

# MULTI-FACETED APPROACH TO ALGAE CONTROL

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## KEYWORDS

EarthTec®, Coagulant dosing, Blue-green algae, Taste and odour

## INTRODUCTION

Safe drinking water is essential for life. Whilst pathogen risk is the greatest risk to human health in drinking water (NHMRC, NRMCC, 2025), aesthetic quality is what customers often use to assess whether or not the water is acceptable. A leading cause of taste and odours worldwide is earthy-musty odours from geosmin and 2-methylisoborneol (MIB) (Hooper et al. 2025). Geosmin and MIB are produced from a select species of bacteria (Actinobacteria and Myxobacteria), blue-green algae (cyanobacteria), fungi, bryophytes and a small number of plant and protozoan, of which the main sources are typically blue-green algae (Watson and Jüttner, 2019).

GWMWater is a water utility in Western Victoria that supplies, treats and distributes water for drinking, stock and domestic and regulated customers. In autumn 2025, taste, odour, and green algae issues developed in the raw water storages at the Birchip, Hopetoun and Rainbow water treatment plants (WTPs). Taste and odours had not historically been detected at these locations. This case study demonstrates a multi-faceted approach to algae control to combat these issues.

## CASE STUDY

Three WTPs experienced issues with taste and odours and green algae October 2025. The following case studies describe the approaches used to combat aesthetic and treatment issues related to these water quality issues to maintain customer satisfaction.

### **Birchip WTP**

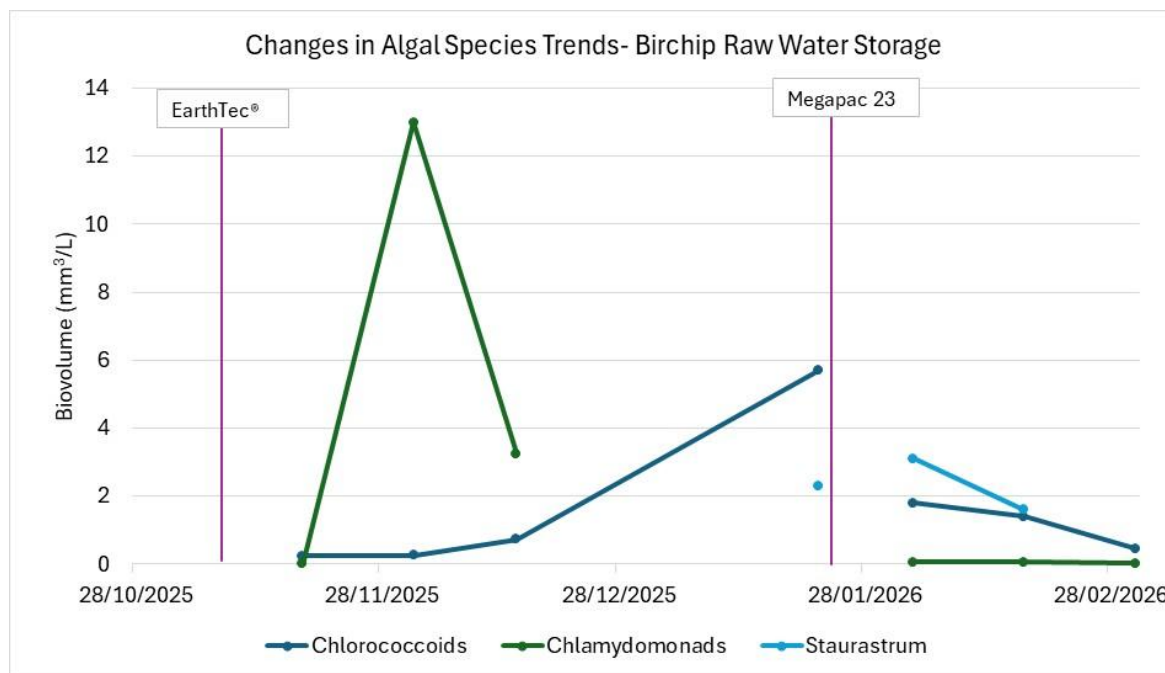
In October 2025, a customer in Birchip noted a dirty/dusty taste to the water. Sampling results indicated low levels of geosmin (7 ng/L) and 2-methylisoborneol (MIB; 13 ng/L) in the raw water storage at the water treatment plant, with concentrations of 9 ng/L geosmin and 5 ng/L detected at some locations in the reticulation.

