CYPRUS

DEPARTMENT OF WATER DEVELOPMENT

ANNUAL REPORT FOR 1955

BY

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

Director

NICOSIA

PRINTED AT THE CYPRUS GOVERNMENT PRINTING OFFICE

1956

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WEIGHTS, MEASURES AND CURRENCY.

WEIGHT :	400 drams	=	1 oke.
	1 oke	=	2 4/5 lbs.
	44 okes	=	1 kantar.
	180 okes	=	1 Aleppo Kantar (carobs).
	800 okes	=	1 ton.
CAPACITY :	1 Cyprus litre	=	2 4/5 quarts.
	1 kile	=	1 bushel.
	1 kouza	=	9 quarts } wine.
	16 kouzas	=	1 load }
LENGTH :	1 pic	=	2 feet.
AREA :	1 evlek	=	3,600 sq. feet.
	1 donum	=	14,400 ,,
	3.025 donums	=	1 acre.
CURRENCY :	1000 mils	=	1 pound.

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Department of Water Development.

ANNUAL REPORT FOR 1955.

The engineering and geological side of all Government water development work is in the hands of the Department of Water Development whose duties include the search for new sources, the conservation and development of supplies for irrigation, domestic and industrial use, and the problems connected with river training, flood protection and land drainage. The administration of village Irrigation Divisions and Associations and Domestic Water Commissions is supervised by the District Commissioners. Disputes over water rights are handled chiefly by the Commissioners in consultation with the Law Officers, the Departments of Lands and Surveys and the Department of Water Development. Soil conservation and the agricultural problems involved in the economic use of water are responsibilities of the Department of Agriculture.

2. In 1955 the main features of the work of the Department of Water Development were the completion of new town water supplies in Nicosia, Limassol and Famagusta, and the drilling of a record number of boreholes, chiefly for irrigation. Construction of gravity irrigation works and village domestic water supplies proceeded as in previous years, and the usual requests from village communities for such works continued on an increasing scale for village domestic water but in fewer numbers for irrigation schemes. The hydrological service, formed towards the end of 1954, completed its first year's work which consisted of measurements of surface flow and surveys of underground water conditions.

3. The rainfall year 1954–55 was on the whole slightly above average. In the early part of the year, that is in November and December, 1954, the rainfall was exceptionally heavy, more than double average, but the reverse occurred in January and February when the rainfall was very low. No special demands were made upon the department in 1955 for either drought relief works or for flood damage repairs.

4. The activities of the department are divided into five chief branches dealing respectively with (*a*) Irrigation and Drainage, (*b*) Town Water Supplies, (*c*) Village Domestic Water Supplies, (*d*) Geology and Drilling and (*e*) Hydrology. There is continuous liaison between these branches so that their work is co-ordinated in the best interests of the over-all water supply problems of the island. Thus the Village Domestic Water branch may develop a source of water in excess of the requirements of a particular village and the surplus may be utilised for irrigation ; where gravity water supplies are not available, investigations by the Geological branch may locate underground sources from which water can be pumped for irrigation or domestic use. The departmental workshop serves all branches.

Irrigation.

5. As in previous years, the policy of the department has been to undertake many small schemes rather than a few large ones. These have become very popular and a steady flow of proposals for new works still continues to come in although at a slower rate than in previous years. As time passes the number of simple irrigation schemes awaiting execution is getting fewer and the cost and technical difficulty of irrigating each additional donum of land is increasing.

6. The total number of irrigation schemes completed during the year was 54, providing sufficient water to irrigate 5,885 donums, of which 1,950 donums can be irrigated perennially. Thirteen more schemes were in progress at the end of the year and a further 77 have been planned in detail and are ready to be carried out as opportunity occurs.

7. 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	Seasonal		
	Donums	*Donums*	*Donums*	*Donums*
1946 Census..	59,409 say 59,500	284,977 say 285,000	53,131 say 53,000	397,517 say 397,000
Estimated at end of 1954 ..	84,500	341,500	102,000	528,000
New Irrigation, 1955 (say).. ..	2,000	3,500	11,500*	17,000
Estimated totals at end of 1955	86,500	345,000	113,500*	545,000
Percentage increase since 1946 census and commencement of Ten-Year Programme of Development	45%	21%	113%	37%

* Includes 1,500 donums resulting from non-Government drilling.

8. The total area of arable land in Cyprus amounts to about 3,900,000 donums, of which 14% is now irrigated in an average winter and 5% in an average summer.

9. The irrigation works carried out by the department may be classified in the following groups :—

(*a*) Schemes developing small springs by excavation at their source, by lining channels in masonry or reinforced concrete to prevent loss of water, and by constructing masonry tanks for night storage.

(*b*) Schemes involving the diversion of seasonal or perennial flow from rivers and water sources by means of weirs and channels.

(*c*) Irrigation from infiltration galleries constructed in slow yielding aquifers, in fissured rock, or in river gravels either by gravity or by pumping.

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

(*e*) Installation of pumping plant on wells and boreholes and the construction of distribution channels.

10. The lining of irrigation channels in cement-concrete has been a prominent activity of the irrigation branch of the department during the year and this type of work is now widely recognised among Cypriot cultivators as a very effective means of increasing the volume of water reaching the fields. By the elimination of seepage losses between source and field, additional water becomes available for extending the area under cultivation. In addition less labour is required for cleaning and maintaining channels. In the past when channels were lined to prevent leakage the materials used were most often masonry blocks cemented together with lime or lime and cement mortar, but these have now been superseded almost entirely by reinforced concrete. During the year 13 miles of channels were lined in reinforced concrete and one mile in unreinforced lime-cement concrete or masonry. These works were carried out chiefly in the village areas of Mamonia, Ayia Varvara–Kochati, Kilani, Kalokhorio (Lefka), Dhymes, Akaki, Pyrgos (Ll.) and Ayios Dhimitrios.

11. Some small schemes involving the excavation and building of springs, and the conveyance of water in pipes or channels to small irrigation tanks have been completed in the hill areas. Among the villages that have received this type of small but popular scheme are Milikouri, Moutoullas, Limnatis, Prodhromos, Kyperounda, Kilanemos, Trimiklini and Ayios Ioannis (Agros).

12. Three dams were completed in 1955. The first was a small earth dam at Gypsos built for the purpose of storing flood water. This is 16 feet high and 1,700 feet long, and it has a storage capacity of 30 million gallons. At Kandou a 40-foot masonry dam was built on a somewhat fissured site after an early experimental dam 15 feet high had shown no sign of leakage. A concrete dam, 60 feet high was completed at Perapedhi at Government expense, without any village contribution, for the purpose of compensating irrigators for water extracted from the upper reaches of the stream for domestic use at Troodos. These three dams are described in greater detail in Appendix 6.

13. In Cyprus dams are built chiefly for the purpose of extending the period of spring irrigation into early summer by supplying water during the critical irrigation month of mid-April to mid-May, the time when streams are rapidly drying up and when late waterings are required to produce a good crop. A dam of relatively small storage is, at this season, sufficient to make possible a final watering when it is most needed and to turn a poor crop into a successful one. The cost of dams built in Cyprus is usually high in relation to storage capacity because of unfavourable topography, the valleys being for the most part too steep and narrow to hold much water without a disproportionately high dam. Because of the special need for water in April and May, however, there are many places where the construction of dams up to about 100 feet high will be economically sound. The highest to date is 70 feet and the storage capacity 28 million gallons.

14. A number of Government irrigation works and one drainage scheme was carried out with funds provided by the Department of Agriculture. These were (*a*) a pumped irrigation scheme for the Agricultural Department's experimental farm at Athalassa, (*b*) the lining of channels and incidental works at the Mamonia chiftlik, (*c*) the lining of channels and incidental works at the Potima chiftlik, (*d*) the excavation of some springs and the construction of an irrigation tank as part of a soil conservation scheme at Argaki, (*e*) a drainage scheme at Akhyritou, (*f*) a pump and irrigation tank in the Nursery Gardens, Nicosia, and (*g*) a pump and irrigation tank at Kouklia chiftlik. Items (*a*), (*b*), (*e*) and (*g*) were only partly completed at the end of the year. The total expenditure in 1955 on these works amounted to £28,000 approximately.

15. At Ayios Loucas, near Famagusta, the second phase of an interesting scheme was well under way at the end of the year. This is a ground-water re-charge scheme designed to improve underground water conditions around Famagusta town where heavy pumping in past years has caused a general lowering of the water-table to such an extent that it is now more than 20 feet below sea level in some places, and the sea is penetrating into wells and boreholes along the coast, causing them to turn brackish or saline, and making the water unfit for irrigation. The first phase of the works were described in the 1954 Annual Report and include the repair of an old earth embankment across the Harangas river to form a 30 million gallon reservoir, the construction of a 100-foot spillway, and the driving of a mile of re-charge tunnels in a porous stratum at sea level. The tunnel is intended to convey water from the reservoir into the aquifers that provide irrigation water in and about Famagusta town. It is hoped that the fresh water introduced both through the tunnel and by seepage through the bed of the reservoir will tend to retard the advance of sea water. This first phase of the scheme was completed in 1955. The second phase, now under construction, will enlarge the scope and effectiveness of the works by bringing in water from Kouklia reservoir nine miles

away, and from intervening catchments. This involves the construction of 3 miles of open channels with many small incidental works and one mile of tunnels. The cost of the first phase was £9,445 and the second is estimated at £21,000.

16. The following works that are representative of the 1955 programme are described in detail in Appendix 6 : Perapedhi, Kandou, Kilani, Pyrgos, Gypsos, Mamonia and Akaki.

17. Schemes examined and ready for construction include a 100-foot dam in the Kouris River near Trimiklini, a 50-foot dam for Argaka and Magounda, a 35-foot earth flood detention dam for Exometokhi, a drainage scheme for the Syriano-khori marshes and river training works at Kapilio and Nata–Kholetria. A proposal for a 100-foot dam combined with a road bridge near Platres was examined and abandoned because of the high cost.

18. Preliminary or partially complete investigations have been made for many other works including several proposed dams, the drainage of the north-western part of the Akrotiri depression, and the lining of many existing irrigation channels in concrete. Among the proposed dams is one 100 feet high near Klirou on the Agros road, and one about 50 feet high near Pyrgos (Tylliria).

19. A proposal for an Irrigation Research Centre has received study during the year by members of the Land Use Co-ordinating Committee. This research station, if established, would be a centre for studying irrigation methods and practices in Cyprus and for advising irrigators about the efficient and economical use of water. It is estimated that if better methods and practices in the use of irrigation water could be made to increase perennial irrigated production by 15% the value of the products of irrigated land would be increased by more than £1,000,000 annually.

Town Water Supplies.

20. The principal suppliers of water in Nicosia, Limassol and Famagusta are the respective Water Boards. The members are nominated half by Government and half by the Municipality and the Chairman is appointed from among these six by the Governor. In Larnaca the water authority is the Evcaf Department while in both Paphos and Kyrenia it is the Municipality. The Department of Water Development advises all these authorities on the technical aspects of their water supplies and has recently completed major schemes for Nicosia, Limassol and Famagusta. The Larnaca water supply is operated and maintained by staff of the department. Minor works were carried out during 1955 in Larnaca, Paphos and Kyrenia as described in Appendix 10.

21. Three major schemes have been under construction during the past four years and were completed in 1955. The work included the construction of many small pumping stations, a reservoir at each town, and the laying of 282 miles of supply and distribution pipes. The total cost of construction, which is within the estimates, amounted to £1,190,900 made up as shown :—

	£
Nicosia	504,200
Limassol	374,450
Famagusta	312,250
Total	£1,190,900

Details of these three schemes are given in Appendices 10, 11 and 12.

22. Although these schemes have only just been completed, more improvements are needed in all the chief towns of the island. In Nicosia, the new scheme has doubled the quantity of water available in the Water Board's area of supply but in 1955 the necessity arose, as in previous years, to limit the quantity of water supplied to the town at certain periods of the summer. The restrictions, however,

were of course less severe than formerly. The actual average consumption rose to about 34 gallons per person per day throughout July. Had it been possible to continue without restrictions it is thought that the average consumption in July would have exceeded 40 gallons per person per day. In Limassol and Famagusta, where the actual July consumption was 39 and 31 gallons per person per day respectively no restrictions were imposed in 1955, although in Limassol the old pumping station at Chiftlikoudhia had to be brought into use and, as regards Famagusta, anxiety is felt as to the ability of the new boreholes to maintain this year's output in future.

23. The need for more domestic water in the towns, particularly in Nicosia, has thus become very evident and is caused by a number of contributary factors. The increase in population is not less than 3% per annum. The quantity of water required is more than indicated by the numerical rise in population because there is also a growing *per capita* consumption caused by better standards of living and, in particular, by the increasing use of water-borne sanitation. Furthermore, many of the wells in urban areas that formerly gave, in the aggregate, large quantities of water are now partly drying up or becoming subject to contamination as a greater area becomes " built up ". It is now necessary to assume that all town domestic water must come from the piped town supply.

24. Appendix 11 gives the approximate water consumption per person in the four chief towns of Cyprus in the summer of 1955, and other information on this subject is given in Appendix 10.

25. It seems that a satisfactory summer supply under present conditions would require 35 to 40 or 45 gallons per person per day in the chief towns. Rising standards indicate that a prudent figure to use for the design of future works would be 50 gallons per person per day. If the population increases at 3% per annum and if it takes 5 years to plan and complete a new water supply scheme it follows that plans should be prepared for a population at least 15% more than existing.

26. The position in the suburban villages adjoining Nicosia has become very acute. These villages as yet have practically no modern water supply facilities although they are virtually part of the town. The combined population of the villages is now estimated at about 17,000 as compared with 57,000 within the Nicosia Water Board's area of supply and a total of 74,000 in Greater Nicosia. The first phase of a scheme to supply water to the suburban villages of Nicosia and at the same time to provide more water for the present Water Board has been prepared in detail and will bring more water to the capital from Kokkini Trimithia, from the hills near Dhikomo, and from the Idalias river-bed near Dhali. In view of the expanding population and the rising *per capita* consumption this phase is likely to afford only temporary relief and steps are therefore being taken to plan for further extensions. To obtain thoroughly reliable sources it may be necessary to pump water from beyond Morphou, and with this end in view prospecting boreholes are being drilled near the Syrianokhori marshes. This scheme, which is still in the planning stage, provides for pumping four million gallons per day through a 20-mile pumping main against a gravity head of 600 feet.

27. Investigations and studies have been proceeding for improvements and extensions to the water supplies of all the other chief towns in the island. A number of prospecting boreholes have been sunk near Xylophagou with a view to finding suitable sources for an extension to the Famagusta town supply some 12 miles away. At Larnaca proposed works include the duplication of the existing 15" main from the tunnels to the town, the construction of an 800,000 gallons covered reservoir, and the division of the distribution system into six independent districts, each fed from a ring main at sustained pressure. In Limassol proposals exist for laying a 2-mile pumping main from the Chiftlikoudhia pumping station to the reservoir so that in dry seasons, when the springs are low, the pumped water may mix uniformly with the spring water instead of being supplied directly to certain

quarters of the town. In Paphos plans have been prepared for extending the distribution system and several alternative schemes have been examined for piping more water to the town. The most promising of these appears to be the proposal to pipe water from the Trozena springs near Yerovasa through a 24-mile pipeline.

Village Domestic Water Supplies.

28. The work of the Village Domestic Water Section is confined mostly to water supplies for villages and rural municipalities. Sources of water are examined, measured, and where suitable, developed. Supply and distribution pipelines are laid and storage tanks and public "fountains" constructed. A "fountain" is a combined public standpipe, trough and drainage soak-pit. With the exception of certain of the larger villages no house connections are made. The sources may be springs, infiltration galleries, boreholes or wells.

29. During the year a record number of 84 village water supply works was completed. 17 are entirely new, 55 are improvements to existing supplies that were formerly unsatisfactory or inadequate, and the remaining 12 are for schools or police stations. It is now estimated that of the total of 627 villages named in the census of 1946, the number with piped supplies is 488 or 78%. Of these 388 (62%) may be considered to be satisfactory and 100 (16%) need fundamental repairs or replacements. The 139 villages still without piped supplies, are on the whole, situated far from reliable sources, and the cost and difficulty of supplying them with piped water will in most cases be greater than in past schemes.

