

**Quarterly Water Quality Report
for the
Department of Health**



**Report to the Department of Health
by
Country Heights Water Pty Ltd
for the period
1 July 2024 to 30 September 2024**

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1.0 Water Provider Information

Water Provider Contact Details	
Name of Company	Country Heights Water Pty Ltd ABN 72 624 317 746
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Company Phone	(+61) 449 898 511
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DoH Liaison Officer	Carel van der Westhuizen Pendragon Environmental Solutions
DoH Liaison Officer e-mail	carel@pendragonenvironmental.com

Water Treatment and Distribution

Water from the Leederville confined aquifer is pumped into a 375-kilolitre raw water tank from where the water passes through a sediment filter (which produces high quality water without iron, manganese and turbidity not using any chemicals) prior to pH adjustment (using sodium hydroxide [NaOH] when pH is too low and hydrochloric acid [HCl] when pH is too high) before disinfection with chlorine.

The treated water is then distributed to maintain the residual chlorine in the reticulation at a level of 0.4 milligrams per litre.

Treatment is monitored continuously and regularly tested by a NATA accredited laboratory to ensure it meets the requirements of the ADWG and DoH.

The water is not fluoridated.

The treated water is stored in a 375-kilolitre storage tank adjacent to the Water Treatment Plant for distribution (gravity fed) by a reticulation network to customers in the Country Heights Estate.

Materials used within the bore installation, Water Treatment Plant, storage tanks and reticulation network are approved under Australian Standard AS/NZS 4020 (Testing of Products for Use in Contact with Drinking Water) and comply with the DoH directive Materials and Substances in Contact with Drinking Water Requirements and the MOU.

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The critical point at the plant is at the treatment train where the pH is adjusted, and chlorine is added. Only free chlorine and pH are monitored after treatment as treatment does not affect any other water quality parameter, as low turbidity water (<0.3NTU) is pumped from a bore drawing water from the Leederville Aquifer, sampled quarterly, having a pH between 6.65 and 7.51 and an Electrical Conductivity between 518 $\mu\text{S}/\text{cm}$ and 576 $\mu\text{S}/\text{cm}$ which equates to a Total Dissolved Solids concentration of between 337 mg/L and 374 mg/L.

The filtration system requires regular backwashing to remove materials such as iron precipitates and other impurities, which settle through the carbon filtration media, with the backwashed water pumped to a separate collection tank for further treatment. At regular maintenance intervals the backwash water tank will be dosed with flocculent, which will settle any solids in the bottom of the tank for later removal. The clear water from the top can then be recycled through the system and sent back to the treatment train.

The Water Treatment Plant is remotely monitored: there is one remote controlled camera inside the plant and two stationary cameras outside; the inside camera can see almost everything inside the plant whilst one outside camera is aimed at the entrance gate whilst the other one aims in the opposite direction towards the tanks. All the camera feeds are stored on a hard drive with about 4 weeks of rolling cover.

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2.0 Performance Summary

Water Quality Meeting the Drinking Water Guidelines/Minister of Health's Directions			
Microbiological Quality	Zone 1⁽¹⁾ Water Treatment Plant (WTP)		
	No Assessed⁽²⁾	No within Guidelines	Variance⁽³⁾
Thermotolerant Coliforms / <i>E.coli</i>	3	3	0
Amoeba (Thermophilic Naegleria)	3	3	0
Chemical Quality⁽⁴⁾			
Chemical – Health Guideline ⁽⁵⁾ including Total Trihalomethanes	3	3	0
Chemical – Aesthetic ⁽⁶⁾	1	1	0
Radiological	1	1	0
Chlorine (target 0.4mg/L)	continuous	all	0
	Zone 1⁽¹⁾ Display Home (DH)		
	No Assessed⁽²⁾	No within Guidelines	Variance⁽³⁾
Thermotolerant Coliforms / <i>E.coli</i>	3	3	0
Amoeba (Thermophilic Naegleria)	3	3	0
Chlorine	3	3	0
Notes:			
(1) Table may be expanded or collapsed according to the number of zones.			
(2) Number of samples taken for the quarter/year.			
(3) Number of samples that do not comply with the drinking water guidelines.			
(4) Chemical performance is based on the results of the quarter.			
(5) Chemicals tested with a health guideline value – refer to Small Community Sampling Grid.			
(6) Chemicals without health guideline values.			

