations and it is now estimated that the total number of villages with piped water is 363 or 58% of the 627 villages named in the census. This figure, however, is misleading as many of the installations are very old and primitive and need either fundamental repairs or total replacement. The villages still without piped supplies are on the whole situated far from reliable sources and the cost and difficulty of providing them with piped water will usually be greater than has been the case in past schemes. Of the four large towns in Cyprus only one, Larnaca, may be said to have a satisfactory water supply. The other three, Nicosia, Famagusta and Limassol, all have proposed projects under study by the Water Department.

7. Gravity Irrigation : No change in policy has been made during the year and again the main efforts of the department as regards gravity irrigation have been towards carrying out many small schemes rather than a few big ones. These small schemes have become very popular particularly in the hill areas and a steady flow of proposals for new works is coming in. The proposals usually originate among the landowners themselves who in the first instance put forward ideas which are frequently sound in principle and require little modification by the department's officers except in technical detail. While all construction work is carried out by the Water Department the management and maintenance of the works upon completion passes over to the beneficiaries. The total number of gravity irrigation schemes completed during the year is 91 commanding 4,597 donums of which 1,807 can be irrigated perennially.

8. The typical small hill scheme consisting of water source, masonry lined channels, and frequently a masonry irrigation tank may be said to have reached the stage of mass production. In the Pitsillia, where this type of work is perhaps the most popular, there is scarcely a village which does not possess a number of schemes ; for instance within Kyperounda village boundaries there are no less than 30 completed schemes, in Polystipos 29, in Agros 24, Ay. Konstantinos 14, Palekhori 14 and so on. During the year 65 new schemes of this type have been completed commanding 1,455 donums of perennial irrigation.

9. A new and economical method of storing night flow for small hill schemes is being developed in places where excavations are made to increase and concentrate seepages from the igneous rocks. The tunnel or chain-of-wells from which the water is tapped is fitted with a concrete diaphragm wall and sluice valve near the outlet. The space of the tunnel becomes a storage tank which is filled at night and emptied in the day time. This simple device has so far been used only in four schemes but its value under suitable conditions has been proved and it may be employed more often in future.

10. Projects utilizing the steady winter and spring flow and sometimes the diminished summer flow of the larger rivers are also in demand and during the year 8 schemes of this type commanding 11,719 donums have either been completed or are in progress. Among these may be mentioned the works now in hand at the three former Paphos Chiftliks of Kouklia, Akhelia and Potima (where the water was formerly privately owned but has been acquired by Government) and the schemes at Dhierona, Kochati and Limnitis.

11. The Water Department has carried out only one major water conservation work in 1949. This is a 20-ft. high earth dam at Kanli Keuy with a storage capacity of 50 million gallons. In this case the watercourse on which the dam is built has little continuous flow even in winter although there is considerable flash flooding. The object of the dam is to hold back the floods for a few days or a few weeks and to release the water slowly so that it may be applied to the land when required instead of during the short intervals of flood. Although of a type common in other countries it is the first dam of its kind in Cyprus. The area commanded is 300 donums.

12. A matter that is now being studied closely and which will be the subject of a special report is the silt content of flooded rivers in Cyprus. This has for long been a topic for discussion but very few actual measurements have been available to support opinions. With the primary object of determining the rate at which recently constructed reservoirs are likely to become ineffective through the accumulation of silt some nine existing reservoirs are being closely examined. Seven of them have been built since the recent war and the other two, Kouklia and Syngrasis, are upwards of 50 years old. This work of research may, incidentally, give useful information regarding the rate of soil erosion in Cyprus.

13. Flood irrigation, by which sudden floods of short duration are utilized to irrigate winter and spring crops, mainly cereals, is practised chiefly in the Mesaoria and also in other places throughout the island. In 1949 no large schemes have been undertaken but a number of minor ones including improvements to existing works have been carried out in various places, chiefly in the Eastern Mesaoria.

14. The Kouklia reservoir (Eastern Mesaoria Irrigation Works) was this year filled to capacity and all lands commanded received adequate winter and spring irrigation. At the end of the rains there was still a large volume of water in the reservoir and, since the Director of Medical and Health Services had removed his objections to the storage of summer water following the successful completion of the anti-malaria campaign, it was possible to use the water for summer crops of cotton. Summer water storage such as this has not been permitted for many years. It is perhaps doubtful if it will pay financially because the revenue from the sale of water is less than the rents that may be obtained by leasing the water-logged bed of the reservoir for summer cultivation and grazing. There are, however, certain indirect benefits, not least of which is the effect the standing water has on ground-water near Kondea where the yield of wells this summer was continuously high although rainfall in the area had been only average or less than average.

15. A total of 4,288 donums was irrigated from Kouklia reservoir in the winter and 1,809 donums in the summer; land leased for cultivation at Kouklia, Akhyritou, Syngrasis and Vatili amounted to 3,239 donums. Grazing licences were issued in respect of 6,933 sheep and goats. Revenue from all sources amounted to £1,676 as against expenditure on normal maintenances of £1,300, special repairs £2,746 and staff £2,488.

16. A steady increase in expenditure in the Eastern Mesaoria works without a corresponding rise in revenue has caused concern and in June, 1949, a committee comprised of the Commissioner, Famagusta, the Water Engineer and the Assistant Director of Land Registration and Surveys prepared a full report and submitted recommendations to Government. As a result, following their recommendations, Government has decided that in future the works will be administered by a committee composed of the Commissioner, Famagusta (Chairman), the Water Engineer, the Director of Land Registration and Surveys, and the Accountant-General. The date of handing over by the Water Department has not yet been fixed.

17. In December, at the beginning of the 1949–50 irrigation season, the works were badly damaged by the exceptional floods, the worst since the reservoir was constructed fifty years ago. A description is given in paragraph 29 and Appendix 4.

18. Domestic Water Supply : Once again it is necessary to record that the keen demand in villages for new domestic water schemes is far in excess of anything that can be carried out with the available pipes ; and until deliveries from the United Kingdom improve the situation will continue to be an embarrasment to the Water Department which in present circumstances can carry out only a fraction of the work wanted. During the year 542 tons of pipes were received in Nicosia, of which 320 tons arrived in the last three months. Outstanding orders amount to some 2,800 tons of which it seems probable about half will be delivered in 1950.

19. Nevertheless, in spite of the shortage of materials, more work has been done on village water supplies than in any other year, and 32 villages have received new or improved piped supplies in 1949 while work on a further 24 is in hand. In some cases, where water has been brought from a distance, only the main pipe line with a storage tank has been installed, the usual distribution system to fountains in different parts of the village having been omitted for the present. By this arrangement less pipes are used than would be required for a complete scheme and the villagers are relieved from making long journeys for water by animal or on foot. Investigations for many new schemes have been proceeding and this part of the work is in advance of construction. In all, there are now 89 fully prepared schemes on which it has not yet been possible to start construction.

20. A complete scheme for a new town water supply for Nicosia including some of the adjoining villages estimated to cost £250,000 has been prepared during the year and some technical details are given in Appendix 3. The scheme has been accepted in principle by both Government and the Municipality except that whereas it was proposed to place the control of the works under a Water Board composed of Government, the Municipality and Evcaf members, the Municipality wishes the entire management of the works to be in its own hands. The matter is now before Government from whom the Municipality seek both a loan and a financial grant.

21. A project to provide Famagusta Municipality with about 400,000 gallons of water per day from its new boreholes in the Phrenaros area is in course of preparation. The scheme will relieve the over-pumping that now occurs in the municipal wells at Stavros. The estimated cost will be about £31,000. Repairs to the 10-mile aqueduct from the Panayia spring to the town are also under consideration and are estimated to cost £7,000.

22. The Water Department has been asked by the Limassol Municipality to prepare the details of a completely new water supply for Limassol on the lines of general proposals made several years ago. The original scheme was to use water from the Mavrommata and Kephalovryso springs in the Khalassa area some 14 miles from Limassol but another spring, the Kria Pighadia, is now being considered as a possible substitute for Kephalovryso as its use would save about four miles of pipe line. The complete project, as now being prepared, will include some 14 miles of main pipe line, a large service reservoir in Limassol, and a completely new network of pipes within the town.

23. Drilling for Water : More boreholes have been drilled in 1949 than in any previous year, and the amount of land perennially irrigated with water pumped from boreholes shows a corresponding increase. Applications for new boreholes to be drilled under the subsidized drilling scheme continue to come in at a steady rate, and though there is still a waiting-list of applicants the increased drilling output has enabled the department to attend to all arrears left over from earlier years. As in 1948, priority has been given to boreholes drilled for private individuals under the subsidized drilling scheme, but it is hoped that in 1950 it will be possible to devote more attention to the prospecting programme. A successful prospective borehole usually results in many applications for subsidized boreholes from landowners in the vicinity.

24. Eleven drilling rigs have been in operation throughout the year. Of these, five are on loan from the Army, while the remaining six are Government property. Three of the latter are very old, consequently their maintenance and running costs are high. In 1949, these 11 rigs have drilled 181 boreholes, totalling 33,610 feet. Of this total, 25 boreholes were drilled to expedite the execution of engineering works in the Akhelia and Kouklia Chiftliks, and the village water supply at Anoyira. Of the 156 boreholes drilled for water, 102, or 65% are "successful", i.e. yield more than 1,000 gallons per hour when test-pumped. The total tested output from the successful boreholes amounted to some 13,500,000 gallons per day. This amount of water is sufficient to irrigate 13,500 donums in summer; steady pumping at half the tested yield would be sufficient to irrigate 7,000 donums in summer and 21,000 donums in winter.