30. In addition to the 84 schemes completed in 1955 a further 4 schemes were under construction but incomplete at the end of the year. The number of schemes prepared and awaiting execution in due course as staff and money become available is 155. The following table indicates the works done on village water supplies during the year under review :—

Village Water Supplies.

Miles of Pipe laid in 1955.

Size of Pipe	¾″	1″	1¼″	1½″	2″	2½″	3″	4″	6″	Total miles
Galvanised steel pipes	4.6	20.8	18.3	17.4	17.4	15.1	11.5	5.3	—	110.4
Black steel pipes									1.1	1.1
Asbestos cement pipes							2.1	0.7	3.2	6.0

Storage Tanks : 64 Fountains : 368 Distribution Boxes : 27.

31. The schemes completed may be classified as shown below. "Village standard" means that the distribution of the water is effected by street fountains only, not by house connections.

(*a*) New schemes to village standard where previously there was no piped water..	15
(*b*) As above but including house to house service as well	2
(*c*) Total replacement of an obsolete scheme	6
(*d*) Improvements to village standard only	49
(*e*) Improvements including house connections	12
Total	84

Of the above 84 schemes, 61 obtain their water from springs, 7 from infiltration galleries by gravity, and 16 from wells or boreholes by pumping.

32. The tendency for village communities to seek more facilities for their domestic water supplies continues and is reflected in the large number of improvement schemes indicated in the above paragraph. Villagers are now asking for more water per person than formerly and they seek a greater number of fountains per hundred inhabitants. The above table shows 14 house-to-house water supplies whereas in 1954 only 5 schemes of that type were carried out.

33. The dry villages of the Eastern Mesaoria have again been the subject of more investigation but so far without concrete results. No suitable new source of water within reasonable distance of this group of waterless villages has yet been discovered and there would appear to be no practical alternative to the proposal of acquiring some of the water of the Kythrea spring and distributing it among the villages for their domestic use. The users of the Kythrea water would be amply compensated if some of their unlined channels were lined with concrete. The cost of lining an appropriate length of channels and of piping water to ten villages in the plains would probably amount to more than £120,000. It would be possible to use the new Water (Development and Distribution) Law, 1955 (see paragraph 55) for the purpose of carrying out this cheme.

34. The following village water supply schemes that are typical of the year's work are described in Appendix 13 : Dhali, Karavas, Arsos–Vatili–Strongylos, Kondea–Sinda–Kouklia, Paramytha–Spitali–Palodhia, and Emba–Lemba–Kissonerga.

Drilling for Water.

35. The Drilling Section is largely occupied in sinking irrigation boreholes for private persons under a subsidised drilling scheme. It also sinks prospecting boreholes for Government, and irrigation, domestic water, and industrial boreholes for public bodies and commercial companies on a full cost basis. The benefits of perennial irrigation resulting from recent boreholes are clearly visible in the marked agricultural development that is taking place in drilling areas. Where previously the summer landscape was bare and arid, citrus groves and vegetable gardens are being extended year by year and the agricultural economy of these districts is thereby improved. These beneficial results are reflected in an increased demand for subsidised and full-cost boreholes. In spite of a record year's drilling the waiting list of applications for new boreholes stood at 115 at the end of 1955.

36. Thirteen modern drilling rigs were continuously employed throughout the year, and in addition, in order to cope with the increased demand, another old rig was recommissioned in April and worked for the remainder of the year. All these rigs are of the percussion drilling type. Boreholes are mainly 8″, with a few of 10″ and 12″ diameter. In 1955 the average drilling depth of boreholes sunk for water was 211 feet and the greatest depth 539 feet.

37. The number of boreholes sunk by the department during the year was the new record total of 333. Of these 135 were for irrigation, 16 for domestic water, 58 for prospecting for water and 24 for industrial water supplies. In addition 13 observation boreholes were drilled and a further 87 for technical and engineering purposes. Of the 233 boreholes drilled for water 67% produced more than 1,000 gallons per hour on test and are classified as successful. The tested outputs show that, if pumped together, all these boreholes can produce water at the rate of 1,282,000 gallons per hour. This is 34% greater than the corresponding figure for 1954 and is a new water production record for Cyprus.

38. In addition to the above Government work, a considerable amount of drilling for water was carried out by registered contractors. With improved drilling machinery these private drillers have sunk 96 new boreholes for water during 1955, of an average depth of 69 feet and with a total estimated (but not tested) rate of 238,000 gallons per hour. The majority of these boreholes is either 4″ or 6″ in diameter,

39. While much of this year's work was concentrated in the further exploitation of previously proved underground aquifers, several new areas were prospected with most satisfactory results. The most important new water finds were :—

(*a*) In the upper Morphou areas between Pano Zodhia and Angolemi.
(*b*) In the Karpas around Ayios Andronikos and Ephtakomi.
(*c*) Previously untapped areas near Liopetri and Xylophagou.

Successful exploratory works were also carried out at Akhelia, Paphos, to enable further use of the large sub-surface flow in the Ezuza river gravels. All these are described in Appendix 1.

40. The large number of boreholes drilled in recent years has caused a proportional increase in pumping in the island generally, in particular in the Morphou area and in the peninsula between Famagusta and Larnaca. In the Morphou area there is so far no sign of any serious fall in the ground water table and further development can no doubt continue for a number of years. At the other end of the island, in the peninsula between Famagusta and Larnaca, the position is not so hopeful and measurements from the department's observation boreholes indicate that the limits of safe development are being approached and in some cases already exceeded. The area around Kokkini Trimithia is causing similar concern.

Hydrology.

41. The new hydrological service which was formed towards the end of 1954 has completed its first year's work which consisted of collecting and recording information about the following subjects :—

(*a*) Changes in ground water levels.
(*b*) The quantity of water pumped from wells and boreholes.
(*c*) Annual re-charge of aquifers.
(*d*) Special studies of certain ground water areas.
(*e*) Flood run-off in rivers.
(*f*) Summer discharges of streams.
(*g*) Spring discharges.
(*h*) Run-off from different types of catchments.
(*i*) Chemical analyses of water.

42. Among the results expected from research on these subjects one of the most useful will be information regarding the effect of the recent expansion of borehole pumping upon the underground water resources of the island. This should indicate if it is advisable to continue drilling at the present rate or if new drilling should be restricted or prohibited in the areas now being developed.

43. The increased agricultural production resulting from irrigation by the pumped water is of great economic value to the island and it is very important that the present pumping output should not only be maintained but that it should be increased from year to year where possible. The reservoirs of underground water, however, are not unlimited and so in developing irrigation from wells and boreholes, one must take care not to exhaust the aquifers by drawing off more water than can be replaced naturally each year from the rainfall.

44. In order to study the effect of the recent expansion of pumping upon the natural underground water reservoirs it is necessary to keep a careful watch upon changes of ground water levels in pumped areas. For this purpose a total of 38 special observation or control boreholes has been drilled at key points and the level of the water in each is measured regularly each month. The chemical quality of the water is also checked periodically so that any increase in salinity can be detected at an early stage.

45. A summary of the water levels over the past few years is given in Appendix 5. This shows, among other things, that the average ground water level at Kokkini Trimithia, which is the chief source of the Nicosia town water supply, has fallen by about 6′ 6″ in four years. At Phrenaros, the source of the Famagusta town supply, the water level at one group of boreholes has fallen by 10 feet in 4 years. It is not possible at present to assess the real significance of this rapid fall in water level because the time that has elapsed since regular pumping began is insufficient ; it is clear, however, that both Kokkini Trimithia and Phrenaros should be watched most carefully in future.

46. The Ayios Memnon area, beside the sea near Famagusta, is one in which many groves have been ruined in past years because the water-table has fallen below sea level thus enabling the sea to penetrate by gravity into the ground water, causing it to become brackish. In 1955 this area showed a slight improvement, partly because of high rainfall and partly because of the artificial re-charge operations described below in paragraph 49 and in Appendix 4.

47. The chief water-bearing area of Cyprus, that around Morphou, is still showing no signs of depletion in spite of heavy pumping and it is hoped that much more development will be possible before declining water levels indicate that drilling operations should be restricted.

48. The rapid fall in water level at Phrenaros has shown the need for a special hydrological study of the surrounding district. This study has been started and maps are being prepared showing contour levels of the underground water surface over the whole area, so that from year to year changes can be recorded not only at observation boreholes but also at all places throughout the area under study. The rainfall on the catchment is measured by a number of rain-gauges, estimates are made of the total volume of water pumped, and the quantity of surface water flowing away is measured at specially built weirs with automatic water level recorders. A similar study will be carried out at Kokkini Trimithia when staff becomes available.

49. Artificial re-charge of the underground reservoirs is carried out in three places, viz. : at Ayios Memnon near Famagusta, at Ayios Loucas also near Famagusta, and at Limassol. In 1955 the Ayios Memnon and Limassol operations appear to have been very successful but the Ayios Loucas scheme suffered through lack of water for running into the re-charge tunnels. This latter scheme is now being extended to include new catchments as described in paragraph 15. A description of the re-charge methods is given in Appendix 4.

50. Regular flood measurements continued to be made in the winter of 1954–55, at the six automatic recorder sites of the previous year. The results are shown in Appendix 4. During the summer automatic water level recorders were established for the same purpose at a further 13 sites and so, in the winter of 1955–56, 19 recorders are in action. Of this number 7 operate at bridge sites or at other places without the advantage of specially built measuring weirs and although they indicate the level of flood water sufficiently accurately for practical purposes they do not provide the information required for accurate calculations of volume, which can only be found approximately. At the remaining 12 sites special masonry measuring weirs have been built and accurate volumetric results can be obtained.

51. Three of the above recorders are at stream sites where there is usually a summer flow and they therefore work throughout the year. They are on the Limnitis and Pyrgos streams in the northern part of the Troodos Forest and on the Kouris river near Trimiklini. All measure the run-off from forest areas. A fourth recorder for summer stream flow operates at the mouth of the Serakhis river near Syrianokhori.

52. Measurements of the flow of 268 springs at different places throughout the island are made at regular intervals and many odd flow measurements are recorded at others, usually for some specific purpose such as the improvement of a village water supply or irrigation works.

53. A total of 1,308 samples for chemical analysis and 191 for bacteriological analysis has been made during the year mostly in connection with pump tests on wells and boreholes, routine checks on town water supplies, the examination of sources for proposed village water supplies, or for irrigation. The samples are all sent to the Medical Department for analysis.

Miscellaneous Activities.

54. Technical advice is frequently given to public bodies including the military and to private individuals on their water supply problems. The department is often asked to provide expert opinion on water disputes. A total of 33 prolonged pump tests of wells and boreholes was made during the year for Government, the military, public bodies and private individuals. Three small Government water supplies in Nicosia are run by the department. Miscellaneous activities such as the above and the necessity for the department to be represented at numerous committee meetings on a wide range of subjects absorb a very large proportion of the time of the technical staff.

Legislation.

55. An important new law, the Water (Development and Distribution) Law, came into force on 28th March. This provides for the compulsory acquisition of privately-owned water in places where it appears to the Governor-in-Council that the conservation and better use of water resources, the provision of sufficient water, its equitable distribution and availability at fair prices, or the effective execution of an island-wide policy relating to water, may be more effectively secured thereby. Upon the application of the law to any given area private water rights will vest in a Committee and the former right-holders may claim compensation from the Committee. Some of the chief functions of the Committee are to promote the conservation of water resources, to develop their use, and to co-ordinate their distribution.

56. A draft land drainage law has been prepared and is under consideration by Government. If enacted it will provide (*a*) for the establishment of committees to drain and reclaim land, and to maintain river and drainage channels within declared areas, (*b*) for the maintenance of rivers and drainage channels outside a declared drainage area and (*c*) for the prevention of pollution of drainage channels. As a complementary measure to the new law it is proposed that the existing Irrigation Divisions Law should be amended to enable Divisions to carry out drainage and flood protection works for the benefit of their members.

57. Minor amendments to the Water Supply (Municipal and Other Areas) Law are under consideration following suggestions made mostly by the Water Boards.

58. A preliminary notice under the Wells Law has issued giving details of a proposed order for the protection of water supplies (*a*) in the Famagusta–Larnaca peninsular and (*b*) in the Limassol–Phassouri area. If this order is confirmed no permit for the sinking of well or borehole will be given in these areas without the concurrence of the Director of Water Development.

Finance.

59. The following is a summarised statement of the expenditure of the Department of Water Development in 1955 :—

Nature of Work.	Government Funds.	Contributions from Beneficiaries.	Totals
	£	£	£
1. Gravity Irrigation Schemes ..	140,500	40,350	180,850
2. Village Water Supplies	94,050	102,800	196,850
3. Subsidised Drilling	6,150	3,850	10,000
4. Prospecting for Water	30,300	—	30,300
5. Drilling upon Repayment ..	—	18,050	18,050
6. Nicosia Water Supply Scheme ..	—	14,350	14,350
7. Limassol Water Supply Scheme..	—	24,500	24,500
8. Famagusta Water Supply Scheme	—	35,750	35,750
9. Miscellaneous town water supplies	2,600	7,500	10,100
10. Miscellaneous works upon repayment including test pumping ..	—	3,450	3,450
11. Departmental and Maintenance ..	87,200	—	87,200
Totals	360,800	250,600	611,400

60. Included in the above statement are :—

	£
1. Personal emoluments	42,650
2. Wages for labour (approx.)	265,000
3. Travelling	11,700
4. Government controlled irrigation works..	30,250
5. Pump testing	8,150
6. Value of casing pipes fixed in boreholes	10,700
7. Purchase of drilling equipment	4,000
8. Total cost of drilling and cleaning boreholes excluding items 5, 6 and 7	35,500
9. Maintenance of Government water supplies and purchase of water	21,700
10. Fire hydrants at Nicosia, Limassol and Famagusta ..	2,600

61. A sum of £12,621 was collected as departmental charges for works carried out for the Water Boards, for drilling upon repayment, and for miscellaneous works upon repayment.

62. The average cost of a new borehole in 1955 was £102 and the cost per foot of drilling £0.582. Details of drilling costs are given at the end of Appendix 1.

63. Water development works are usually assisted by Government grants or loans, or by both grants and loans. Towards the cost of gravity irrigation works the village contribution varies from 20% to 60% according to the type of work and the nature of the ownership of the water. Where the water is owned collectively as by the members of an Irrigation Division, the usual rate is 20% for spate irrigation and 33.3% for perennial irrigation. In Irrigation Associations there is private ownership of water and the village share is usually higher than for a Division. Each case is considered on its merits with the result that the average village contribution over the past two years was about 45%. The village share of the cost of a scheme is usually raised by a loan from the Government Loan Commissioners at a low rate of interest. Occasionally it is paid partly or wholly in cash or in free

labour. A borehole under the subsidised drilling scheme is carried out for a private person at a fixed price to him of £32.500 mils for the first borehole, and the balance of the cost which, in 1955 has on the average amounted to about £100, is paid by Government. Private individuals requiring a second or third borehole are charged the actual cost in full including departmental charges. Municipal Corporations, companies, etc., also usually pay the full cost and departmental charges. The new town water supply schemes were paid for in full by the respective Water Boards, which raised the money by special loans from Government. Village domestic water schemes are paid for half by Government and half by the village if no house connections are wanted. If there are house connections the extra cost is borne entirely by the village.

Staff and Labour.

64. No noteworthy additions or changes to the strength of the staff occurred during the year. On 31st December it was as follows :—

Director	1
Assistant Director	1
Senior Engineers	2
Engineer-Hydrologist	1
Superintendent of Waterworks	1
Senior Inspectors of Water Supplies	2
Assistant Engineer	1
Inspectors of Water Supplies	11
Technical Assistants	23
Foremen	79
Accounts, Clerical and Miscellaneous	38

Three scholars are studying in the United Kingdom for university degrees under a Government scholarship scheme and two more scholarships for the same purpose were advertised towards the end of the year.