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3.0 Microbial Performance

3.1 Microbiological - Exception Notifications

Microbiological Water Quality Exceptions							
Region/Scheme/ Zone/Service Provider	Population served	Date	Microbiological Characteristic	Alert Level	Remedial Action	DoH Notified	Close Out Date
Zone 1 (WTP) and (DH): none							

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4.0 Chemical - Health Related Performance

4.1 Chemical - Health Related - Exception Notifications

Health Related Chemical Water Quality Exceptions							
Region/Scheme/Zone/ Service Provider	Population served	Date	Health Related Chemical Characteristic	MoU Alert Level	Remedial Action	DoH Notified	Close Out Date
1 – none							

4.2 Chemical – Health Guideline

Zone 1 Country Heights Estate Water Treatment Plant (WTP)				
Health Characteristic	No of Analyses	No of Analyses Complying	% Compliance	Maximum Concentration (mg/L)
Total Trihalomethanes, THM (0.25mg/L)	3	3	100	0.024
Fluoride, F (1.5mg/L)	1	1	100	<0.1
Nitrite, as NO ₃ (50mg/L)	1	1	100	<0.01
Nitrate, as NO ₂ (3mg/L)	1	1	100	0.01
Antimony, Sb (0.003mg/L)	1	1	100	<0.001
Arsenic, As (0.01mg/L)	1	1	100	<0.001
Barium, Ba (0.7mg/L)	1	1	100	0.181
Boron, B (4mg/L)	1	1	100	<0.05
Cadmium, Cd (0.002mg/L)	1	1	100	<0.0001
Copper, Cu (2mg/L)	1	1	100	0.005
Lead, Pb (0.01mg/L)	1	1	100	<0.001
Manganese, Mn (0.5mg/L)	1	1	100	<0.001
Mercury, Hg (0.001mg/L)	1	1	100	<0.0001
Molybdenum, Mo (0.05mg/L)	1	1	100	<0.001
Nickel, Ni (0.02mg/L)	1	1	100	0.009
Selenium, Se (0.01mg/L)	1	1	100	<0.01
Silver, Ag (0.1mg/L)	1	1	100	<0.001
Total Samples Taken	4	All	100	-

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5.0 Chemical - Aesthetic Performance

5.1 Chemical – Aesthetic Guideline

Zone 1 Country Heights Estate Water Treatment Plant (WTP)				
Aesthetic Characteristic	No of Analyses	No of Analyses Complying	% Compliance	Maximum Concentration (mg/L)
pH (6.5 – 8.5)	1	1	100	7.2
Total Dissolved Solids, TDS (600mg/L)	1	1	100	473
Sulfate, SO ₄ (250mg/L)	1	1	100	12
Total Hardness (as CaCO ₃ ; 200mg/L)	1	1	100	46
Turbidity (5NTU)	1	1	100	0.2
Ammonia, NH ₃ (0.5mg/L)	1	1	100	0.03
Aluminium, Al (0.2mg/L)	1	1	100	<0.01
Iron, Fe (0.3mg/L)	1	1	100	<0.05
Zinc, Zn (3mg/L)	1	1	100	0.026
Total Samples Taken	1	All	100	-

5.2 Chemical - Aesthetic - Incident Specific Information

5.2.1 Zone 1 Country Heights Estate Water Treatment Plant (WTP) and Display Home (DH)

No incidents to report.

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6.0 Radiological Performance

6.1 Radiological - Exception Notifications

Radiological Water Quality Exceptions							
Zone	Population served	Date	Radiological Characteristic	Alert Level	Remedial Action	DoH Notified	Close Out Date
1 - none							

6.2 Radiological Performance

Zone 1 Country Heights Estate Water Supply Bore CEPB1				
Country Heights Water undertakes radiological monitoring once a year during the January Quarter: this sample was taken in February 2023.				
Radiological Characteristic	No of Analyses	No of Analyses Complying	% Compliance	Max Value (Bq/L)
Gross Alpha (0.5)	-	-	-	-
Gross Beta (0.5)	-	-	-	-
Bq/L is Becquerels/Litre.				

