[Report 1934] / Medical Officer of Health, Torquay Borough.

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BOROUGH OF TORQUAY

(6)

Waterworks Department

ANNUAL REPORT

FOR THE YEAR 1934

SAMUEL C. CHAPMAN,
M.Inst.C.E.,
M.Inst.W.E.,
Chartered Civil Engineer,
Water Engineer.

Town Hall, Torquay,
February, 1935.

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Waterworks Department.

WATER ENGINEER'S OFFICE,
TOWN HALL,
TORQUAY,
February, 1935.

To the Chairman and Members
of the Water Committee.

GENTLEMEN,

I have the honour to present to you the Annual Report upon the works under your control, for the year ending 31st December, 1934.

AREA SUPPLIED.

The "limits," within which the Corporation administer the supply of water, cover about 11,000 acres.

The areas supplied in detail by the Corporation, are as follows:—

The Borough of Torquay	5,473	acres
The Urban District of Newton Abbot ...	4,171	,,
*Part of the Rural District of Newton Abbot	1,324	,,
	10,968	,,

*NOTE.—Of this area, 866 acres in the Parish of Stokeinteignhead will be included within the Borough, after 1st April, 1935.

SUPPLIES IN BULK.

Water is supplied in bulk, under Section 43 of the Torquay Corporation Act, 1903.

Under an agreement which expires on 24th March, 1937, water is supplied to the Newton Abbot Rural District Council for the following parishes :—

Hennock	Village
Hennock	Chudleigh Knighton
Abbotskerswell ..	Village
Abbotskerswell ..	Aller
Bovey Tracey.. ..	Heathfield Works
Kingskerswell	
East Ogwell	
Haccombe-with-Combe	
Stokeinteignhead	

The maximum quantity of water that can be demanded, in any one day, is 145,000 gallons; and about half of this quantity is being taken at the present time.

Population.

According to the census return for 1931, the population of Torquay and Newton Abbot, was then 61,168. To this figure there must be added the number of persons supplied in bulk, the natural increase in growth, and the visitor population; the number of persons supplied during the year 1934, I estimate to be as follows :—

Torquay	48,073
Newton Abbot ..	15,321
Bulk Supplies ..	3,691
Visitors	5,150
Total	72,235

New Houses.

During the year, the number of new services laid, in Torquay and Newton Abbot, was as follows :—

Torquay	329
Newton Abbot	53
	382

From 1902 to the beginning of 1914 the development of land for building was steady and without much variation, the average number of houses built each year being about 150.

During the past year, 329 houses were added in Torquay, and 53 at Newton Abbot, giving a total of 382, which is an increase of 71 over the year 1933, and 38 above the average for the past fourteen years.

TABLE GIVING THE NUMBER OF NEW SERVICES ADDED DURING THE PERIOD, 1921 TO 1934, INCLUSIVE.

Year.	Torquay.	Newton Abbot.	Total.
1921	101	33	134
1922	118	35	153
1923	197	43	240
1924	278	64	342
1925	471	35	506
1926	463	147	610
1927	426	146	572
1928	258	116	374
1929	241	73	314
1930	278	48	326
1931	260	27	287
1932	209	46	255
1933	258	53	311
1934	329	53	382
Total	3887	919	4806

The above figures do not include any premises which have been converted into flats.

Within the Urban District of Newton Abbot, houses are being erected in the Milber and Buckland area, to the east of the Aller Brook; and, in the Wolborough and Highweek districts, an area is now opened up for building purposes.

In last year's report, mention was made of probable extensions to do with the Cockington Estate, but these, so far, have been disappointing.

In Chelston, and at Shiphay, there has been some activity; and generally, over the whole Borough, there has been a steady increase in the number of houses erected, as the table shews.

From plans submitted for main extension purposes, it would appear likely that the rate of progress in building will be maintained.

The Gallows Gate reservoir, which was provided to meet the demands of the Western part of the Borough, was brought into commission 18th August, 1934.

At present the whole of the Shiphay and Edginswell districts are supplied therefrom; and a feeder main has been laid from this reservoir to the old Cockington reservoir, to give it a second means of supply, should it be necessary to do so.

Sufficient suitable land was acquired at Gallows Gate to build a service reservoir there of considerable size; and, although the reservoir, just completed, holds only 250,000 gallons, it has been so constructed as to form a compartment in the larger reservoir, whenever such reservoir is built.

The Gallows Gate reservoir dominates the whole of the Western side of the Borough. It is fed through a 10-in. main, branched off the 14-in. main from Tottiford to Great Hill.

This work formed part of the scheme sanctioned in the Torquay Order, 1933, under the Public Works Facilities Act, 1930.

The estimate was £19,882, and although the full statement is not yet to hand, there will be a saving of about £,2,000, due to the fall in the price of pipes, and meeting less rock than was expected.

