Introduction

Hamilton City Council is committed to providing safe, high quality drinking-water. Hamilton's multi-barrier water treatment, distribution and management systems ensure that when water reaches consumers it is free from harmful contaminants.

Water quality and safety is monitored at the Waiora Treatment Plant and in each of the seven supply zones in accordance with the Drinking-water Standards for New Zealand 2005 (Revised 2018) (DWSNZ). The DWSNZ specify the Maximum Acceptable Values (MAVs) of microorganisms, organic and inorganic chemicals that are of health significance and specify requirements that must be met during treatment and in the distribution. Hamilton City Council reports to the Waikato District Health Board Drinking-water Assessor who reviews and audits compliance data and information. The Ministry of Health gathers this information on a national basis to produce the Annual Report on Drinking-water Quality.

Hamilton City Council undertakes additional testing for chemicals of health significance or for those that can affect the aesthetic quality of water (taste, odour and appearance) in water leaving the plant and the reticulation. These results are not used for compliance purposes but provide additional assurance that Hamilton's water quality remains high. Comprehensive chemical monitoring results are included in this report, along with DWSNZ compliance summaries.

Hamilton City Council complied with the requirements of the DWSNZ and met duties under part 2A (Drinking water) of the Health Act 1956 for the latest annual compliance period (1st July 2020 to 30th June 2021).

Waiora Treatment Plant Compliance Monitoring

Continuous online monitoring is undertaken at the Waiora Treatment Plant to ensure the plant is operating effectively and within the requirements of the DWSNZ. This data also provides valuable information required to make operational decisions and to optimise the treatment process. Continuously monitored parameters include turbidity of water leaving filters and disinfection criteria like UV dose, chlorine concentration and pH.

Microbiological Compliance

Under the DWSNZ, bacterial disinfection compliance at Waiora Treatment Plant is achieved through the addition of chlorine. Protozoa removal (Giardia and Cryptosporidium) is based on the ability of different treatment barriers to reduce protozoa numbers. The Waiora Treatment Plant is required to achieve at least 3.0 log credit removal of protozoa from the source water. The treatment barriers that are in place at Waiora Treatment Plant are capable of providing 7.0 log credit removal.

Process	Possible protozoa log credits
Coagulation, Sedimentation and Filtration	3.0
Enhanced Individual Filtration	1.0
UV Disinfection	3.0

Chemical Compliance (P2a - Fluoride)

Hamilton City Council adds fluoride to drinking-water for dental health purposes. While online monitoring controls the process, samples are required to be taken under the DWSNZ to verify that concentrations of fluoride in water leaving the plant are well below the MAV.

Summary of Waiora Treatment Plant Annual Compliance Results

	Protozoa	Bacterial	Chemical (P2a)
	Achieved	Achieved	Achieved
2020 Q3 (July – Sept)	✓	✓	✓
2020 Q4 (Oct – Dec)	✓	✓	✓
2021 Q1 (Jan – Mar)	✓	✓	✓
2021 Q2 (Apr – June)	✓	✓	✓

Distribution Supply Zone Annual Compliance 2020/2021

Zone Compliance Monitoring

Under the DWSNZ, E. coli is used as the indicator for microbiological contamination in the distribution. This means that while E. coli itself will not generally cause illness, it provides an indication that water is contaminated with faecal material that could contain other illness causing microorganisms.

E. coli monitoring occurs at sites throughout the Hamilton supply network, including reservoirs. This routine testing also includes total coliforms and heterotrophic plate counts which are useful indicators of general microbiological quality of the water, as well as chlorine, pH and turbidity which are all important in understanding the demands on the chlorine disinfection residual in the network. Only E. coli and Total coliform data is used for compliance and the frequency of monitoring in each supply zone depends on the population size. The table below summarises the guideline or MAV values specified in the DWSNZ for these parameters (not available for Total coliforms or HPC).

Maximum Acceptable Values (MAVs) and Guideline Values (GV) from the DWSNZ

Determinand	Guideline Value	Maximum Acceptable Value	Unit
Chlorine Residual	0.6-1.2	5	mg/L
Turbidity	<2.5	-	NTU
pH	7.0-8.5	-	pH Units
E. coli	-	<1	MPN/100mL

The results for the key parameters measured during monitoring for bacterial compliance in each of the Hamilton City Council supply zones is summarised in the tables below.

Please note, the Claudelands Grandstand drinking-water fountain is registered as its own supply as the water from the Hamilton City Supply zone undergoes further treatment to reduce fluoride levels back to those found in the Waikato River (around 0.2mg/L). Chlorine is also added back into the water.

Hamilton City Council also provides a UV-treated drinking-water supply tap at Taitua Arboretum from a bore located at the Arboretum however this supply was not in service over the 2020/2021 year.