Comparative Table showing number of boreholes drilled 1943–1949 :—

	No. of Boreholes Drilled.						
	1943	*1944*	*1945*	*1946*	*1947*	*1948*	*1949*
For private individuals	25	34	56	61	35	92	135
For Government ..	20	23	16	3	17	25	46
For War Department	10	4	—	19	15	—	—
Totals	55	61	72	83	67	117	181
Aggregate footage drilled	7,964	9,115	12,785	11,686	12,171	21,397	33,610

25. Since the commencement of the Ten-Year Development Programme in 1946 the total tested output of new boreholes aggregates some 26 million gallons per day. If steadily pumped at half the test rate the boreholes will yield sufficient water to irrigate 13,000 donums in summer and 39,000 donums in winter. Not all boreholes have as yet come into regular production but nevertheless it is estimated that the area of land irrigated by mechanical means (chiefly pumping from boreholes and wells) has increased by about 9,500 donums in the past three years, i.e. by about 18%.

26. Most of this year's successful boreholes have been drilled in the Pliocene Deposits which cover 1,180 square miles, or just a third of the island. In the Western Mesaoria, 56 new boreholes have produced a tested yield of 9,000,000 gallons per day, equivalent to an average yield per borehole of 6,700 gallons per hour. In spite of a steadily increasing total output of pumped water from this underground storage area, the water table shows no sensible change and as yet there is no reason to curtail development in this area. As a safeguard it is proposed to record the water level in selected boreholes, so that changes in the amount of water stored underground can be measured. In the Kondea–Avgorou area some .16 boreholes have been drilled and were mostly successful; but the demand in this area has been satisfied for the present. Near Limassol, seven successful boreholes have been drilled, and at Polis, three. Drilling near Ktima has not in general produced water as but two boreholes out of 6 drilled proved successful. Fourteen boreholes drilled along the Kyrenia coast were but 30% successful, as they soon left the Pliocene Deposits, and penetrated the Kythrean beds.

27. By means of a geophysical survey and some trial boreholes, a commercial firm has located near Phrenaros a water-bearing area in which they have drilled six successful boreholes to provide domestic water for Famagusta. Two of these boreholes each produced over 10,000 gallons per hour when subjected by this department to an eight-day test and they are now included in the new scheme for improving the town supply. It would appear that conditions around Phrenaros resemble those of the Kondea–Avgorou area.

28. The water-bearing strata pierced by the foregoing boreholes lie within the Pliocene, but at Rizokarpaso, six successful boreholes all encountered water at shallow depths in Pleistocene Deposits. At Trikomo, several boreholes have found water at the base of the Pliocene, or within a local sandy facies of the Kythrean beds; unfortunately, this water has a rather high saline content. Of the remaining boreholes, some have been drilled in the Pliocene just south of Nicosia, an area whose underground reservoirs have been heavily depleted; others have been drilled with but faint hopes of success at the request of applicants whose lands overlie the earlier geological formations which seldom contain water that can be made available by drilling.

29. Flood Damage to Irrigation Works: The floods that occurred in the Eastern Mesaoria in December, 1949, were the worst for at least 50 years and no records exist of comparable rainfall in the plains. A note by Dr. Burdon, Assistant Water Engineer, giving rainfall and estimated run-off figures is included in Appendix 4 of this report. The chief damage to irrigation works occurred at the following places:—

(*a*) *Eastern Mesaoria Irrigation Works.*—It is estimated that the inflow into the Kouklia reservoir on the 21st December was about three times the full capacity of the two spillways which can take about 4,000 cusecs. The reservoir had filled before the maximum discharge occurred, so that overtopping of the earthen embankment was inevitable and a breach occurred a few hundred yards to the north of the masonry spillway. Although the main embankment has sometimes breached in the past there is no record of any flood of similar magnitude having occurred since the reservoir was built 50 years ago. The Prastio reservoir bank was overtopped for similar reasons and some 1,200 feet almost completely destroyed. A breach also occurred in the Syngrasis embankment. At the time of writing it has not been possible to make a close estimate of the cost of repairs which may be of the order of £15,000.

(*b*) *Pedieos Irrigation Division.*—The banks of the main canal for a distance of about a mile between Mousoulita and the headworks were severely damaged and two escape weirs near the village completely destroyed. Remedial measures costing some £5,000 may be required.

(*c*) *Angastina Weir.*—This weir which is 13 feet high and 590 feet long, was outflanked by the flood. The right wing wall was completely washed away and considerable erosion occurred. It may be advisable to abandon this weir site and to build another smaller intake about a mile upstream with a corresponding length of new channelling. This may cost about £2,000.

(*d*) *Kanli Keuy Dam.*—Although no damage was caused to the dam severe erosion on the natural earth overflow channel has made the construction of a masonry spillway advisable for future protection. This will cost about £1,500.

(*e*) *Kaimakli.*—Two existing weirs were outflanked by the floods and their abutments damaged. Severe erosion occurred in the bed and banks of the river between the two weirs and may extend to the upper weir if left unchecked. If the works are to be put into good order an expenditure of about £4,000 will be needed.

(*f*) *Prastio.*—Two weirs were damaged and the banks of an earth channel washed away in a number of places. Repairs and protective works will cost about £2,000.

30. Miscellaneous: Miscellaneous activities in the department occupy a considerable proportion of the time of the technical staff. In Nicosia three water supply systems, viz. the Government House—English School, the Government Offices and Hospital, and the supply to the Prison and the houses of Government officers, are all managed by the department, and this year a number of extensions has been made. Personnel of the department exercise technical control over the water supply works of the Nicosia Water Administration, which provides water chiefly to the part of Nicosia within

the old city walls. The maintenance of the Larnaca water supply is supervised by staff of the department. Several miles of pipe lines have been laid for the Central Electrification to supply water to the proposed construction sites near Dhekelia. Pumping tests of boreholes have been carried out for the Famagusta Municipality, the Army, Village Water Commissions, and private persons. Regular measurements of spring discharges are carried out in many places throughout Cyprus for record purposes.

31. LEGISLATION : During the year two new laws relating to water have been promulgated. The first, the Government Waterworks (Amendment) Law, 1949, gives powers to the Water Engineer to ascertain by measurement and enquiry the nature and extent of private water rights and to conduct experiments for examining the flow of water. The usefulness of this law has already been demonstrated on several occasions. The second, the Irrigation (Private Water) Association Law, 1949, enables the owners of any private water on a majority vote to combine together in an " Association " for the purpose of maintaining or improving their irrigation works. Upon the formation of such an Association the share of water held by each member will remain unaltered and will not necessarily be in proportion to the area of land he irrigates.

32. FINANCIAL : The following is a summarized statement of the expenditure of the Water Supply and Irrigation Department, in 1949.

	Government		Village or Private Contribution	Total
	Colonial Development and Welfare Grants	Cyprus Funds		
	£	£	£	£
Gravity Irrigation Schemes	49,109	40,142	22,101	111,352
Village Water Supplies	13,792	13,792	25,826	53,410
Subsidized Drilling	1,652	13,093	1,849	16,594
Prospecting for Water	—	3,048	—	3,048
Departmental Charges	—	25,863	—	25,863
	£64,553	£95,938	£49,776	£210,267

33. Included in the above are Personal Emoluments from all votes (£18,156), Payment of Labour (£77,804), Travelling and Subsistence charges (£1,702), Improvement to Irrigation in the Paphos Chiftliks (£17,604), Special Expenditure on the Eastern Mesaoria Irrigation Works (£2,746) and Purchase of Drilling Plant (£1,652). Not included are miscellaneous works costing £6,230 carried out upon repayment for the Central Electrification, various Municipalities, and Government departments.

34. Village contributions towards the cost of gravity irrigation works vary from 1/5 to 1/3 according to the type of work, the lower fraction being for flood-irrigation schemes and the latter for perennial irrigation. Payment by the villagers is made in cash, in free labour (capitalized in the above statements) or by Government loans at loans at low rates of interest. Village domestic water schemes are paid for half by Government and half by the village, the village contribution being either in cash or by Government loan. Boreholes under the Subsidized Drilling Scheme are carried out for private irrigators at a fixed price to them of £32. 10*s*. 0*p*. per borehole and the balance, which, in 1949, has on the average amounted to £70, excluding depreciation of plant, is paid by Government. Municipalities or private individuals requiring boreholes for purposes other than irrigation are charged the actual cost in full.

