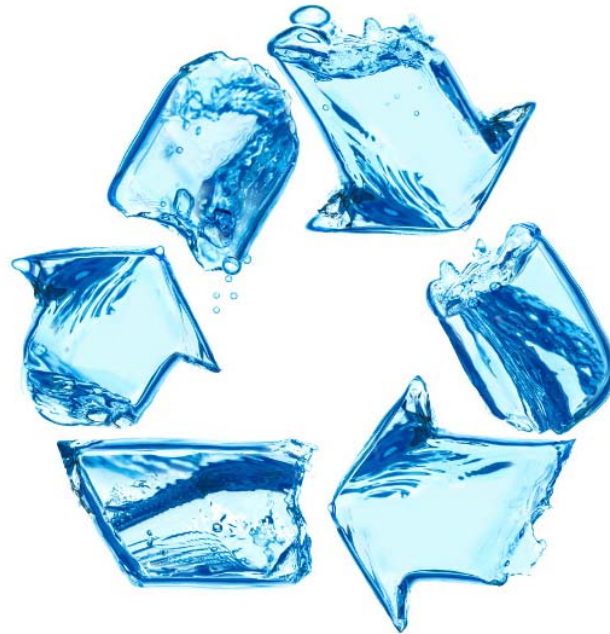


# Uralla Water Supply – Yield and water quality update



28 January 2020

## Kentucky Day – Yield Analysis and Storage

- Secure Yield Study Completed by SMEC in 2015
- Under the '**5/10/10** design rule', a water utility would be able to cope with a drought more severe than had occurred in the past 120 years with only moderate drought water restrictions. Restrictions would apply for no more than 5% of the time, with a probability of restrictions being required in any one year being 10% (one in 10 years). The reduction in supply would be no greater than 10%
- For the 10/15/25 scenario, restrictions would apply for no more than 10% of the time, with a probability of restrictions being required in any one year being 15% (one in 6.7 years). The reduction in supply would be no greater than 25%.