Distribution Supply Zone Annual Compliance 2020/2021

Hamilton City Council
Te kaunihera o Kirikiriroa

Hamilton City Supply Zone (includes Reservoirs) **Registered Population: 167,635**

638 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.30	0.11	6.50	<1	<1
Maximum	1.46	0.98	8.20	<1	<1
Average	0.60	0.42	7.65	no transgressions	

Temple View Supply Zone **Registered Population: 1,430**

84 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.39	0.12	6.70	<1	<1
Maximum	0.81	0.73	8.00	<1	<1
Average	0.63	0.37	7.50	no transgressions	

Ruakura/Ryburn Road Supply Zone **Registered Population: 151**

17 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.43	0.20	7.00	<1	<1
Maximum	0.70	0.69	7.90	<1	<1
Average	0.59	0.41	7.55	no transgressions	

SH26, Morrinsville Road Supply Zone **Registered Population: 57**

14 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.61	0.24	6.70	<1	<1
Maximum	0.76	0.77	7.90	<1	<1
Average	0.69	0.45	7.59	no transgressions	

Powells Road Supply Zone **Registered Population: 20**

18 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.45	0.18	6.80	<1	<1
Maximum	0.71	0.66	8.00	<1	10
Average	0.59	0.33	7.70	no transgressions	

Distribution Supply Zone Annual Compliance 2020/2021

Greenhill Road Supply Zone

Registered Population: 17

17 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	0.31	0.16	7.00	<1	<1
Maximum	0.76	0.93	8.00	<1	<1
Average	0.46	0.42	7.72	no transgressions	

Claudelands Grandstand Drinking Water Fountain

96 samples	Chlorine Residual (mg/L)	Turbidity (NTU)	pH	E. coli (MPN/100mL)	Total Coliforms (MPN/100mL)
Minimum	<0.08	0.18	6.90	<1	<1
Maximum	1.24	0.77	7.70	<1	<1
Average	0.64	0.43	7.29	no transgressions	

Chemical Analysis of Hamilton Drinking Water 2020/2021

The following reports are not used for DWNZ compliance but are used to monitor for potential changes in our water supply and provide useful data to assure consumers that the Hamilton drinking-water supply is safe to drink.

The first report relates to water as it is leaving the water treatment plant, with samples taken from the city bulk main as it is pumped out of the plant into the distribution system. The second report represents water in the distribution system, with samples taken from a site in Temple View and a site within Hamilton City supply zone.

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

The Guideline Values (GVs) and Maximum Acceptable Values (MAVs) are defined in the Ministry of Health Drinking-water Standards for New Zealand 2005 (Revised 2018). MAVs relate to parameters of health significance and should not be exceeded. GVs are the limits for aesthetic determinands that, if exceeded, may render the water unattractive to consumers.

BDL = Below Detection Limit

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Individual Tests											
True Hazen Colour	Hazen units	10	2	0	BDL	BDL	BDL			10	✓
pH	pH units	0.1	4	4	7.0	7.7	7.3			7.0-8.5	✓
Total Alkalinity	g/m³ as $CaCO_3$	1.0	4	4	22.3	37.1	32.5				
Total Hardness	g/m³ as $CaCO_3$	1.0	3	3	39.6	42.9	40.9			100-300	✓
Electrical Conductivity (EC)	mS/m	0.1	2	2	17.6	18.5	18.1				
Total Dissolved Solids (TDS)	g/m³	10	3	3	122	151	140			1000	✓
Dissolved Calcium	g/m³	0.05	2	2	11.37	12.24	11.81				
Total Iodine	g/m³	0.001	2	1	<0.0010	0.0022	≤0.00161				
Dissolved Iron	g/m³	0.02	4	1	<0.02	0.04	≤0.0255				
Dissolved Magnesium	g/m³	0.02	2	2	2.71	3.01	2.86				
Dissolved Manganese	g/m³	0.0005	4	0	BDL	BDL	BDL				
Dissolved Potassium	g/m³	0.05	4	4	3.11	3.40	3.20				
Dissolved Sodium	g/m³	0.02	2	2	17.3	18.2	17.8				
Bromide	g/m³	0.05	2	0	BDL	BDL	BDL				
Bromate	g/m³	0.005	2	0	BDL	BDL	BDL	0.01	✓		
Total Cyanide	g/m³	0.001	2	0	BDL	BDL	BDL	0.6	✓		
Chloride	g/m³	0.5	3	3	16.5	18.2	17.4			250	✓
Chlorite	g/m³	0.005	2	0	BDL	BDL	BDL	0.8	✓		
Chlorate	g/m³	0.005	2	0	BDL	BDL	BDL	0.8	✓		
Total Ammoniacal-N	g/m³	0.010	3	0	BDL	BDL	BDL				
Nitrite-N	g/m³	0.002	4	0	BDL	BDL	BDL	0.2	✓		
Nitrate-N	g/m³	0.001	3	3	0.224	0.443	0.326	50	✓		
Nitrate-N + Nitrite-N	g/m³	0.002	3	3	0.224	0.443	0.326				
Reactive Silica	g/m³ as SiO_2	0.1	3	3	34.62	39.96	36.82				