35. STAFF AND LABOUR : The post of Assistant Water Engineer which had been vacant since November, 1948, was filled by Dr. D. J. Burdon, Geologist, on the 14th August. He and the Water Engineer are the only expatriate staff in the department. The Cypriot staff at the end of the year comprised the following :—

Superintendent of Waterworks	1
Senior Inspector of Water Supplies	1
Inspectors of Water Supplies	3
Temporary Inspector of Water Supplies	1
Technical Assistants	9
Temporary Technical Assistants	2
Foremen	70
Clerical and Miscellaneous	20

The average number of labourers employed was 805 of which 12% were "skilled". The approximate monthly averages were as shown :—

January	360	April	700	July	1000	October	1000
February	700	May	900	August	1000	November	1000
March	700	June	1000	September	900	December	400

36. A 44-hour week was introduced on all works in March ; from Monday to Friday the working day is 8 hours but on Saturday 4 hours only. The 4 hours on Saturday is considered as a full day and wages are paid for 8 hours. In drilling for water a bonus system is used whereby a drilling crew, if it exceeds a certain prescribed monthly output, receives an addition to its normal weekly wages.

37. DEMAND FOR SCHEMES : The major effort of the department in 1949 has been in irrigation development where the steady demand for new works, including boreholes, has been fully met. As regards the future, no increase in irrigation activity is anticipated and it is unlikely that the present high rate of drilling boreholes will be maintained. The unprecedented demand for village domestic water supplies has not been satisfied in 1949 owing chiefly to the shortage of pipes but if pipes become readily available in 1950 a large increase in the output of village domestic water schemes is to be expected.

I. L. WARD,
Water Engineer.

APPENDIX 1.

DESCRIPTIONS OF CERTAIN IRRIGATION SCHEMES.

(*A*) *Kouklia* (*Paphos*).—The water of the Dhiarizos river, formerly privately owned, has been acquired by Government as part of the Kouklia Chiftlik. The new works are being carried out to facilitate irrigation on the Chiftlik lands and to prevent waste of water, particularly in summer.

There are two main channels, one on either bank, the right bank intake being about a mile upstream of that on the left bank. No weirs have been constructed at the heads of the channels but intakes of the groin type have been provided, the first of their kind in Cyprus. These are simply low masonry walls on deep lime-concrete foundations extending from the solid rock of the river bank out into the gravels of the river bed, on which they are founded. Each channel is designed to take 4 cusecs when running full but for economy the lower lengths in each case are masonry-lined only for an estimated summer flow of 2 cusecs. This means that in winter the lining will be submersed but in summer when water is scarce and valuable all will be contained within the lined portion and none will be wasted. Provision will be made to pass summer water through a buried pipe syphon from the right bank channel to the left in order that the upper intake may at times of low flow serve both channels thus preventing losses of water in the river gravels between the two intakes.

With a view to providing extra summer water a geophysical survey followed by 8 trial boreholes was made to determine the depth of the gravels at various places along the river bed. These explorations at length revealed rather unexpectedly that the gravels were 87 feet deep in a cultivated area above flood level and that large quantities of water can probably be extracted from a single borehole of medium diameter. A 10″ borehole is now being sunk and if there is a demand for extra water in the summer it will be fitted with a deep well turbine pump discharging through pipe lines into both the right and left bank channels.

A total of about 1½ miles of lined main channel and 3½ miles of unlined will command in all 2,762 donums. The estimated cost is £19,300. The work was started in May, 1949, and is proceeding according to plan.

(*B*) *Akhelia*.—The water of the Ezuza river has been acquired by Government from its former owners as part of the Akhelia Chiftlik and works are in progress for improving irrigation. Akhelia is the largest of the four recently acquired Paphos Chiftliks but the quantity of water available per donum of land in summer is the least. The provision of additional summer water is, therefore, important and has called for special measures.

The lands commanded by the scheme are on the left bank of the river and they are served by two intakes, the upper one for summer water and the lower one for the large winter flow. In addition two channels on the right bank are being brought under control by masonry headworks and measuring weirs. In all cases groin type intakes have been adopted as at Kouklia. The winter channel is designed for 12 cusecs and is unlined while the summer channel takes 4 cusecs and is lined throughout in masonry. The winter and summer channels join and thereafter the lining is for 4 cusecs only, it being an accepted principle that the lining will be submersed in winter.

To explore the possibility of obtaining extra summer water from the gravels of the river bed at reasonable cost a geophysical survey was made followed by 4 trial boreholes. These showed that at a point some 180 feet downstream of the summer intake the gravels are 100 feet deep and underlain by the solid and impervious white and yellow marls which also form the sides of the valley. It was thereupon decided to sink an open well in the marls beside the irrigation channel down to the level of the bottom of the gravels

and from the bottom of the well to drive a horizontal gallery under the river to tap the water from the gravels at their lowest level. The water will then be pumped to the surface from the well and discharged into the channel whenever it is needed during the summer months.

Work on the scheme was started in May, 1949, and is now proceeding according to plan. The total length of main channels is about 5 miles of which one mile is lined. The area commanded is 4,721 donums and the estimated cost of the irrigation works is £18,000.

(*C*) *Potima.*—This irrigation scheme is the third to be undertaken following the acquisition of the Paphos Chiftliks. In this case the waters of the Mavrokolymbos river, which are part of the former Potima Chiftlik, are being canalized in masonry in order to facilitate irrigation and minimize losses of water.

A weir 246 feet long and 3 feet high across the river forms the headworks. In order to prevent leakage under the weir or around the ends it was necessary to key the foundations and abutments into bed rock, i.e. the weir is of the " sub-surface " type, the greater part of the masonry being below ground level. The depth of the foundation in the centre of the river was 9 feet below river bed level.

The channel from the weir is designed to take 2 cusecs. At a point about 2,000 feet from its head it divides into two branches, the one continuing on the left bank and the other crossing the river through a pipe syphon to serve the right bank.

The total length of main channels is about 2½ miles of which nearly half will be lined in masonry. The area commanded is 726 donums and the estimated cost of the irrigation works £7,700. Work was started in May, 1949, and is proceeding according to plan.

(*D*) *Koloni.*—This irrigation scheme consists of a sub-surface masonry weir in the Kochatis river, masonry channels, an irrigation tank and the excavation of six small springs. It is worthy of special mention because of unforeseeable difficulties that were met with in the construction of the weir and only partly overcome.

The weir is 60 feet in length and 3 feet high above the bed of the river. To key the foundations and abutments into bed rock with the object of preventing the flow and loss of water by percolation through the gravels under the weir its foundations were carried down to 19 feet below ground level. This operation was successfully achieved with no abnormal difficulties but upon completion it was seen that the bed rock at foundation level was considerably fissured immediately downstream of the dam and that through the fissures a considerable volume of water was issuing and running to waste amounting to about 50% of the total flow at the weir. This may have been indirect leakage through cracks in the rock around the abutments or under the weir and attempts to stop it by extending the abutments were only partly successful. The loss of water by these operations was reduced to 28% of the total flow whereupon it became evident that further efforts of this nature to force the lower water to the top level of the weir were unlikely to succeed. The excavations were then filled with clay, a measure that may perhaps have had some good effect, and the weir was thereafter completed and put into use. The volume of water brought to the surface by the weir at the end of the summer of 1949 was about 50,000 gallons per day ; in spring and early summer, of course, a very much greater flow will be available. It is expected that the total area irrigated will be about 600 donums of which 80 will be perennial. The scheme was completed by the end of the year except for the excavation of the springs. When these are finished the total cost will be about £5,700 of which £1,300 represents the cost of the weir.

(*E*) *Kochati.*—In this scheme the old Makheras weir has been strengthened and heightened and new channels have been made to utilize the spring and winter flow of the river Idalias for the irrigation of lands belonging to the villages of Ayia Varvara and Kochati. The reconstruction of the weir was the largest single structural work undertaken by the department during the year.

The original Makheras weir is understood to have been built many years ago by the monks of the Makheras Monastery. It has been damaged, if not demolished, from time to time by floods and on each occasion repaired and no doubt altered. Immediately before the present reconstruction began it was 17′ 6″ high in the centre and 172 feet long and in a bad state of disrepair. Before the weir could be heightened with safety it was necessary to cut away part of the old stone-work and to clean out and regrout the joints. Ten massive masonry counterforts, each 6 feet wide, were then built against the downstream face and the crest finally built up to the required level. As reconstructed the weir is curved in plan, 220 feet long and 20 feet high. No damage was caused to it by the recent exceptionally heavy floods.

In addition to the main weir the works comprise 12,600 feet of new channelling partly in rock and partly in earth, a tunnel 1,330 feet long, and numerous culverts, retaining walls, etc.

A total of 1,600 donums of winter and spring irrigation is commanded, 1,150 of which are in Ayia Varvara village lands and the remainder in Kochati. The scheme, which is nearing completion, is estimated to cost £9,000.

(*F*) *Kanli Keuy Dam.*—This is an earth structure built in the impervious Kythrean beds for the purpose of storing flood water for irrigation. Whereas in the past flood waters in this area have been available for irrigation only during the short periods when streams are actually flowing, perhaps for only a few days in the year, they may now be stored in the reservoir and used as required in the intervals between rains or after the rains.

The dam is a simple structure 20 feet high in the centre and 420 feet long containing about 9,000 c. yards of compacted clay filling without a core wall. The filling was placed in 1-foot layers, watered and rolled with a 15-cwt. sheep-foot roller. The outlet is an 8″ pipe passing through solid ground under the right abutment and the spillway is excavated in earth and rock on the left abutment clear of the dam, discharging into a small tributary valley. No new distribution channels have yet been made but there are existing ditches which may be used pending the preparation of a canalization scheme. In the very exceptional floods of December, 1949, some erosion took place on the recently completed spillway over which water flowed for the first time. As was to be expected in the circumstances the earth covering was swept away exposing the underlying rock which, although soft, was sufficiently strong to hold out against the erosive and abrasive action of a very large flow of water. To stabilize the position, however, a masonry spillway is now needed.