The cause of the taste and odours was thought to be due to the raw water storage getting slightly lower than normal and when re-filling, stirring up sediment on the bottom of the storage. It was not known if the taste and odour was due to microorganisms in soil, or algae; however total blue-green algae (BGA) biovolume was low (0.00068 mm<sup>3</sup>/L) and total algae was relatively low (0.36082 mm<sup>3</sup>/L). The water treatment plant process includes coagulation and dissolved air floatation, flocculation (DAFF) followed by chlorination; however, there is no in-built technology at the WTP to remove taste and odours.

EarthTec® is an acid-stabilized, copper-based algaecide that can convert geosmin to non-odorous argosmin, and 2-methylisoborneol to 2-methylenebornane via an acidic dehydration reaction (Hammond et al. 2021). To combat the taste and odours, the storage was dosed with EarthTec®. Within a week, the geosmin levels had dropped to below the limit of detection (<1 ng/L), and MIB level to 3 ng/L and by the second week, all levels were below the limit of detection. The EarthTec® was successful at keeping the taste and odours away for the season from a single dose.

Interestingly, a secondary issue arose in the raw water storage approximately a month after dosing, with green algae concentrations starting to increase but not cyanobacteria (blue-green algae).

The predominant species of algae that grew in the Birchip raw water storage was the green algae chlorococcoids, chlamydomonads and Staurastrum. These algal species did not necessarily contribute significantly to geosmin and MIB, however, they can create a problem in elevated concentrations for water treatment. The storage was therefore dosed with the coagulant Megapac 23 to bind and sink the green algae. Whilst the green algae levels were not completely eradicated, the levels were lowered significantly to ensure no disruption to the water treatment process.