65. The average number of labourers employed during the year was 1,450 of whom 200 were unpaid, their work being considered as a contribution to the village share of irrigation works. These figures compare with 1,580 and 155 in 1954. About 35% were classed as "skilled" labourers of Special Grade or Grades I and II, and 22% were regular employees. The approximate monthly averages were as shown :—

Month	Paid Labour	Free Labour	Total
January	1,500	370	1,870
February	1,350	230	1,580
March	1,350	410	1,760
April	1,100	370	1,470
May	1,150	370	1,520
June	1,250	200	1,450
July	1,350	170	1,520
August	1,350	150	1,500
September	1,350	100	1,450
October	1,250	—	1,250
November	1,200	—	1,200
December	800	—	800
Average	1,250	200	1,450

Future Requirements.

66. Requests for irrigation works including subsidised boreholes have on the whole been satisfied during the year although there is still a long waiting list. Because the easier and less costly irrigation schemes are becoming completed, and perhaps because there is a pressing demand for labour at relatively high rates of pay away from the villages, the number of applications for village irrigation works has been less in 1955 than in previous years. The problems of flood control, river training, anti-erosion works in river beds, and the reclamation of river beds and marsh-lands, are coming into greater prominence than formerly. The demand for village domestic water supplies has become very intense and is such that it can only be satisfied with the present resources of the department after a long period of years. In the district towns the short-term problems have been mostly solved but more improvements are already needed if the water supply facilities are to keep pace with the rapidly expanding populations and the rising standard of living. Nicosia requires more water immediately, particularly in the suburbs, and long-term planning is needed to provide for the future. In the field of planning and research the time has come to look for major schemes to conserve water that cannot be utilized by small works.

I. L. Ward,
Director.

January, 1956.

APPENDIX 1.

DRILLING FOR WATER.

By D. P. McGregor, B.Sc., A.M.I.M.M., *Assistant Director.*

The department's drilling plant consists of thirteen modern rigs of which nine are Ruston-Bucyrus 22–Ws, one is a Bucyrus-Erie 33–W and three are Edecos. Five of the Ruston rigs are on loan from the Army but operated and maintained by the department. All these rigs were operated in the field continuously throughout the year, except for minor breakdowns and periodical overhauls. In addition, owing to the increased demand for drilling, an old Toronto rig was re-commissioned and worked from April until the end of the year.

The department has also four transportable deepwell pumping units which are used for long continuous test-pumpings of boreholes and wells. They consist of two 6″ and one 4″ reciprocating pumps with diesel engines, capable of pumping rates between 2,000 and 8,000 gallons per hour, according to the pumping lift ; and a diesel-electric generating set used in conjunction with $7\frac{1}{2}$″ diameter electro-submersible pumps of from 10,000 to 18,000 gallons per hour capacity. These test-pumping units were in great demand, particularly throughout the summer and autumn of 1955. In all, 33 test-pumpings, of from 48 to 360 hours duration, were carried out, involving a pumping time of 5,800 hours and a total quantity of over 52 million gallons of water.

The number of boreholes sunk during 1955 was 333 with an aggregate footage of 58,437. Of these, 233, with a total footage of 49,197, were drilled for water. The average drilling depth of water wells was 211 feet. The average time taken to complete a borehole, including the time taken to lay borehole casing and to carry out an 8-hours test-pumping of successful boreholes was 11.7 days. The total yield of the boreholes drilled for water in 1955 was 30,766,000 gallons per day. In addition to new drillings thirty-one old boreholes were cleaned and renovated, involving 169 drilling days. These results of the development of the underground water resources of Cyprus during 1955 constitute a new high record.

One hundred and thirty-five boreholes were sunk for irrigation. Of these, 101 or 74.8%, produced on test, an aggregate of 21.8 million gallons per day which is considered sufficient to irrigate 11,000 donums in summer.

The number of successful irrigation boreholes drilled since the beginning of the Ten-year Development Programme in 1946 is now 748 with a tested output of 125.3 million gallons per day, sufficient to irrigate 62,000 donums of summer crops. Making allowance for boreholes which have not yet come into production, the actual area irrigated from new boreholes may be conservatively estimated to be of the order of 59,000 donums. The census of 1946 estimated that there was then some 53,000 donums of land being irrigated perennially by pumped water. By the end of 1955, as a result of Water Development Department drilling alone, this area has been increased by 111% to 112,000 donums.

With fourteen rigs in the field, drilling activities were widespread throughout the island, although the demands for the drilling of irrigation boreholes in the highly productive Western Mesaoria again resulted in the greatest concentration of new boreholes in that area. Out of 75 boreholes drilled there, 69 or 92% were successful, yielding an aggregate tested output of over 16 million gallons per day. Westwards along the Tyllirian coast, between Xeros and Pyrgos, 10 successful out of 11 boreholes yielded a further 1.75 million gallons per day. Other areas which again produced good drilling results from known aquifers were in the vicinity of Xylophagou and Liopetri, in the Famagusta-Dhekelia peninsula, and around Zakaki and Phasouri, west of Limassol.

Fifty-eight prospecting boreholes were sunk by the department in 1955, of which 55% were successful, yielding a total tested output of over 5 million gallons per day.

The most important result of prospecting from an irrigation point of view was the proof of the existence of good water bearing aquifers in the area between Pano Zodhia and Angolemi, in the Western Mesaoria. Two prospecting boreholes were sited well apart along the road which connects these two villages and each of these found water in quantities sufficient to justify pumping from the deep level at which it was found. Borehole 32/55 is situated 1½ miles north-east of Angolemi and at an elevation of approximately 480 feet above sea level. The water level in this borehole is 234 feet below the surface. On test this borehole produced over 10,000 gallons per hour with only 9 feet drawdown. From this borehole the ground slopes gently downwards towards Pano Zodhia and borehole 90/55, about a mile south-west of the village, has a ground elevation of 350 feet above sea level. The static water level in borehole 90/55 is 122 feet below ground level. This borehole also yielded 10,000 gallons per hour. A third (subsidised) borehole was subsequently drilled roughly half way between 32/55 and 90/55. It also found water at 174 feet although not in such large quantity. These results are most encouraging and indicate the possibility of drilling further high yielding boreholes on the gently sloping ground between the Angolemi–Pano Zodhia road and the Morphou–Ghaziveran coastal plain and of developing large tracts of this excellent agricultural land for perennially irrigated farming. At present it only produces poor crops of wheat and barley.

Another interesting find, as the result of prospecting drilling, has been the presence of an excellent free-yielding water bearing aquifer around Ayios Andronikos, in the Karpas peninsula. Near the village this water had been previously tapped only by shallow wells. Twenty-one boreholes in all were drilled in this area and have now proved that the water-bearing rock, a highly porous shelly lime stone, probably of Pliocene age, has infilled a basin, up to 240 feet in depth, in the underlying Miocene clays and marls, formed as the result of an upthrow fault along the northern side. The borings have also proved that the aquifer extends laterally over a much larger area into the surrounding state forest and south-westwards towards Kilanemos. Several of the boreholes produced, on long continuous tests, quantities of water of the order of 10,000 to 16,000 gallons per hour with little drawdown. Many of the villages in the Karpas suffer from shortage of domestic water and it is anticipated that adequate supplies may be provided from this newly found source without affecting local irrigation to any extent.

Near Ephtakomi prospecting drilling also discovered another small Pliocene infilled valley with a moderately yielding aquifer and it is possible that further investigations may reveal similar small isolated but useful sources of water in this locality.

A series of boreholes drilled across the Yialias river valley near Ayios Sozomenos, 10 miles south of Nicosia, again revealed that, as at Dhali, the old buried river bed lies some distance to the west of the present river. These ancient river gravels are up to 60 feet deep and are free yielding, and borehole 116/55 produced, during an eight days test, a continuous output of 7,500 gallons per hour with 6½ feet drawdown. It is hoped to supply the villages of Tymbou and Pyroi with domestic water from this source.

Prospecting drilling in the Liopetri and Xylophagou area proved the existence of good water bearing aquifers in previously unexplored localities. Several high yielding wells were found and should provide sources for future additional supplies for Famagusta. In this connection it is the aim of the department to try to locate these sources in rocky areas where the land is unlikely to be capable of being developed agriculturally.

The drilling of a series of prospecting boreholes along the eastern border of the Syrianokhori marsh was started during the autumn of 1955. These boreholes are situated along a line roughly parallel to, and some 5,000 feet from, the sea. At present it is considered unwise to permit drilling nearer to the sea but that an untapped fresh water " bank " should remain to seawards of this line so as to

prevent the possibility of sea-water encroachment at any future time. It is hoped that, thus protected, these wells will provide an inexhaustible source of excellent quality water for the future domestic supply requirements of a rapidly expanding Nicosia.

Around Mitsero, the Hellenic Mining Company Ltd. continued their prospecting for water required for their new ore treatment plant and a Water Development drilling rig was employed on a full-cost basis. Fifteen boreholes were drilled during 1955. Nine of these proved unsuccessful. Five of the remainder were low yielding and only one, 5/55, with a tested yield of 20,000 gallons per hour can be regarded as giving a satisfactory output. A further four were carried out by the same company near Potami but these also proved unsuccessful. Near Akaki, however, the company's prospecting efforts were rewarded by three successful boreholes which together should provide at least an additional 20,000 gallons per hour for its industrial requirements. Pumping from this latter source will entail a long pumping lift.

A problem which has defied the efforts of the department for several years has been the provision of domestic water for the large village of Trikomo. Two wells near Lapathos were examined at the request of the Improvement Board but after testing the quantities proved to be inadequate. It was, however, decided to develop these wells by horizontal auger borings in the sandstone aquifer similarly to the work carried out in the same locality in 1954. (Annual Report 1954 Appendix 1, para. 15). The results were most satisfactory. The yield of the wells was doubled and a £30,000 water supply scheme is now being executed.

A successful experiment for the development of underground water was carried out in the Ezuza river near Akhelia, Paphos. A geophysical survey of the river bed had been carried out in 1949, and subsequently drillings had proved the configuration of the impervious Miocene marl bed-rock underlying the river gravels across a narrow section of the valley. In 1950 a well was sunk in the marls on the left bank of the river and a tunnel was driven from the bottom of the well out under the river. It had however only reached 50 feet when water started pouring in through fissures and further tunnelling had to be abandoned. A 15,000 gallons per hour pump was subsequently installed in the well and has since been used each summer to augment the irrigation water of Akhelia Chiftlik. In 1955 another well was sunk, this time on the opposite, right, bank of the river. It penetrated Miocene marls throughout and although water was encountered between 30 and 60 feet, seeping into the well from the river gravels through fissured zones, and necessitated continuous pumping at the rate of nearly 5,000 gallons per hour, the well was successfully completed to a depth of 120 feet. A tunnel, 125 feet long, was then driven out under the river bed, also all in marl rock. Two boreholes were then sunk in the river bed above the end of the tunnel and when these penetrated the tunnel the water from the overlying river gravels entered freely into the well. A subsequent test-pumping of the well produced an output at the rate of 45,000 gallons per hour (over one million gallons per day) with only 20 feet drawdown. Unfortunately, before a long test could be completed, the first of the winter rains caused a surface flow in the river. It will be necessary to re-test the well next summer to assess its true value but undoubtedly it will be able to provide a very considerable additional quantity of water for irrigation in this area.

Four new observation boreholes were sunk during 1955, bringing the total of these holes, in which regular measurements are taken of water and samples for chemical analyses, up to 38. Two were drilled in the Syrianokhori marsh area, one at Laxia, south of Nicosia, and one near Ephtakomi. The results of the measurements of water levels in the control boreholes is given in Appendices 4 and 5. Nine other temporary observation boreholes were drilled in connection with the underground flow experiments, which were carried out near Ayios Sozomenos and are referred to in Appendix 4.

There was an increased demand particularly from the Army, for the use of rigs for drilling engineering boreholes and a total of 87 borings, with an aggregate footage of 7,674, were drilled for technical and geological purposes such as building, bridge and dam foundations and electrical earthing connections.

Sixteen private drilling contractors were licensed during 1955 and between them drilled a total of 100 new boreholes with an aggregate footage of 6,906. Each of these drillers operates a single locally made rig of somewhat primitive design. With experience however they are rapidly improving both their equipment and technique. The majority of the drilling was carried out in the Famagusta and Larnaca districts where drilling is comparatively easy and wells may be sunk without borehole casing. A few boreholes were, however, also drilled near Kokkini Trimithia. By law, private drillers are obliged to give notice of drilling, to keep records of depths of boreholes and static water levels, and to retain borehole samples for inspection by an officer of the Water Development Department. Test-pumpings are not normally carried out but from information received it is possible to arrive at an approximate figure of the total yield of these private drillings. Four of the 100 boreholes were drilled for the Electricity Authority of Cyprus for earthing purposes. Of the remainder 75 may be classified as successful with an estimated total output rate of 5.7 million gallons per day. As many of these boreholes were drilled in the bottom of existing wells the increase in yields is somewhat conjectural but it may be conservatively estimated that the increase in perennially irrigated land as a result of these drillings is not less than 1,500 donums.

The average cost of departmental drilling in 1955 was £102 per borehole or 11/7*d.* per foot of drilling. These costs are inclusive of the expenses of laying casing pipes and of an 8-hour test pumping of successful boreholes. They are exclusive of the purchase price of borehole casing pipes and the capital cost and installation charges of permanent pumping plant. They include the wages of the drilling crews and workshop maintenance fitters and blacksmiths, fuel and lubricating oils, bit sharpening and repairs and replacements of drilling tools and equipment. They do not include depreciation of drilling plant and salaries and expenses of the supervisory staff. Seventy-eight subsidised boreholes were drilled, costing an average of £133 each or 11/6*d.* per foot of drilling. The contribution of the beneficiaries to the cost was £32.10*s.* per borehole and Government provided the balance of just over £100. One hundred prospecting, observation and geological boreholes, drilled entirely from Government funds, cost an average of £141 each or 16/5*d.* per foot. One hundred and fifty-five full-cost boreholes cost £61.6 each or 8/2*d.* per foot of drilling. The low price of full cost drillings may be accounted for by the inclusion in this total of 87 engineering boreholes averaging only 88 feet in depth.

APPENDIX 2.

NUMBER AND FOOTAGE OF BOREHOLES.

NUMBER OF BOREHOLES DRILLED.

1948–1955.

Purpose	1948	1949	1950	1951	1952	1953	1954	1955	
For private individuals and Companies	92	135	132	157	195	169	182	170	129
For Government ..	25	46	32	41	21	51	57	101	54
For War Department and Air Ministry	—	—	27	32	26	10	15	62	30
Totals ..	117	181	191	230	242	230	254	333	213
Aggregate Footage drilled	21,397	33,610	40,751	47,766	41,022	44,563	49,159	58,437	42681
Average Depth ..	182	186	231	208	170	194	194	175	200

42681

Boreholes drilled in 1955.

Purpose	No.	Existing Well Footage	Footage drilled	Percentage Successful*	Total Tested Yield in Gallons per day
Irrigation	135	3,561	26,625	74.8	21,803,760
Domestic Water Supplies..	16	128	2,749	75.0	2,313,840
Prospecting..	58	—	12,432	55.2	5,211,600
Industrial	24	285	7,391	45.8	1,437,120
Total for Water ..	233	3,974	49,197	67.0	30,766,320
Observational Boreholes (not tested)	13	—	1,566	—	—
Technical and Geological Boreholes	87	—	7,674	—	—
Total Drilled	333	3,974	58,437	—	—

Old Boreholes cleaned : 31.

* A successful borehole is one that yields on test more than 1,000 gallons per hour of usable water.

APPENDIX 3.

BOREHOLES DRILLED FOR WATER IN 1955.

Summary of Results.