Consumption and Distribution of Water.

During the year 1934, the total quantity of water consumed amounted to 932,165,000 gallons, or an average of 2,553,000 gallons per day.

The maximum consumption in any one week was between the 19th. and 25th. August, inclusive, when the amount of water delivered was 22,475,000 gallons. This is less by 100,000 gallons than the maximum week in August, 1933, the difference being probably due to the general carefulness exercised by consumers in response to the National appeals for economy.

The amount of water supplied to the Newton Abbot Rural District Council, in bulk, was 28,993,000 gallons, compared with 28,169,000 gallons, in the previous year.

The following tables shew how the water has been distributed.

TABLE SHEWING DISTRIBUTION OF WATER FOR VARIOUS PURPOSES, FOR THE YEAR 1934.

Locality.	Domestic & Unmetered Supplies.	Sundry Metered Supplies.	Municipal Metered Supplies.	Total.
	Gallons.	Gallons.	Gallons.	Gallons.
Torquay ...	587,093,220	128,389,000	28,483,000	743,965,220
Newton Abbot...	132,028,000	27,178,000	—	159,206,000
Supplied in Bulk...	—	—	—	28,993,780
Total ...	719,121,220	155,567,000	28,483,000	932,165,000

TABLE GIVING THE DISTRIBUTION OF WATER IN GALLONS PER DAY.

Purpose.	Total Gallons.	Gallons per day.	Percentage.
1 Domestic & unmetered supplies	719,121,220	1,970,195	77.2
2 Metered. Sundry supplies ...	155,567,000	426,211	16.7
3 ,, Municipal supplies	28,483,000	78,035	3.0
4 ,, Supplied in bulk	28,993,780	79,435	3.1
Total	932,165,000	2,553,876	100.0

Water sold to the Newton Abbot Rural District Council, in bulk, was distributed as follows:—

	Gallons.
Kingskerswell	12,468,000
Abbotskerswell (village) ...	6,189,500
do (Aller) ...	268,000
East Ogwell	1,874,000
Bovey Tracey (Heathfield) ...	1,412,000
Hennock (village)	278,030
do (Chudleigh Knighton) ...	3,131,750
Stokeinteignhead and Haccombe-with-Combe ...	3,372,500
Total	28,993,780

TABLE SHEWING THE DISTRIBUTION OF WATER FOR EACH MONTH THROUGHOUT THE YEAR 1934.

Month.	Borough of Torquay	The Urban District of Newton Abbot.	Supplies in Bulk.	Total.
	Gallons.	Gallons.	Gallons.	Gallons.
January ...	60,559,000	12,772,000	1,884,000	75,215,000
February ...	52,620,850	12,180,000	2,049,150	66,850,000
March ...	55,574,900	14,576,000	2,344,100	72,495,000
April ...	57,688,000	11,861,000	1,971,000	71,520,000
May ...	62,403,500	14,554,500	2,492,000	79,450,000
June ...	63,423,000	14,444,000	2,623,000	80,490,000
July ...	75,900,000	12,608,000	2,612,000	91,120,000
August ...	77,484,860	13,808,000	2,842,140	94,135,000
September	64,896,720	13,809,000	2,819,280	81,525,000
October ...	59,324,950	13,731,000	2,599,050	75,655,000
November ...	55,983,410	12,034,500	2,287,090	70,305,000
December ...	58,106,030	12,828,000	2,470,970	73,405,000
Totals	743,965,220	159,206,000	28,993,780	932,165,000

TABLE OF AVERAGE DAILY CONSUMPTION PER ANNUM FOR THE PAST 25 YEARS.

Year.	Gallons per day.	Year.	Gallons per day.
1909	1,815,000	1922	*1,671,000
1910	1,858,000	1923	1,830,000
1911	1,873,000	1924	1,868,000
1912	1,814,000	1925	2,080,000
1913	1,816,000	1926	*2,080,000
1914	1,835,000	1927	2,192,000
1915	1,826,000	1928	2,304,000
1916	1,831,000	1929	2,363,410
1917	1,913,000	1930	2,439,600
1918	2,001,000	1931	2,441,972
1919	1,986,000	1932	2,475,737
1920	2,034,000	1933	2,601,473
1921	*1,822,000	1934	2,553,000

*Intermittent Supply.

Detection and Prevention of Waste.

The consumption of water would get beyond all control, were it not for the constant round of inspection, which goes on year in and year out. Seven turncocks, under the supervision of a foreman, are employed for this important work, which is conducted by night as well as by day.