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7.0 Planned Sample Summary

Zone	Microbiological			Chemical			Radiological		
	Planned	Taken	% Taken	Planned	Taken	% Taken	Planned	Taken	% Taken
Zone 1 (WTP) and Zone 2 (DH)	3	3	100	1	1	100	0	0	0
	3	3	100						
Fluoridation of drinking water is not undertaken; hence sampling is not warranted.									

7.1 Planned Sample Exceptions

Planned Sample Exceptions				
Zone	Sampling Point	Date Due	Characteristic (Microbiological/Chemical/ Radiological)	Reason for missed sample
None				

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8.0 General Notes

Country Heights Water Pty Ltd adheres strictly to the Guidelines and Regulations of the Department of Health Department WA (DoH) to ensure the safety and health of consumers at the Country Heights Estate are not compromised. The steps we take to treat and disinfect and ensure the drinking water we provide is safe, include targeting microorganisms, as explained below, and implementing recognised industry practices as remedial efforts to combat any of these microorganisms in the potable water we provide and accordingly implement routine monitoring, sampling and analytical testing to ensure our practices are effective and safe.

Micro-organisms (or microbes) are microscopic living organisms, occurring naturally in our environment, in air, soil and in water bodies; some are beneficial, but some may impact human health. Pathogens (pathogenic micro-organisms) are micro-organisms that cause disease or illness; the most common and widespread health risk to humans is associated with drinking water contaminated by pathogens. Organisms associated with faecal matter from humans or other mammals cause several waterborne diseases. It is impossible to test for the presence of all pathogens that may be present in water. The Australian Drinking Water Guidelines recommend testing for the presence of *Escherichia coli* (*E. coli*) as an indicator of faecal pathogen contamination. The Australian Drinking Water Guidelines state that *E. coli* should not be present in a minimum 100mL sample of drinking water. Thermophilic *Naegleria* refers to a group of common water borne *amoebae* which includes *Naegleria fowleri*, an environmental pathogen living in fresh warm water, and the organism that causes primary amoebic meningoencephalitis, a serious condition, which requires prompt medical treatment to prevent secondary brain damage, neurological (nerve) disorders, or coma.

Country Heights Water Pty Ltd will immediately notify the DoH of any confirmed detection of *E. coli* or Thermophilic *Naegleria* in any microbiological analysis of a sample of water.

8.1 Sampling for Per- and Polyfluorinated Substances (PFAS)

PFAS are a large, complex group of manufactured chemicals that are ingredients in various everyday products. For example, they are used to keep food from sticking to packaging or cookware, make clothes and carpets resistant to stains and water, and create a more effective foam for firefighting. PFAS are used in industries such as aerospace, automotive, construction, and electronics.

PFAS molecules have a chain of linked carbon and fluorine atoms. Because the carbon-fluorine bond is one of the strongest, these chemicals do not degrade easily in the environment and are highly mobile. Multiple health effects associated with PFAS exposure have been identified and are supported by different scientific studies. Concerns about the public health impact of PFAS have arisen for the following reasons:

- Widespread occurrence. Studies find PFAS in the blood and urine of people, and scientists want to know if they cause health problems.
- Numerous exposures. PFAS are used in hundreds of products globally, with many opportunities for human exposure.
- Growing numbers. More than 9,000 PFAS have been identified.
- Persistent. PFAS remain in the environment for an unknown amount of time.

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- Bioaccumulation. People may encounter different PFAS chemicals in various ways. Over time, people may take in more of the chemicals than they excrete, a process that leads to bioaccumulation in bodies.

Research conducted to date reveals possible links between human exposures to PFAS and adverse health outcomes. These health effects include altered metabolism, fertility, reduced foetal growth and increased risk of being overweight or obese, increased risk of some cancers, and reduced ability of the immune system to fight infections. While knowledge about the potential health effects of PFAS has grown, many questions remain unanswered with further investigation and research continuing.

Investigations into the presence and extent of PFAS in groundwater in the Leederville Aquifer is currently underway (e-mail correspondence with the Department of Water and Environmental Regulation and the Water Corporation).