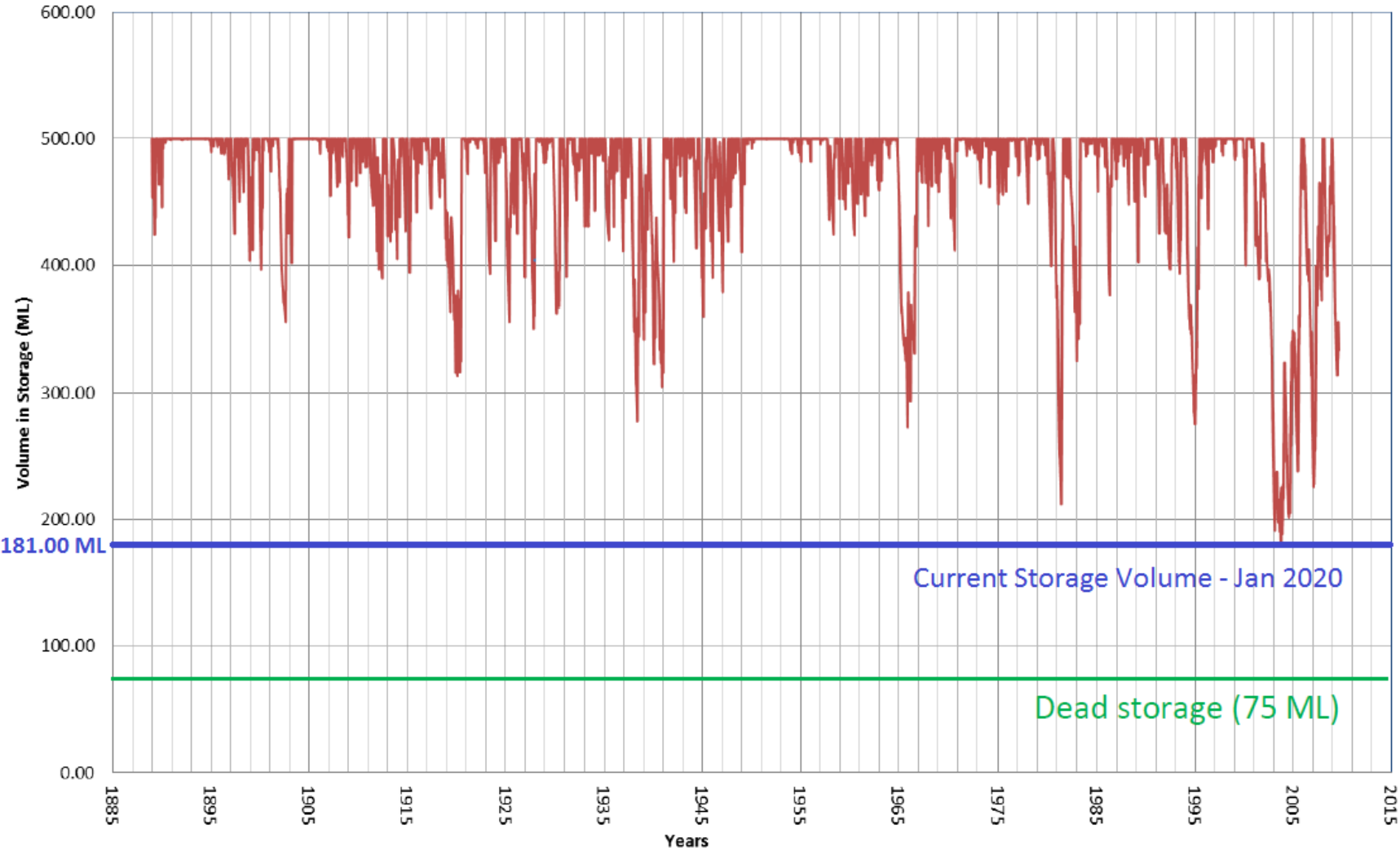
# Kentucky Dam – Information

- Dam capacity available 425ML (this takes into account 75ML of dead storage. )
- Historical annual water production: 230-350ML/yr
- 15 Global Climate Model (GCM) climate data sets were used to assess the secure yield for each GCM.
- The study lists the GCM modelling results for the secure yield for each climate data set through an application of a 5/10/10 and 10/15/25 rules.

# Kentucky Dam – Information

- 5/10/10 Model:
- The modelling indicated that the secure annual yield in 2050 (under the worst climate change scenario) would reduce from the observed historical yield of 339ML to 214.3ML, with the median modelled result providing for a reduced annual yield of 308ML.
- 4 of the 15 climate change scenarios provided for an increase in the yield with a maximum 2050 yield of 368.8ML (increase of 30ML)
- 10/15/25 Model:
- The modelling indicated that the secure annual yield in 2050 (under the worst climate change scenario) would reduce from the observed historical yield of 339ML to 249.6ML.
- This indicates that additional restrictions for longer periods of time will be required to improve the water security eg 40/50/40 scenario.

### Storage Volume vs. Time - Observed



# Kentucky Dam – Water Statistics

- Water data is available online on Council’s website.