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Un-ionised hydrogen sulphide	g/m³	0.002	2	0	BDL	BDL	BDL				
Total Sulphide	g/m³	0.002	2	0	BDL	BDL	BDL				
Sulphate	g/m³	0.5	3	3	20.0	24.1	21.9			250	✓
Dissolved Organic Carbon (DOC)	g/m³	0.5	2	2	1.0	1.4	1.2				
Total Organic Carbon (TOC)	g/m³	0.5	4	4	0.7	1.4	1.2				
Trace Metals											
Total Aluminium	g/m³	0.0032	4	4	0.0049	0.0227	0.0164			0.1	✓
Total Antimony	g/m³	0.00021	4	4	0.00046	0.00060	0.00052	0.02	✓		
Total Arsenic	g/m³	0.0011	10	10	BDL	0.00584	≤0.00228	0.01	✓		
Total Barium	g/m³	0.0053	3	3	0.0144	0.0180	0.0163	0.7	✓		
Total Beryllium	g/m³	0.00011	2	0	BDL	BDL	BDL				
Total Boron	g/m³	0.0053	2	2	0.227	0.238	0.233	1.4	✓		
Total Cadmium	g/m³	0.000053	0	0	BDL	BDL	BDL	0.004	✓		
Total Calcium	g/m³	0.053	4	4	6.53	11.93	10.17				
Total Chromium	g/m³	0.00053	2	1	BDL	0.00067	≤0.00060	0.05	✓		
Total Copper	g/m³	0.00053	4	1	BDL	0.00056	≤0.00054	2.0	✓	1	✓
Total Iron	g/m³	0.021	3	1	BDL	0.021	≤0.021			0.2	✓
Total Lead	g/m³	0.00011	4	1	BDL	0.000488	≤0.000205	0.01	✓		
Total Lithium	g/m³	0.00021	2	2	0.074	0.083	0.078				
Total Magnesium	g/m³	0.021	3	3	2.77	3.13	2.96				
Total Manganese	g/m³	0.00053	3	3	0.00073	0.00089	0.000817	0.4	✓	0.04	✓
Total Mercury	g/m³	0.00008	3	0	BDL	BDL	BDL	0.007	✓		
Total Molybdenum	g/m³	0.00021	3	3	0.00036	0.00048	0.000423	0.07	✓		
Total Nickel	g/m³	0.00053	3	0	BDL	BDL	BDL	0.08	✓		
Total Potassium	g/m³	0.053	2	2	3.0	3.2	3.1				
Total Selenium	g/m³	0.0011	3	0	BDL	BDL	BDL				
Total Silver	g/m³	0.00011	2	0	BDL	BDL	BDL				
Total Sodium	g/m³	0.021	3	3	17.6	19.8	18.7			200	✓
Total Tin	g/m³	0.00053	2	0	BDL	BDL	BDL				
Total Uranium	g/m³	0.000021	2	0	BDL	BDL	BDL				
Total Zinc	g/m³	0.0011	4	3	BDL	0.00324	≤0.00177			1.5	✓

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Halogenated Acetic Acids											
Bromochloroacetic acid	g/m³	0.004	2	2	BDL	BDL	BDL				
Dibromoacetic acid	g/m³	0.004	2	2	BDL	BDL	BDL				
Dichloroacetic acid	g/m³	0.004	2	2	BDL	BDL	BDL	0.05	✓		
Monobromoacetic acid	g/m³	0.004	2	2	BDL	BDL	BDL				
Monochloroacetic acid	g/m³	0.005	2	2	BDL	BDL	BDL	0.02	✓		
Trichloroacetic acid	g/m³	0.004	2	2	BDL	BDL	BDL	0.2	✓		
Total HAA	g/m³	0.03	2	2	BDL	BDL	BDL				
Sum of HAA DWSNZ MAV ratios		0.3	2	2	BDL	BDL	BDL				
Halogenated Volatile Disinfection By-Products											
Sum of Haloacetonitriles DWSNZ MAV ratios			2	0	BDL	BDL	BDL				
Bromochloroacetonitrile	g/m³	0.0002	2	1	BDL	0.00057	≤0.00049				
Bromodichloromethane	g/m³	0.00007	2	2	0.0009	0.0033	0.0021	0.06	✓		
Bromoform (tribromomethane)	g/m³	0.00007	2	2	0.0005	0.0011	0.0008	0.1	✓		
Carbon tetrachloride	g/m³	0.0007	2	0	BDL	BDL	BDL	0.005	✓		
Chloroform (Trichloromethane)	g/m³	0.007	2	0	BDL	BDL	BDL	0.4	✓		
Chloropicrin	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2-Dibromo-3-chloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL	0.001	✓		
Dibromoacetonitrile	g/m³	0.0003	2	2	0.0006	0.0006	0.0006	0.08	✓		
Dibromochloromethane	g/m³	0.00007	2	2	0.0013	0.0040	0.0026	0.15	✓		
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	0.0003	2	0	BDL	BDL	BDL	0.0004	✓		
1,1-Dichloro-2-propanone	g/m³	0.0003	2	0	BDL	BDL	BDL				
Dichloroacetonitrile	g/m³	0.0003	2	0	BDL	BDL	BDL	0.02	✓		
Tetrachloroethene (tetrachloroethylene)	g/m³	0.0002	2	0	BDL	BDL	BDL	0.05	✓		
1,1,1-Trichloro-2-propanone	g/m³	0.0003	2	0	BDL	BDL	BDL				
Trichloroacetonitrile	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1,1-Trichloroethane	g/m³	0.0002	2	0	BDL	BDL	BDL				
Trichloroethene (trichloroethylene)	g/m³	0.00007	2	0	BDL	BDL	BDL	0.02	✓		
Total Trihalomethanes (THM)	g/m³	0.007	2	1	BDL	0.008	≤0.015				