District	Locality	No. of boreholes drilled	No. successful (*)	Percentage successful (*)	Total tested output Gals. per day	Average yield per successful borehole Gals. per day
Nicosia ..	Western Mesaoria ..	75	69	92.0	16,320,000	236,500
	Karavostasi–Limnitis–Pyrgos	11	10	90.9	1,759,200	175,900
	Kokkinotrimithia ..	5	5	100.0	842,400	168,500
	Lakatamia–Psomolophou–Xeri	5	2	40.0	576,000	288,000
	Yeri	4	2	50.0	291,600	145,800
	Meniko	2	—	—	—	—
	Mitsero	15	6	40.0	834,720	139,100
	Nicosia	3	1	33.3	129,600	129,600
	Ayios Sozomenos ..	1	1	100.0	180,000	180,000
Kyrenia ..	Kyrenia–Lapithos ..	16	4	25.0	372,000	93,000
	Kyrenia Range	3	—	—	—	—
	Ayia Irini	1	—	—	—	—
Famagusta	Kantara–Ephtakomi ..	6	1	16.7	129,600	129,600
	Ayios Andronikos ..	21	12	57.1	1,848,000	154,000
	Sinda–Lysi–Asha ..	4	1	25.0	86,400	86,400
	Liopetri–Phrenaros–Dhenia	10	9	90.0	940,800	104,500
	Akhna	2	1	50.0	166,080	166,100
Larnaca ..	Pergamos–Xylophagou–Pyla	21	15	71.4	2,700,000	180,000
	Athienou–Melousha ..	3	1	33.3	24,000	24,000
	Psevdhas	2	—	—	—	—
Limassol ..	Zakaki–Akrotiri–Phasouri	6	5	83.3	1,488,000	297,600
	Polemidhia	3	2	66.7	304,800	152,400
	Moni–Pyrgos	2	1	50.0	32,400	32,400
	Platres	1	1	100.0	45,360	45,400
Paphos ..	Mandria–Akhelia ..	4	3	75.0	1,272,000	424,000
	Trimithousa–Mesoyi (Polis)	2	1	50.0	43,200	43,200
	Pelathousa–Skoulli–Prodhromi	5	3	60.0	380,160	126,700
	Totals	233	156	67.0	30,766,320	197,200

* A successful borehole is one that yields on test more than 1,000 gallons per hour of usable water.

APPENDIX 4.

HYDROLOGICAL NOTES 1954–55.

By M. Grehan B.Sc., A.M.I.C.E., A.M.I.W.E., *Engineer-Hydrologist.*

These notes refer to the hydrological year beginning on 1st October, 1954, and ending on 30th September, 1955.

Meteorological.

The main characteristics of the total precipitation during the year were :—

(*a*) Very high rainfall during the first three months (October, November and December, 1954).

(*b*) Below average rainfall for the remainder of the year.

(*c*) No snow, apart from a few transient falls, on the Troodos hills.

(*d*) No exceptionally intense rainfalls and therefore no serious floods.

Over the whole island the total precipitation averaged 20.9 inches. This is about 8% more than normal. Although the net result was an overall above-average rainfall, certain parts of the island experienced sub-normal precipitation. The Troodos massif and the Morphou area were conspicuous in this respect but the very high rainfalls recorded in the northern range of hills, particularly to the east of Halevga, more than compensated for this deficiency.

Until May, temperatures and other meteorological characteristics remained about normal. From the middle of May until August, temperatures were above average. The normal conditions until May, coupled with belated and temporarily above-average rainfalls in March, prevented any premature use of pumped water for irrigation purposes.

Flood Discharges.

The rainfall intensities during 1954–1955 were usually moderate and few floods were reported. Those which did occur were caused by heavy falls of rain in the northern hills between the 3rd and 5th December, and intense river spates resulted along the entire northern boundary of the Mesaoria plain. The heaviest rainfalls were recorded east of Kythrea, Halevga registering 4.48″ in the three days and Cape Andreas 3.32″. The maximum rainfall in one day (3.92″) was also recorded at Halevga. The result of this was that the most serious floods were experienced in the Chakili valley near Vitsadha, spreading eastwards to the sea between Famagusta and Trikomo, and in the Syngrasi Reservoir area where a maximum flood-flow of about 3,200 cusecs was estimated at Syngrasi weir. At the other extremity of the Kyrenia range very sharp intensities of run-off caused a rapid rise in the rivers without, however, producing severe floods. A peak flow of about 840 cusecs was recorded at the Ovgos River near Morphou which was well within the capacity of the river bed to take.

River and Stream Discharges.

During the winter of 1954–55 river and stream flows were above average up to the beginning of January, winter spates having commenced earlier than usual. During the remainder of the wet season flows rapidly subsided, the result being that in some areas total discharges were below normal. Summer discharges from hill streams were well below average owing to the drying up of springs and in some instances, such as the Kryos Potamos at Troodos, the lowest flows on record were reported.

At the beginning of the Hydrological year—October, 1954—water level recorders had already been installed and were in operation at the gauging stations given in the following table. All stations consist of a water-level recorder with weekly charts used in conjunction with velocity measurements by floats. They are intended to estimate river spates and to enable approximate figures for total annual flows to be calculated at the end of a season. During the year 1954–55 the discharges measured at these stations were as follows :—

Discharge Site	Total Rainfall on Catchment ($x10^6$ c.ft.)	Total Run-off ($x10^6$ c.ft.)	Maximum Run-off in 24 hrs. period. ($x10^6$ c.ft.)	Percentage Run-off.
Pedieos River near Nicosia ..	2,130	38	6	1.8
Yialias River at Nisou ..	1,498	68	4	4.5
Ovgos River near Morphou ..	2,250	79	17.3	3.6
Serakhis River near Morphou	7,300	138	34.6	1.9
Xeros River at Xeros	1,806	negligible	negligible	—
Marathasa River near Lefka ..	1,342	75	7	5.6

During the Hydrological year ending 30th September, 1955, 14 new gauging stations were completed and the four listed below recorded the summer discharges appended in each instance :—

(i) Weir on the Ovgos River at Syrianokhori :

This is a removable installation designed to record summer flows only and consists of a 6′–7″ sharp-edged weir with a 2′–0″ × 6″ notch for measuring small flows. The weir was brought into operation on the 11th July. The following flows were recorded from 11th July to 30th September:—

Average flow .. .. 10,600 c. ft. per day.
Maximum flow .. .. 14.400 c. ft. per day.

(ii) Weir on the Pyrgos River near Phileyia :—

A 30-foot broad-crested weir with a 2′–0″ × 6″ notch.

This was brought into use on the 4th July. The following flows were recorded from 4th July to 30th September :—

Average flow .. .. 11,800 c. ft. per day.
Maximum flow .. .. 13,600 c. ft. per day.

(iii) Weir on the Limnitis River at Limnitis Saw-Mill :—

A 30-foot broad-crested weir with a 2′–0″ × 6″ notch. This was brought into use on the 11th July. The following flows were recorded from 11th July to 30th September :—

Average flow .. .. 15,700 c. ft. per day.
Maximum flow .. .. 21,100 c. ft. per day.

(iv) Weir on the Kouris River at m/s 22 on the main Limassol–Troodos Road :—

An 18-foot broad-crested weir with a 2′–0″ × 6″ notch and a by-pass channel (equipped with weir and recorder) to take a limited amount of water for irrigation purposes in Summer. This installation was brought into use on the 12th September. The following flows were recorded during the remainder of September :—

Average flow .. .. 294,000 c. ft. per day.
Maximum flow .. .. 350,000 c. ft. per day.

Spring Discharges.

During the year 1,635 spring-discharges were measured, giving an average of over 136 measurements per month. 286 springs are now measured regularly, 67 at monthly intervals, 152 bi-monthly, 61 every three months and 6 every six months.

The eccentric rainfall-pattern during the winter of 1954–55 inevitably produced similar vagaries in the spring flows during the following summer. Above-average rainfall in the east of the island and particularly over the northern range, east of Kyrenia led to above-average spring discharges in this area later on. From Larnaca westwards along the littoral, where the rainfall was about normal or slightly above, spring discharges were generally lower than normal. The central massif and the Morphou area were the only parts of the island to experience below-average rainfall during the winter and the summer spring-flows suffered as a result. The Troodos area was additionally affected by the slight and transient snow-falls and by the absence of heavy rain in the early months of 1955. The spring-discharges on the heights therefore tailed off earlier than usual and by September the Troodos water supply springs, for instance, were yielding only 17,500 gallons/day or 2,500 gallons/day less than the previous minimum flow recorded in 1951. The three springs used for the Limassol domestic water supply, Kephalovrysos, Krya Pighadhia and Mavrommata, themselves fed from the southern slopes of Troodos, were down to an aggregate flow of 642,000 gallons/day by the end of the summer. The Kissousa spring in the same area dropped to a minimum of 165,000 gallons/day by the end of September and the average for the month was 280,000 gallons/day. This is the lowest discharge recorded since systematic measurements were commenced in 1952.

Pumped Discharges from Wells and Boreholes.

1954–55 was a normal year with regard to irrigation requirements of underground water. All pumps were in operation by mid-April and were still in general use at the end of September, although on a reduced scale. In contrast to boreholes pumped for irrigation purposes during only five or six months each year, the boreholes supplying Nicosia and Famagusta domestic water supplies are in use continuously. Nicosia obtains a large proportion of its water from the Kokkini Trimithia area and during the year a total of about 110 million gallons was pumped from the aquifer. Almost the entire requirements for Famagusta are extracted from boreholes in the Phrenaros area and during 1954–55 a total of 232 million gallons was pumped from this source. Of this quantity 144 million gallons were derived from a cluster of four boreholes situated to the north of Phrenaros village and 87 million gallons from a similar cluster of four to the west of the village.

Ground-Water Levels.

Four new observation boreholes were brought into use during the year 1954–55, the total now being 38. Two of the new boreholes are near Syrianokhori and have been sunk for the purpose of studying the variations in the Morphou area water-table, one is at Laxia where underground water is extracted for the Nicosia water supply and the fourth is at Ephtakomi. All water-levels in the observation boreholes are read monthly and chemical analyses are also made of samples at regular intervals. Appendix 5 gives the annual maximum and minimum water-level for each observation borehole during the period October 1954–September, 1955 and for the same periods in 1950–51 and 1952–53.

In the Kokkini Trimithia area of the western Mesaoria, where boreholes supplying Nicosia are located, the average water-table has dropped nearly 6′–6″ in 4 years. During the last twelve months the decrease in level has been 1′–6″ and the general trend appears to be continuing evenly. The amount of water extracted from this area is being limited and increasing control will be exercised in the future.

At Astromeritis the average level in the observation borehole is now 349 feet above sea level or about 8 feet less than the corresponding figure for last year. The minimum level was, however, one foot higher this year and the violent drop of last year, between August and September, has been repeated only on a more attenuated scale. The rainfall in the area was only about 80% of average during the winter of 1954–55 and the general result may therefore be taken as not too unsatisfactory.

As a result of the low precipitation to the north of the Troodos massif the water-table in the Morphou coastal area has shown signs of falling away after the encouraging results of last year. The indications are that near the sea-shore the recovery, compared with last winter, will be nearly complete but measurements from the five observation boreholes (Nos. 5 to 9) covering an area from north of the Ovgos River to Pendayia show an average drop of about 2 feet and at Observation Borehole No. 6 (Government Experimental Farm) the minimum level reached 64.7 feet above sea level compared with 70.3 feet last year. At the end of the year the recovery of the water-table in this area was rising at an encouraging rate and it is hoped that a season of normal rainfall will result in full recovery but a careful watch will need to be kept over future developments, particularly as the number of pumping installations in the area is increasing rapidly.

At Xylophagou, in the south-eastern Mesaoria, the average level of the water-table showed a slight recovery compared with last year. This was undoubtedly due to the copious rainfall during the winter of 1954–55 when 18.5 inches was recorded in the area compared with the 15 inches of a normal year. In the four years since 1950–51, when observation borehole records were commenced in this locality, the water-table has been depressed by an average of 1′–6″ or just over 4″ each year. Compared with most other ground-water areas this decline is small but as the water-table here is within a few feet of sea level it is important that careful control should be retained over future developments. It is intended to have this region declared a water conservation area as soon as possible.

In the Phrenaros area, from which water for the Famagusta domestic supply is obtained and which is a controlled area so far as new exploitation by wells and boreholes is concerned, the water-table continues to decline. The boreholes supplying the Famagusta Water Board are in two well defined localities, one to the west of Phrenaros village and the other to the north. At Phrenaros West a decrease of about 10 feet in four years has been recorded although during the past year the drop has been only one foot. This may be due to the heavy rainfall last year and to a decrease in total water extraction. At Phrenaros North the average depression of the water-table during the last year has amounted to just over 3 feet. This compares with a fall of 2 feet during the preceding year and indicates a disquieting trend. This rapid decline may, in part, be explained by the very heavy demands made in this area by the requirements for the Famagusta water supply but the rate of exhaustion can obviously not be allowed to continue at this level. The entire Phrenaros area is at present being made the subject of a complete hydrological survey in order to arrive at an estimate of the permanent water resources.

In the Famagusta area, where the water-table has been depressed in places to 20 feet or more below sea level by over-pumping, a temporary halt in the depletion of the aquifer has been recorded this year. The average level of borehole 69/38 during 1954 was 16.8 feet below sea level. This year the corresponding figure is 15.3 feet. Similarly the water level in the other borehole (No. 50/53) has been raised by nearly 2 feet. It is too early yet to be certain that the improvement will continue but it is obvious that last winter's heavy rains and the artificial re-charge operations have been immediately beneficial and that the water-table responds quickly to variations in the annual replenishment.

Re-charge Activities.

The artificial re-charge of underground water reserves which are being depleted by over-pumping has become a recognised practice where surface strata are porous enough to absorb water in substantial quantities. During the past year this form of activity has been in operation at three places in Cyprus. At Ayios Loucas in the Famagusta area a re-charge basin has been formed and surplus water from nearby catchments will be fed into it during the coming wet season. This scheme is described in paragraph 15. Nearby, at Ayios Memnon, surplus water from Paralimni Lake is drawn off through a drainage tunnel and used for re-charge purposes either by allowing it to flow into an underground re-charge tunnel driven above the surface of the depleted water-table or, when the volume of the water has been too great, by allowing it to flood the low-lying ground in the same locality. During the winter of 1954–55 it is estimated that a total of 75 million gallons was transferred in this way from Paralimni Lake to the re-charge area. This is equivalent to a rainfall of about 6 inches over an area of one square mile in the locality which most needs it.

In the Limassol area the old source of the Limassol town domestic water supply is also being used for re-charge purposes. Previously water was drawn from the Chiftlikoudhia chain-of-wells whereas now, surplus water from the town water supply, obtained from another source, is fed back into the chain-of-wells and replenishes the aquifer in the low-lying coastal area to the west of Limassol. During the year 36 million gallons were thus utilized and although, during the summer water-shortage, it was found necessary to extract 14 million gallons from the chain-of-wells for domestic supplies, the net gain to the aquifer has been 22 million gallons. Although the water pumped from this chain-of-wells was formerly brackish, this year's output was all of good quality for drinking as a result of the re-charging.

Chemical Analyses.

During the year, 1,308 samples of water were sent to the Government Analyst for chemical analysis. Of these, 417 were taken from wells, springs, boreholes and reservoirs used for town and village water supplies. These were submitted to full chemical analysis. The remainder, derived from springs, observation boreholes, irrigation schemes, new boreholes, pumping-tests and from other miscellaneous sources, were subjected to partial analysis only.

Bacteriological Analyses.

Following discussions in January and February 1955 with the Assistant Director of Medical Services and with the Government Pathologist it was decided that the Water Development Department would take over the responsibility for collecting samples from the various town water supplies and for delivering these to the Pathological Laboratory for testing. Previously, samples had been taken by the local Health Inspectors of the Department of Medical Services. The Hydrological Section took over these new duties and, following a period of training for the technical assistants concerned, the collecting of samples commenced on the 17th February. For the first month activities were restricted to the Nicosia water supply but in March the first samples were taken in Famagusta, in April the services were extended to Limassol and from May onwards tests were made of Larnaca water supply samples.

From the 17th February to the 30th September, 191 samples were taken which averages out at nearly 26 per month. It should be mentioned that at present other commitments of the Pathological Laboratory limit the number of water supply samples that can be tested to a maximum of 30 each month. Representations have been made to Government in order to improve the laboratory facilities for public water supply control.

Of the 191 samples taken, 94 were from Nicosia, 78 from Famagusta, 15 from Limassol and 4 from Larnaca. A total of 26 of all these was pronounced to be " unsatisfactory ".