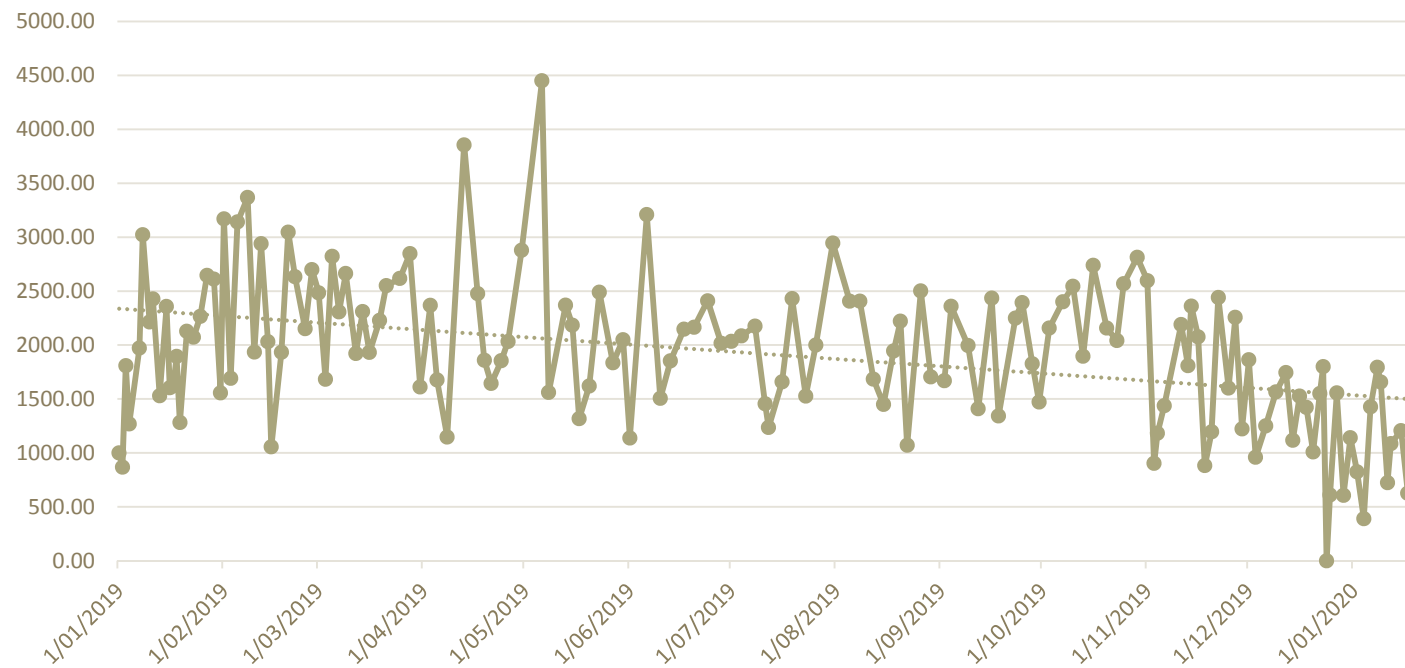
<https://www.uralla.nsw.gov.au/Council-Services/Water-Supply/Water-Usage-and-Storage-Volumes>

Table 1.1 - Water - Uralla - Usage Data					
Goal	500	150			
Week Ending (Thursday)	Average daily water production (kL/day)	Previous week's average water production per person (L/person/day)	Raw Water Storage Volumes % Full	Days to empty (based on current demand)	Storage Empty Date (based on current demand)
16/01/2020	428	156	29%	130	25/05/2020
23/01/2020	392	143	31%	189	30/07/2020

# Weekly Water Production



Water supplied to Uralla in 2019/2020



# Water Production Calculations



- Calculations are taken from the current census data against the volumes produced the in the Secure Yield Study.
- Town consumption has been decreasing with implementation of restrictions and recent wet weather.
- Subject to government funding approval, Council will be undertaking a study of alternative ground water sources to augment the current supply.



# Water Quality

- Drought conditions have decreased water quality.  
with increasing organics and turbidity.
- Rapidly changing pH (Algae and Diatoms.)
- Sudden increase in the Arsenic concentrations.

# Arsenic Response and Information

- Council was alerted to the presence of Arsenic 04/12/2019
- Response protocol initiated with NSW Health and others
- Do not drink alert issued on 18/12/2019 after confirmation of the initial sampling results and as per advice from NSW Health.
  
- NSW Health Fact Sheet available:
  
- Further reading can be found at:
- WHO – Fact Sheet
- Australian Drinking Water Guidelines (ADWG) - Fact Sheet

# Assistance from Federal and State Government



- Council is eligible for funding of up to 90% for emergency works to resolve this issue.
- Council has been working closely with specialists in NSW DPIE, NSW Health, NSW Office of Water, to solve the issues.
- Testing of the water quality within water course, dam, treatment plant and town reticulation is continuing on a weekly basis.



Planning,  
Industry &  
Environment



Health

## Regarding Notice Issued in Dec 2019: Uralla Town Water arsenic levels above drinking water guidelines

### Key points

- Uralla town water should not be used for drinking or food preparation until further notice
- No health effects are expected as a result of previously drinking town water

Levels of arsenic over Australian Drinking Water Guidelines (0.01 mg/L) have been detected in the drinking water of the town of Uralla. It is unlikely that anyone will have experienced health effects as a result of drinking this water to date.

Arsenic is a chemical found naturally in the earth's crust in soil, rocks, and minerals. The levels of arsenic found in drinking water systems can vary widely. Arsenic at a level of 0.04mg/L was detected on routine testing of town water collected on 26 November 2019. Arsenic levels were below Guideline levels when tested in August 2019 and for all other testing conducted over the last 15 years. Uralla Council has been working to adjust the treatment plant to bring arsenic levels down below guideline levels. However further testing done in December 2019 and January 2020 identified persistent levels of 0.04-0.05 mg/L arsenic.