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Chloroform MAV ratio	g/m³	0.018	2	0	BDL	BDL	BDL				
Bromodichloromethane MAV ratio		0.002	2	2	0.01	0.06	0.03				
Dibromochloromethane MAV ratio		0.001	2	2	0.01	0.03	0.02				
Bromoform MAV ratio			2	2	0.00	0.01	0.01				
Sum of THM DWSNZ MAV ratios			2	2	0.03	0.09	0.06	1	✓		
Pesticides											
Alachlor	g/m³	0.00004	2	0	BDL	BDL	BDL	0.02	✓		
Aldrin	g/m³	0.000005	2	0	BDL	BDL	BDL				
Atrazine	g/m³	0.00004	2	0	BDL	BDL	BDL	0.002	✓		
Atrazine-desethyl	g/m³	0.00004	2	0	BDL	BDL	BDL				
Atrazine-desisopropyl	g/m³	0.00008	2	0	BDL	BDL	BDL				
Azinphos-methyl	g/m³	0.00008	2	0	BDL	BDL	BDL	0.004	✓		
gamma-BHC (Lindane)	g/m³	0.00001	2	0	BDL	BDL	BDL	0.002	✓		
Bromacil	g/m³	0.00004	2	0	BDL	BDL	BDL	0.4	✓		
Carbofuran	g/m³	0.00004	2	0	BDL	BDL	BDL	0.008	✓		
cis-Chlordane	g/m³	0.000005	2	0	BDL	BDL	BDL				
trans-Chlordane	g/m³	0.000005	2	0	BDL	BDL	BDL				
Chlorpyrifos	g/m³	0.00004	2	0	BDL	BDL	BDL	0.04	✓		
Chlorpyrifos-methyl	g/m³	0.00004	2	0	BDL	BDL	BDL				
Chlortoluron	g/m³	0.00008	2	0	BDL	BDL	BDL	0.04	✓		
Cyanazine	g/m³	0.00004	2	0	BDL	BDL	BDL	0.0007	✓		
2,4'-DDD	g/m³	0.00001	2	0	BDL	BDL	BDL				
4,4'-DDD	g/m³	0.00001	2	0	BDL	BDL	BDL				
2,4'-DDE	g/m³	0.00001	2	0	BDL	BDL	BDL				
4,4'-DDE	g/m³	0.00001	2	0	BDL	BDL	BDL				
2,4'-DDT	g/m³	0.00001	2	0	BDL	BDL	BDL				
4,4'-DDT	g/m³	0.00001	2	0	BDL	BDL	BDL				
Diazinon	g/m³	0.00002	2	0	BDL	BDL	BDL				
Dieldrin	g/m³	0.000005	2	0	BDL	BDL	BDL				

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Dimethoate	g/m³	0.00008	2	0	BDL	BDL	BDL	0.008	✓		
Diuron	g/m³	0.00004	2	0	BDL	BDL	BDL	0.02	✓		
Endrin	g/m³	0.000005	2	0	BDL	BDL	BDL	0.001	✓		
Endrin aldehyde	g/m³	0.000005	1	0	BDL	BDL	BDL				
Endrin ketone	g/m³	0.00001	2	0	BDL	BDL	BDL				
Heptachlor	g/m³	0.000005	2	0	BDL	BDL	BDL				
Heptachlor epoxide	g/m³	0.000005	2	0	BDL	BDL	BDL				
Hexachlorobenzene	g/m³	0.00004	2	0	BDL	BDL	BDL				
Hexazinone	g/m³	0.00002	2	0	BDL	BDL	BDL	0.4	✓		
Malathion	g/m³	0.00004	2	0	BDL	BDL	BDL				
Metalaxyl	g/m³	0.00004	2	0	BDL	BDL	BDL	0.1	✓		
Methoxychlor	g/m³	0.000005	2	0	BDL	BDL	BDL	0.02	✓		
Metolachlor	g/m³	0.00004	2	0	BDL	BDL	BDL	0.01	✓		
Metribuzin	g/m³	0.00004	2	0	BDL	BDL	BDL	0.07	✓		
Molinate	g/m³	0.00008	2	0	BDL	BDL	BDL	0.007	✓		
Oxadiazon	g/m³	0.00004	2	0	BDL	BDL	BDL	0.2	✓		
Parathion-methyl	g/m³	0.00004	2	0	BDL	BDL	BDL				
Pendimethalin	g/m³	0.00004	2	0	BDL	BDL	BDL	0.02	✓		
Permethrin	g/m³	0.00002	2	0	BDL	BDL	BDL				
Pirimiphos-methyl	g/m³	0.00004	2	0	BDL	BDL	BDL	0.1	✓		
Procymidone	g/m³	0.00004	2	0	BDL	BDL	BDL	0.7	✓		
Prometryn	g/m³	0.00002	2	0	BDL	BDL	BDL				
Propanil	g/m³	0.0002	2	0	BDL	BDL	BDL				
Propazine	g/m³	0.00002	2	0	BDL	BDL	BDL	0.07	✓		
Pyriproxyfen	g/m³	0.00004	2	0	BDL	BDL	BDL	0.4	✓		
Simazine	g/m³	0.00004	2	0	BDL	BDL	BDL	0.002	✓		
Terbacil	g/m³	0.00004	2	0	BDL	BDL	BDL	0.04	✓		
Terbuthylazine	g/m³	0.00002	2	0	BDL	BDL	BDL	0.008	✓		