Special Investigations.

A number of special hydrological investigations was conducted during 1954–55. The principal of these were :—

(1) *Phrenaros Hydrological Survey.*

The Famagusta water supply is derived from boreholes in the locality of Phrenaros village. The underground water-table in this area has been steadily declining ever since records have been kept and a study is now being made of the general hydrological characteristics and trends exhibited in the aquifer. An area of about 23 square miles was first chosen, centred about the water-supply boreholes and large enough to be considered as a semi-independent hydrological zone. A complete topographical survey of this area was then executed and every well and borehole individually recorded together with an estimate of its yield during the past year. Drawings are being prepared to show the underground water-table contours. Rain-gauges and measuring-weirs installed at various key-points on the site allow replenishment and surface run-off to be gauged. Every year new measurements of the water-table will be made and the net loss in ground-water calculated. The object of the study is to investigate the general trend and, if necessary, to institute controls so that at some future date the aquifer will reach a state of equilibrium through the equalization of output and input.

(2) *Springs in the Troodos Area.*

The sub-normal precipitation in the Troodos area during the winter of 1954–55 led to anxiety with regard to the probable summer yields of high altitude springs in the central massif and as a result a study was made of past records together with the preparation of estimates of minimum flows to be expected. In the field, monthly measurements were made of all springs in the area and a close watch was kept over their behaviour. By the end of September all springs and mountain streams had reached their minimum discharge level and it was found that while the highest springs had dropped to 20% below the anticipated lowest yield, lower springs were not affected to the same degree. Although the reduction in the yield of most springs was serious, it is now apparent that this is temporary only. With the rains of November an immediate and rapid recovery in spring-flows has been recorded and normal conditions should quickly be established.

(3) *Sub-soil flow tests at Ayios Sozomenos.*

The flow of ground-water in the gravels and sands of dry river beds was made the subject of a special study during the summer. The site chosen was near Ayios Sozomenos in the bed of the Yialias river where several boreholes were sunk in convenient positions. The tests were conducted by dosing one of the boreholes with brine and fluorescein dye and subsequently by taking samples from nearby boreholes for electrical conductivity and colour tests. It was hoped, by this method, to determine the direction and velocity of underground percolation. Although the brine and dye-dosing was progressively increased no positive results were achieved although some understanding of the behaviour of ground-water in the locality was obtained by inference. The studies concluded with an 8-day pumping test of one of the boreholes during which measurements were made and samples taken from surrounding boreholes.

New Works and Costs.

By the end of the hydrological year 19 water-level recorders were in operation at river and stream gauging-stations compared with 6 at the same time last year. The following new gauging installations were constructed and equipped during 1954–55 :

(1) *Paralimni Lake.*—Standing-wave flume and recorder measuring outflow through drainage tunnel. Cost £420 (includes new penstock for tunnel inlet).

(2) *Avgorou.*—40-foot weir, with 2′–0″×6″ notch for low flows, on valley discharging into the old Akhyritou reservoir area. Cost £620.

(3) *Harangas River at Ayios Yeoryios.*—Adaptation of existing 70-foot irrigation weir by installing a water-level recorder and by cutting a 2′–0″×6″ notch in the sill of the existing weir. Cost £150.

(4) *Phrenaros West.*—40-foot weir (with 2′–0″×6″ notch) on valley draining the Phrenaros catchment into the old Akhyritou reservoir area. Cost £450.

(5) *Kouris River at Trimiklini.*—18-foot weir, with 2′–0″×6″ notch, in conjunction with a standing-wave flume on a new irrigation channel by-passing the weir during the dry-weather season. In winter the irrigation-channel gate is closed and all flow passes over the main weir. Two recorders are used in summer, one in winter. Cost £1,600.

(6) *Pyrgos River at Phileyia.*—30-foot weir with 2′–0″×6″ notch. Cost £750.

(7) *Limnitis River at Limnitis.*—30-foot weir with 2′–0″×6″ notch. Cost £950.

(8) *Mouth of Ovgos River near Syrianokhori.*—6′–7″ sharp-edged weir with 2′–0″×6″ notch. This measures summer flows only, the weir being dismantled and the recorder removed before the onset of winter spates. Cost £320.

(9) *Yermasoyia River at the Nicosia–Limassol road bridge.*—Water-level recorder installation at bridge used in conjunction with float measurements. For flood flows only. Cost £150.

(10) *Tremithos River at Kiti.*—Water-level recorder fitted to existing 73-foot irrigation weir. Cost £160.

(11) *Kouris near Kandou.*—Adaptation of existing 300-foot irrigation weir for use as measuring weir by stepping sill, installing water-level recorder and by clearing access channel upstream. Cost £650.

(12) *Peristerona River near Panayia.*—25-foot weir with 2′–0″×6″ notch. Cost £600.

(13) *Kalopannes weir on the main drain into the old Akhyritou reservoir area.*—25-foot weir with 2′–0″×6″ notch. Cost £800.

(14) *Ayios Yeoryios Weir on valley in the Akhna vicinity discharging into the old Akhyritou reservoir area.*—40-foot weir with 2′–0″×6″ notch. Cost £700.

The total cost of the above works amounts to £8,320. This amount does not include the cost of the recorders themselves. The total expenditure by the Hydrological Section amounted to about £11,000.

APPENDIX 5.

WATER LEVELS IN CONTROL BOREHOLES.

Feet above sea level.

Location	Borehole No.	Maximum water level			Minimum water level		
		50–51	52–53	54–55	50–51	52–53	54–55
1. Kokkini Trimithia (Police Station)	90/50	685.8	681.2	678.8	681.2	678.4	675.2
2. Kokkini Trimithia (North Side) ..	160/50	682.7	679.9	675.9	679.8	677.1	672.8
3. Kokkini Trimithia (East Side) ..	161/50	686.0	681.5	678.7	680.2	676.2	673.7
4. Astromeritis (Katokopia Road) ..	91/50	370.4	363.9	359.8	365.1	362.0	332.3
5. Morphou (North of Ovgos River)	168/50	89.2	94.1	89.7	84.1	85.1	83.5
6. Morphou (Government Experimental Farm)	92/50	83.7	82.7	78.3	69.9	70.8	64.7
7. Prastion (27 M.P.)	93/50	27.1	26.3	25.6	22.1	23.4	20.8
8. Ghaziveran (between 29–30 M.P.)	94/50	18.5	18.5	17.6	16.2	17.0	15.5
9. Pendayia (on road to Peristeronari)	95/50	10.6	14.4	11.5	8.0	9.1	8.9
10. Xylophagou (West of village) ..	70/51	24.4	23.2	23.3	23.4	19.7	20.1
11. Xylophagou (West of village) ..	71/51	18.8	16.9	15.6	17.7	14.2	13.2
12. Xylophagou (West of village) ..	72/51	23.2	22.9	24.4	22.6	20.9	20.9
13. Xylophagou (East of village) ..	73/51	11.3	10.3	10.5	10.3	8.7	9.0
14. Xylophagou (East of village) ..	74/51	11.1	11.8	11.9	11.1	10.4	10.1
15. Pergamos	86/51	256.6	257.3	254.2	254.7	254.4	250.2
16. Phrenaros (Famagusta W.S.B.Hs.)	51/51	87.0	83.1	75.5	86.6	78.2	73.6
17. Phrenaros (Famagusta W.S.B.Hs.)	52/51	85.8	82.3	77.0	85.4	79.4	73.3
18. Phrenaros (Famagusta W.S.B.Hs.)	53/51	85.2	83.0	78.0	84.9	80.7	76.6
19. Phrenaros (Famagusta W.S.B.Hs.)	67/53	—	81.1	78.5	—	80.4	76.5
20. Phrenaros North (Famagusta W.S.B.Hs.)	108/52	—	72.2	67.3	—	71.3	63.7
21. Phrenaros North (Famagusta W.S.B.Hs.)	109/52	—	—	66.7	—	—	63.5
22. Phrenaros North (Famagusta W.S.B.Hs.)	110/52	—	—	66.3	—	—	63.5
23. Ayios Memnon (South)	69/38	—	–13.3	–12.3	—	–17.1	–19.4
24. Ayios Memnon (South)	50/53	—	–8.9	–7.9	—	–11.9	–14.9
25. Makrasyka (South of village) ..	48/54	—	—	117.0	—	—	110.7
26. Makrasyka (South of village) ..	49/54	—	—	120.1	—	—	117.4
27. Kalopsidha (S.W. of village) ..	54/54	—	—	68.6	—	—	60.3
28. Kalopsidha (S.W. of village) ..	55/54	—	—	73.9	—	—	65.4
29. Kalopsidha (S.W. of village) ..	56/54	—	—	75.3	—	—	74.2
30. Kolossi	88/54	—	—	16.0	—	—	12.0
31. Syrianokhori	150/54	—	—	9.7	—	—	8.2
32. Syrianokhori	151/54	—	—	9.3	—	—	8.1
33. Syrianokhori	152/54	—	—	7.2	—	—	5.0
34. Syrianokhori	153/54	—	—	4.3	—	—	3.3
35. Syrianokhori	1/55	—	—	23.1	—	—	17.7
36. Syrianokhori	23/55	—	—	20.9	—	—	17.4
37. Laxia	208/55	—	—	—	—	—	—
38. Ephtakomi	163/55	—	—	—	—	—	—

APPENDIX 6.

DESCRIPTION OF CERTAIN IRRIGATION SCHEMES.

By J. Karapetian, B.E.M., *Senior Inspector of Water Supplies.*

(*A*) *Perapedhi.*—This scheme consists of a dam 60 feet above river bed level impounding 11 million gallons of water on the Kryos river, half-way between Platres and Perapedhi. The work was undertaken as a measure of compensation to the Irrigation Division of Kilani and Perapedhi, for the quantity of water drawn by Government from the upper sources of the river for domestic purposes in the Troodos area.

It was estimated that the total requirements on Troodos in future would be of the order of about 10 million gallons during the summer season, and the reservoir was therefore designed to hold about an equal quantity of water, which could be stored in winter, when there was plenty of water in the river and drawn off at a slow rate for irrigation during the summer. In addition to storage in the reservoir, the stream in late summer flows at a minimum rate of about $\frac{1}{2}$ cusec.

The dam was built in two stages : the first stage was completed in the summer of 1954 and consisted of the foundations and the undersluice section up to level 8 feet above river-bed. The average depth of foundation below bed-level was 7 feet and the width at foundation level is 52 feet. The foundations were cast in concrete mainly in the proportion of 1 : 2 : 4 and the total volume of concrete in the first stage was about 500 cubic yards.

The second stage of the scheme proceeded in 1955. Excavation work of the abutments started in spring and the main work of concreting commenced in June and was completed at about the end of September. The reservoir first filled on 16/12/55, when surplus water began to flow over the crest.

The core of the dam was built all in 1 : 3 : 6 cement concrete and the outer faces to a width of 4 feet with 1 : 2 : 4 cement concrete. Concrete was cast in 2-foot lifts in blocks with vertical construction joints at 40-foot intervals rendered in a bituminous mixture with copper strips near the upstream face. Stone displacers or " plums " were embedded in the concrete in the core of the dam in the proportion of about 15% of the volume of the concrete. Aggregate was brought to the site by lorry from the coast near Limassol and Episkopi, a distance of 20 miles, the last two of which were along a specially made mountain access track. From a flat space about 100 feet above the stream bed the aggregate was discharged through steel pipes directly into a concrete mixer standing on the top of the partly completed dam raised periodically upon the completion of each lift of concrete. In about three months a total of about 5,000 cubic yards of concrete was poured.

A circular 15″ diam. penstock gate was installed at the mouth of the undersluice gallery with a screw spindle that can be operated from the crest. The draw-off arrangement consists of a vertical perforated inlet pipe fixed on the upstream side of the dam, a 6-inch sluice valve operated by a spindle and wheel from the top of the dam, and a 6″ steel delivery pipe cast in the dam at 2 feet above bed level, discharging into the river at the downstream end. The valve is fitted at the lower end of the perforated pipe.

This dam is the first in Cyprus to be built of concrete, the usual practice in the past having been to build in masonry with lime or cement mortar. The total cost was £25,000.

(*B*) *Kandou.*—The first stage of the scheme was carried out in 1953–54. It consisted of intake works and distribution channels and a small dam of 15 feet in height, on the " Tabakkos " valley which was built mainly for experimental purpose to find out if the rock at the site of the dam was sufficiently impervious to hold water.

When the experimental dam had proved successful, a new scheme for raising the dam to 40 feet was put in hand and completed in 1955. The storage capacity of the new reservoir is 8 million gallons.

The new dam encloses the first experimental dam within itself. It is built in rubble masonry in cement mortar of proportion 1 : 4 and all stone used for the work was extracted from near the site. A great deal of excavation had to be made into both abutments, to find a solid and impervious rock, free from cavities and fissures.

The width of the dam at foundation level is 32 feet and the crest length between abutments is about 200 feet. The total volume of masonry completed in 1955, was 3,000 cubic yards. It was built in lifts of one foot and vertical contraction joints joined by copper strips were allowed at 32-foot intervals. The downstream face was built in steps cast in cement concrete and the upstream face was plastered in cement mortar. A 2′ × 2′ penstock operated from the top of the dam was installed at the mouth of a 3′ × 4′ undersluice gallery and a draw-out pipe is controlled with a 4″ diam. valve in a manhole immediately below the downstream toe of the dam.

The total cost of the scheme including the first stage works was £21,500 towards which the Irrigation Association Committee contributed the sum of £5,500.

The total area commanded is 600 donums out of which 400 donums can be irrigated in summer.

(*C*) *Kilani.*—This is a typical scheme of reinforced concrete lined irrigation channels which has proved very popular especially in hill villages, for preventing the waste of irrigation water.

The scheme consists of three weirs and one groyne-intake at successive intervals in the bed of the river with channels either on one or both flanks conducting the water to terraced gardens mostly planted with apple-trees.

The original irrigation scheme for Kilani was carried out by the Department in 1943, and some improvement works were continued in subsequent years. The lack however of properly lined irrigation channels was very badly felt, and the present scheme of linings and supplementary intakes has satisfied a long felt need in the village.

A total length of 8,000 feet of channels has been lined including some lengths of pipe distribution branches and crossings where necessary. The total cost of the scheme was £5,400 out of which the villagers contributed one-third or £1,800. The total area benefited with summer irrigation is 105 donums.

(*D*) *Pyrgos* (*Ll.*).—The scheme was carried out for an Irrigation Association known as " Moulos " in the village of Pyrgos, Limassol.

The scheme consists of a subsurface weir and reinforced concrete channel. The weir is one of the largest of its type undertaken in Cyprus and has a total length of 250 feet maximum depth of 18 feet below lowest river bed level. The profile of the bed rock was first determined by trial wells and boreholes and the subsurface flow was determined by test-pumping.

Before the execution of the scheme there was very little if any water flowing on the river surface in summer and the members of the Association had to content themselves with water for winter and spring irrigation only. Following the construction of the subsurface weir a flow of about 100,000 gallons per day was brought to the surface and made available for summer irrigation. This was according to the original forecast.

The scheme, which includes lining of some 3,500 feet of channels in reinforced concrete was first estimated in 1953 at £3,000 out of which the Association was to contribute 52% of the cost (i.e. £1,560). Due, however, to the increase of wages of labourers, field allowances, etc., the cost of the scheme was £6,400 which is by £3,400 above the original estimate. The difference in cost was, therefore, borne by Government. Total area commanded is 200 donums out of which 100 donums is irrigated in summer.

(*E*) *Gypsos.*—This is a scheme for the control and impounding of flood waters for irrigation purposes. It consists of an earth dam 1,700 feet long and 16 feet high, across a valley north of Gypsos at the locality " Vathys ". The storage

capacity is 30 million gallons and the area of the bed is 400 donuns. The object of the dam is to retain spate water flowing from the surrounding hills, from which the water runs off at a high rate for a short period of time. By impounding the water in the reservoir it is brought under control and can be released at a slow rate and be used with greater advantage.