An expert panel recommended that as a precaution people avoid drinking and cooking with Uralla town water while adjustments are being made to water treatment. Until the water treatment plant is able to maintain the arsenic levels below guideline values, water is being trucked in for Council to distribute to community members for drinking and food preparation.

Arsenic is not well absorbed through the skin and so bathing, swimming and showering with town water may continue. Swallowing of town water should be avoided.

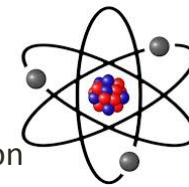
If people are exposed to drinking water with high levels of arsenic (many times the Australian Drinking Water Guidelines) for a number of years, some could experience skin damage or irritation, or problems in a range of body organ systems and cancers. Short term exposure at the levels measured in Uralla town water will not cause cancer, other chronic health conditions or impact on pregnancy.

At the current levels of exposure through Uralla drinking water, there is no value in testing for arsenic in urine, hair, skin or nails. Therefore the expert panel advises that testing is not recommended.

For any questions related to water supply please contact Uralla Shire Council – 67786300

For any specific health concerns, please visit your GP or call Hunter New England Public Health Unit on 1300066055.

# Arsenic Species Presence



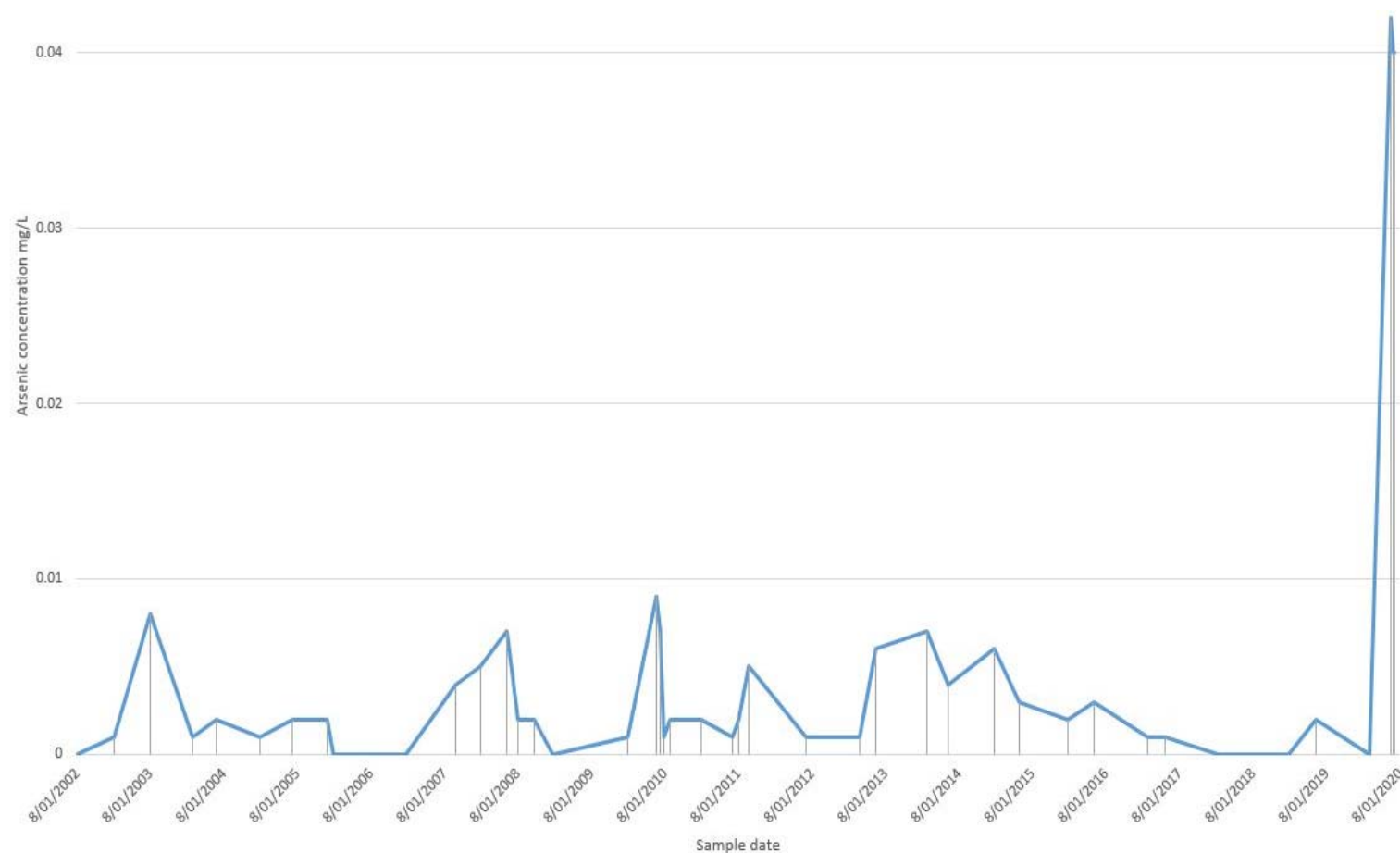
- Arsenic is present in different forms in our water.
- As III & V (inorganic) are more easily treated by conventional processes of sedimentation and filtration.
- Di and mono methyl arsenic compounds (organic) are not readily removed by these processes.
- Adsorption via Granular Activated Carbon has the potential to remove the arsenic