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
Terbuthylazine-desethyl	g/m³	0.00004	2	0	BDL	BDL	BDL				
Thiabendazole	g/m³	0.0002	2	0	BDL	BDL	BDL	0.4	✓		
Total Chlordane [(cis+trans)*100/42]	g/m³	0.00002	2	0	BDL	BDL	BDL				
Trifluralin	g/m³	0.00004	1	0	BDL	BDL	BDL	0.03	✓		
Volatile Organic Compounds - BTEX											
Benzene	g/m³	0.0003	2	0	BDL	BDL	BDL	0.01	✓		
Toluene	g/m³	0.0003	2	0	BDL	BDL	BDL	0.8	✓	0.03	✓
Ethylbenzene	g/m³	0.0005	2	0	BDL	BDL	BDL	0.3	✓	0.002	✓
m&p-Xylene	g/m³	0.0005	2	0	BDL	BDL	BDL				
o-Xylene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Halogenated Aliphatics											
Bromomethane (Methyl Bromide)	g/m³	0.0003	2	0	BDL	BDL	BDL				
Carbon tetrachloride	g/m³	0.0003	2	0	BDL	BDL	BDL	0.005	✓		
Chloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
Chloromethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2-Dibromo-3-chloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL	0.001	✓		
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	0.0003	2	0	BDL	BDL	BDL	0.0004	✓		
Dibromomethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
Dichlorodifluoromethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1-Dichloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2-Dichloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL	0.03	✓		
1,1-Dichloroethene	g/m³	0.0003	2	0	BDL	BDL	BDL				
cis-1,2-Dichloroethene	g/m³	0.0003	2	0	BDL	BDL	BDL				
trans-1,2-Dichloroethene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Dichloromethane (methylene chloride)	g/m³	0.010	2	0	BDL	BDL	BDL	0.02	✓		
1,2-Dichloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL	0.05	✓		
1,3-Dichloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1-Dichloropropene	g/m³	0.0003	2	0	BDL	BDL	BDL				
cis-1,3-Dichloropropene	g/m³	0.0005	2	0	BDL	BDL	BDL				

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
trans-1,3-Dichloropropene	g/m³	0.0005	2	0	BDL	BDL	BDL				
Hexachlorobutadiene	g/m³	0.0003	2	0	BDL	BDL	BDL	0.0007	✓		
1,1,1,2-Tetrachloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1,2,2-Tetrachloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
Tetrachloroethene (tetrachloroethylene)	g/m³	0.0003	2	0	BDL	BDL	BDL	0.05	✓		
1,1,1-Trichloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1,2-Trichloroethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
Trichloroethene (trichloroethylene)	g/m³	0.0003	2	0	BDL	BDL	BDL	0.02	✓		
Trichlorofluoromethane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2,3-Trichloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1,2-Trichlorotrifluoroethane (Freon113)	g/m³	0.0003	2	0	BDL	BDL	BDL				
Vinyl chloride	g/m³	0.0003	2	0	BDL	BDL	BDL	0.0003	✓		
Volatile Organic Compounds - Halogenated Aromatics											
Bromobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Chlorobenzene (monochlorobenzene)	g/m³	0.0003	2	0	BDL	BDL	BDL				
2-Chlorotoluene	g/m³	0.0003	2	0	BDL	BDL	BDL				
4-Chlorotoluene	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2-Dichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL	1.5	✓	0.001	✓
1,3-Dichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,4-Dichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL	0.4	✓	0.0003	✓
1,2,3-Trichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL			0.01	✓
1,2,4-Trichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL			0.005	✓
1,3,5-Trichlorobenzene	g/m³	0.0003	2	0	BDL	BDL	BDL			0.05	✓
Volatile Organic Compounds - Monoaromatic Hydrocarbons											
n-Butylbenzene	g/m³	0.0005	2	0	BDL	BDL	BDL				
tert-Butylbenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Isopropylbenzene (Cumene)	g/m³	0.0005	2	0	BDL	BDL	BDL				
4-Isopropyltoluene (p-Cymene)	g/m³	0.0005	2	0	BDL	BDL	BDL				