The cost of the dam including outlet and earth spillway was £1,320. It was constructed by the Water Department with earth-moving machinery lent by the Department of Agriculture.

(*G*) *Kivisil.*—This scheme, which was formally opened by the Acting Governor on 1st April, 1949, consists of a masonry weir in the Pouzi river for winter flow, a sub-surface weir for summer flow, and some 5,600 feet of masonry channelling. It has been carried out in three stages :—

(*a*) a weir for winter flow was constructed in 1942 together with 10,000 feet of unlined channels ;

(*b*) in 1948 the sub-surface weir and 1,800 feet of lined channels were completed ;

(*c*) in 1949 a further 3,800 feet of lined channels together with certain ancillary works were added. A possible future addition is a masonry tank for night storage.

The weir for winter flow is of a usual type and calls for no special comment. The weir for summer flow, 76 ft. long and 2′ 6″ high above the river bed, was unusual in that it was of the "sub-surface" type—that is its foundations and abutments were keyed into the bed rock with the object of preventing all seepage under or around the structure. To achieve this it was necessary to carry the foundations down 20 ft. below the level of the stream bed. Upon completion, in the autumn of 1948, the weir was successful in bringing 200,000 gallons per day to the surface at a place where the river bed had previously always been dry at that time of the year. This weir was the first of its type to have been brought into operation in Cyprus although two experimental weirs had been built several years earlier. The third stage of the works was the lining in masonry of the lower portion of the main channel in order that it would convey the summer water to the fields without loss. For economy of cost the lined portion in cross-section is only large enough to carry the quantity of water available in summer. In winter, when the river has a greater discharge and small losses are relatively less important, the lined part of the channel is submersed and the full volume of water carried within the earth banks.

The total area commanded is about 2,000 donums of which some 150 to 200 can be irrigated perennially. The cost of the completed works was £5,740 including £1,600 the cost of the sub-surface weir.

(*H*) *Limnitis.*—This scheme aims chiefly at utilizing the winter and spring flow of the Limnitis river for irrigation of both banks in the lower part of the valley. It is noteworthy in two respects, first that it includes two weir crossings of a type new to Cyprus and secondly that it will make use of water brought to the surface by an experimental sub-surface weir built in 1945 about 1 mile upstream of the present works.

The works comprise two masonry weir crossings of the river, one pipe syphon under the river, about 5,000 ft. of lined channels and repairs to some 2 miles of existing earth channels. The weir crossings are built as low weirs extending transversely across the river bed, founded on gravel not on bed rock. Ordinary flow from the upper river and the sub-surface weir is conveyed across each of the lower weirs without loss in a channel that may be easily cleared of accumulated gravel by opening sluice gates placed at intervals across it. At each weir water from the river may be diverted into the main channel but surplus will pass over the crest and continue down the river. The scheme which is now nearing completion will cost about £4,000. A total of 750 donums is commanded of which some 50 will be irrigated perennially.

An extension to the works has been requested by the Irrigation Division and is under consideration. It consists of building the unlined portions of the main channel in masonry for summer flow from the sub-surface dam to the pipe syphon in order that more perennial irrigation will be possible.

(*I*) *Karavas.*—In this scheme waters from the Karavas spring have been canalized in concrete to prevent loss of water. It is the first major work of its kind to be carried out in the Kyrenia hills where most of the larger springs are privately owned and where the owners have as yet (except at Karavas) shown little inclination to combine together to make better use of the water.

Some 2½ miles of new concrete channels have now replaced street gutters and earth ditches as the means of conveying irrigation water from the spring to the fields. Controlled outlets prevent leakage to branch channels and fields, culverts and pipes convey the water under streets or over gulleys without loss and without untidiness, and regulated divisions ensure that each branch channel receives the proportion of flow to which it is rightfully entitled. At the request of the Irrigation Division the channels have been made of concrete, lightly reinforced with steel bars to minimize temperature cracking, instead of lime masonry which is more usual in Cyprus.

The area irrigated perennially by the scheme is some 500 donums of which about 400 were irrigated before the scheme was started and 100 added as a result of the new channels. The cost was £4,800 of which the villagers paid slightly more than half, their contribution being higher than the normal one-third because the area of new irrigation was low in proportion to total expenditure. Whereas a shortage of irrigation water formerly existed in this area, now, as a result of the scheme, there is sufficient for all cultivators and the selling price of water has accordingly fallen considerably, probably by as much as 25% or 50% or in some cases even more. While this fall in price is looked upon with consternation by these proprietors who formerly sold their water instead of using it, the change is greatly welcomed by the small landowner who is trying to obtain the maximum yield from his land.

The example of Karavas could well be used as an object lesson by other villages in the Kyrenia hills, in particular by Kythrea and Lapithos, where irrigation works are neglected and much water is wasted.

(*J*) *Dhierona.*—Two comparatively large irrigation schemes have been carried out in this remote little village and a considerable increase in the area of its gardens has resulted.

The first scheme, completed in May, 1948, comprised a weir 17 feet high in the bed of the river Kyparisha, a concrete aqueduct across the river 90 ft. long and 25 ft. high, 1,700 ft. of masonry channels and 4,600 ft. of unlined channels in earth and rock. The second scheme, which takes water from the same river at a point half a mile downstream of the first weir, is somewhat similar and was completed in the autumn of 1949. It consists of a weir 8 feet high, a pipe syphon across the river, 3,550 feet of masonry lined channels, and more than 3 miles of unlined channels. Part of the channelling is constructed across the face of an almost vertical cliff.

The total cost of the two schemes was £7,000 and the area irrigated rather more than 300 donums, all of which is perennial. The Dhierona people are very industrious and they have lost no time in availing themselves of the opportunities offered following the completion of the irrigation works and already the valley below the irrigation channels is being transformed into a garden.

(*K*) *Chakistra.*—This is a perennial irrigation scheme where water is conveyed in pipes across 3½ miles of difficult hill forest country to the cultivable lands of Chakistra village.

The Hadji Stavrinos spring, in the Paphos Forest below the Kykko–Stavros road, was excavated and built and black pipes 2½-inch and 3-inch diameter were laid through the forest to the high land above Chakistra village where a 28,000-gallon night storage tank was built. This comprised the first part of the scheme, completed early in 1949. The second part, still in hand, consists of a system of pipes for distributing the water from the tank to the fields.

The scheme could not have been carried out by the more orthodox method of channelling except at very great expense because of the deep valleys lying between the spring and the village. The pipes were from surplus Army stocks and being of black wrought iron were unsuitable for village drinking water supplies.

An area of about 120 donums is irrigated and the cost of the scheme, when finished, will be about £6,700. This is very expensive and it would not have been undertaken except under unusual conditions. Chakistra is surrounded by forest lands on which goat grazing (formerly the chief occupation of the villagers) has been prohibited and it is, therefore, important that an alternative means of livelihood is provided. His Excellency the Governor, in June, 1948, directed that the village share in the cost of the scheme should be £200 less than the normal one-third.

(*L*) *Ayios Konstantinos and Kalokhorio* (*Limassol*).—A short description of the irrigation works in these two somewhat poverty stricken villages is given because they are typical of the Water Department's work in the hill villages of Cyprus, particularly in the Pitsillia. Small works such as these

occupy a large proportion of the time of the staff of the department and they absorb a large proportion of its annual expenditure. They are perhaps the most popular and successful type of gravity irrigation scheme now being carried out and although individually they may be small and usually unspectacular they have, in the aggregate, caused a transformation in the agricultural economy of many villages. Ayios Konstantinos and Kalokhorio have been chosen as typical illustrations but they are not in any way outstanding examples ; it would be possible to describe any of a dozen others in much the same way.

Ayios Konstantinos.—The first scheme in this village was carried out in 1943 when the spring Vrysi-tou-Khoriou was excavated and permanently built in masonry, the flow being increased from virtually nil to 15,000 gallons per day, part of which was used to augment the village drinking water supply. An irrigation tank big enough to hold a night's flow from the spring was built at the same time.

In 1945, following requests from the villagers, work in Ayios Konstantinos was resumed and within two years nine schemes were carried out consisting of small weirs, night storage tanks, channels and spring excavations. An example of a successful excavation of a spring is that at Merikas where originally the water was used to irrigate only half a donum of land and upon completion yielded sufficient for 36 donums.

The most successful scheme in the area is perhaps the Paleokamina where unused water from a stream was diverted from its course by a masonry weir and led in masonry channels to the " Raeburn " tank, built in a commanding position overlooking the village and named by the villagers after Dr. Raeburn who was then Water Engineer. The flow from this source is about 100,000 gallons per day in summer and more in winter. Recently, in 1949, a new pipe line from an additional source, the Vrysakia springs, was laid to the tank adding more water, and at the same time additional masonry channels were built to distribute the water without loss to the cultivated lands.