Table 1. Arsenic Speciation tests in catchment on 15/02/2020 (Please note all values <1 shown as 0.5)

Arsenic Type	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08	TP09
AS III (Arsenious Acid) ( $\mu\text{g/L}$ )	12	4	15	5	5	4	4	8	0.5
As V (Arsenic Acid) ( $\mu\text{g/L}$ )	15	18	12	55	8	5	17	62	75
ASB (Arsenobetaine)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
DMA (Dimethylarsenic Acid) ( $\mu\text{g/L}$ )	60	58	57	2	0.5	2	57	1	5
MMA (Monomethylarsonic Acid) ( $\mu\text{g/L}$ )	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5	0.5

# Typical Water Results

- NSW Health data on previous Arsenic results in the treated drinking water



# Raw water arsenic levels



**Health**  
Pathology

Forensic & Analytical  
Science Service



REPORT NUMBER: W2020000160

Project No:

Sample Class: Water

Trace Inorganic Laboratory

Certificate of Analysis

Uralla Shire Council

PO Box 106

Uralla NSW - 2358  
Sub Organisation: Uralla S C

Sample ID	DOH / Client ID	Sample Description	Site Code	Sample Remarks	Sampling Date	Date Received
2020000358	Raw	Uralla			23/01/2020	24/01/2020
2020000359	Settled(Filtered)	Uralla			23/01/2020	24/01/2020
2020000360	Final	Uralla			23/01/2020	24/01/2020
2020000362	Depot	Uralla			23/01/2020	24/01/2020

	2020000358	2020000359	2020000360	2020000362
Arsenic	0.084 ***	0.063 ***	0.053 ***	0.023 ***

