

Helsinki

Sea	501 km ²
Land	185 km ²
Total area	686 km ²
Shoreline	98 km
Islands	315
Population (1999)	546,317
Total in Helsinki region	1,171,596
Density	2,950 inhabitants per km ²
Average temperature, July	16.4 °C
Average temperature, February	-3.6 °C
Mean temperature (1998)	5.4 °C

Helsinki Water (Helsingin Vesi), a municipal business enterprise owned by the City of Helsinki.

Drinking water

Surface water	100 %
Source	Lake Päijänne (Lake Hiidenvesi and River Vantaa are reserves)
Water works	2
Water reservoirs	6
Total volume	101,000 m ³ (70% of the daily consumption)

Raw water is taken from Lake Päijänne and is led through a 120-kilometre-long rock tunnel to Helsinki.

Technical information of the Päijänne tunnel /5/.

Length	120 km
Cross-section area	13.5 - 18 m ²
Volume	2,000,000 m ³
Capacity without pumping	10 m ³ /s
Capacity with pumping	20 m ³ /s
Rate of use	25 %
Altitude difference between the start and the end of the tunnel	36 m
Power produced at the energy plant	830 kW

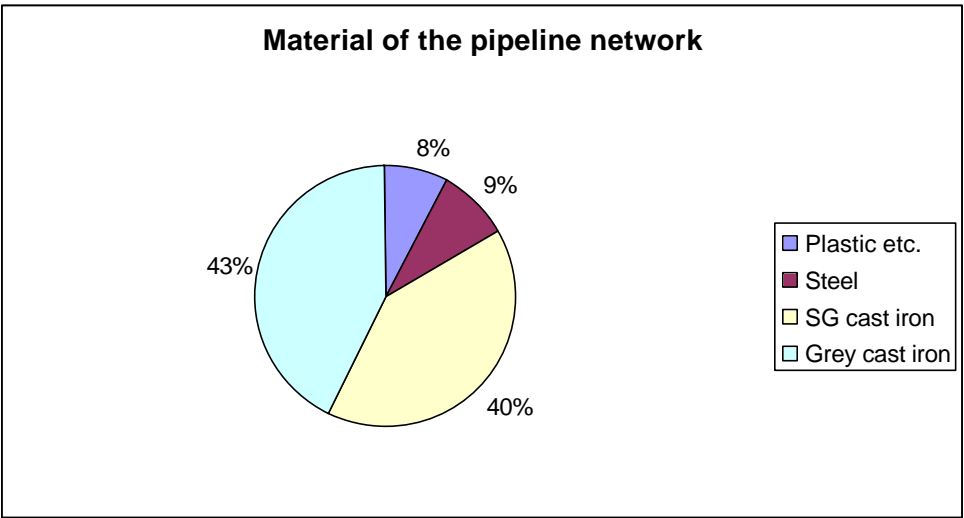
The main pipe lies inside the bedrock at the depth of 30-80 m.

Water quality in 1999.

Parameter	Raw water mg/l	Observed in Pitkääkoski after treatment mg/l	The present Finnish standard mg/l
Arsenic			
Lead			
Nitrates NO ₃ ⁻	0.23	0.24	6
Nitrites NO ₂ ⁻	<0.01	<0.01	0.03
Cyanides			
Aluminium	0.01	0.04	0.2
Ammonium NH ₄ ⁺	<0.01	0.13	0.4
Chlorides	5.5	6	100
Copper	0.005	0.001	1
Manganese	0.004	0.001	0.05
Iron	0.02	<0.01	0.2
Zinc			
Sulphates	3.0	7.5	50
pH	7.1	8.64	6.5-9.5
Fluoride			
Turbidity (NTU)	0.20	0.05	4
Colour(Pt mg/l)	15	<1	15
Total bacteria in 1 ml (20°)	53.7	0.1	100
Total nitrogen	0.41	0.52	-
Total phosphorus	0.008	0.004	0.1