Chemical Analysis of Water Leaving Waiora Treatment Plant 2020/2021

Test	Unit	Detection Limit	No. Samples	No. of Detectable results	Min.	Max.	Average	MAV	Complies	GV	Meets
n-Propylbenzene	g/m³	0.0005	2	0	BDL	BDL	BDL				
sec-Butylbenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Styrene	g/m³	0.0005	2	0	BDL	BDL	BDL	0.03	✓	0.004	✓
1,2,4-Trimethylbenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,3,5-Trimethylbenzene	g/m³	0.0003	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Ketones											
Acetone	g/m³	0.05	2	0	BDL	BDL	BDL				
2-Butanone (MEK)	g/m³	0.05	2	0	BDL	BDL	BDL				
Methyl tert-butylether (MTBE)	g/m³	0.0003	2	0	BDL	BDL	BDL				
4-Methylpentan-2-one (MIBK)	g/m³	0.010	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Trihalomethanes											
Bromodichloromethane	g/m³	0.0003	2	2	0.0017	0.0031	0.0024	0.06	✓		
Bromoform (tribromomethane)	g/m³	0.0003	2	2	0.0008	0.0011	0.0009	0.1	✓		
Chloroform (Trichloromethane)	g/m³	0.0003	2	2	0.0008	0.0017	0.0012	0.4	✓		
Dibromochloromethane	g/m³	0.0003	2	2	0.0026	0.0040	0.0033				
Other Volatile Organic Compounds											
Carbon disulphide	g/m³	0.0005	2	0	BDL	BDL	BDL				
Naphthalene	g/m³	0.0005	2	0	BDL	BDL	BDL				

Chemical Analysis of Hamilton Water Supply Zones 2020/2021

The following report is for samples taken in the Hamilton City supply zone and the Temple View supply zone. The Guideline Values (GVs) and Maximum Acceptable Values (MAVs) are defined in the Ministry of Health Drinking-water Standards for New Zealand 2005 (Revised 2018). MAVs relate to parameters of health significance and should not be exceeded. GVs are the limits for aesthetic determinands that, if exceeded, may make the water unattractive to consumers.

BDL = Below Detection Limit

Test	Unit	Detection Limit	No. of Samples	No. of Detectable Results	Min.	Max.	Average	MAV	Complies	GV	Meets
Individual Tests											
Apparent Hazen Colour	Hazen units	10	2	0	BDL	BDL	BDL				
Total Hardness	g/m^3 as $CaCO_3$	1.0	2	2	41.9	44.2	43.05			200	✓
Total Dissolved Solids (TDS)	g/m^3	10	1	1	139	139	139				
Total Ammoniacal-N	g/m^3	0.010	2	0	BDL	BDL	BDL				
Nitrite-N	g/m^3	0.002	2	0	BDL	BDL	BDL	0.2	✓		
Nitrate-N	g/m^3	0.001	2	2	0.201	0.455	0.33	50	✓		
Nitrate-N + Nitrite-N	g/m^3	0.002	2	2	0.201	0.455	0.33				
Reactive Silica	g/m^3 as SiO_2	0.1	2	2	34.31	34.99	34.65				
Trace Metals											
Total Aluminium	g/m^3	0.0032	2	2	0.0149	0.0226	0.0188			0.1	✓
Total Antimony	g/m^3	0.00021	2	2	0.00044	0.00063	0.00054	0.02	✓		
Total Arsenic	g/m^3	0.0011	2	1	0.00321	0.00321	0.00321	0.01	✓		
Total Barium	g/m^3	0.0053	2	2	0.0130	0.0162	0.0146	0.7	✓		
Total Beryllium	g/m^3	0.00011	2	0	BDL	BDL	BDL				
Total Boron	g/m^3	0.0053	2	2	0.223	0.264	0.24	1.4	✓		
Total Cadmium	g/m^3	0.000053	2	0	BDL	BDL	BDL	0.004	✓		
Total Calcium	g/m^3	0.053	2	2	12.37	13.16	12.77				
Total Chromium	g/m^3	0.00053	2	0	BDL	BDL	BDL	0.05	✓		
Total Copper	g/m^3	0.00053	2	2	0.0016	0.0020	0.0018	2.0	✓	1.0	✓
Total Iron	g/m^3	0.021	2	0	BDL	BDL	BDL			0.2	✓
Total Lead	g/m^3	0.00011	2	1	BDL	0.00039	≤0.00025	0.01	✓		
Total Lithium	g/m^3	0.00021	2	2	0.0715	0.088	0.08				
Total Magnesium	g/m^3	0.021	2	2	2.68	2.76	2.72				
Total Manganese	g/m^3	0.00053	2	2	0.00062	0.00088	0.00	0.4	✓	0.04	✓
Total Mercury	g/m^3	0.00008	2	0	BDL	BDL	BDL	0.007	✓		
Total Molybdenum	g/m^3	0.00021	2	1	BDL	0.0003	≤0.00026	0.07	✓		