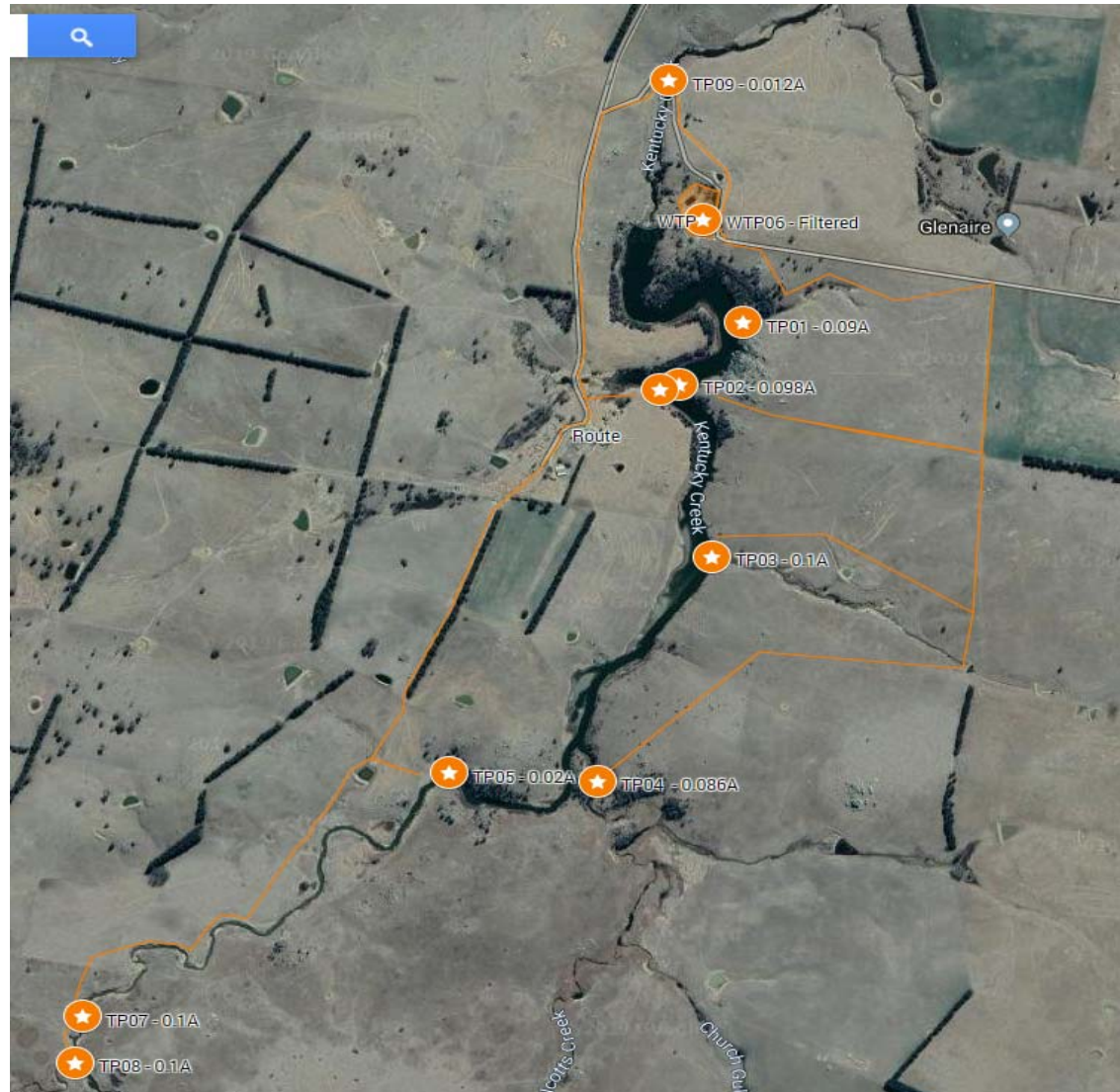
# Typical Raw Water Results

- Raw water results have been consistent across the storage and tributaries
- Date – 15/01/2020