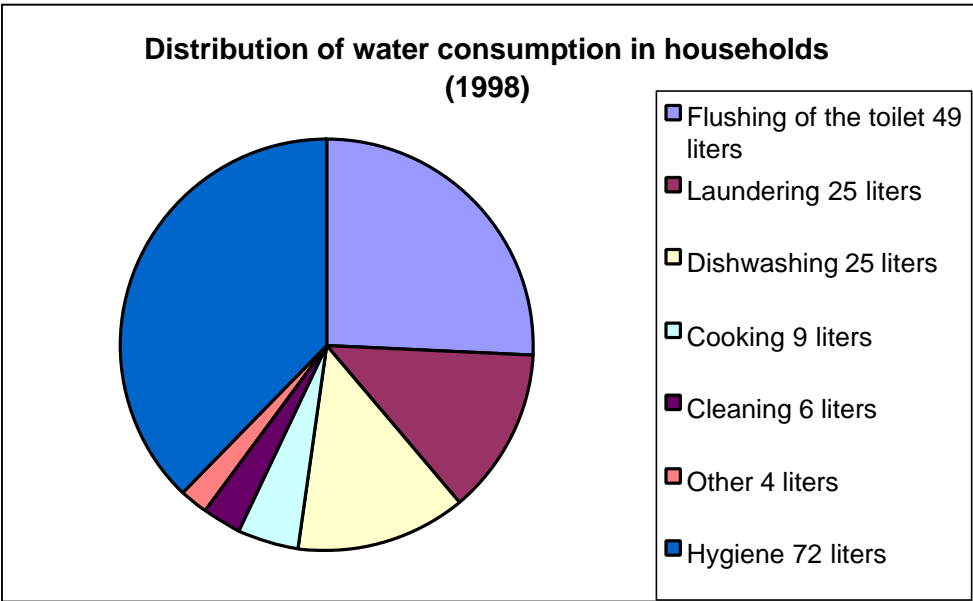
Total length of the water pipeline network (1998)
(DN 600-1000 mm)

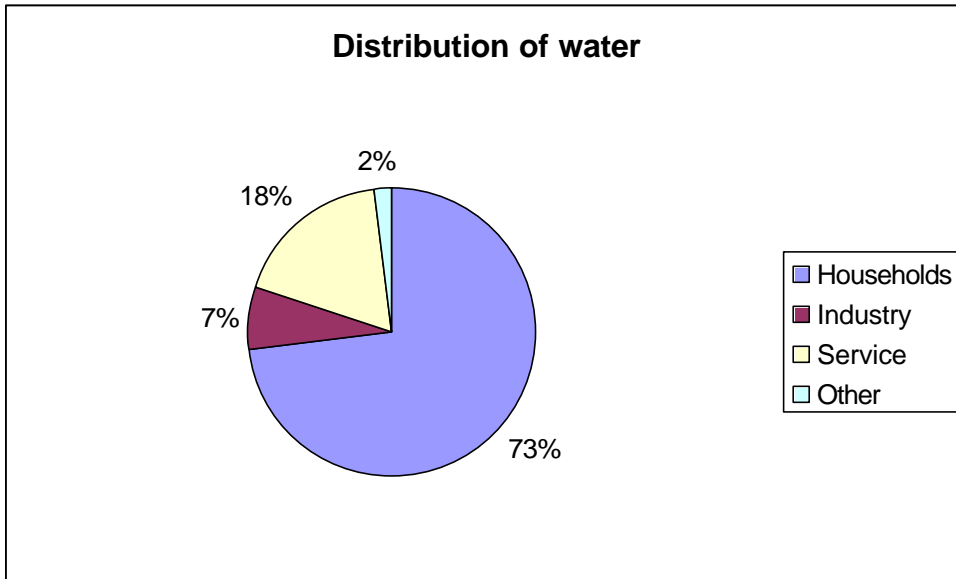
approx. 1100 km
approx. 120 km



Mean daily consumption in 1998

190 litres per capita (households only)