The total expenditure on irrigation works in Ayios Konstantinos is £10,580 and the area of intensive perennial cultivation commanded by the schemes about 410 donums. There is in addition a variable area of winter and spring irrigation usually amounting to about 200 donums. The village share of the cost has always been paid in free labour except in one case when a Government loan of £170 was raised.

Kalokhorio.—Work in this village was commenced in 1942 when two small schemes were put through entirely at Government expense in order that the villagers would see and understand the usefulness of such works. These original works included a weir, the excavation of a spring, some lined channels, and two night storage tanks commanding in all an area of some 90 donums of perennial irrigation.

Nothing further was done during the war but in 1947, as a result of petitions from the villagers new works of a similar nature were carried out, this time the villagers paying their share. Others followed in 1948 and 1949. The largest and perhaps most successful scheme is that which conveys the Kephalovrysos water from the stream bed through about a mile of masonry channels built on a steep hillside to an irrigation tank set on high ground overlooking the village. From the tank the water gravitates through a series of steep masonry channels to the village gardens.

A domestic water supply scheme for the village was completed in 1949. It consists of the excavation and building of a spring, 1,700 feet of pipes, two 1,500-gallon storage tanks and five fountains. Surplus water is used for irrigation.

The total expenditure on irrigation at Kalokhorio is £8,287 and the area of intensive perennial cultivation commanded by the new works about 277 donums. In addition there is a certain amount of winter and spring irrigation. The village contributions have been paid entirely in free labour.

The following table summarizes the irrigation work carried out by the Water Department at Ayios Konstantinos and Kalokhorio (Limassol).

IRRIGATION SCHEMES AT AYIOS KONSTANTINOS AND KALOKHORIO.

Village	Locality	Excavation of springs	Construction of weirs	Masonry channels in feet	Pipeline in feet	Irrigation tank	Donums Commanded Summer	Year of construction
Ay. Konstantinos	1. Vrysi-tou-Khoriou ..	1	—	—	—	14′×14′×4′	20	1943
	2. Petranis	1	—	800	—	24′×24′×4′	30	1945
	3. Dophanides	1	1	900	—	24′×24′×4′	40	1945
	4. Merika	1	—	—	2,350	20′×15′×3′	30	1946
	5. Kephalovrysos	1	—	50	—	30′×15′×4′3″	20	1946
	6. Platanos	1	—	750	—	30′×15′×4′3″	25	1946
	7. Merika (channels) ..	—	—	800	—	—	10	1946
	8. Dhophanidhes	—	1	—	—	30′×12′×5′	10	1946
	9. Paleokamina	—	1	400	—	20′×15′×4′6″	15	1946
	10. Krionerata	—	1	600	—	20′×20′×4′6″	20	1946
	11. Raeburn's Tank ..	—	1	300	3,600	40′×35′×6′	100	1947
	12. ,, (extra channels)	—	—	3,000	—	—	40	1949
	13. Vrysakia	—	—	—	6,200	—	20	1949
	14. ,, ...	5	—	—	—	—	30	1949
							410	
Kalokhorio (Ll.)	1. In the Village	—	—	600	—	40′×25′×5′6″	60	1942
	2. Marammenos	1	1	100	—	40′×25′×5′6″	30	1942
	3. ,, ...	—	1	500	—	30′×25′×4′3″	30	1947
	4. ,, (channels)..	—	—	1,500	—	—	20	1948
	5. In the Village	—	—	2,500	—	—	30	1948
	6. ,, ...	—	—	590	—	—	12	1949
	7. Kato Marammenos ..	—	1	1,200	—	20′×15′×6′	35	1948
	8. Kephalovrysos	—	1	6,200	—	30′×20′×6′	60	1949
							277	
	9. Orongou	5	Exploratory works	—	—	—	—	—

APPENDIX 2.

DESCRIPTIONS OF CERTAIN VILLAGE WATER SUPPLY SCHEMES.

(*A*) *Prastio and Gaidhouras.*—This scheme provides piped domestic water for two of the driest villages in the Eastern Mesaoria with a combined population in 1946 of 1,311 persons.

The source of the water is an old chain-of-wells near Kondea, some seven miles from Prastio. To make the chain-of-wells fit for a domestic supply it was necessary to clean out 2,400 feet of tunnels, stone line part of them, and rebuilt the tops of 76 wells. Seven miles of 6″ diameter asbestos cement pipe conveys the water to Prastio village where a distribution box divides the water between Prastio and Gaidhouras in proportion to population. A 4″ pipe line, 2 miles long, connects with Gaidhouras. Each of the two villages will have its own independent storage and distribution system. Prastio will have two 1,500-gallon storage tanks and 13 fountains while Gaidhouras will have one 1,500-gallon tank and 6 fountains.

The work, now nearing completion, is estimated to cost £17,960 or approximately £13.7 per person. This high cost is due chiefly to the large diameter pipe line (6″) needed because of the very flat gradient between the source of the water and the villages. It has been held that the plight of the two villages, situated several miles away from the nearest source of permanent water, has been sufficient to justify the high *per capita* cost of the scheme.

(*B*) *Anoyira.*—This scheme is particularly notable because in order to shorten the length of the pipe line it was decided to drive a 2,000-foot tunnel through a ridge instead of going round. By this means not only was the length of pipe line reduced by about 3 miles but, since the gradient is increased a smaller size of pipe can be used.

The water will be taken from the Perdikes spring which was excavated and built in 1947. A 7,500-foot pipe line of 2½″ diameter will cross the Kha Potami valley and on the opposite side pass through a tunnel to Anoyira village. At the present time work on the tunnel is in hand and although it is now proceeding satisfactorily at about the estimated cost an unexpected difficulty arose in the early stages in that the rock was unusually hard for the district and was almost devoid of the joint planes which usually facilitate the work of tunnelling. This appeared to indicate that progress would be slow and the cost high. It was decided to sink the 25 shafts along the length of the tunnel with a well drilling machine and to use compressed air machinery for breaking the rock. This was done and has resulted in a general improvement in progress and a reduction in costs.

The estimated cost of the scheme is £7,420 and the population of the village by the 1946 census was 651, so that the cost is about £11.4 per person. The tunnel accounts for about half of the total expenditure.

(*C*) *Dhora.*—This recently completed scheme is a combination of gravity flow and pumping. Water from three springs flows to the lower part of the village by gravity and from there is pumped to high ground from which it gravitates to public fountains in the various quarters of the village.

Before the present works began Dhora had an insufficient and inconvenient water supply which came from two small springs, the Mersinoudhia and the Phoni, and was delivered through pipes to the lower part of the village which is situated on a steep hillside. The women were thus obliged to carry the water up to their houses from the bottom of the village. The new scheme utilizes the former water together with a new spring called "Kato Vrysses" and the total quantity

of water is now more than trebled. A gravity pipe line 8,800 feet long, mostly 2½" diameter, brings the water to a new 4,000 gallons covered storage tank at the lower part of the village. From this lower tank a pump, installed by the Public Works Department, lifts the water 260 feet through 1,200 feet of rising pipe to a high level tank, also of 4,000 gallons capacity. The water then gravitates to 9 new fountains in different parts of the village. A certain amount of surplus water is available for irrigation at the lower tank.

The scheme provides water for 749 persons (1946 census) and the cost was £3,450 of £4.6 per person.

(*D*) *Ayios Dhometios.*—This village, which is really a suburb of Nicosia, has long awaited the execution of its water supply project.

The scheme is in two parts, one of which has now been completed and the other not yet commenced. The first part involved the cleaning and building of an old chain-of-wells at the Ali Bey spring near the Nicosia airfield, the laying of 13,500 feet of 3" pipes to the village, and the construction of a distribution system consisting of two 1,500-gallon storage tanks, pipe lines, and 23 public fountains. The second part, not yet started, will include the cleaning of a borehole, the installation of electric power lines and an electro-submersible pump, and the laying of a pipe to the Ali Bey spring to connect with the main to the village.

The total estimated cost is £6,200 and the 1946 population 2,530 so that the rate per person is only about £2.5.

(*E*) *Ayios Athanasios and Mesayitonia.*—These two Limassol villages have combined for the purpose of their water supplies and a joint scheme has been carried out bringing water from the Ayios Dimitris spring, some three miles away.

The spring was excavated and built and a 4" pipe line, 2½ miles long, laid to a point on high ground above both villages where a division box automatically divides the water in proportion to the two populations. Separate pipes thereafter convey the respective shares to the villages each of which has its own storage tank and fountains.

The quantity of water that the spring can provide is usually much in excess of the domestic requirements of the villages and in June, 1949, shortly after the completion of the scheme, there was a surplus of 20,000 gallons per day in Ayios Athanasios and about half that quantity in Mesayitonia. In the former village the surplus is mostly used for irrigation and in the latter a small industry has grown up whereby water carts ply between the village and Limassol to sell water in the town where a ready market exists. The total cost of the scheme was £5,740 and the combined population, by the 1946 census, 1,189. The *per capita* cost is, therefore, £4.8.

(*F*) *Kouklia* (*Paphos*).—This scheme is expensive owing to the long length of pipe line from the Katopia spring near Prastio to Kouklia village. Because of the high cost and the poverty of the villagers His Excellency the Governor has directed that in this case the village share in the cost of the work is to be only one-third instead of the usual half.