The work was commenced in 1954, when the relief spillway was constructed with two 100-foot long spill-weirs, built in series. The spillway is 600 feet long and each weir is 100 feet wide and 4 feet deep. Excess water over and above the capacity of the reservoir is discharged into an adjacent stream. The draw-out arrangements were also completed in 1954. These consist of an intake channel leading to a vertical perforated pipe 8″ diam. which delivers into a valve tower rising above the flood water level. An outlet pipe 8″ runs from the valve tower under the dam into the irrigation system below the reservoir. Draw-off control is effected by means of a penstock gate operated by a wheel and spindle mounted at the top of the outlet pipe. A foot-bridge has been provided leading from the embankment to the top of the tower for easy access.

The construction of the earth dam was started and completed in 1955. A total of about 25,000 cubic yards of earthwork was involved in the scheme. All work was done by machinery supplied on loan by the Department of Agriculture and other Government departments, or hired from contractors.

The spoil used for the construction of the embankment was taken from a wide borrow-pit immediately above and alongside the embankment. The foundation of the bank was excavated to an average depth of 2 feet and earth was placed and properly consolidated in layers of about six inches. The construction was carried out in three main sections with stepped joints between sections. The machinery used was mainly a scraper, traxcavator and rollers. Water for consolidation was brought through a pipeline from a distant well which was sunk for the purpose.

The total cost was £7,545, of which £1,750 was contributed by the beneficiaries. An area of 740 donums of cereals can be irrigated.

(*F*) *Mamonia Chiftlik.*—A supplementary scheme of works was carried out in 1955. This consists mainly of lining in reinforced concrete all the length of the main channel which conveys water from the river at the village of Ayios Yeoryios to the lands of the chiftlik. This supply is required only for winter and spring irrigation, as the river flow in summer is very small. The summer irrigation supply to the chiftlik is provided by a pumping installation which is part of the first scheme completed in 1954.

The present works will, apart from benefiting the chiftlik, which is a public utility project, also benefit private owners of lands in the Ayios Yeoryios area, who will enjoy irrigation water, as they did in the past through an improved system of lined channels.

The total area benefiting from the scheme including the chiftlik area is 720 donums, out of which 273 donums are private holdings. The total length of reinforced concrete channels constructed in 1955 was 11,800 lin. feet and the total cost £7,400. The scheme will be completed in 1956.

(*G*) *Akaki.*—Improvement works to an old chain-of-wells at the "Merika" locality were commenced in September, 1954, and completed in early August, 1955.

The works carried out consist of the cleaning and regrading of old tunnels, the extension of these works by sinking 22 new wells and the driving of 1,100 feet of tunnels and the excavation of 400 feet of cutting.

In order to prevent leakage the tunnels were lined with reinforced concrete precast oval blocks and the channels, for some 4,370 feet, with reinforced concrete cast in place.

The surface water which was formerly flowing in the river bed has been intercepted and collected by the extension of the tunnels and is now most effectively utilized for the irrigation of some 270 donums under various seasonal crops. The sum of £8,000 was spent on the execution of the necessary improvement works, towards which the beneficiaries contributed 50%.

APPENDIX 7.

IRRIGATION SCHEMES COMPLETED IN 1955.

Ser. No.	Location	Nature of Construction	Donums Commanded New Irrigation		
			Winter or spring	Summer	Total
1.	Milikouri	Small weirs, piping, etc.	—	40	40
2.	Pissouri	Irrigation tank and pipes	50	55	105
3.	Mia Milia	Repairs to siphon, installation of iron grates	—	—	—
4.	Kambi–Pharmaka	R.C.C. channels	—	83	83
5.	Pano Kyrenia	Springs, piping, channels, irrigation tank	160	130	290
6.	Milikouri (Kephalovrysos)	R.C.C. channels and piping	—	9	9
7.	Xeros–Kouklia (Co-op. Society)	R.C.C. channels	—	100	100
8.	Dhali	R.C.C. channels and piping	—	100	100
9.	Ayios Lucas (F.)	Recharge scheme (Tunnelling, etc.) Dam	—	—	—
10.	Amargeti	R.C.C. channels, pipe crossing, spring	—	120	120
11.	Moutoullas	Springs, Irrigation tank and piping	—	50	50
12.	Trimiklini	Spring, R.C.C. channels and irrigation tank	—	35	35
13.	Limnatis	Spring and R.C.C. channels	—	30	30
14.	Prodhromos	Irrigation tanks and R.C.C. channels	—	40	40
15.	Kyperounda	Irrigation tank and channels	—	5	5
16.	Peristeronopiyi (F.)	Standing wave weirs	—	—	—
17.	Lapathos	Pumping scheme	—	25	25
18.	Klirou (Mega–Pervolia)	Irrigation tank and channels	—	20	20
19.	Gypsos	Flood-detention dam	740	—	740
20.	Nicosia Nursery Garden	Irrigation tank and pump	—	20	20
21.	Kritou Marottou	Piping, etc	—	2	2
22.	Khrysoroyiatissa	Spring	—	2	2
23.	Phlasou	R.C.C. channels, culverts	20	30	50
24.	Kalopanayiotis	Repairs, retaining walls & channels	—	—	—
25.	Dhymes	R.C.C. channels	—	46	46
26.	Klirou (Pap. Nicoli)	Repairs to tunnels and R.C.C. channels	6	8	14
27.	Kato Arodhes	Piping	—	2	2
28.	Nikitari	Weir, R.C.C. channels, pipe crossings	—	120	120
29.	Akaki (Avlona Merika)	Tunnel, cutting and R.C.C. channels	150	126	276
30.	Argaka (Ayia Varvara lands)	Springs, Irrigation tank and channels	—	50	50
31.	Kilanemos	Spring, tank, R.C.C. channels and piping	—	31	31
32.	Ay. Vavatsinias (Dhiploma)	Weir, R.C.C. channels and pipe crossing	9	9	18
33.	Patriki	Repairs	—	—	—
34.	Ayios Ioannis (Agros) (Ayia Marina).	Masonry channels, irrigation tank weir	—	150	150
35.	Chatos	Irrigation ports and spillway	100	—	100
36.	Ayios Ioannis (Agros) (Yerambelia).	Repairs	—	—	—
37.	Potima	R.C.C. channels	—	15	15
38.	Kouklia (F) E.M.E.W.	Pitching of Kouklia Reservoir embankment	—	—	—
39.	Agridhia (Kaourou)	Irrigation tank and channels	—	22	22
40.	Ayios Ioannis (Malounda)	Repairs, retaining wall	—	—	—
		Carried forward	1,235	1,475	2,710

Ser. No.	Location	Nature of Construction	Donums Commanded New Irrigation		
			Winter or spring	Summer	Total
		Brought forward	1,235	1,475	2,710
41.	Argaka (Ayia Varvara lands) Stage II.	Construction of settling tanks and piping	—	—	—
42.	Kilani	Groyne intake, R.C.C. channels ..	—	105	105
43.	Kiti (Kokkines–Softadhes) ..	Repairs	—	—	—
44.	Nicosia (Government House)	R.C.C. channels	—	10	10
45.	Pelendria (Kolokosi) ..	Excavation of spring	—	8	8
46.	Pelendria (Korypis) ..	do.	—	8	8
47.	Pelendria (Dhimma) ..	do.	—	14	14
48.	Morphou (Gnafkia) ..	Retaining wall	—	30	30
49.	Perapedhi	Construction of a dam	—	—	—
50.	Kandou	Construction of a masonry dam ..	400	200	600
51.	Pyrgos (Ll.)	Subsurface dam and R.C.C. channels	100	100	200
52.	Morphou (Teratsia) ..	Groyne intake and channel ..	1,600	—	1,600
53.	Potima	Repairs to stream level crossing	—	—	—
54.	Vitsadha	Wingwalls, overflow spillway ..	600	—	600
		Totals	3,935	1,950	5,885

APPENDIX 8.

IRRIGATION SCHEMES IN HAND AT THE END OF 1955.

Ser. No.	Location	Nature of Construction	Donums Commanded New Irrigation		
			Winter or spring	Summer	Total
1.	Akaki (Merika Water) ..	Cutting, lining of channels in R.C.C.	40	60	100
2.	Ayios Lucas	Re-charge Scheme..	—	—	—
3.	Akhyritou (F.)	Drainage Scheme	—	—	—
4.	Kalokhorio (Lefkas) ..	Subsurface weir, lining of channels	—	500	500
5.	Katokopia–Argaki	Groyne intake, retaining wall ..	2,000	—	2,000
6.	Athienou (Athanassi) ..	Chain of wells R.C.C. channels ..	500	400	900
7.	Kouklia (Chiftlik)	Pumping Scheme—Irrigation tank	—	100	100
8.	Prastion (Baradji land) ..	R.C.C. channels	60	40	100
9.	Ayios Dhimitrios (Ll.) ..	Weir, R.C.C. channels	—	80	80
10.	Morphou (Lekanis) ..	Tunnelling, chain of wells ..	400	32	432
11.	Mamonia (P.)	Lining of channels in R.C.C. and Ports	—	720	720
12.	Orounda	Tunnelling, chain of wells, channel	—	288	288
13.	Athalassa	Pumps, pipes, irrigation tank ..	—	100	100
		Totals	3,000	2,320	5,320

APPENDIX 9.

IRRIGATION SCHEMES READY FOR CONSTRUCTION AT THE END OF 1955, BUT NOT YET STARTED.

Ser. No.	Location	Nature of Construction	Donums Commanded New Irrigation		
			Winter or Spring	Summer	Total
1.	Alethriko	Irrigation tank	20	5	25
2.	Ayios Epiphanios (Orinis)	Irrigation tank and channels	20	14	34
3.	Anoyira	Irrigation tank	15	4	19
4.	Ayios Dhimitrios	Spring	—	10	10
5.	Agridhia K. (Platanidhia)	Irrigation tank and pipes	—	7	7
6.	do. (Kambia)	Irrigation tank and pipes	—	9	9
7.	Ayios Isidhoros	R.C.C. channels and pipes	—	6	6
8.	Steni	Weir, channels and piping	—	50	50
9.	Alekhtora	Lining of channels in R.C.C.	20	20	40
10.	Ayios Theodhoros (Tylliria)	Small weir, pipes, etc.	—	4	4
11.	Aplanda	Spring and irrigation tank	25	25	50
12.	Argaka–Magounda II	Construction of a dam and pipes	240	200	440
13.	Argaka–Magounda III	Subsurface dam and piping	—	100	100
14.	Angastina	Repairs—reformation of earth bank	—	—	—
15.	Bellapais	Weir and R.C.C. channels	—	150	150
16.	Dhierona (Kamaroudhia)	Lining of channels in R.C.C.	—	100	100
17.	Trimiklini	Construction of a dam 1st Stage	—	—	—
18.	Vitsadha	Irrigation ports and channels	200	—	200
19.	Limnitis	Subsurface weir (repairs)	100	50	150
20.	Perapedhi	Lining of channels in R.C.C.	—	80	80
21.	Meniko	Lining of channels	—	60	60
22.	Tembria	Construction of irrigation tank and pipes	—	22	22
23.	Prastion (Evdhimou)	Spring, irrigation tank	—	10	10
24.	Vouni (Klokkaris)	Irrigation tank and piping	—	12	12
25.	Vouni (Palea Vrysi)	R.C.C. channels	—	10	10
26.	Nea Dhimmata	Small weir and piping	—	10	10
27.	Kalokhorion (Klirou)	Lining of channels in R.C.C.	100	60	160
28.	Evretou (Karadja)	Spring, cutting, pipes	80	40	120
29.	Syngrasi	Construction of weir, screwgate, etc.	2,000	—	2,000
30.	Ephtagonia	Lining of channels in R.C.C.	220	—	220
31.	Episkopi	Repairs to weir and piping	—	20	20
32.	Koutraphas (Pano)	Irrigation tank and pipes	—	14	14
33.	Kyra (Kokkinokremmos)	Groyne intake and irrigation ports	200	240	440
34.	Kyra (Kalokerinon)	Chain of wells, lining of channels in R.C.C.	300	210	510
35.	Kalopanayiotis	Excavation of springs	—	15	15
36.	Pharmakas (Koskinas)	Piping	130	—	130
37.	Yerolakkos (Ovgos)	Lining of channels—spring	—	55	55
38.	Stavrokonnou	Irrigation tank and piping	—	11	11
39.	Phini (Kambi-tou-Stavrou)	Weir, tank and channels	—	68	68
40.	Karavostasi	Subsurface weir and channels	1,500	—	1,500
41.	Vikla	Weir, pipes and irrigation tank	135	32	167
42.	Lasa	Lining of channels and piping	—	20	20
43.	Prastion (P)	Repairs to channels	—	—	—
44.	Kithasi	Repairs to channels	—	—	—
45.	Gouphes	Channels and irrigation port	100	—	100
46.	Yenagra	Repairs to channels, irrigation ports	—	—	—
47.	Petra (Karkotis river)	Irrigation ports and retaining walls	500	—	500
48.	Sotira	Weir, R.C.C. channels and irrigation tank	300	150	450
49.	Marathounda	Weir, irrigation tank and piping	—	100	100
50.	Lefkoniko (Lizion)	Repairs to channel, relief spillway	—	—	—
51.	Sinda	Repairs	—	—	—
52.	Potami (Poliati)	Weir, channels and tank	70	22	92
		Carried forward	6,275	2,015	8,290

Ser. No.	Location	Nature of Construction	Donums Commanded New Irrigation		
			Winter or Spring	Summer	Total
		Brought forward	6,275	2,015	8,290
53.	Peristeronopiyi (F.) ..	Standing wave weir..	—	—	—
54.	Kapilio	Subsurface dam, pipes and channels	60	70	130
55.	Exometokhi	Flood-detention dam	1,000	—	1,000
56.	Kapilio	River-training, staking	—	—	—
57.	Trikomo (Krina)	Repairs to channels	—	—	—
58.	Kholetria–Nata	River-training, staking	—	—	—
59.	Palekhori (Livadhi No. 2)	Lining of channels in R.C.C. ..	—	3	3
60.	Psevdhas	Irrigation ports, culverts	200	—	200
61.	Peristeronopiyi (F) (Langouphes)	Construction of a weir	200	—	200
62.	Vyzakia	Retaining walls, channels and ports	100	—	100
63.	Styllos (Plakos)	Weir and channels	1,400	—	1,400
64.	Ora	Repairs and lining of channels ..	16	4	20
65.	Kalokhorion (Ll.) ..	Repairs and lining to channels ..	10	5	15
66.	Statos	Spring, irrigation tank	—	20	20
67.	Kyperounda (Halospities)	Weir, piping and irrigation tank ..	—	12	12
68.	Kyperounda (Piyi) ..	Spring and piping	—	5	5
69.	Nata	R.C.C. irrigation tank and piping	—	24	24
70.	Philousa (Yerondas) ..	Irrigation tank and piping	—	50	50
71.	Platanistasa (Stavros) ..	Spring, piping and tank	—	18	18
72.	Lapithos (Anatoliko) ..	Spring, excavation and channel ..	—	3	3
73.	Episkopio (N)	Groyne intake and channel ..	300	—	300
74.	Pelendria (Kardama Haji Ktori)	R.C.C. channels	—	8	8
75.	Trimiklini (Kondaris Ammides)	Weir, channels in R.C.C.	—	55	55
76.	Krini (Krini water) ..	Lining of channels in R.C.C. ..	200	100	300
77.	Pergamos (Central School Farm)	Pumping Scheme	—	100	100
		Totals	9,761	2,492	12,253

APPENDIX 10.

TOWN WATER SUPPLIES.

By R. S. Wood, B.Sc., A.M.I.C.E., A.M.I.W.E., *Senior Engineer.*

Nicosia.

The Nicosia Water Supply Scheme was completed early in 1955, except for the installation of two pumps. As the Water Board of Nicosia had not the staff to run the pumps and maintain the pipelines the Department of Water Development continued to operate the water supply until able to hand over the new works to the newly appointed Engineer-in-charge of the Water Board, on May 2nd. The Department of Water Development continued to be responsible for the maintenance of the pipelines until the final handing over of all works on June 18th.

The two remaining pumps were deep well turbines run by diesel engines. These were installed in the boreholes No. 6/47 at Kokkini Trimithia and No. 62/51 at Laxia by June 14th, which completed the water supply works before the summer season.