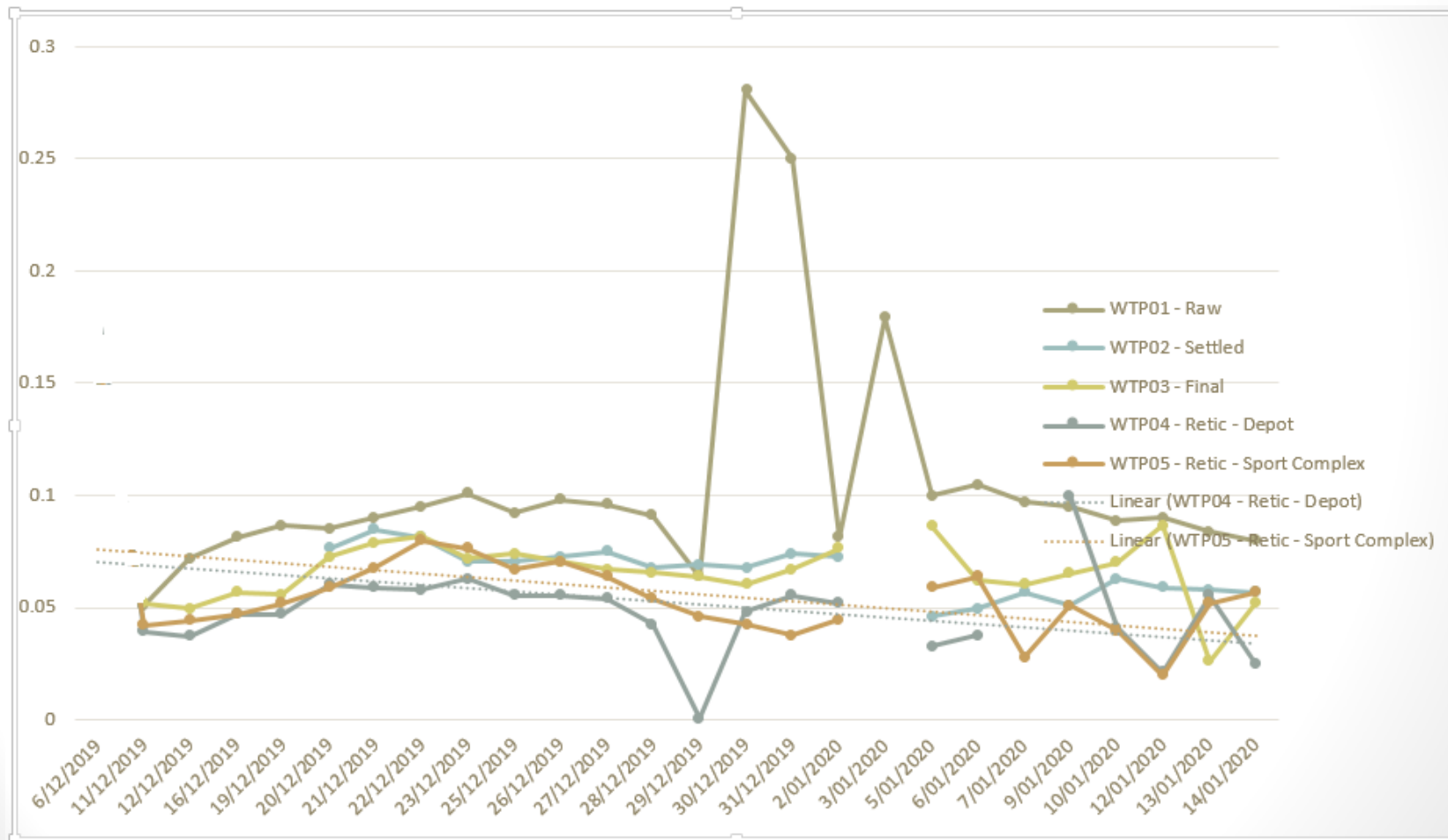
Arsenic Type	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08	TP09
AS III (Arsenious Acid) (µg/L)	12	4	15	5	5	4	4	8	0.5
As V (Arsenic Acid) (µg/L)	15	18	12	55	8	5	17	62	75
ASB (Arsenobetaine)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
DMA (Dimethylarsenic Acid) (µg/L)	60	58	57	2	0.5	2	57	1	5
MMA (Monomethylarsonic Acid) (µg/L)	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5	0.5
Totals	88	81	85	64.5	14.5	12	79	72	81.5



# Raw water levels, likely origin & Arsenic Species Presence



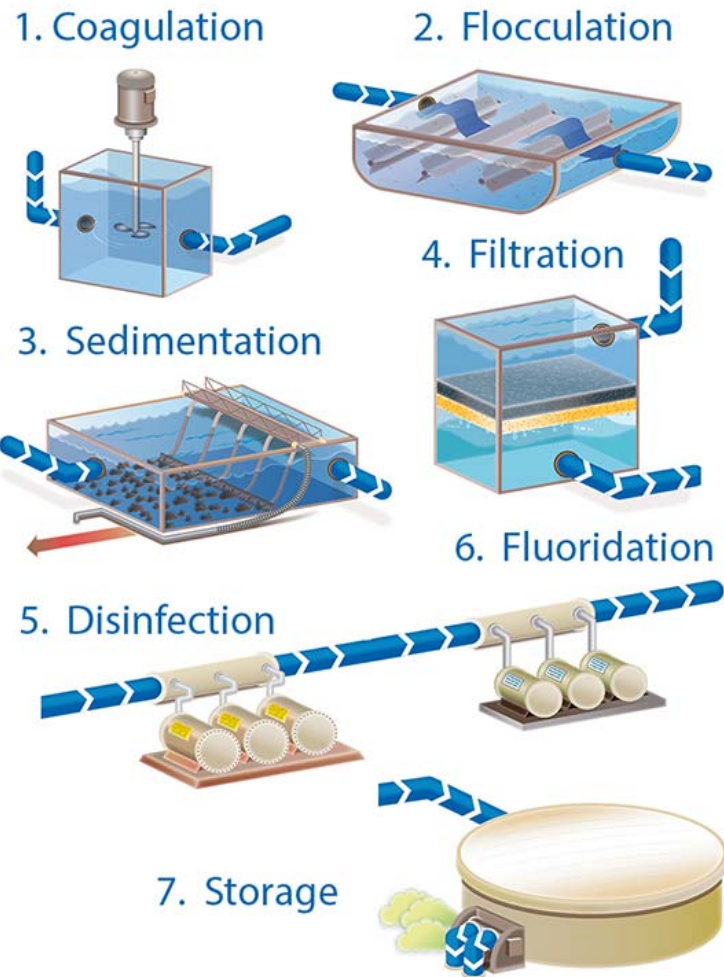
# Raw water levels, likely origin & Arsenic Species Presence