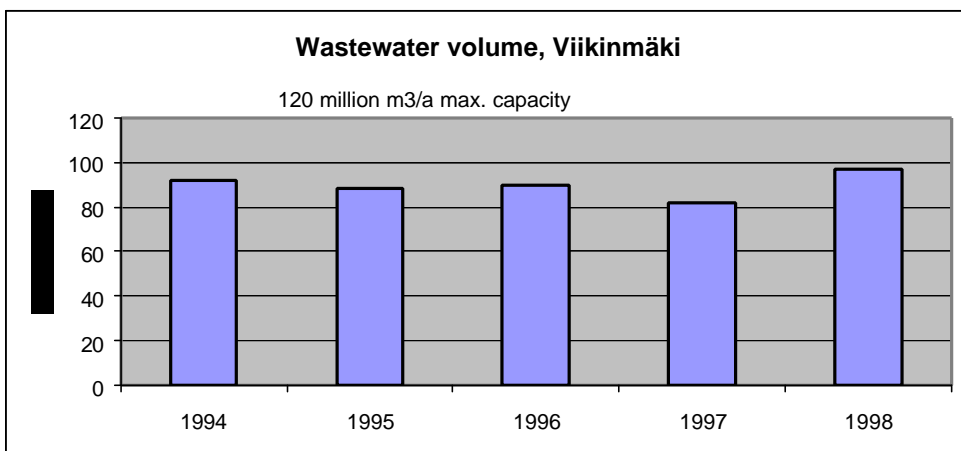
Loss of water (Leaks, spoilage, free distribution) 11%
 Number of leaks in 1998 144

Sewerage system

Sewer network: 1,760 km, of which wastewater sewers 44%
 rainwater sewers 41%
 combined sewers 15%

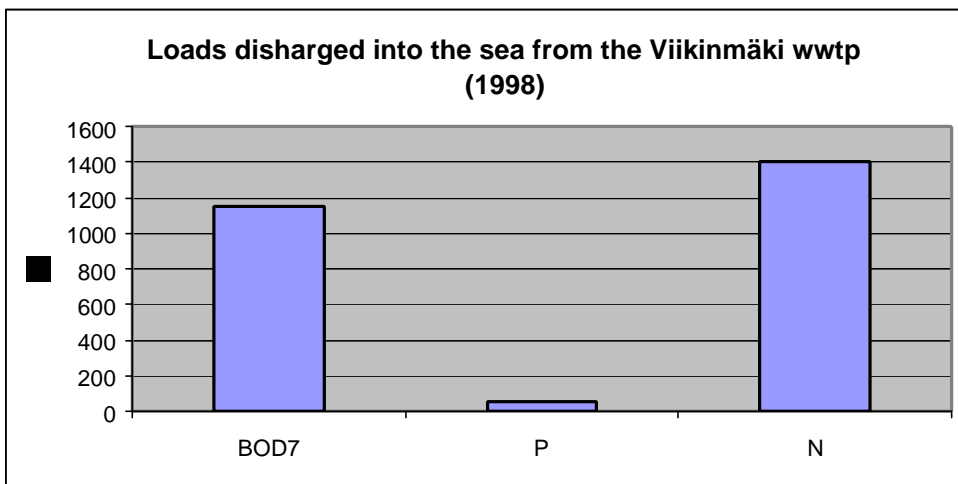
Pump stations 112

Total volume of generated wastewater 266,800 m³/d
 Treated amount 257,200 m³/d (96.4%)
 In the metropolitan area there are two treatment plants: in Viikinmäki (Helsinki) and in Suomenoja (Espoo).

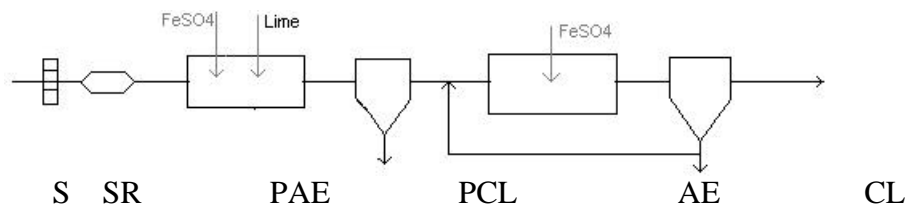


Loads discharged into the sea in 1998.

Source of pollution /	Flow (m ³ /d)	BOD ₇ (kg/d)	Total phosphorus (kg/d)	Total nitrogen (kg/d)
Incoming wastewater	266,800	41,580	1,413	8,940
Bypasses	330	800	22.7	320
Treated amount	257,200	2,410	115.7	3,570
Discharges into the sea		3,220	138.4	3,890
Refining efficiency %		92	90	57



Treatment process



Wastewater treatment process of the Viikinmäki plant: screen (S), sand remover (SR), preaeration (PAE), preclarification (PCL), aeration (AE), clarification (CL).

The plant is self-sufficient in heat production and it produces 65% of its electricity needs.

Treated wastewater is conducted via a 17-km-long rock tunnel 8 km off shore.