The town, for the purposes of supply, is divided into districts; and upon the main pipe, leading to each district, is fixed a meter, which records, hour by hour, upon a diagram, the rate of flow of water through the main. These diagrams are allowed to run for two days, when they are brought to the office for scrutiny. If every pipe and fitting were in perfect order, and consumers shut off their taps dead tight, and no

water was used for trade, or other purposes, at night, then the meters would register along the zero line ; but in any event, the minimum consumption would be during the night, from midnight to about 4 a.m. The line recorded on the diagram, between the hours mentioned, is known as the "Night Line" ; and the quantity of water registered is termed the "Night flow." The night flow represents legitimate use of water, and waste, due to defective fittings, or carelessness.

Any unusual consumption, whether from legitimate use, or other cause, is automatically recorded on the meter diagram, and steps are at once taken to locate its position, and to ascertain the cause.

Tables follow, giving the night flow, and also the number of defective pipes and fittings that have been discovered by the staff, and made good.

TABLE OF THE NIGHT FLOW FOR THE YEARS 1933 and 1934.

Month.	Gallons per hour. 1933	Gallons per hour. 1934
January	26,020	25,560
February	25,000	23,070
March	24,460	21,590
April	24,460	22,100
May	24,330	22,720
June	26,630	24,340
July	26,830	26,500
August	28,630	29,350
September	29,830	26,550
October	27,670	25,370
November	25,720	26,020
December	27,220	25,280
Average ..	26,400	24,870

TABLE GIVING THE NIGHT-FLOW FOR THE YEARS 1900 TO 1934 INCLUSIVE.

Year.	Gallons per hour.	Year.	Gallons per hour.
1900	36,554	1919	31,788
1901	34,502	1920	32,256
1902	38,077	*1921	29,130
1903	35,609	‡1922	23,783
1904	30,243	†1923	22,103
1905	29,157	1924	22,942
1906	27,796	1925	26,140
1907	22,723	§1926	26,027
1908	23,788	1927	26,606
1909	25,186	1928	26,469
1910	24,869	1929	26,673
1911	23,558	‖1930	27,900
1912	23,575	1931	27,113
1913	23,353	1932	25,544
1914	23,844	1933	26,400
1915	24,975	1934	24,870
1916	26,033		
1917	31,804		
1918	31,096		

*1921 9 months only. †1923 11 months only.
‡1922 10 months only. §1926 10 months only.
‖1930 Shiphay and Barton districts added.

It is interesting to note that, notwithstanding the growth of population, and the increase in the number of premises supplied, the night flow for 1934 is very substantially lower than in the year 1900.

THE NUMBER OF DEFECTIVE PIPES AND FITTINGS DETECTED AND REPAIRED, AFTER NOTICE

PRIVATE PROPERTIES.

TORQUAY.

Month	Ball taps.	Bib taps.	Burst Pipes.	W.C. Valves.	Cisterns Defective.	Total.
January ..	74	42	84	31	—	231
February ..	87	43	97	48	—	275
March ..	95	52	100	40	—	287
April ..	64	46	76	27	—	213
May ..	56	47	87	33	—	223
June ..	77	63	93	37	—	270
July ..	56	50	99	22	—	227
August ..	61	34	96	35	—	226
September ..	68	51	93	30	—	242
October ..	68	46	94	42	1	251
November ..	74	44	67	27	2	214
December ..	35	33	49	16	—	133
Total ..	815	551	1035	388	3	2792
NEWTON ABBOT						
January ..	59	6	33	—	—	98
February ..	41	9	26	1	—	77
March ..	42	2	15	—	—	59
April ..	20	5	17	1	—	43
May ..	21	4	34	1	—	60
June ..	11	4	37	—	—	52
July ..	23	3	36	—	—	62
August ..	32	11	35	1	—	79
September ..	26	6	31	—	—	63
October ..	3	1	21	3	—	28
November ..	7	1	21	—	—	29
December ..	4	—	8	—	—	12
Total ..	289	52	314	7	—	662
Totals for Torquay and Newton Abbot.						
Grand Total	1104	603	1349	395	3	3454

WORKS CARRIED OUT BY THE WATER DEPARTMENT ARE SET OUT IN THE FOLLOWING TABLES

PUBLIC SUPPLIES.

TORQUAY.

Month	Trunk Main Repairs.	Service Main Repairs.	Service Repairs.	Repairs to Valves.	Repairs to Hydrants.	Total Repairs.	New Services.
January ..	—	7	22	6	8	43	21
February ..	—	5	19	2	2	28	17
March ..	—	6	21	6	2	35	20
April ..	—	3	25	15	3	46	22
May ..	—	4	20	4	3	31	29
June ..	—	7	22	5	3	37	56
July ..	2	7	28	2	3	42	26
August ..	1	8	26	4	—	39	42
September ..	1	9	24	6	3	43	23
October ..	—	5	31	10	—	46	28
November .	—	6	19	6	3	34	25
December ..	—	8	12	11	2	33	20
Totals ..	4	75	269	77	32	457	329

NEWTON ABBOT.