During the summer the demand for water was so great that it exceeded the designed capacity of the scheme, which with the borehole No. 6/47 obtained from the Kermia Company was 1,150,000 gallons per day in an average year. In June the output rose to 1,320,000 gallons per day which exceeded the safe output of the various sources. Restrictions had therefore to be enforced intermittently for short periods from June 27th to October, 29th. An additional supply of water was purchased by the Water Board from the Cyprus Waterworks Company, the source being their borehole P. 129. The water was received through a connection made to the supply main from Ayii Trimithias from August 27th, and the average quantity supplied up to October 31st was 97,000 gallons per day.

Two and a half miles of 4" and 6" distribution pipes were laid in 1955 as extensions to the mains in places where development had taken place since the water supply scheme was commenced. Eight public fountains were constructed at Kaimakli for the Water Board of Nicosia and are supplied with 32 saccoraphia of water by the Nicosia Water Commission.

Cost of Nicosia Water Supply Scheme.		£
Estimated cost of Scheme in May, 1952		475,000
Estimate amended in May, 1955, for increases in cost of labour and materials	485,000	
Add cost of extra works at Kermia (£12,920) and Laxia (£4,000)	16,920	
Original estimate of May, 1952, corrected in May, 1955, for increases in the cost of labour and materials, and for extra works		501,920
Actual cost of completed work at 31st December, 1955, exclusive of compensation payments, house connections, purchase and installation of consumer meters and hydrants, none of which were included in the estimates. Government departmental charges are included		504,200

Government Water Supplies.—Half-inch water meters have been installed on all private residences served by Government water supply, separate meters being fitted for domestic and irrigation water. Improvements have been carried out at the same time in supply pipes to gardens and houses, including the erection of an elevated water tank near the prison. The Police Training Depot near Athalassa has been supplied with water from borehole No. 28/41 at milepost 3 on the Dheftera road and 3¼ miles of 3" and 4" were laid for this purpose.

Water Consumption.—The maximum quantity of water supplied by the new scheme before restrictions were imposed was 1,320,000 gallons per day average during the week ending June 27th. From meter recorder charts the maximum consumption per hour in any one day is 1½ times as great as the average hourly consumption for that day.

For comparison of summer and winter consumption the average total supply at source for the whole of Nicosia within the Water Board area and the consumption per head per day are given in the following table for the months of August and December. The population for the Water Board area is taken as 57,000.

Average total supply in gallons per day at source (including old supplies within Water Board Area)	*August.* 1,750,000	*December.* 1,294,000
Average consumption in gallons per head per day	31	23

The percentage of water from each source was as shown:—

	August. %	*December.* %
Laxia	12	11
Trimithia	25	29
Athalassa	5	4
Makedhonitissa	6	9
Upper Arab Ahmet	11	9
Hadjikyriacos and Paraskevaides	5	2
Nicosia Water Administration	21	27
Acquired Private Companies and Kykko Supply	10	8
Government Water Supply	5	1
Total	100	100

Greater Nicosia.—The water supply plan for Greater Nicosia, which includes the suburbs round Nicosia, has been amended to include another reservoir at Lakatamia and another connection from the proposed Engomi reservoir to the existing ring main near Ayii Omoloyitadhes village. The new reservoir at Lakatamia will draw from the proposed Engomi reservoir and will feed the higher areas of Strovolos and Eylenja villages. Levels have been taken along the pipelines of the scheme, and plans and sections prepared. Plans of the three proposed reservoirs have also been prepared.

Famagusta.

The following works were carried out in 1955 to finish the new water supply scheme for Famagusta, and the works as substantialiy complete, were handed over to the Famagusta Water Board on June 15th.

(*a*) Eighteen miles of 4″ and 6″ pipes were laid to complete the distribution mains ; and meters, sluice valves and hydrants were fixed. Each area is now fitted with a meter so that all water consumed is recorded. The foundations of the roads were prepared as soon as the refilled trenches were sufficiently consolidated.

(*b*) Three centrifugal pumps driven by electric motors were installed and delivered water from the ground level reservoirs (Nos. 1, 2 and 3) to the elevated reservoir (No. 4). The meters on the two main pipelines from Phrenaros were fitted in the meter room and a chlorinator was fixed at the inlet to the reservoirs. These new works were in operation by March 26th.

(*c*) The Panayia reservoir (No. 6) was repaired and re-roofed with a reinforced concrete slab. A new gauging chamber was built and gauze screens fitted. Two centrifugal electric pumps were installed by June 20th to pump the water to the reception tank of the main reservoirs.

(*d*) The existing pump in borehole No. 5 was connected by a 4″ delivery pipe through a meter to the reception tank.

(*e*) Borehole No. 3 was cleared out and the pump-house re-roofed. A pump can be fixed in this borehole in an emergency, and a 3" delivery pipe has been laid to the reception tank ready for use.

(*f*) Borehole No. 4 was lined with 10" perforated steel casing so that any surplus water can be turned down the borehole through a meter to re-charge the underground aquifers.

(*g*) The existing water tower was renovated, a new ladder and depth indicator fitted, and the whole structure painted.

(*h*) The pump was removed from borehole No. 1 and the pump-house is being demolished by the municipality for road widening.

(*i*) The fencing of the reservoir site was completed and double gates fixed.

(*j*) The Ramparts reservoir was re-roofed with a flat reinforced concrete slab on beams and supporting pillars.

(*k*) Four public fountains were constructed.

(*l*) 4,770 precast concrete meter boxes were made to protect consumer meters.

Cost of Famagusta Water Supply Scheme.

	£	£
Estimated cost of scheme in July, 1952		363,500
Actual cost of completed work at 31.12.55	290,250	
Estimated cost of laying balance of pipes not required at present	20,000	
Estimated cost of 40 public fountains ..	2,000	
		312,250
Estimated saving December, 1955		51,250

The above costs are exclusive of compensation payments, house connections, and the purchase and installation of water meters and hydrants. Government departmental charges are included.

Water Consumption.—The maximum average quantity of water supplied during the summer was 817,000 gallons per day, and this rate occurred in the week ending August 2nd. The capacity of the existing sources of supply in an average summer is estimated at 900,000 gallons per day and it will be seen from Annual Report of 1954 that the maximum consumption in that year was 906,000 gallons per day. The decrease in consumption by 89,000 gallons per day or 10% is attributed to the fact that all supplies are now metered.

For comparison of summer and winter consumption the following figures are given. The population of Famagusta is estimated as 25,500.

	August. %	*December.* %
Average total consumption in gallons per day at source	733,500 ..	438,000
Average consumption in gallons per head per day	29 ..	17

The percentage of water pumped from each source was as shown :—

	August. %	*December.* %
Phrenaros West	32 ..	34
Phrenaros North	62 ..	59
Panayia	6 ..	7
Total	100 ..	100

It will be seen that no water was pumped from the old wells on the Ramparts and at Stavros, these sources are now only kept as standbys for use in an emergency.

Limassol.

The new distribution works of the water supply scheme for Limassol were completed and handed over to the Limassol Water Board by October 24th. The old pipe system had been cut off previously, on August 19th.

Twenty miles of pipeline have been laid during the year, chiefly in the town area along narrow paved streets. Approximately a mile of service pipes was laid in 2,200 house connections in some of which meters were fitted. The house connections were made by the Department to assist the Water Board and reduce the time required before the surface of the roads could be repaired. The foundations of the road were re-made as soon as the pipes had been laid and the re-filled trenches consolidated. The municipality undertook to resurface the pipe trenches on payment and this work is now being done.

Cost of Limassol Water Supply Scheme.	£	£
Estimated cost of scheme in March, 1952		365,000
Estimated cost as revised in April, 1953, for increases in cost of labour and materials		382,293
Actual cost of completed work at 31.12.55	360,432	
Estimated cost of road asphalt re-instatement	14,000	
Revised estimate of total cost at October, 1955		374,450
Estimated saving December, 1955		7,843

The above costs are inclusive of compensation payments (£12,002) and Government departmental charges, but exclusive of house connections and the purchase and installation of consumer meters and hydrants.

Water Consumption. — The maximum average quantity of water supplied during the summer was 1,247,000 gallons per day and occurred in the week ending July 29th. The disconnection of the old supply pipe system on August 19th resulted in a considerable economy of water, as the old pipes leaked and frequently burst. Water was pumped from the wells at Chiftlikoudhia from August 20th to October 26th at an average rate of 211,000 gallons per day which was approximately 1/4 of the supply during the period. For the whole of that time the water in the wells remained fresh and of good quality, as proved by regular analyses, although in former years it was brackish. This improvement has resulted from resting and re-charging the wells as described in Appendix 4.

The summer and winter consumptions are given in the following table. The estimated population of Limassol is 29,000.

	August.	*December.*
Average total consumption in gallons per day at source	832,000	576,000
Average consumption in gallons per head per day	29	20

The consumption is measured at the outlet of the reservoir and 3% is added for losses between source and reservoir.

Larnaca.

The laying of new distribution mains for private developers at the request of the Evcaf Department has continued within the framework of the proposed water supply and one mile of 3″ and 6″ mains has been laid. Private developers are only allowed to lay the mains to serve their property if the mains are 3″ galvanised iron

pipes. All asbestos-cement pipes have to be laid by the Department of Water Development to make sure the pipes are laid properly. The laying of all mains is strictly supervised.

In 1955 the number of house meters fixed was 240, bringing the total in the town up to 360. Fifty-nine meters have been fixed for house supplies replacing 30 saccoraphia. The total number of saccoraphia for domestic purposes is now 1,474 and for irrigation 100. An average of 31,000 gallons per day of water is at present sold by meter, which is 3% of the total water supply for domestic purposes.

Paphos.

A new scheme was prepared for extending the distribution system of Paphos and a 4″ main was laid to Kato Paphos within the framework of this scheme to replace an old 2″ pipe. Half a mile of distribution pipes 4″ to ½″ diameter was laid for a new Government housing scheme at Ktima. A balancing tank was built and 1¼ miles of 3″ pipe were laid to bring in an additional supply of water for Paphos from Borehole No. 91/54 at Trimithousa. The water was purchased from a private owner by the Municipality as a termporary measure to supplement the Paphos water supply. A scheme has been examined for bringing an additional supply of 250,000 gallons per day through 24 miles of 6″ pipe from the Trozena group of springs in the Yerovasa area at an estimated cost of £84,000.

Kyrenia.

A new collecting tank was constructed at milepost 13 on the Nicosia–Kyrenia road and a mile of 2″ and 3″ galvanised iron pipes was laid to connect Borehole 14/42 at mile post 12, Platanos spring, and Borehole 170/53 to the collecting tank. This work was carried out to improve the gradient from the source to the collecting tank and to replace old concrete channels with new pipes.

General.

Meter Testing.—The meter testing room at the workshop of the Department has been completed and testing apparatus and work benches fitted. During the year 108 meters have been tested for the three Water Boards of Nicosia, Famagusta and Limassol on payment. Meters have also been inspected and tested on pumping mains and supply pipes for the Water Boards, and consumption records have been tabulated and graphs produced.

Pipes Laid in 1955.

	Length in feet					
	8″	6″	4″	3″	2″ and under	
Nicosia Water Board ..		1,200	12,324			2½
Government Water Supplies			9,800	7,100		3½
Famagusta		9,400	84,560			18
Limassol	1,150	22,840	80,260			20
Larnaca		2,620		2,810		1
Paphos			7,940	6,400	1,400	3
Kyrenia				3,840	1,800	1
					Total	49

APPENDIX 11.

TOWN WATER CONSUMPTION, SUMMER, 1955.

QUANTITY SUPPLIED AT SOURCE IN GALLONS PER HEAD PER DAY.

Town	Estimated population	June g.h.d.	July g.h.d.	August g.h.d.	Sept. g.h.d.
Nicosia (Water Board Area)	57,000	32	33½	31	30
Limassol	29,000	33	39	29	31
Famagusta	25,500	30	31	29	27
Larnaca	16,700	—	66*	62*	59*

* Approximate only, unmetered.

NOTES : (1) The population figures are interpolated from a report on "Distribution of Population and Growth of Towns" by Mr. Windyer Morris, dated 30th December, 1952. The Nicosia figure has been brought up to date by subsequent correspondence with Mr. Morris.

(2) *Nicosia.*—The water supplied by Nicosia Water Board and Government is measured by meter at source. The Lower Arab Ahmet and Sykhari water supplied are measured by gauging. The quantity of water from other sources has been estimated following enquiry with regard to pumping hours and times and in some cases measurements have been made of pump discharges.

Within the walls water was supplied from the beginning of the year for 12 hours per day, from May 30th 8 hours per day and from September 19th to the end of the year 6 hours per day.

(3) *Limassol.*—The water supplied is measured by meter at the outlet from the reservoir and an allowance of 3% has been added for losses in the main pipelines from the springs. The drop in consumption between July and August is attributed to cutting off the old supply mains, which leaked and frequently burst.

(4) *Famagusta.*—Water sold to ships amounted to 15,000 gallons per day on the average or 0.59 g.h.d.

(5) *Larnaca.*—The water supplied is measured by gauging at source and 9% is deducted for water supplied by saccoraphi for irrigation.

APPENDIX 12.

DATA CONCERNING THE NEW TOWN WATER SUPPLIES

	Nicosia *	Limassol	Famagusta
(*a*) Sources in regular use—Nos. ..	13	3	9
(*b*) Sources for emergency use—Nos. ..	1†	1	3
(*c*) Capacity of sources in an average summer, m.g.d.	1.15	1.00	0.90
(*d*) Main reservoir capacity, m.g. ..	0.80	0.80	0.70
(*e*) Supply mains, miles	29	18	13
(*f*) Distribution mains, miles	106	55	61
(*g*) Pumps in regular use on wells or boreholes—Nos.	19	Nil	8
(*h*) Consumer meters—Nos.	5,061	5,614	4,980
(*i*) Hydrants—Nos.	612	335	403
(*j*) Cost of construction	£504,200	£374,450	£312,250

* Excludes old water supplies still in operation.
† Water is purchased from a privately-owned borehole.
m.g.d. = million gallons per day.
m.g. = million gallons.

APPENDIX 13.

DESCRIPTION OF CERTAIN VILLAGE WATER SUPPLY SCHEMES.

By V. C. Toundjian, M.B.E., *Superintendent of Waterworks.*

(*A*) *Dhali* (*Nicosia*).—This is a pumping scheme from a public well located on the bank of Yialias river which passes along the northern outskirts of Dhali. A pumping unit was installed and housed after the well was deepened and lined to a depth of 56 feet. Its yield on test late in summer was over 8,000 gallons an hour.

A turbine pump driven by a diesel engine 13.5 H.P. pumps the water through a 4″ main 0.3 mile in length at the rate of 6,000 gallons an hour against a total head of 120 feet to a set of three R.C.C. circular storage tanks of 10,000 gallons capacity each, built on a commanding hill on the N.E. end of the village.

The water is distributed by means of 19 public fountains, which are built to the standard type complete with troughs, drains and soak-pits. A reticulation covering almost all the streets in the village for a house-to-house service was also installed. The total length of galvanised pipes up to 4″ diameter laid was 5.0 miles of various sizes, fitted with the required specials for house connections.

The scheme was commenced in February and completed in October, 1955, at a total cost of £8,500, or an average cost of £4.3 per head of the population which, according to the 1946 census, was 1965.

(*B*) *Karavas* (*Kyrenia*).—Karavas is a rural municipality. Although it is fortunate in having a potential source of supply known as " Kephalovrysos " with a flow fluctuating between 540,000 and 1,400,000 gallons a day, yet it lacked a proper piped distribution system.

By an arrangement with the owners of the spring, which is mainly used for irrigation, one-fifteenth of the flow was acquired and a distribution box for this purpose built at the source. The share thus acquired is conveyed in a 2½″ steel main 0.7 mile in length to twin storage tanks of 10,000 gallons capacity each, built on a commanding site above the village.

Water is distributed by means of 31 public fountains including two at the school yard built in the form of small 4′ × 4′ × 4′ tanks. A reticulation for a house-to-house service was also installed, complete with fittings for house connections. The total length of galvanised pipes laid in the village is 6.3 miles (sizes up to 3″ diameter).