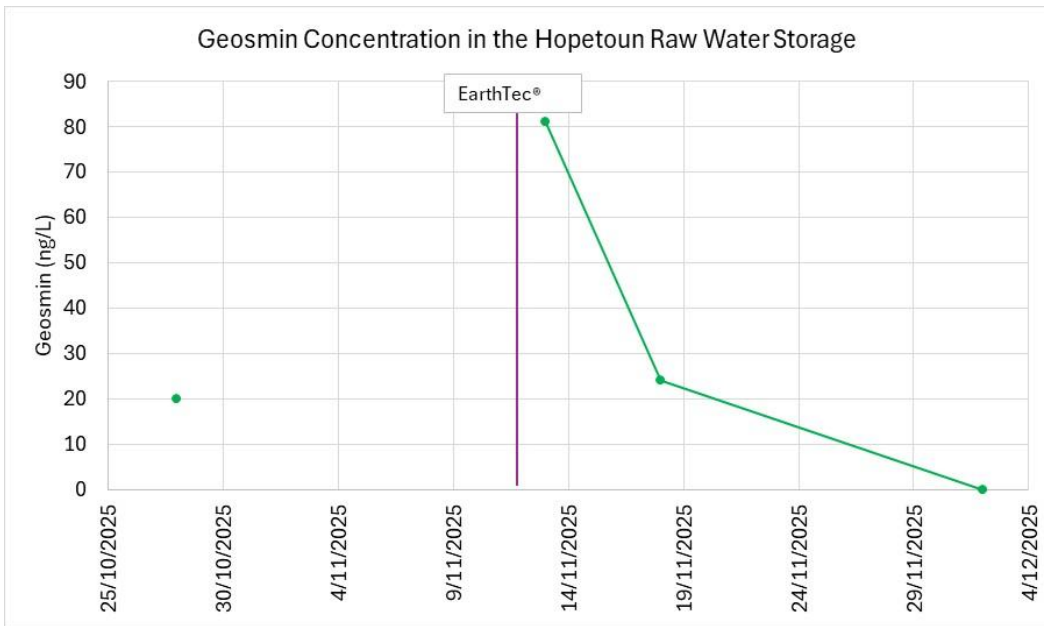


**Figure 1.** Algal trends in the Birchip raw water storage after dosing with EarthTec® and coagulant (Megapac 23).

### Hopetoun WTP

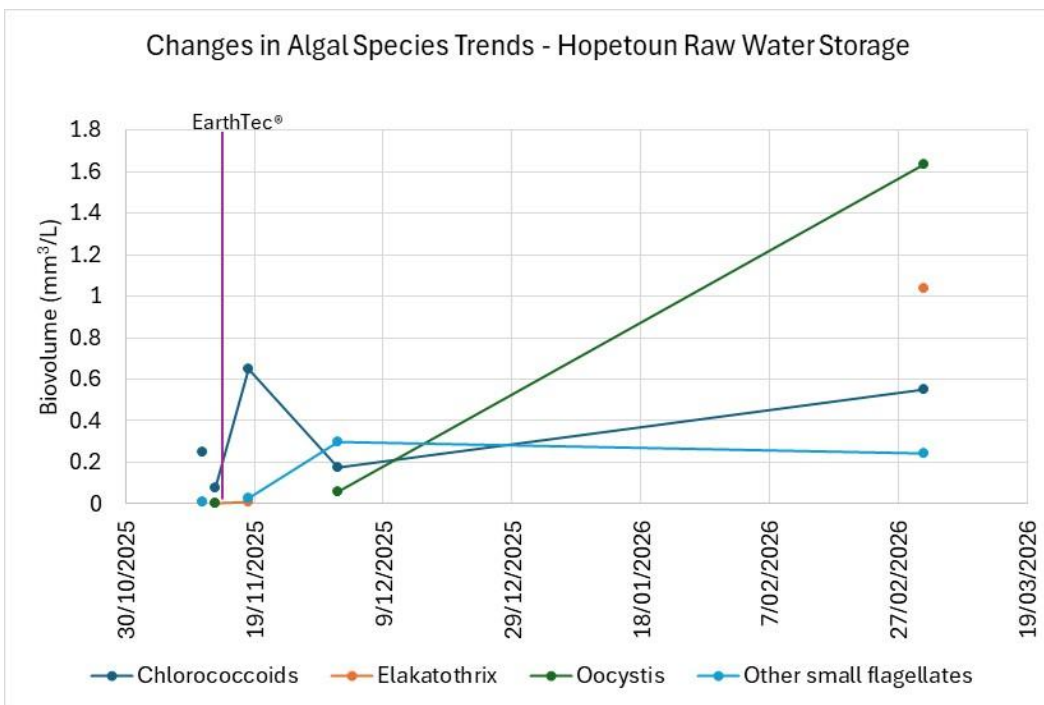
In October 2025, a customer at Hopetoun reported an 'earthy' taste. Historically Hopetoun had not had taste and odour complaints, and sampling results indicated a geosmin concentration of 20 ng/L in the storage. The cause of the taste and odours was thought to be due to the raw water storage getting slightly lower than normal, and when re-filling, stirring up sediment on the bottom of the storage. Similarly to the Birchip WTP, the Hopetoun WTP does not have means to remove taste and odour compounds. Total BGA biovolume (0.02139 mm³/L) and total algal biovolume (0.40029 mm³/L) was low.

The storage was dosed with EarthTec® which successfully removed the geosmin within two weeks (Figure 2).



**Figure 2.** Geosmin trends in the Hopetoun raw water storage after dosing with EarthTec®.

Similarly to Birchip WTP however, with time, a secondary issue began to arise, with the green algae biovolumes increasing in the raw water storage (Figure 3).



**Figure 3.** Green algae trends in the Hopetoun raw water storage.

### Rainbow WTP

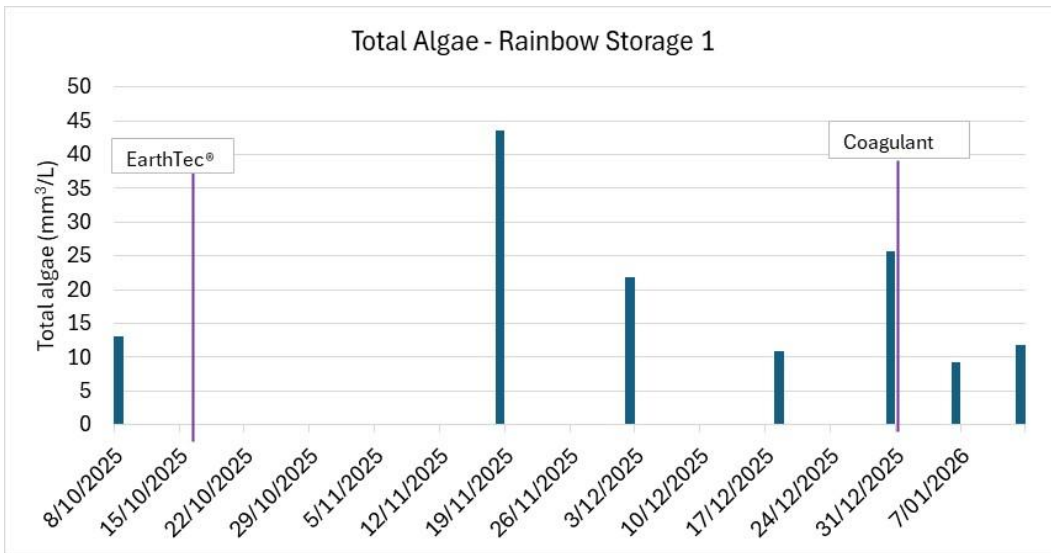
The Rainbow WTP Operator began to see issues with a sticky and thick floc from algae in the raw water storage October/November 2025 (Figure 4). The heavy floc would sink to the bottom of the filter, raising the filtered water turbidity.