January ..	1	—	10	1	2	14	10
February ..	2	2	5	—	1	10	4
March ..	1	1	—	—	1	3	10
April ..	1	3	8	—	1	13	3
May ..	2	2	4	—	1	9	9
June ..	1	3	12	2	3	21	3
July ..	—	1	11	—	2	14	4
August ..	3	2	8	1	2	16	2
September ..	—	3	3	3	3	12	1
October ..	—	1	4	—	1	6	—
November ..	—	2	4	2	2	10	5
December ..	—	1	2	1	1	5	2
Totals ..	11	21	71	10	20	133	53
Totals for Torquay and Newton Abbot	15	96	340	87	52	590	382

PRIVATE SUPPLIES.

TORQUAY.

Month	Meters fixed new	Meters removed	Meters repaired and refixed	Meters discontinued	Repairs to Private Supplies after notice	Total.
January	5	11	11	4	—	31
February	1	39	39	6	—	85
March	3	22	22	4	—	51
April	4	10	10	4	—	28
May	4	5	5	6	1	21
June	6	11	11	4	1	33
July	9	26	26	6	2	69
August	2	31	31	3	3	70
September	—	20	20	4	2	46
October	4	27	27	3	—	61
November	—	14	14	—	1	29
December	2	12	12	6	3	35
Totals	40	228	228	50	13	559

NEWTON ABBOT

January	1	3	2	—	—	6
February	1	1	2	1	—	5
March	—	3	2	1	—	6
April	1	3	4	—	—	8
May	—	—	—	1	—	1
June	2	11	10	—	—	23
July	—	5	6	1	—	12
August	1	10	10	2	—	23
September	1	1	1	—	—	3
October	1	8	8	—	—	17
November	—	2	2	—	—	4
December	—	—	—	—	—	—
Totals	8	47	47	6	—	108
Totals for Torquay and Newton Abbot	48	275	275	56	13	667

The total number of pipes and apparatus, which were found to be defective, and have been repaired, are as follows:—

	Private Supplies	Public Supplies	Total
Torquay	2792	457	3249
Newton Abbot	662	133	795
	3454	590	4044

As will be seen, the number of defective pipes and fittings is considerable; and if they were not repaired promptly, the waste would assume a very high figure.

There are approximately 1600 meters in use, on trade, and garden services, which are read, some weekly, and others every month, or quarterly.

Under the heading, Private Supplies, details are given of the work executed in connection with their installation and maintenance.

There are between 13,000 and 14,000 assessments for water supply purposes, and, incidentally, there are nearly an equal number of service pipes and stop-cocks to be kept in order, in the roadway, to say nothing of the innumerable fittings in private premises.

Beneath the public highways, there are approximately 41 miles of lead service pipes, 180 miles of distribution mains, and 65 miles of trunk mains; and of course the full complement of valves and fire hydrants.

During the year, excluding renewals, there have been laid 10,183 yards of pipes, of which 3614 yards formed part of the Gallows Gate scheme, carried out under the Torquay Order, 1933. (Public Works Facilities Act, 1930).

A LIST OF CAST IRON PIPES LAID DURING THE TWELVE MONTHS ENDED 31st DECEMBER, 1934

1934		*Length in Yards* 3″	4″	5″	6″	7″	9″	10″
	Special Expenses							
January	Rocombe Cross	77						
	Special Loan							
February	Milber 6″ Distribution ..		2		2			
	Public Works Facilities Act							
February	Gallowsgate to Cockington ..				2710			
February	Gallowsgate Distribution Main ..						837	
February	Gallowsgate Reservoir Connections				67			
	Mains Extensions							
January	Moles Cross	135						
January	Bradley Road, Newton Abbot ..		96					
February	Nut Bush Lane				1113			
February	Broad Park Estate	85	509		82			
March	Thorne Park Estate	30	195					
April	Milber-Rowantree				190			
April	Newton Road—Hospital Side ..		224					
May	Herbert Road—High Press ..	7	1		390			
May	Newton Road—Cadewell Side ..		165					
May	Cockington Lane—Wright ..		287					
May	Chatsworth Road, Torquay ..	125						
June	Fore Street, Barton (off) ..	101						
July	Maidencombe—Rock House ..	168						
August	Claddon Lane, Stoke ..				104			
September	Bradley Road, Newton Abbot ..		28					
September	Banbury's Estate ..	163	199					
September	Water Lane, Shiphay ..	73						
October	Buckland Estate, Newton Abbot		105		603			
November	Barton Housing Estate ..		417					
November	Rooklands Estate, Torquay		71					
December	Wall's Hill, Babbacombe ..	76						
	Water Revenue. Service Mains							
January	Ilsham Marine Drive ..	83	511					
January	Gas Works Hill, Torquay ..	4	366					
February	Chestnut Avenue, Torquay ..	12	487					
March	Avenue Road, Torquay ..	10	286					
June	Ilsham Road, Torquay ..	250						
June	College Road, Newton Abbot ..	379						
June	Bridge Road, Torquay ..	4	224					
July	Warren Road, Torquay ..	9	7	2	657			
August	St. Luke's Road, Torquay ..	107	1128					1
August	Melville Street ..			3	185			
September	Park Hill Road, Torquay ..	185						
October	Victoria Parade ..	35	4	6	573	4		
November	Torwood Street, Torquay ..	6	124		1			
November	Braddon's Street ..	27	221					
November	Hillesdon Road, Torquay ..	9	193					
November	Old Woods Hill ..		135					
December	Abbey Road, Torquay ..				20			
December	Union Street, Torquay ..	1	12					
	Water Revenue Recoverable Expenses							
February	Broad Park Estate ..	366						
March	Thorne Park Estate ..	336						
November	G.P.O. Fire Main ..	3	1					
	Water Revenue Meters and Valves							
February	Devon Laundry, Newton Road ..	34	6					
April	East Street, Newton Abbot ..	3						
October	Marldon Road, Torquay ..		7					
	Total for Year	2903	6011	11	6697	4	837	1