Chemical Analysis of Hamilton Water Supply Zones 2020/2021

Test	Unit	Detection Limit	No. of Samples	No. of Detectable Results	Min.	Max.	Average	MAV	Complies	GV	Meets
Total Nickel	g/m³	0.00053	2	0	BDL	BDL	BDL	0.08	✓		
Total Potassium	g/m³	0.053	2	2	3.18	3.2	3.19				
Total Selenium	g/m³	0.0011	2	0	BDL	BDL	BDL	0.01	✓		
Total Silver	g/m³	0.00011	2	0	BDL	BDL	BDL				
Total Sodium	g/m³	0.021	2	2	17.5	20.0	18.8			200	✓
Total Tin	g/m³	0.00053	2	0	BDL	BDL	BDL				
Total Uranium	g/m³	0.000021	2	0	BDL	BDL	BDL	0.02	✓		
Total Zinc	g/m³	0.0011	2	2	0.00128	0.00234	0.00181			1.5	✓
Halogenated Volatile Disinfection By-Products											
Sum of Haloacetonitriles MAV ratios	ratio		2	2	0.030	0.041	0.036				
Bromochloroacetonitrile	g/m³	0.00014	2	2	0.00077	0.00122	0.00100				
Bromodichloromethane	g/m³	0.00007	2	2	0.0052	0.0074	0.00630	0.06	✓		
Bromoform (tribromomethane)	g/m³	0.00007	2	2	0.00102	0.00272	0.00187	0.1	✓		
Carbon tetrachloride	g/m³	0.0007	2	0	BDL	BDL	BDL	0.005	✓		
Chloroform (Trichloromethane)	g/m³	0.007	2	0	BDL	BDL	BDL	0.4	✓		
Chloropicrin	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,2-Dibromo-3-chloropropane	g/m³	0.0003	2	0	BDL	BDL	BDL	0.001	✓		
Dibromoacetonitrile	g/m³	0.0003	2	2	0.0005	0.0015	0.0010	0.02	✓		
Dibromochloromethane	g/m³	0.00007	2	2	0.0051	0.0088	0.0070	0.15	✓		
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	0.0003	2	0	BDL	BDL	BDL	0.0004	✓		
1,1-Dichloro-2-propanone	g/m³	0.0003	2	0	BDL	BDL	BDL				
Dichloroacetonitrile	g/m³	0.0003	2	2	0.00044	0.00047	0.00046	0.02	✓		
Tetrachloroethene (tetrachloroethylene)	g/m³	0.0002	2	0	BDL	BDL	BDL	0.05	✓		
1,1,1-Trichloro-2-propanone	g/m³	0.0003	2	1	BDL	0.0005	≤0.00045				
Trichloroacetonitrile	g/m³	0.0003	2	0	BDL	BDL	BDL				
1,1,1-Trichloroethane	g/m³	0.0002	2	0	BDL	BDL	BDL				
Trichloroethene (trichloroethylene)	g/m³	0.00007	2	0	BDL	BDL	BDL	0.02	✓		
Total Trihalomethanes (THM)	g/m³	0.007	2	2	0.0143	0.0233	0.0188				
Chloroform MAV ratio	ratio	0.018	2	0	BDL	BDL	BDL				
Bromodichloromethane MAV ratio	ratio	0.002	2	2	0.086	0.124	0.105				

Chemical Analysis of Hamilton Water Supply Zones 2020/2021

Test	Unit	Detection Limit	No. of Samples	No. of Detectable Results	Min.	Max.	Average	MAV	Complies	GV	Meets
Dibromochloromethane MAV ratio	ratio	0.001	2	2	0.034	0.059	0.047				
Bromoform MAV ratio	ratio		2	2	0.010	0.027	0.019				
Sum of THM MAV ratios (DWSNZ)	ratio		2	2	0.138	0.220	0.179	1	✓		
Volatile Organic Compounds - BTEX											
Benzene	g/m^3	0.003	2	0	BDL	BDL	BDL	0.01	✓		
Toluene	g/m^3	0.005	2	0	BDL	BDL	BDL	0.8	✓	0.03	✓
Ethylbenzene	g/m^3	0.003	2	0	BDL	BDL	BDL	0.3	✓	0.002	✓
m&p-Xylene	g/m^3	0.005	2	0	BDL	BDL	BDL				
o-Xylene	g/m^3	0.003	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Halogenated Aliphatics											
Bromomethane (Methyl Bromide)	g/m^3	0.003	2	0	BDL	BDL	BDL				
Carbon tetrachloride	g/m^3	0.003	2	0	BDL	BDL	BDL	0.005	✓		
Chloroethane	g/m^3	0.003	2	0	BDL	BDL	BDL				
Chloromethane	g/m^3	0.003	2	0	BDL	BDL	BDL				
1,2-Dibromo-3-chloropropane	g/m^3	0.003	2	0	BDL	BDL	BDL	0.001	✓		
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m^3	0.003	2	0	BDL	BDL	BDL	0.0004	✓		
Dibromomethane	g/m^3	0.003	2	0	BDL	BDL	BDL				
Dichlorodifluoromethane	g/m^3	0.003	2	0	BDL	BDL	BDL				
1,1-Dichloroethane	g/m^3	0.003	2	0	BDL	BDL	BDL				
1,2-Dichloroethane	g/m^3	0.003	2	0	BDL	BDL	BDL	0.03	✓		
1,1-Dichloroethene	g/m^3	0.003	2	0	BDL	BDL	BDL				
cis-1,2-Dichloroethene	g/m^3	0.003	2	0	BDL	BDL	BDL				
trans-1,2-Dichloroethene	g/m^3	0.003	2	0	BDL	BDL	BDL				
Dichloromethane (methylene chloride)	g/m^3	0.003	2	0	BDL	BDL	BDL	0.02	✓		
1,2-Dichloropropane	g/m^3	0.003	2	0	BDL	BDL	BDL	0.05	✓		
1,3-Dichloropropane	g/m^3	0.003	2	0	BDL	BDL	BDL				
1,1-Dichloropropene	g/m^3	0.003	2	0	BDL	BDL	BDL				
cis-1,3-Dichloropropene	g/m^3	0.005	2	0	BDL	BDL	BDL				
trans-1,3-Dichloropropene	g/m^3	0.005	2	0	BDL	BDL	BDL				

