

Problem 1

A community has experienced the growth in population and water use shown. Estimate the population, per capita water use, and total average daily water demand in the year 2030.

Year	1970	1980	1990	2000	2010
Population	8100	8990	11,400	14,800	18,600
Average daily flow, m³	2370	2820	3750	4990	6900

Problem 2

A city with a present population of 56,000 persons used a total of 9,499,500 m³ of water during the last 12 months. On the maximum daily during the period 43,000,000 L were used. Estimate the average and maximum daily flows to be expected in ten years, when the population is estimated to be 72,600.

Problem 3

20 years from now, a community's population is estimated to be 36,000, the present population is 28,500 and present average water consumption is 16,200 m³/day. The existing water treatment plant has a design capacity of 18,900 m³/day. Assuming an arithmetic rate of population growth, determine in what year the plant will reach design capacity.

Problem 4

A residential community has an estimated ultimate population density of 14,500 per km² and an area of 115,000 m². The average wastewater flow is presently 300 L per capita per day. Estimate the maximum sewage flow rate to be expected from this area.

Problem 5

The population characteristics for five cities are tabulated below. Estimate the population of the city A in the year 2025 using the arithmetic, geometric, comparative, and logistic projection methods.

Year	City Population (in thousands)				
	A	B	C	D	E
1960	80	260	200	265	110
1970	90	330	270	450	165
1980	120	430	360	630	275
1990	160	560	440	800	420
2000	200	680	560	950	535
2015	270	800	670	1150	650