# Likely origin of Arsenic in Kentucky Creek Dam

- During dry periods deep springs can flow, bringing arsenic into creeks
- In dry times with reduced water levels sedimentation in dams can release also release arsenic.
- There may be contribution from some orchards and livestock dips, but this is unclear until further testing is completed.
- <https://minview.geoscience.nsw.gov.au/#/?lon=151.4021&lat=-30.74340&z=14&bm=bm1&l=at2:y:100,at1:y:100,wa1:y:100,tt5:y:100,sa3:y:100,sa2:y:100>

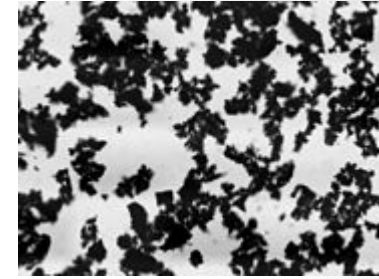
# Uralla Water Process



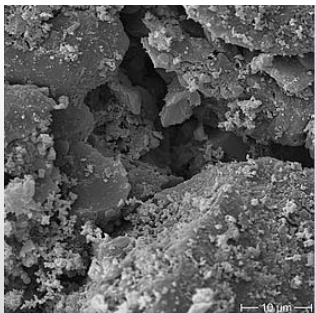
# Proposed Solution

- Initial testing undertaken by DPIE has shown that Granular Activated Carbon (GAC) has the potential to remove the organic Arsenic to comply with drinking water guideline limits.
- Subject to further validation, installation of GAC filters on the output of the Uralla Water Treatment Plant (WTP) will provide the likely treatment solution.

# GAC vs PAC

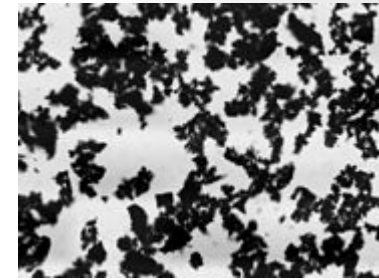


- PAC: Powder activated carbon – Powdered form of carbon  
(Particle size 0.15mm – 0.25mm)
- GAC Granular Activated Carbon ( 0.2-5.0mm)
- PAC is being dosed into the raw water pumping main prior to the mixing and settling tanks - ineffective in the removal of Arsenic.

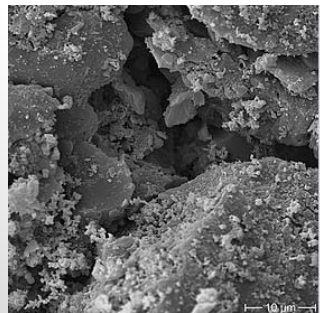




# GAC Filtration



- Arsenic requires time in contact with carbon to be removed.
- Additional purpose made filters are required to achieve the required contact time.



# Timeframes for plant upgrades and solution

## Return to town supplied drinking water

- Currently assessed at 12 weeks plus to implement a solution

## Work Breakdown Structure

- Procure GAC Filter by RFQ
- Design - Water Treatment process from Raw to Final
- Process - Water Treatment Changes required
- Connect - GAC Feed System to WTP
- Testing and commissioning
- Supply GAC filtered water to town



# Rain Water tanks

- Council is organising testing equipment for tests on tanks that may contain arsenic.
- Testing equipment is specialized equipment and will take several weeks to arrive.
- When the required equipment arrives, Council will request residents with rainwater tanks to submit a sample bottle marked with:
  - Residents Name
  - Contact details
  - Date of collected sample
  - Water carter details and date of supply



Questions ?