Rainfall of 1934.

Tottiford Catchment Area.

The rainfall at the Kennick Gauge has been 45.38 inches as compared with 34.32 inches in 1933.

The average for the past 50 years is 42.56 inches as compared with the Air Ministry's Standard average for this gauge, over 35 years, of 41.6 inches.

TABLE SHEWING THE MONTHLY DISTRIBUTION OF RAIN AT THE KENNICK GAUGE DURING 1934, AS COMPARED WITH THE AVERAGE MONTHLY DISTRIBUTION OVER 50 YEARS.

	1934	% of Year's Total.	Average for 50 Years.	% of 50 Years average.	1934 as % of 50 Years average.
	inches.		inches.		
January ..	5·05	11·1	4·44	10·4	113·8
February ..	·27	·6	3·45	8·1	7·8
March ..	3·92	8·6	3·49	8·2	112·4
April ..	3·62	8·0	2·79	6·6	129 8
May ..	1·83	4·0	2·35	5 5	77·9
June ..	1·90	4·2	2·10	4·9	90·5
July ..	·62	1·4	2·63	6·2	23·6
August ..	4·12	9·1	3·09	7·3	133·4
September ..	2·91	6·4	2·72	6 4	107·0
October ..	2·92	6 4	4·85	11·4	60·2
November ..	2·55	5·6	4·89	11·5	52·1
December ..	15·67	34·6	5·76	13 5	272 0
	45·38	100 0	42·56	100 0	106·6

The year 1934 was remarkable for the dryness of the first eleven months, February and July being especially dry, the latter being the driest July since 1898, and for an extremely wet December.

The eleven dry months, coming, as they did, immediately after the dry year of 1933, which was about 8 inches below the average, produced a deficiency amounting to 15.4 inches over the 23 months.

This loss, however, was made up by the very heavy rains of December, 1934, when a precipitation of 15.67 inches was observed.

During the year 1934 there were two "partial droughts," the first extending from January 26th to February 23rd, a period of 29 days, when only .10 inches of rain fell and the second extending from May 7th to June 4th, a further period of 29 days, when .21 inches of rain fell.

An "absolute drought" was observed between June 28th and July 12th, a period of 15 days during which no rain fell.

During December rain fell on every day, the total registration being 15.67 inches.

This is the highest figure ever recorded for any month, since the gauge was installed in 1885 and has only been approached once before, namely in November, 1929, when the figure of 14.65 inches was reached.

This, it will be remembered, was followed by another heavy rainfall in December, 1929, when 13.22 inches was recorded, this being, until now, the heaviest fall for that month.

Despite the high aggregate figure attained in December, 1934, however, the greatest amount of rain that fell on any one day was only 1.24 inches, which may be regarded as quite a usual maximum for the time of the year.

There were no abnormally heavy rainfalls during the year, the greatest being 1.29 inches on the 1st of August and, apart from December, when there were four such falls, that was the only occasion on which an amount exceeding 1 inch in 24 hours was recorded during the 205 days upon which rain fell.

The years 1887, '88, '89 are the three driest consecutive years of which there are records on the Tottiford Catchment area, the figures for these years being respectively 28.04 inches, 46.27 inches and 32.26 inches, the average being 35.52 inches.

It should be noted that the figure for 1888 is high only by reason of a very wet November, when the precipitation was 12.43 inches. Deducting this high figure, the amount for the other eleven months would be 33.84 inches.

In 1934, the eleven months, excluding December, showed a precipitation of 29.71 inches.