The spring, purchased from the See of Paphos, was excavated and built this year and 9 miles of 2½" pipe line laid down the Dhiarrizos valley to Kouklia village. The work was stopped on the outskirts of the village pending the arrival from the United Kingdom of pipes for the distribution system. There will eventually be two 1,500-gallon storage tanks and 10 public fountains in the village.

The estimated cost of the scheme is £9,240 and the village population in 1946 was 789 so that the rate per person approximates to £11.7 which is very high.

(*G*) *Peyia.*—Water has been conveyed to this large Paphos village from the Chelonari and Karidhi springs which are situated in the hills some 4½ miles from the village.

The two springs were each excavated and built in masonry and from them a 2½" pipe line was laid to a high point above the village. From a pair of standard 1,500-gallon storage tanks distribution pipes carry the water to 10 public fountains in different parts of the village. This scheme, which is a straightforward one with no particular difficulties, was completed in July, 1949.

The population of Peyia in 1946 was 1,403 and the cost of the scheme £5,650. The cost per head of population is thus about £4.

(*H*) *Patriki.*—This is a simple and straightforward scheme bringing water from the Vrysi-tou-Aetou spring in the Kyrenia hills to the formerly waterless village. Upon completion in February, 1949, the new water supply was officially opened by the Acting Governor.

The main pipe line, 4 miles long and 1½" diameter, brings water from the spring to a 1,500-gallon storage tank in the high part of the village. From the tank the water gravitates to 11 public fountains.

The cost was £3,000 and the population of the village according to the 1946 census, 831. The cost per head is thus about £3.6.

APPENDIX 3.

NICOSIA WATER SUPPLY SCHEME, 1949.

This is a scheme prepared by the Water Supply and Irrigation Department for supplying domestic water to that part of Nicosia which lies outside the old city walls including the villages of Kaimakli, Omorphita and Palouriotissa. Within the walls, for financial reasons, no improvement of the existing system of pipes is planned and the Nicosia Water Commission, which now serves the old city, will continue unaltered. The old town will benefit only in that a greater quantity of water will be made available for delivery to new consumers by the Nicosia Water Commission.

The scheme is similar in general principle to the 1939 proposals of Dr. Raeburn, who was then Water Engineer, but it differs considerably in detail. It is similar in that it draws different waters from widely separated sources, concentrating them in a central reservoir, but it differs in that much of the water now comes from other sources and, since the outer town only is served, in the layout of the pipe lines conveying water from reservoir to consumer.

The proposed new works will distribute 850,000 gallons of water daily to the outer town, two-thirds of this quantity being new water brought into Nicosia from outside sources not at present utilized, and the remaining third being water already used in Nicosia but now, for better control, to be concentrated in the proposed main reservoir and delivered through the new pipe lines. These quantities of water will be sufficient for the domestic needs of 30,000 people as compared with a present population in the area to be served of only about 20,000. The surplus, or part of it, will be available to the 25,000 people living within the walls of the old city for delivery through their existing pipes. In the future, as the population increases, the works may be extended and more water added as found necessary from time to time.

The existing but almost unused sources of water that are proposed for the scheme are :—

(*a*) Boreholes at Kokkini Trimithia and Ayii Trimithia.

(*b*) The upper part of the Arab Ahmet Chain-of-Wells.

(*c*) The Makedhonitissa Chain-of-Wells.

(*d*) Boreholes at Laxia.

Other wells and boreholes at present in use will also be incorporated in the new works. At each source water will be pumped into a small balancing tank from which it will gravitate to the proposed 750,000-gallon reservoir on the Strovolos bye-pass. After chlorination it will be delivered to consumers through an entirely new system of pipes. The higher parts of Nicosia will be supplied through a 10,000 gallons water tower to be erected at the reservoir site.

It is proposed that the responsibility for construction, operation, maintenance and future extensions of the works will rest with a Nicosia Water Board whose duties and powers will be defined by special legislation. The Chairman of the Board will be the Nicosia Commissioner and the members will be representatives of Government, the Municipality and Evcaf. It is intended that the technical details of construction will be under the supervision of the Water Supply and Irrigation Department and that any extra staff required for the purpose will be paid for from the Board's funds.

Estimated Costs.—The proposed works are estimated to cost the following :—

	£
(*a*) Supply Installations and Reservoir (including pumping machinery, supply pipe lines, elevated tanks, reservoir, purification plant, etc.)	100,000
(*b*) Distribution Ring Main	27,000
(*c*) Distribution Pipe Lines	123,000
Total cost of construction	£250,000

Maintenance costs, including staff salaries, labour, fuel, oil, repairs to plant, etc., are estimated to be approximately £7,500 per year. If a loan of £250,000 is raised in the first instance on the basis of repayment after 25 years with 4% interest, the annual payment on the loan will be about £16,000 and total annual expenditure will amount to some £23,500. To recover this amount from revenue, assuming that the full 850,000 gallons per day are sold, the chargeable rate would be about 1/4½*p*. per 1,000 gallons or, allowing a margin for the works at times not being required to work to full capacity, for the water supplied free to public places, for bad debts, etc., say 1/6*p*. to 2/- per 1,000 gallons.

APPENDIX 4.

FLOODS AND RAINFALL IN THE EASTERN MESAORIA, DECEMBER, 1949.

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This report describes quantitatively the floods in the Eastern Mesaoria in December, 1949. These floods originated in the abnormally heavy rainfall which lasted for a week from 17th to 23rd December, and which reached two peaks, one on the 17th/18th and a second on Wednesday 21st. It was this second peak, occurring at a time when the ground was already satufated and flood control works were fully extended, which caused the greater portion of the damage.

2. The area to be described lies within the rectangle formed by the Famagusta–Kondea–Lefkoniko–Trikomo main road. Water flowed into this central area from the catchments which lie to the south, west and north ; the outflow is to the east, where the Yialia and Kambion rivers reach the sea south of Engomi.

3. The report falls into three parts. The first part gives a table of rainfall for eight stations in the Eastern Mesaoria, and some comparisons with earlier floods. The second describes quantitatively the inflow of water to the central area at 16 points along the main road which bounds the area. The third part gives some information as to the movement of the water within the central area.

I.—RAINFALL.

TABLE OF RAINFALL (in inches)—DECEMBER, 1949.

Date	Station								
	Nicosia	Halevga	Vatili	Kouklia	Akhyritou	Syngrasis	Ayios Theodhoros	Famagusta	Average
December 17 ..	3.65	2.05	2.08	2.33	2.25	1.50	—	—	1.73
„ 18 ..	0.96	2.50	2.31	3.45	3.61	1.87	2.00	5.35	2.76
„ 19 ..	0.50	1.15	0.60	0.88	1.00	0.93	2.70	0.85	1.08
„ 20 ..	1.55	0.50	0.23	1.65	0.70	0.62	1.50	0.16	0.86
„ 21 ..	2.88	4.20	3.84	2.45	5.50	3.45	0.50	2.40	3.15
„ 22 ..	0.34	0.33	0.38	1.08	0.48	0.33	0.50	1.20	0.58
6 Days—total ..	9.88	10.73	9.44	11.84	13.54	8.70	7.20	9.96	10.16
December 23 ..	0.15	—	0.04	0.82	0.05	0.08	1.00	0.10	0.28
„ 24 ..	—	0.40	—	—	—	—	0.20	0.20	0.10
8 Days—total ..	10.03	11.13	9.48	12.66	13.59	8.78	8.40	10.40	10.54

4. These stations are distributed fairly uniformly through the Eastern Mesaoria and its catchment area. At most of them, records have been kept since 1901. Only on two occasions since then has the rainfall in any one month exceeded 10 inches ; at Nicosia 10.74 inches fell in 8 days in November, 1913, and at Akhyritou 12.65 inches fell in 14 days in December, 1911. At none of the other stations was the rainfall abnormally high at those two periods. But as the above table shows, the average of 8 stations exceeds 10 inches over a period of 6 days. Thus, both in total amount and in intensity, the rainfall which produced the 1949 floods greatly exceeds anything recorded in the past 50 years.

II.—INFLOW OF WATER.

5. The maximum flow of water across and beneath the main tarred road (Famagusta–Kondea–Lefkoniko–Trikomo) has been calculated for 16 different localities. The inspection was made on 3.1.1950, and information collected as to the extent and duration of the flood from a study of flood marks, damage to structures, etc., and from information supplied by the local people. This has been supplemented by a knowledge of the physical features and the extent of the different catchment areas as shown on the map.

Maximum Flow and Destination of Water.