Samples of groundwater were obtained on the 16th of March 2023, the 15th of November 2023 and the 18th of June 2024 and submitted to ALS Environmental Laboratories for determination of Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids, Perfluoroalkyl Sulfonamides, Fluorotelomer Sulfonic Acids and Sums of PFAS; these substances were all below their PFAS Super Ultra Trace Levels, hence are absent in groundwater at the Country Heights Estate.

Zone 1 Country Heights Estate Water Treatment Plant (WTP)				
Sample Dates: 16 March 2023, 15 November 2023 and 18 June 2024				
Health Characteristic: PFAS Substances	No of Analyses	No of Analyses Complying	% Compliance	Maximum Concentration (ng/L)
Sum of perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS); 70ng/L	3	3	100	2
Perfluorooctanoic acid (PFOA); 560ng/L	3	3	100	2
Total Samples Taken	3	All	100	-

PFAS sampling: three sampling events to date reported PFAS parameters below their detection limits in addition to a low risk of being present in the deep confined Leederville aquifer (personal communications with DWER and Water Corporation):

PFAS Substances:		Threshold	Concentrations at CHW
Perfluoroalkyl Sulfonic Acids	ng/L	-	<0.0005 and PFOS <0.0002
Perfluoroalkyl Carboxylic Acids		-	<0.0005 and PFBA <0.0002
Perfluoroalkyl Sulfonamides		-	<0.0005 and MeFOSA, EtFOSA, MeFOSE and ETFOSE <0.001
(n:2) Fluorotelomer Sulfonic Acids		-	<0.001
PFAS Sums		70	<0.0002
PFOA		560	

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In view of these results, taking due cognisance that the Leederville Aquifer is a confined aquifer i.e. potential contamination from surface sources (including pesticides) are highly unlikely to migrate vertically into the aquifer, hence the risk is considered negligible, which warrants no further sampling for PFAS substances and/or pesticides, other than to demonstrate compliance.

DoH reported that the US EPA has proposed drinking water concentration limits of **4 ng/L** for **PFOS and PFOA** in their National Primary Drinking Water Regulation and limits on perfluorononanoic acid (PFNA), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS) and hexafluoropropylene oxide dimer acid (GenX) through a hazard index:

Table 1: Overview: US EPA National Primary Drinking Water Regulation (April 2024).

Chemical	Maximum Contaminant Level Goal (MCLG, ng/L)	Maximum Contaminant Level (MCL, ng/L)
PFOA	0	4
PFOS	0	4
PFNA	10	10
PFHxS	10	10
HFPO-DA (GenX chemicals)	10	10
Mixture of two or more: PFNA, PFHxS, HFPO-DA, and PFBS	Hazard Index of 1	Hazard Index of 1
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.		
Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.		
Hazard Index (HI): The Hazard Index is a long-established approach that EPA regularly uses to understand health risks from a chemical mixture (i.e., exposure to multiple chemicals). The HI is made up of a sum of fractions. Each fraction compares the level of each PFAS measured in the water to the health-based water concentration.		

References provided by DoH included:

Ackerman Grunfeld, D., Gilbert, D., Hou, J. et al. Underestimated burden of per- and polyfluoroalkyl substances in global surface waters and groundwaters. *Nat. Geosci.* 17, 340–346 (2024). <https://doi.org/10.1038/s41561-024-01402-8>.

<https://www.eurofins.com.au/media/remdibjd/environote-1137-drinking-water-regulation-for-pfas.pdf>.

Other recommendations for drinking water include Health Canada (one of the most restrictive) with the sum of all PFAS being less than 30 ng/L whereas the European Union recommends the sum off all PFAS being less than 500 ng/L.

It should be noted that the laboratory (ALS Environmental Laboratory Perth) detection limits for the various compounds vary between 0.2 and 0.5 ng/L and 1 ng/L for Fluorotelomer Sulfonic Acids; all of which are below the US EPA MCL.

Notes:

The Australian Drinking Water Guidelines (ADWG) are available from:

<https://www.nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines>.

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DoH currently uses Version 3.7 (DoH, January, 2023).

The DoH Fact Sheet Materials, Products and Substances in contact with Drinking Water, May 2023 is available from:

<https://www.health.wa.gov.au/~media/Files/Corporate/general-documents/water/PDF/MaterialsSubstancesDrinkingWater.pdf>