It will be apparent that there is a distinct similarity between the years 1887-88 and 1933-34. In the former years the only outstanding month was November 1888 with its 12.43 inches of rain and in the latter years, December, 1934, which was the only month with abnormal rain.

The average rainfall over the whole Catchment Area, for 1934, was 48.55 inches, the details of which are set out in the following table :—

Name of Gauge.	Mardon.	Kennick.	Smitha-cott.	Bullaton.	Laployd.
Height above sea-level.	837 ft.	836 ft.	861 ft.	928 ft.	1041 ft.
	inches	inches	inches	inches	inches
January ..	5.14	5.05	5.53	6.06	6.12
February ..	.34	.27	.23	.35	.26
March ..	4.22	3.92	4.33	4.13	4·45
April ..	4.03	3.62	3.87	4.02	3 93
May ..	1.89	1.83	2.25	2.37	2.61
June ..	1 88	1.90	1.99	1.88	2.11
July ..	.75	.62	.59	1.07	.52
August ..	4.54	4.12	4.14	4.05	4.32
September ..	3.10	2.91	2.90	2.92	3.09
October ..	3.45	2.92	3.36	3.58	3.73
November ..	2.87	2.55	2.54	2.75	2.46
December ..	15.98	15.67	16.56	16.25	17 87
Total ..	48.19	45.38	48.29	49.43	51.47

Fernworthy Catchment Area.

The rainfall at the Fernworthy Gauge was 68.90 inches, compared with 52.62 inches for 1933, the amount recorded in December, being 21.87 inches.

The computed mean rainfall at this gauge, over the standard 35 year period, is 63.75 inches, so that the heavy fall during December brought what would otherwise have been a low rainfall figure to one well above the normal.

There were two "partial droughts," the first commencing on January 26th and lasting until February 23rd, a period of 29 days, during which .12 inches of rain fell, and the second commencing on June 28th and lasting until July 27th, a period of 30 days, during which .28 inches of rain fell.

The latter period also included an "absolute drought" from June 28th until July 12th, 15 days during which no rain fell.

There were 228 rain days during the year, the greatest fall being 2.21 inches on December 8th.

The average rainfall for 1934, over the whole Fernworthy catchment area was 73.22 inches, the details of which are set out in the following table :—

1934. RAIN GAUGES, FERNWORTHY CATCHMENT.

Gauge	White Ridge	Tom's Hill	Hemstone	Hurstone Ridge	Crown Hall	Thornworthy Down	Fernworthy	Metherall
Height above sea level	1,650 ft.	1,500 ft.	1,350 ft.	1,350 ft.	1,320 ft.	1,250 ft.	1,150 ft.	1,150 ft.
	inches	inches	inches	inches	inches	inches	inches	inches
January ..	10·70	10·65	10·63	9·31	10·42	8·40	9·13	8·48
February ..	·38	·38	·37	·30	·37	·36	·33	·32
March ..	5·30	5·09	5·28	4·76	5·03	5·01	4·93	4·76
April ..	5·50	5·70	5·90	5·32	5·97	6·10	5·28	5·11
May ..	4·43	4·37	4·12	3·55	3·90	3·86	3·67	3·73
June ..	3·42	3·38	3·13	2·50	2·64	2·49	2·42	2·33
July ..	1·16	1·04	1·14	·71	·73	·70	·69	·66
August ..	7·10	7·14	6·97	5·59	5·64	5·54	5·36	5·22
September ..	6·18	6·16	5·17	5·17	5·19	6·13	5·18	4·92
October ..	8·40	8·04	8·37	6·75	7·50	6·58	6·99	6·01
November ..	3·52	3·27	3·50	2·97	3·29	3·21	3·05	2·77
December ..	25·40	25·29	24·71	18·28	23·12	23·09	21·87	20·76
Totals ..	81·49	80·51	79·29	65·21	73·80	71·47	68·90	65·07

Evaporation.

Kennick Gauge.

The surface evaporation, measured from a galvanised iron tank, 6 feet square, sunk into the ground with its rim level with the surface, is given hereunder :—

1934	
January	+.08
February	.48
March	.84
April	1.17
May	3.50
June	3.61
July	4.69
August	2.84
September	1.50
October	.62
November	.22
December	+.47
	18.72 inches

Yield of the Catchment Areas.

The yield of the Catchment Area at Tottiford is estimated to be as follows for the year 1934 :—

	Gallons
Water consumed	932,165,000
Overflow from Trenchford Reservoir	438,689,000
Amount added to Storage ...	182,907,000
	1,553,761,000
Less amount delivered from Fernworthy	332,775,500
Total	1,220,985,500

The area of the Tottiford Catchment is 2,303 acres ; the figures given in the following table are the gaugings of streams flowing into the reservoirs. The gauged area is 1,608 acres leaving 695 acres which drain directly into the reservoir.