(*a*) *Famagusta–Kondea Road.*					
(i)	Laki Bridge	Max. discharge	=	5,000	cusecs to Fresh Water Lake.
(ii)	Ay. Nikolaos	,, ,,	=	500	cusecs to sea, south of Engomi.
(iii)	Akhyritou Road Jn.	,, ,,	=	13,000	cusecs to sea, south of Engomi.
(iv)	7 Miles from F'gusta.	,, ,,	=	1,100	cusecs to Akhyritou Reservoir.
(v)	Avgorou Road Jn.	,, ,,	=	1,700	do.
(vi)	9 Miles from F'gusta.	,, ,,	=	1,300	do.
(vii)	½ Mile East of Kouklia	,, ,,	=	7,500	cusecs mainly to Akhyritou.
(*b*) *Kondea–Lefkoniko Road.*					
(viii)	15th Mile Stone	Max. discharge	=	4,500	cusecs to Kouklia Reservoir.
(ix)	16.5 Miles	,, ,,	=	600	do.
(x)	Oxidina/Yialias River	,, ,,	=	13,000	do.
(xi)	Pedieos Canal	,, ,,	=	1,500	do.
(xii)	Prastio village	,, ,,	=	600	cusecs to Prastio Reservoir.
(xiii)	Prastio–Prastio Station	,, ,,	=	11,400	cusecs (half to Prastio Reservoir, half to sea at Engomi).
(xiv)	Prastio to Lefkoniko	,, ,,	=	3,750	cusecs to sea at Engomi.
(*c*) *Lefkoniko–Syngrasis Road.*					
(xv)	Lefkoniko–Gypsos	Max. discharge	=	3,750	cusecs to sea at Engomi.
(xvi)	Syngrasis Reservoir	,, ,,	=	5,000	cusecs to sea at Trikomo.

6. In all cases, the maximum flow occurred as a result of the second rainfall peak on Wednesday, 21st December. From 08.00 hrs. on 21st to 08.00 hrs. on 22nd, this rainfall averaged 3.15 inches over the whole area; the greatest flow took place on the afternoon and night of the 21st. At the Akhyritou road junction the flood lasted 10 hrs. (14.00 hrs.–24 hrs.). With a much larger catchment area, the peak flow of the Yialias and Pedieos rivers was probably about 18 hours.

7. The total flow in this area due to the 24 hrs. rainfall on 21st December has been calculated to be 2,900,000,000 cubic feet, made up as follows :—

To Fresh Water Lake	=	180,000,000	cubic ft.
To Sea (Yialias river)	=	486,000,000	,, ,,
To Akhyritou reservoir	=	417,600,000	,, ,,
To Kouklia reservoir	=	1,058,400,000	,, ,,
To Prastio reservoir	=	317,600,000	,, ,,
To Sea (Kambion river)	=	260,000,000	,, ,,
Total ..		2,899,600,000	cubic ft.

8. The flood on the 21st followed four days of heavy rainfall, which totalled 6.43 inches over the whole area, and was followed by 0.86 inches of rain for the next two days. It would appear that during the first six days of the floods, at least 10,000 million cubic feet of water flowed into the whole flooded area. This is sixty times the maximum capacity of Kouklia reservoir.

9. The catchment area from which this water flowed equals about 730 square miles. Over this area, the total average rainfall was 10.16 inches in six days. Hence the total rainfall amounted to 18,000 million cubic feet of water. The run-off of 10,000 cubic feet equals 56% of this amount which is not unusual in a flood of this description.

III.—MOVEMENT OF WATER WITHIN THE FLOODED AREA.

10. At two points within the flooded area, estimates have been made of the amount of water which passed, and these estimates help to give some idea as to the behaviour of the flood waters.

(*a*) *Kouklia Reservoir.*

11. Two methods of escape for flood water are provided in the Kouklia retaining works. There is a masonry weir, 100 ft. long, with its sill 17.4 feet above the bottom of the reservoir. There is also a 100-foot long earthen weir, whose sill is at 17.6 feet, and which is further protected by a low breaching bank. In this flood, water escaped by both weirs, and also, as will be shown, by flowing back into Prastio reservoir.

12. The water in Kouklia reservoir reached the 21.3 foot level on 21st December, and on that day the water overflowed and breached the Prastio bank to the north of Kouklia reservoir proper; but Kouklia remained full until its main earthern bank was breached early on the morning of the 24th December.

13. The calculated outflow from Kouklia reservoir for the 24 hours of 21st December amounts to 367.8 million cubic feet (204.3 over the masonry weir, and 163.5 over the earthern spillway). Over the same period, the inflowing water was estimated to amount to 1,058.4 million cubic feet. Of this, some 200 million cubic feet went to fill Kouklia reservoir from the 17.0 to the 21.3 foot contour. A balance may be struck as follows :—

Inflow for 24 hours on 21st December	=	1,058,400,000	cubic ft.
Discharge over two weirs	=	367,800,000	,, ,,
Filling reservoir from 17.0 to 21.3 ft. level	=	200,000,000	,, ,,
Balance ..		490,600,000	,, ,,

14. To this balance of 490 million cubic feet is attributed the breaching of the Prastio bank on the 21st December. The water backed up into the Prastio reservoir, overflowing the non-return flood gates, and then escaped by overflowing and breaching the Prastio bank.

(*b*) *Akhyritou Reservoir.*

15. Water escapes from Akhyritou over a weir whose sill has been lowered to the level of the bottom of the reservoir. It is reported that the water flowed in flood over this weir for 4 days. The maximum discharge for the 24 hours of 21st December is calculated to have been 400 million cubic feet and this agrees closely with the calculated inflow (417.6 million cubic feet). There is an old gap in the Kalopsidha–Akhyritou training bank through which the 17.6 million cubic feet, and also part of the overflow from Kouklia, could have escaped passing through Akhyritou weir.

APPENDIX 5.

IRRIGATION SCHEMES COMPLETED IN 1949.

	Location	Nature of Construction	Donums commanded		
			Winter	Summer	Total
1	Agros (Dhihalorotsos)	Weir, masonry channels	—	15	15
2	,, (Anastasha)	Piping and masonry channels	—	10	10
3	,, (Esso Yitonia)	Masonry channels and repairs	—	18	18
4	,, (Kato Kamares)	Weir	—	32	32
5	,, (Koukkaris)	Masonry channels and tank	—	20	20
6	Agridhia	Spring, tank and masonry channels	—	20	20
7	Agridhaki	Piping	—	6	6
8	Akapnou	Repairs to weir	—	50	50
9	Alona	Spring, channels and tank	—	50	50
10	,, (Yerona)	,,	—	30	30
11	,, (Koukkoupas)	,,	—	12	12
12	,, (Frakti)	Spring and tank	—	6	6
13	,, (Kokkotis)	,,	—	6	6
14	,, (Havouza)	,,	—	6	6
15	Alithinou	Masonry channelling	—	8	8
16	Angastina	Repairs to masonry channels	—	—	—
17	Anglissidhes	Masonry channels	—	25	25
18	Argaka-Magounda *	Repairs to weir and channels	—	—	—
19	Arsos	Masonry channels	—	30	30
20	Asha	Weirs and channelling	2,250	—	2,250
21	Ayios Epiphanios	Masonry channelling	—	25	25
22	Ay. Nikolaos (Paphos)*	Repairs to spring and cutting	—	—	—
23	Ay. Ioannis (Limassol)	Masonry channels	—	30	30
24	Ay. Konstantinos (Raeburn's tank)	Channels and piping	—	60	60
25	Ay. Konstantinos (Miliari).	Extension and building of spring	—	15	15
26	Ayios Konstantinos (Vrysakia).	,,	—	10	10
27	Exometokhi *	Repairs to weir	—	—	—
28	Dhierona	Weir, channels and aqueduct	—	230	230
29	Dhrousha	Masonry channelling	—	35	35
30	Dhymes (Kambos)	Weir, masonry channels	—	20	20
31	,, (Hj Pelendrou)	Masonry channels	—	20	20
32	,, (Kardhama)	,,	—	10	10
33	Gastria *	Repairs to channels	—	—	—
34	Geunyeli *	Installation of Irr. Ports	—	—	—
35	Gourri *	Channelling (repairs)	—	—	—
36	Kalokhorio (Klirou) *	Cement plastering of Dam	—	—	—
37	Kanli Chiftlik	Earth Dam	300	—	300
38	Kato Mylos	Masonry channels	—	20	20
39	Karavas	Concrete channels	—	102	102
40	Kalokhorio (Limassol) (Avlaki)	Spring	—	12	12
41	Kalokhorio (Kephalovryso)	Weir, tank and channels	—	60	60
42	Kalokhorio (School-garden)	Piping and repairs to tank	—	4	4
43	Khandria	Spring and tunnels	—	24	24
44	Kivisil	Lining main channel	—	60	60
45	Klavdhia *	Silt Gate and lining of channel repairs	—	—	—
46	Khrysorroyiatissa	Spring, repairs to a tank	—	30	30
47	Kornos	Repairs	—	—	—
48	Kyperounda (Kondomersini)	Spring and tank	—	13	13
49	Kyperounda (Mylos)	Masonry channels and tank	—	20	20
		Carried forward	2,550	1,144	3,694

* Repairs and improvements only.

