

Nine Mile Aquifer – Sampling Results September 2020

Explanatory notes prepared by Cameron Dalgleish, State Water Officer, from the Department of Health (DoH) to accompany the recent water quality testing of the Nine Mile Beach Aquifer (also known as the Dolphin Sands Aquifer).

Please note that historical water quality data for this aquifer is largely related to groundwater levels, recharge rates and salinity, and does not provide sufficient information to assess suitability for human consumption. The recent testing of the quality of the groundwater has shown that there are concentrations of arsenic (As) that exceed the safe drinking water values defined by the *Australian Drinking Water Guidelines (ADWG)*. The ADWG uses both health-related limits; a concentration of a parameter that at that level is not known to have any adverse health effects, and aesthetic limits; which are related to tastes, odours and appearance of the water.

The following information is provided to help your understanding of the above water quality results:

- The data is limited and is not meant to be representative of the water quality in all locations of the aquifer. What it does show us is that some groundwater that has been sampled is unsafe for human consumption and therefore caution needs to be exercised by all users of this water, as there is no way of telling what the water quality will be at other locations within that aquifer without testing it.
- A document is attached that describes the chemical symbols and units used in the Laboratory Report and shows the relevant health and aesthetic limits from the ADWG.
- Many heavy metals are naturally occurring, often originating from rocks, soils and substrates. Arsenic is one of these.
- Hydrogeologists have shown arsenic concentrations to vary with groundwater level, pumping rates and rainfall/runoff recharge of the aquifer. The release of heavy metals over time is influenced by these physical factors and others, such as disturbing sediments and installing new bores. Chemical reactions also occur within the groundwater and its substrate that can affect the concentrations of metals present. It is not uncommon to find arsenic and iron in relative concentrations within an aquifer.
- Water quality within an aquifer can change considerably overtime and it is unknown how much variation occurs within a shorter time frame of say days, weeks or months. Water quality sampling is one point in time and does not tell us what the concentrations were historically or what they are likely to be in the future. We do not know if the results that have been generated are representative of the worst case or best case scenario.
- It is possible for home owners and residents to treat the water for arsenic (and other metal) removal in order to reduce their exposure. This can be expensive and requires ongoing maintenance and monitoring to ensure its effectiveness. It should be the last resort.
- Changes to groundwater chemistry over time and other hydrogeological conditions may have negative impacts on any treatment selected and therefore negatively

impact removal efficiency. Properly characterising the hydrogeological conditions of the aquifer is an important step in ensuring arsenic reduction techniques are effective. This would need to be done by a Hydrogeologist and would come at a considerable cost.

- Home owners and residents solely reliant on the Nine Mile Beach Aquifer for their drinking water, should consider the practicalities of an alternate source. Some options may be rainfall collection, the trucking of potable water or bottled water. Each solution will look slightly different for each home owner or resident depending on their needs and water usage.
- A final word of caution. If you have your bore supply tested and it is assessed as fit for drinking, then this is not a guarantee into the future. An ongoing testing regime would be required to alert you to any changes in the water quality that may render it unsafe for consumption. I would recommend quarterly testing as a minimum as this will pick up seasonal variations, which are known to occur in groundwater.
- Any home owner or resident that chooses to consume water from the Nile Mile Aquifer does so at their own risk.
- The Department of Health does not regulate any Aquifer in Tasmania unless it is the source of a public drinking water supply managed by TasWater. The Department is unable to provide advice on the cause or nature of the water quality within the aquifers but we are able to assist in interpreting results for allowable uses and assisting with designing a sampling program.
- The Department's Environmental Health Unit is working with the Glamorgan Spring Bay Council to develop information that includes the above details and any generic relevant health advice relating to the use of water contaminated by arsenic. A copy of this letter has been shared with Council.
- Should you wish to test your water for heavy metals, please contact Analytical Services Tasmania (AST) on 6165 3300 or enquiries@ast.tas.gov.au, specifying that the sample is used for drinking water.
- Should you wish to test the microbiological quality of your water, please contact the Public Health Lab (PHL) on 6166 1106 or publichealth.lab@health.tas.gov.au, specifying that the sample is used for drinking water.
- All further enquires on water quality and health effects can be directed to the Environmental Health Officer at Glamorgan Spring Bay Council on 6256 4771 or Natalie.rogers@freycinet.tas.gov.au.

Regards

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Sampling results September 2020

Metal	Symbol	DS west	400-500	Bagot Point	Health Limit (µg/L)	Aesthetic Limit (µg/L)
Aluminium	Al	<8	<8	<8		200
Arsenic	As	<1	18	1	10	
Barium	Ba	2	1	1	2000	
Calcium	Ca	89	98	71		
Cadmium	Cd	<0.1	<0.1	<0.1	2	
Cobalt	Co	<0.5	<0.5	<0.5		
Chromium	Cr	<1	<1	<1	50	
Copper	Cu	2	3	<1	2000	1000
Iron	Fe	748	1980	322		300
Potassium	K	1.5	1.8	2		
Magnesium	Mg	8.3	8.8	12.3		
Manganese	Mn	6	40	6	500	100
Molybdenum	Mo	1.1	<0.5	<0.5	50	
Sodium	Na	48	82	120		180
Nickel	Ni	<0.5	0.6	<0.6	20	
Lead	Pb	<0.5	<0.5	<0.5	10	
Selenium	Se	<2	<2	<2	10	
Zinc	Zn	<2	4	2		3000

Simple Water Quality Interpretation

Prepared by DoH State Water Officer for the residents of Dolphin Sands

Chemical Symbol/Term	Name	Health Limit ($\mu\text{g/L}$)	Aesthetic Limit ($\mu\text{g/L}$)
Al	Aluminium		200
As	Arsenic	10	
Ba	Barium	2000	
Ca	Calcium		
Cd	Cadmium	2	
Co	Cobalt		
Cr	Chromium	50	
Cu	Copper	2000	1000
Fe	Iron		300
K	Potassium		
Mg	Magnesium		
Mn	Manganese	500	100
Mo	Molybdenum	50	
Na	Sodium		180
Ni	Nickel	20	
Pb	Lead	10	
Sb	Antimony	3	
Se	Selenium	10	
Zn	Zinc		3000
<i>E. coli</i>	(a bacteria)	Less than 1 MPN/100mL)	

Units used:

- mg/L = milligrams per litre (note 1 gram = 1 000 mg)
- $\mu\text{g/L}$ = micrograms per litre (note 1 gram = 1 000 000 μg)
- MPN/100mL = most probable number per 100mL of sample.
- $\mu\text{S/cm}$ = microsiemens per centremeter. A measure of electrical conductance through water.
- ADWG limits are based on a total concentrations. Water contains a soluble fraction (that which is dissolved) and an insoluble fraction (that which is not dissolved). Together the sum of the soluble and insoluble fractions gives the total concentration.