TABLE GIVING THE DISCHARGE OF THE STREAMS FOR THE YEAR 1934.

Month	Trenchford	Bullaton No 1	Bullaton No 2	Higher Mardon	Lower Mardon	Blacking-stone	Clampitt	Kennick	Total
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
January ..	74,722,000	405,900	2,303,500	678,000	1,728,800	29,760,000	8,526,000	5,464,000	123,588,200
February ..	28,113,000	197,600	954,000	366,000	631,000	13,041,000	2,942,000	3,160,000	49,404,600
March ..	36,650,000	278,400	845,000	444,000	784,000	16,934,000	3,704,000	2,594,000	62,233,400
April ..	41,118,000	390,000	1,121,000	525,000	1,139,000	20,815,000	5,338,000	3,707,000	74,153,000
May ..	34,091,000	331,200	1,065,000	492,000	924,000	21,736,000	4,482,000	3,508,000	66,599,000
June ..	13,204,000	43,400	197,000	210,000	130,600	6,152,000	1,239,000	1,211,000	22,387,000
July ..	5,877,000	1,500	148,700	108,100	14,300	2,254,000	397,000	448,000	9,248,600
August ..	5,456,000	—	91,500	81,000	11,100	3,650,000	312,000	303,000	9,904,600
September ..	3,959,000	—	64,200	60,200	3,500	3,040,000	287,000	160,000	7,573,900
October ..	5,534,000	—	56,100	55,500	8,100	4,200,000	436,000	172,000	10,461,700
November ..	16,924,000	—	102,000	91,600	62,400	6,680,000	1,604,000	643,000	26,107,000
December ..	196,417,000	1,888,000	6,936,000	2,125,000	6,234,000	105,009,000	30,664,000	19,300,000	368,573,000
	462,065,000	3,535,000	13,884,000	5,236,400	11,670,800	233,241,000	59,931,000	40,670,000	830,234,200

The run-off from the several gathering grounds which comprise the Tottiford Catchment Area, upon which gauges are fixed, are given hereunder :—

Catchment.	Area in acres.	Rainfall in thousand gallons.	Run-off in housand gallons.	Proportion of Rainfall collected.
Trenchford	804·8	885,000	462,065	52·2%
Bullaton, No. 1	13·6	14,920	3,536	23·6 ,,
Bullaton, No. 2	45·6	50,100	13,884	27·6 ,,
Higher Mardon ..	11·1	12,200	5,236	43·2 ,,
Lower Mardon	32·5	35,700	11,671	32·7 ,,
Blackingstone	444·8	488,500	233,241	47·7 ,,
Clampitt	142·8	157,000	59,931	38·2 ,,
Kennick	112·8	124,000	40,670	32·8 ,,
Totals	1608·0	1,767,620	830,234	47·1%

These figures have been calculated from the average rainfall over the whole Catchment area, which was 48.55 inches for the year 1934.

Details of the flow of the River South Teign, and the amount drawn by the Corporation, per month, for the year 1934 :—

Month.	Total Flow of River South Teign.	Quantity taken by Corporation.
	Gallons.	Gallons.
January ...	398,047,700	80,074,000
February ...	101,411,000	26,591,000
March ...	132,540,100	8,011,100
April ...	159,572,000	—
May ...	222,678,000	4,341,000
June ...	62,592,500	24,667,500
July ...	38,758,800	1,396,800
August ...	53,125,100	12,068,100
September ...	57,617,100	16,260,100
October ...	194,429,200	74,712,200
November ...	207,283,000	50,814,700
December ...	949,217,000	33,839,000
	2,577,271,500	332,775,500

The run-off from the South Teign Catchment Area, taken as a percentage of the average rainfall over the area, for the year 1934, was as follows:—

Total run-off..	2,577,271 thousand gallons
Average rainfall, 73·22 inches, over 2,400 acres	3,975,846 thousand gallons
Proportion of run-off to rainfall ..	64.83%

The amount of water drawn from the South Teign and Trenchford Reservoirs was 332,775,500 gallons.

The dryness of the years 1933 and 1934 was reflected in the run-off in a remarkable manner.

On the Tottiford Catchment Area the streams give a gradually decreasing discharge during 1934, reaching a minimum on the 14th and 15th of September, when a flow of 157,000 gallons per day was recorded on the gauges which measure the run-off from 1608 acres of the Catchment. This gives a discharge per 1,000 acres of only .182 cubic feet per second, a very low figure.

The recovery of this area to normal after the long dry spell has been more than usually delayed, the six months, June to October inclusive, shewing a rainfall of 15.91 inches whilst the run-off for that period was only 2.59 inches, a deficiency of 13.32 inches.