Chemical Analysis of Hamilton Water Supply Zones 2020/2021

Test	Unit	Detection Limit	No. of Samples	No. of Detectable Results	Min.	Max.	Average	MAV	Complies	GV	Meets
Hexachlorobutadiene	g/m³	0.003	2	0	BDL	BDL	BDL	0.0007			
1,1,1,2-Tetrachloroethane	g/m³	0.003	2	0	BDL	BDL	BDL				
1,1,2,2-Tetrachloroethane	g/m³	0.003	2	0	BDL	BDL	BDL				
Tetrachloroethene (tetrachloroethylene)	g/m³	0.003	2	0	BDL	BDL	BDL	0.05	✓		
1,1,1-Trichloroethane	g/m³	0.003	2	0	BDL	BDL	BDL				
1,1,2-Trichloroethane	g/m³	0.003	2	0	BDL	BDL	BDL				
Trichloroethene (trichloroethylene)	g/m³	0.003	2	0	BDL	BDL	BDL	0.02	✓		
Trichlorofluoromethane	g/m³	0.003	2	0	BDL	BDL	BDL				
1,2,3-Trichloropropane	g/m³	0.003	2	0	BDL	BDL	BDL				
1,1,2-Trichlorotrifluoroethane (Freon 113)	g/m³	0.003	2	0	BDL	BDL	BDL				
Vinyl chloride	g/m³	0.003	2	0	BDL	BDL	BDL	0.0003			
Volatile Organic Compounds - Halogenated Aromatics											
Bromobenzene	g/m³	0.003	2	0	BDL	BDL	BDL				
Chlorobenzene (monochlorobenzene)	g/m³	0.003	2	0	BDL	BDL	BDL			0.01	✓
2-Chlorotoluene	g/m³	0.003	2	0	BDL	BDL	BDL				
4-Chlorotoluene	g/m³	0.003	2	0	BDL	BDL	BDL				
1,2-Dichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL	1.5	✓	0.001	✓
1,3-Dichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL				
1,4-Dichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL	0.4	✓	0.0003	✓
1,2,3-Trichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL			0.01	✓
1,2,4-Trichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL			0.005	✓
1,3,5-Trichlorobenzene	g/m³	0.003	2	0	BDL	BDL	BDL			0.05	✓
Volatile Organic Compounds - Monoaromatic Hydrocarbons											
n-Butylbenzene	g/m³	0.005	2	0	BDL	BDL	BDL				
tert-Butylbenzene	g/m³	0.003	2	0	BDL	BDL	BDL				
Isopropylbenzene (Cumene)	g/m³	0.005	2	0	BDL	BDL	BDL				
4-Isopropyltoluene (p-Cymene)	g/m³	0.003	2	0	BDL	BDL	BDL				
n-Propylbenzene	g/m³	0.005	2	0	BDL	BDL	BDL				
sec-Butylbenzene	g/m³	0.003	2	0	BDL	BDL	BDL				

Chemical Analysis of Hamilton Water Supply Zones 2020/2021

Test	Unit	Detection Limit	No. of Samples	No. of Detectable Results	Min.	Max.	Average	MAV	Complies	GV	Meets
Styrene	g/m^3	0.005	2	0	BDL	BDL	BDL	0.03	✓	0.004	✓
1,2,4-Trimethylbenzene	g/m^3	0.003	2	0	BDL	BDL	BDL				
1,3,5-Trimethylbenzene	g/m^3	0.003	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Ketones											
Acetone	g/m^3	0.5	2	0	BDL	BDL	BDL				
2-Butanone (MEK)	g/m^3	0.5	2	0	BDL	BDL	BDL				
Methyl tert-butylether (MTBE)	g/m^3	0.003	2	0	BDL	BDL	BDL				
4-Methylpentan-2-one (MIBK)	g/m^3	0.10	2	0	BDL	BDL	BDL				
Volatile Organic Compounds - Trihalomethanes											
Bromodichloromethane	g/m^3	0.005	2	2	0.0054	0.0065	0.0060	0.06	✓		
Bromoform (tribromomethane)	g/m^3	0.005	2	2	0.0010	0.0022	0.0016	0.1	✓		
Chloroform (trichloromethane)	g/m^3	0.005	2	2	0.0035	0.0035	0.0035	0.4	✓		
Dibromochloromethane	g/m^3	0.005	2	2	0.0056	0.0079	0.0068	0.15	✓		
Other Volatile Organic Compounds											
Carbon disulphide	g/m^3	0.005			BDL	BDL	BDL				
Naphthalene	g/m^3	0.005			BDL	BDL	BDL				