	Location	Nature of Construction	Donums commanded		
			Winter	Summer	Total
		Brought forward ..	2,550	1,144	3,694
50	Kyperounda (Hasanes Halospities)	Masonry channels and tank ..	—	15	15
51	Kyperounda (Dheisis) ..	Masonry channels	—	20	20
52	Kyperounda (Karidhiatis-Zalihes)	Spring, masonry channels, tank	—	15	15
53	Kyperounda (Pano Kardama)	,,	—	15	15
54	Lagoudhera (Kidhonies)	Masonry channels & spring ..	—	12	12
55	,, (Ahousa) ..	Spring, masonry channels, tank	—	24	24
56	,, (Kokkinoyia)	Extension of masonry channels	—	10	10
57	,, (Kato Pervolia)	Small weir, masonry channels	—	15	15
58	Lapathos	Repairs to weir	—	—	—
59	Layia	Masonry channels and tank ..	—	8	8
60	Lefkoniko	Irrigation ports and repairs to channels	40	—	40
61	Livadhia (Nicosia) ..	Extension of channels ..	—	9	9
62	Lythrodhontas * ..	Installation of a new iron gate	—	—	—
63	Mandria (Limassol)* ..	Lining of channels	—	—	—
64	Mandria (Paphos) * ..	Infiltration gallery, tunnelling	—	—	—
65	Milikouri	Spring, masonry channels, tank	—	55	55
66	Moutoullas ..	Spring and tank	—	10	10
67	Moniatis	Weir and channels	200	50	250
68	Pano Lefkara † ..	Channelling, culverts ..	—	—	—
69	Pano Panayia	Spring, channels, tank ..	—	30	30
70	Paralimni	Channels, wells	—	—	—
71	Paleomylos	Masonry channels	—	10	10
72	Pedieos *	General improvements ..	—	—	—
73	Phterykoudhi	Spring, channels, tanks ..	—	40	40
74	Platanistasa (Louvaras)	Masonry channels	—	24	24
75	,, (Vasilia) ..	Spring and masonry channels	—	13	13
76	,, (Kolymbos)	Spring, masonry channels, tank	—	34	34
77	Potamitissa	Masonry channels, tank ..	—	80	80
78	Polis (Djerepia) * ..	Repairs to weir	—	—	—
79	Polystipos (Laoudhia)	Spring and tank	—	15	15
80	,, (Monastiri)	Small weir, channels, tank ..	—	28	28
81	,, (Vrysi Theodoulou)	Spring, piping, tank	—	15	15
82	Polystipos (Hj. Nicola)	Weir, masonry channels ..	—	6	6
83	Polystipos (Floudhi-tou Charta)	Spring and tank	—	7	7
84	Polystipos (Siderka) ..	Springs, channels, tank ..	—	16	16
85	Polystipos (Floudhi-tou Ayiou)	Spring, tank	—	7	7
86	Sophtadhes *	Modification of screw gate ..	—	—	—
87	Stylos-Limnia * ..	Construction of sluice gate and masonry wall	—	—	—
88	Sykopetra (Agridhia) ..	Spring, channels, tank ..	—	20	20
89	Sykopetra (Konomidhes)	,,	—	25	25
90	Tris Elies	Masonry channels	—	15	15
91	Vasa (Kilani)	Infiltration gallery	—	20	20
		Total donums	2,790	1,807	4,597

* Repairs and improvements only.

† Reported in 1948 report.

APPENDIX 6.

IRRIGATION SCHEMES IN HAND AT THE END OF 1949.

	Location	Nature of Construction	Donums commanded		
			Winter	Summer	Total
1	Agros	Building of spring, channels, tank	—	17	17
2	Agridhia	Excavating of spring	—	20	20
3	Akhelia Chiftlik ..	Construction of new headworks and channels	3,521	1,200	4,721
4	Alona (Pano Dhipotamia).	Spring, weir, tank, channels ..	—	40	40
5	Alona (Kato Dhipotamia).	Masonry channels, tank ..	—	25	25
6	Ay. Ioannis (Limassol)	Masonry channels, tank ..	—	19	19
7	Ayios Konstantinos ..	Enlarging of tank, masonry channels	—	23	23
8	Ay. Varvara–Kochati ..	Weir, tunnels, channels ..	1,600	—	1,600
9	Chakistra *	Piping	—	—	—
10	Dhymes	Spring, masonry channels, tank	—	20	20
11	Kalokhorio (L'ssol.) ..	Excavating and building of spring	—	30	30
12	Khrysorroyiatissa (Chrysanthos) ..	Spring, improving tank channels	—	20	20
13	Koloni	Spring, weir, masonry channels, tank	600	80	680
14	Konia	Digging wells, tank, masonry channels	—	40	40
15	Kouklia Chiftlik ..	Construction of new headworks and channels	1,562	1,200	2,762
16	Kourdhali (Vrysi-tou-Khoriou).	Masonry channels, tank ..	—	15	15
17	Kourdhali (Appidhes) ..	,,	—	11	11
18	Kyperounda	Weir, masonry channels, tank	—	8	8
19	Lagoudhera	Spring, tunnelling	—	7	7
20	Limnitis	Masonry and piped river crossings, lining of channels	700	50	750
21	Mandria (Paphos) † ..	Lining tunnels	—	—	—
22	Phterykoudhi	Excavating and building of spring, masonry channels, tank	—	20	20
23	Polystipos (Pefkos) ..	Spring, channel and tank ..	—	12	12
24	,, (Floudhi-tou-Rocarou)	,,	—	25	25
25	Potima Chiftlik ..	Construction of new headworks and channels ..	—	726	726
26	Sarandi	Excavating of spring and masonry channels	—	15	15
27	Xyliatos (Avlaki-tou Khoriou).	Masonry channelling	14	—	14
28	,, (Kaisili) ..	,,	40	10	50
29	,, (Potinia) ..	,,	30	—	30
		Total donums	8,067	3,633	11,700

* Reported in 1948 report.

† Repairs and improvements only.

APPENDIX 7.

VILLAGE WATER SUPPLIES COMPLETED IN 1949.

1. Ayios Athanasios
2. Ayios Mamas
3. Dhora
4. Dhiorios
5. Melounda (Famagusta)
6. Mesayitonia
7. Monagri
8. Patriki
9. Pelendria
10. Petrophani
11. Peyia
12. Platani
13. Kalokhorio (Limassol)
14. Kato Dhikomo
15. Gypsos
16. Dhavlos
17. Kaliana
18. Dhymes
19. Polystipos
20. Strongylos
21. Aradhippou
22. Platanistasa
23. Eliophotes
24. Exometokhi
25. Moniatis
26. Lefkoniko
27. Yerani
28. Ayios Vasilios
29. Episkopio
30. Kophinou
31. Ayia Varvara (Nicosia)
32. Philousa (Kelokedhara)

APPENDIX 8.

VILLAGE WATER SUPPLIES IN HAND AT THE END OF 1949.

1. Geunyeli
2. Athienou
3. Gaidhouras
4. Kato Platres
5. Moutoullas
6. Prastio (Famagusta)
7. Prodhromos
8. Karmi
9. Boghaz
10. Ayios Amvrosios (Kyrenia)
11. Ayios Yeoryios (Kafkallou)
12. Gastria
13. Ayios Therapon
14. Kapilio
15. Pomos
16. Monagroulli
17. Anoyira
18. Kalopanayiotis
19. Ayios Dhometios
20. Kouklia (Paphos)
21. Mandria (Paphos)
22. Artemi
23. Lefka
24. Kellaki

APPENDIX 9.

VILLAGE WATER SUPPLY SCHEMES READY FOR CONSTRUCTION AT THE END OF 1949 BUT NOT YET STARTED.

1. Phterikoudhi
2. Klirou
3. Pano Koutraphas
4. Pano Pyrgos
5. Kato Pyrgos
6. Astromeritis
7. Petra tou Dhiyeni
8. Aredhiou
9. Dhali
10. Hamid Mandres
11. Ayios Theodhoros Soleas
12. Mazotos
13. Voroklini
14. Livadhia (Larnaca)
15. Pyla
16. Apsiou
17. Ypsonas
18. Erimi
19. Kolossi
20. Kouka
21. Kato Platres
22. Yerasa
23. Ayios Theodhoros (Limassol)
24. Akhna
25. Leonarisso
26. Kouklia (Famagusta)
27. Peristerona (Famagusta)
28. Mandres
29. Ayios Theodhoros (Famagusta)
30. Avgolidha
31. Ardhana
32. Prastio (Paphos)
33. Vretcha
34. Amargeti
35. Eledhiou
36. Lasa
37. Nikoklia
38. Trimithousa (Paphos)
39. Yeroskipos
40. Temblos
41. Liveras
42. Keumurju
43. Polemi
44. Kinousa
45. Arminou
46. Ayios Ioannis (Paphos)
47. Zoopiyi
48. Ayios Dimitrios (Limassol)
49. Agros
50. Plataniskia
51. Kalopanayiotis
52. Akanthou
53. Tembria
54. Kandou
55. Kato Amiandos
56. Tokhni
57. Kalavasos
58. Letymbou
59. Ayios Nikolaos (Paphos)
60. Pano Arodhes
61. Khandria
62. Kambos
63. Armenokhori
64. Pedhoulas
65. Omodhos
66. Ovgoros (Famagusta)
67. Gouphes
68. Sanidha
69. Paleomylos
70. Paramali
71. Timi
72. Phlamoudhi
73. Prastio (Limassol)
74. Maroni
75. Vavla
76. Anaphotia
77. Aplanda
78. Menoyia
79. Sotira (Limassol)
80. Moutoullas
81. Alambra
82. Pissouri
83. Louroujina
84. Paralimni
85. Pano Panayia
86. Ayios Yeoryios (Paphos)
87. Mathikoloni
88. Khirokitia
89. Trypimeni