At Fernworthy, in July the total flow of the River South Teign was only 38,758,800 gallons, an average of 1,250,300 gallons per day, and the minimum days flow was 1,110,000 gallons, or .855 cusecs per 1,000 acres, on July 30th, the absolute minimum on that day being at the rate of 1,060,000 gallons per day or about .818 cusecs per 1,000 acres.

This is the lowest river flow that has been recorded since the gauge was established in 1928.

During the months of July, August and September there were 31 days upon which no water could be taken from the river by the Corporation, owing to the flow being less than the statutory quantity, and a further 20 days during which the take was limited to less than 100,000 gallons per day.

During the months of August, September and October the rainfall over the whole of the Catchment area was 20.4 inches. The run-off during that time amounted to the remarkably low figure of 305,184,000 gallons or, converted into inches of rainfall, 5.47 inches, thus shewing a loss of no less than 14.93 inches over the three months.

This clearly shews the cumulative effect of the preceding dry spell.

On both of the Catchment areas the heavy rainfall of December completely restored the Catchment areas to normal and, whilst no abnormal floods were experienced, a high figure of run-off was maintained.

Analysis of Water Supplied.

The following typical analysis of the water has been supplied to me by the courtesy of the Medical Officer of Health, Dr. T. Dunlop, M.B. :—

Analysis of the Town Water—	
Colour (2 ft. tube)	Faint Yellow
Turbidity	Clear
Odour	Nil
Deposit	Minute Amount
Reaction	pH.=7.8
Hardness	1.7 degrees
Parts per 1,000—	
Total Solids	7.0
Chlorine	1.7
Nitrites	Nil
Nitrates	0.11
Free Ammonia	Trace
Organic Ammonia	0.007
Oxygen Absorbed in 4 hours at 80° F. ..	0.07

This is a water of exceptional purity, gathered from a watershed where there is no possibility of pollution. The water is very soft and therefore economical for domestic and trade purposes ; but there is no solvent action on lead. It is in all respects one of the best domestic water supplies in the kingdom.

The present filtration plant was installed in 1911-12; and, in 1927, its capacity was increased by the addition of four filter units, each having a capacity of 225,000 gallons per day.

The demand for water is steadily increasing; and it will be necessary for the Committee to make further provision, in filtering plant, to meet the growing consumption; and this should not be unduly delayed, or a fall in the quality of the water will result.

The policy of renewing a definite number of old mains each year, is having a marked effect upon the supply generally; and more water is available for all purposes, especially at periods of maximum demand.

The larger arterial mains, through the town are scraped periodically; but scraping pipes of small diameter is unsatisfactory, and generally results in a discoloured water.

The lower valve rods, controlling the external valves in the draw-off tower, at the Trenchford Reservoir, have been renewed; and rods of a zinc free bronze have been substituted for the former ones, in wrought iron, which were badly wasted by rust.

Afforestation.

The area of trees now planted on the Tottiford Catchment area amounts to 526 acres.

The nurseries have been well maintained, and they will furnish sufficient trees to plant out about 50 acres during the planting season 1934-35.

During the next season or two, considerable attention will have to be devoted to thinning the present plantations.

The Torquay Corporation Act, 1934.

In November, 1933, a Bill was deposited in Parliament to obtain the necessary powers to construct a storage reservoir at Fernworthy, on the River South Teign.

Petitions against the Bill were lodged by the Okehampton Rural District Council, the West Devon Electric Supply Company, the Teign Board of Conservators, and the riparian owners, including the Ecclesiastical Commissioners and the Great Western Railway.

The Okehampton Rural District Council withdrew their opposition, the Corporation undertaking to furnish a supply of water for Chagford, in bulk, upon agreed terms.

The Bill came before a Committee of the House of Lords, early in May.

The Petitioners against the Bill asked for not less than 2,000,000 gallons per day as compensation water, £1,500 for damages to salmon spawning beds, and money compensation for Yeo Mill.

The Corporation offered 1,250,000 gallons per day as compensation, and contended that compensation in money had already been made following the Act of 1927.

The Committee fixed the compensation water at 1,250,000 gallons per day; and awarded the Teign Conservators £250 for damages to the spawning beds, and the owner of Yeo Mill £50.

The time fixed in which the works had to be carried out was seven years.

The opposition was not carried to the next House.

The Torquay Corporation Act, 1934, received the Royal Assent on 25th July, 1934.

When the works for which provision is made under the above Act have been carried out, Torquay will be possessed of

a supply which will carry it on for a great number of years; and will place the town in the happy position of having a supply which is unimpeachable in quality and abundant in quantity, two qualities, without which, no town can prosper.

In conclusion, I desire to place on record my appreciation of the loyal manner in which my staff have, one and all, worked with me, and of the able way they have carried through the duties entrusted to them.

I have the honour to be,

Your obedient servant,

SAMUEL C. CHAPMAN,

M.Inst.C.E.,
M.Inst.W.E.

Water Engineer.