Work was commenced in April and completed in September, at a total cost of about £8,500 or an average cost per person of £4. The population is 2,156 as per 1946 census.

(*C*) *Arsos* (*Larnaca*)–*Vatili–Strongylos* (*Famagusta*).—This is a combined gravity scheme from an underground source known as the Arsos chain-of-wells, located about three quarters of a mile S.S.W. of the village, whence it derives its name.

The section of the tunnel which lies in water bearing stratum (1,630 feet in length) was lined in masonry with precast R.C.C. slabs and the mouth-tops of the shafts built and sealed. An asbestos-cement 6″ pipeline 3,700 feet in length (partly laid in the dry section of the tunnel and partly in the deep cutting beyond the tunnel outlet, viz. 1,800 feet and 1,900 feet respectively) conveys the flow (maximum = 64,000 gallons a day and minimum = 32,000 gallons) to a distribution box built on top of a new 6,000 gallons R.C.C. circular storage tank at Arsos.

The water at this box is divided between the three villages in proportion to their population. The share of Arsos is discharged into the storage tank underneath the box and the remaining water of the two other villages is conveyed in a galvanised common pipeline partly 4″ diameter and partly 3″ for 3½ miles to a second distribution box built on top of one of the twin 10,000 gallons storage tanks by the main roadside at Vatili. Here again, after Vatili's share is discharged into the twin tanks, the remaining water is conveyed in a 2″ galvanised pipeline 2¼ miles in length to a 3,000 gallons R.C.C. circular storage tank at Strongylos.

The distribution at the villages is effected by means of public fountains fed from the storage tanks mentioned above. The total number of fountains built to standard type is 45, including four at the school yards in the form of small 3′ × 3′ × 3′ tanks. The total length of reticulation pipes laid is 4.4 miles and of sizes varying between 4″ and 1″ diameter.

Work commenced in July and was completed towards the end of December, at a total cost of about £24,500 or an average cost per person of £7.7. The combined population of all three villages was 3,156 in 1946.

(*D*) *Kondea–Sinda–Kouklia* (*Famagusta*).—The source of supply of this combined pumping scheme is borehole No. 40/54 located about two miles S.W. of Kondea. A pumping unit of 5,000 gallons an hour turbine driven by a 13½ H.P. diesel engine was installed and housed in a masonry building. Water is first pumped into a set of four R.C.C. circular storage tanks of 10,000 gallons each, built at a distance of about 100 yards from the pump-house, and thence gravitated in a galvanised composite main (3″ and 2½″ diameter 2 miles in length) to a distribution box built on top of a newly constructed 10,000 gallons storage tank at Kondea.

At this box the water is divided between the three villages in proportion to their population. After Kondea's share is discharged into the storage tank immediately underneath the box, the remaining water is conveyed in two independent pipelines to the new storage tanks at Sinda (10,000 gallons) and Kouklia (3,000 gallons)—the respective lengths of the mains being 4.4 miles of 3″ and 2½″ and 2¼ miles of 1½″ and 1¼″ galvanised pipes.

Water is distributed at the three villages by means of public fountains (standard type), of which 53 in all were built, including two in the form of small tanks at the school yard. The total length of reticulation pipes laid is 5½ miles and the diameters are 1″ to 4″.

Work was commenced in April and the whole scheme completed by the end of August, at a total cost of about £23,000 or an average cost of £10 per head of the combined population (2,268 in 1946.)

(*E*) *Paramytha–Spitali–Palodhia* (*Limassol*).—This is a combined gravity scheme, having as its source of supply two springs known as "Marammenos", which are located near the 15th milepost of the Limassol–Agros road. These springs were acquired for £800 and work on their excavation and building commenced in September 1954.

The flow, which fluctuates between 32,000 and 16,000 gallons a day, is conveyed in a main galvanised pipeline of 1½″ diameter and of 7¼ miles in length, laid along the Agros road, to a distribution box built on a commanding site about half a mile S.E. of Paramytha. The water at this box is divided between the three villages in proportion to their population and thence conveyed in independent pipes (total length 2.1 miles, diameter 1¼″) to the newly constructed R.C.C. circular storage tanks of 2,000 gallons capacity each at the villages.

The distribution at each village is effected by means of public fountains (standard type) fed from the aforementioned storage tanks. The total number of fountains erected is 11 and the length of reticulation pipes laid 0.7 miles (galvanised steel 1½″ and 1″ diameter).

(*F*) *Emba–Lemba–Kissonerga* (*Paphos*).—This is a combined gravity scheme from " Stavlisma " spring, located at about half a mile to the N.E. of Trimithousa village. After excavating and building the source, its flow (fluctuating between 50,000 gallons a day in spring and 16,000 gallons in autumn) was conveyed in a composite steel main of 3″ and 2″ diameter, two miles in length, to a distribution box on the eastern outskirts of Emba.

The water at this box is divided between the three villages in proportion to their population. After Emba gets its share, the remaining water is proportionately piped in independent pipelines to Emba (1.3 mile of $1\frac{1}{2}$″) and Kissonerga (2.1 miles of 2″ and $1\frac{1}{2}$″).

The distribution at the villages is effected by means of public fountains (standard type), of which 33 in all were erected (including three in the form of small $3' \times 3' \times 3'$ tanks). These are fed from R.C.C. circular storage tanks (four with a total capacity of 24,000 gallons). The total length of galvanised reticulation pipes laid is 4.6 miles of various sizes $2\frac{1}{2}$″ down to 1″.

The headworks were commenced in September, 1954, and the whole scheme completed in April, 1955, at a total cost of about £13,000 (including £3,024 for the acquisition of the spring). The average cost *per capita* is £8.1 calculated on the combined total population of 1946, which was then 1,597.

APPENDIX 14.

NUMBER OF VILLAGES WITH PIPED DOMESTIC WATER.

31ST DECEMBER, 1955.

District	Villages with piped water			Villages with no piped water	Total villages
	Satisfactory	Needing improvement	Total		
Nicosia	96	25	121	56	177
Larnaca	42	6	48	11	59
Limassol	85	17	102	11	113
Famagusta ..	42	16	58	39	97
Paphos	98	23	121	13	134
Kyrenia	25	13	38	9	47
Totals	388	100	488	139	627
Percentage ..	62	16	78	22	100.00

Note.—The above figures were obtained from a new survey and they do not correspond with others given in the annual reports of former years. Some supplies that were formerly satisfactory are now considered to be unsatisfactory because with an expanded population and higher standards of living, more water and more facilities are required.

APPENDIX 15.

VILLAGE WATER SUPPLY SCHEMES COMPLETED IN 1955.

No.	Village	District	Nature of work	Date of Completion
1.	Chakistra	Nicosia	‡	20th January
2.	Kondemenos	Kyrenia	†	8th February
3.	Mandres	Famagusta	†	10th ,,
4.	Xylophagou	Larnaca	*	11th ,,
5.	Karakoumi	Kyrenia	†	18th ,,
6.	Paramytha	Limassol	*	2nd March
7.	Kapilio	,,	†	7th ,,
8.	Agridhia	,,	†	15th ,,
9.	Koma-tou-Yialou	Famagusta	†	22nd ,,
10.	Yerakies	Nicosia	†	24th ,,
11.	Kissonerga	Paphos	*	24th ,,
12.	Spitali	Limassol	*	26th ,,
13.	Photta	Kyrenia	‡	26th ,,
14.	Sha	Nicosia	*	29th ,,
15.	Lemba	Paphos	*	2nd April
16.	Emba	,,	*	7th ,,
17.	Piyenia	Nicosia	*	13th ,,
18.	Timi	Paphos	‡	13th ,,
19.	Aradhippou	Larnaca	†	13th ,,
20.	Palodhia	Limassol	†	28th ,,
21.	Kalogrea	Kyrenia	†	30th ,,
22.	Mamonia	Paphos	†	2nd May
23.	Kedhares	,,	‡†	18th ,,
24.	Kato Dhrys	Larnaca	†	20th ,,
25.	Mesana	Paphos	†	8th June
26.	Galini	Nicosia	†	8th ,,
27.	Kanli Keuy	,,	*	14th ,,
28.	Stavrokono	Paphos	†	15th ,,
29.	Kalopanayiotis	Nicosia	†	21st ,,
30.	Zoopiyi	,,	†	27th ,,
31.	Ayios Mamas	Limassol	‡	29th ,,
32.	Yiolou	Paphos	†	30th June
33.	Arakapas	Limassol	‡	1st July
34.	Eylenja	Nicosia	†	15th ,,
35.	Khoulou	Paphos	†	15th ,,
36.	Kakopetria	Nicosia	†	21st ,,
37.	Phini	Limassol	†	6th August
38.	Sinda	Famagusta	*	17th ,,
39.	Phlamoudhi	,,	†	23rd ,,
40.	Salamiou	Paphos	†	25th ,,
41.	Asproyia	,,	†	25th ,,
42.	Gouri	Nicosia	†	25th ,,
43.	Kondea	Famagusta	*	31st ,,
44.	Moni	Limassol	‡	1st September
45.	Pakhna	,,	‡	2nd ,,
46.	Kaliana	Nicosia	†	8th ,,
47.	Kouklia	Famagusta	*	12th ,,
48.	Asha	,,	†	13th ,,
49.	Karavas	Kyrenia	†	13th ,,
50.	Ayios Yeoryios	Paphos	‡	13th ,,
51.	Ayios Amvrosios	Kyrenia	†‡	30th ,,
52.	Lyso	Paphos	†	13th October
53.	Akhelia	,,	*	15th ,,
54.	Dhali	Nicosia	*	18th ,,
55.	Liveras	Kyrenia	†	20th ,,
56.	Kouklia	Paphos	‡	25th ,,
57.	Boghaz	Famagusta	†	25th ,,
58.	Akhyritou	,,	†	28th ,,

* New scheme where previously there was no piped supply.
† Replacement or improvement of an old supply.
‡ Water Supply to schools and Police Stations

No.	Village	District	Nature of work	Date of Completion
59.	Spilia	Nicosia ..	†	31st October
60.	Galatia	Famagusta ..	†	31st ,,
61.	Kannavia	Nicosia ..	†	31st ,,
62.	Letymbou	Paphos ..	†	9th November
63.	Kaimakli	Nicosia ..	†	9th ,,
64.	Dhavlos	Famagusta ..	†	11th ,,
65.	Pakhyammos	Nicosia ..	†	12th ,,
66.	Ayios Ioannis	Paphos ..	†	21st ,,
67.	Vatili	Famagusta ..	†	30th ,,
68.	Goudhi	Paphos ..	†	30th ,,
69.	Arsos	Larnaca ..	*	30th ,,
70.	Kholi	Paphos ..	†	1st December
71.	Stroumbi	,, ..	†	9th ,,
72.	Angolemi	Nicosia ..	†	16th ,,
73.	Strongylos	Famagusta ..	†	21st ,,
74.	Kato Zodhia	Nicosia ..	†	23rd ,,
75.	Ephtakomi	Famagusta ..	†	23rd ,,
76.	Kato Pyrgos	Nicosia ..	†	23rd ,,
77.	Phlasou	,, ..	‡	23rd ,,
78.	Pergamos	Larnaca ..	*	29th ,,
79.	Galata	Nicosia ..	†	31st ,,
80.	Evrykhou	,, ..	†	31st ,,
81.	Tremetousha	Larnaca ..	*	31st ,,
82.	Ayia Phyla	Limassol ..	†	31st ,,
83.	Pyla	Larnaca ..	†	31st ,,
84.	Apesha	Limassol ..	†	31st ,,

* New scheme where previously there was no piped supply.
† Replacement or improvement of an old supply.
‡ Water Supply to schools and Police Stations.

APPENDIX 16.

VILLAGE WATER SUPPLY SCHEMES IN HAND AT THE END OF 1955.

Serial No.	Village	Serial No.	Village
1.	Trikomo	3.	Astromeritis
2.	Lymbia	4.	Peyia

APPENDIX 17.

VILLAGE WATER SUPPLY SCHEMES READY FOR CONSTRUCTION AT THE END OF 1955 BUT NOT YET STARTED.

Serial No.	Village	Serial No.	Village
1	Koutsovendis	4	Mitsero
2	Dhiorios	5	Zyyi
3	Ayios Ermolaos		
	Nos. 1–5 have already provided their share in the cost of the work		
6	Kalyvakia	18	Syrianokhori
7	Nikitas	19	Ayia Napa
8	Loutros	20	Goshi
9	Ayia Irini (Kannavia)	21	Pano Lefkara
10	Mia Milia	22	Dhromolaxia
11	Lagoudhera	23	Vasa (Kilani)
12	Ayios Epiphanios (Orinis)	24	Mallia
13	Phikardou	25	Neokhorio (Paphos)
14	Skylloura	26	Souskiou
15	Margi	27	Anarita
16	Ayios Yeoryios (Soleas)	28	Yeroskipos
17	Alevga	29	Panayia
	Nos. 6–29 have their loans approved, but not yet executed.		
30	Alithinou	69	Argaki
31	Alona	70	Ayia Marina (Skyllouras)
32	Ambelikou	71	Ayia Marina (Xyliatou)
33	Analiondas	72	Ayios Yeoryios (Kafkallou)
34	Kambia	73	Kalokhorio (Morphou)
35	Lefka	74	Mora
36	Thermia	75	Pharmakas
37	Xeri	76	Pyrgos, Pano
38	Kokkini Trimithia	77	Palekhori Orinis
39	Korakou	78	Aghirda
40	Katydhata	79	Ayios Yeoryios (Kyrenia)
41	Gourri	80	Karpasha
42	Lazania	81	Myrtou
43	Ghaziveran	82	Kormakitis
44	Sellain d'Api	83	Kazaphani
45	Mansoura	84	Kremama Kamilou
46	Ayios Theodoros (Tyllirias)	85	Larnaca-tis-Lapithou
47	Mosphileri	86	Pileri
48	Ayios Sozomenos	87	Sykhari
49	Ayios Nikolaos (Lefkas)	88	Trapeza
50	Kalokhorio (Lefkas)	89	Angastina
51	Kourou Monastir	90	Aphania
52	Kythrea	91	Asha
53	Mammari	92	Chatos
54	Mandres (Morphou)	93	Knodhara
55	Masari	94	Marathovounos
56	Ayii Trimithias	95	Mousoulita
57	Paleometokho	96	Ornithi
58	Apliki	97	Pyrga (Famagusta)
59	Aredhiou	98	Yenagra
60	Askas	99	Ayios Khariton
61	Orounda	100	Trypimeni
62	Petra	101	Monarga
63	Yerolakkos	102	Akhna
64	Zodhia, Pano	103	Alaminos
65	Zodhia, Kato	104	Athienou
66	Varisha	105	Avdhellero
67	Petra-tou-Dhiyeni	106	Ayii Vavatsinias
68	Mathiatis		

Serial No.	Village	Serial No.	Village
107	Kophinou	132	Sotira (Limassol)
108	Maroni	133	Yermasoyia
109	Melousha	134	Apsiou
110	Tersephanou	135	Akourdalia
111	Tokhni	136	Akoursos
112	Voroklini	137	Miliou
113	Kivisil	138	Kathikas
114	Agros	139	Amargeti
115	Alekhtora	140	Anavargos
116	Ayios Ioannis (Agrou)	141	Maronas
117	Ayios Therapon	142	Lasa
118	Kalokhorio (Zoopiyi)	143	Kili
119	Kyperounda	144	Arkhimandrita, Kato
120	Lemithou	145	Ayia Marinoudha
121	Lophos	146	Khlorakas
122	Pakhna	147	Kholetria
123	Mandria	148	Peristerona (Paphos)
124	Mesa Yitonia	149	Steni
125	Moniatis	150	Tala
126	Phasoula (Limassol)	151	Trakhypedhoula
127	Plataniskia	152	Tsadha
128	Polemidhia, Pano	153	Marathounda
129	Polemidhia, Kato	154	Armou
130	Potamiou	155	Mesa Khorio
131	Prodhromos		

Nos. 30–155 schemes submitted for approval.