A customer complaint was also received early November 2025 describing the water as having a 'funny' taste and smell. Rainbow WTP has two raw water storages that were proactively treated for taste and odours with EarthTec®. Sampling results indicated very low levels of geosmin in one location in the reticulation (5 ng/L), and predominantly below the limit of detection in the storages with one result in Rainbow storage 1 having 2 ng/L geosmin. After a week, results were all below the limit of detection.

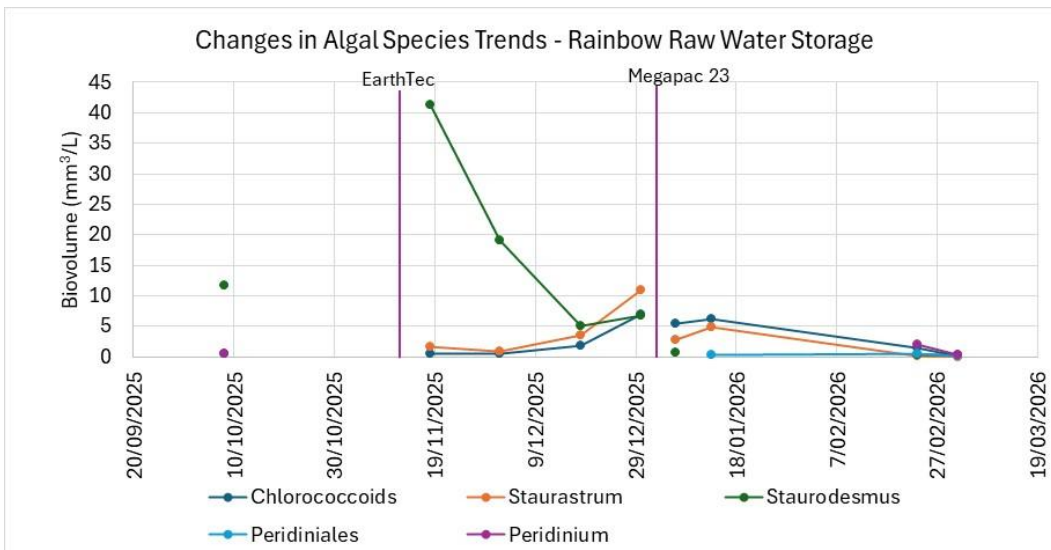
Whilst the treatment of the taste and odours was successful, the dose rate was not optimised for treatment of the green algae, which persisted (Figure 5). GWMWater typically treat algae in storages with coagulation as it is typically effective and uses a chemical that is readily available at WTPs. A jar test was conducted to determine the coagulant dose rate, and the storages were dosed with Megapac 23. The coagulant was applied to the storage by putting the coagulant and water in a water trailer and spraying the solution across the surface of the storage. The coagulant dosing successfully lowered the green algae concentration by half and enabled the treatment plant to continue to run smoothly (Figure 6). Green algae species were dynamic, and continued to change in composition over time.



**Figure 4.** Rainbow WTP dissolved air flotation filtration (DAFF) process affected by green algae.



**Figure 5.** Total algae trends in the Rainbow raw water storage 1.



**Figure 6.** Green algae trends in the Rainbow raw water storage.

### Cost Considerations

With algal blooms increasing in frequency, there has been a necessity to strengthen treatment processes to protect public health against potential algal toxins and to aid in polishing the treated water. An increased focus is also on pre-treatment of raw water to alleviate pressure on the treatment process.

These case studies showed three scenarios having different taste and odour species and treatment process impacts to consider. Consideration of cost became important when deciding what treatment option to use for the application. Coagulation was a cheap and effective method for removal of green algae, and EarthTec® was an effective method for removal of taste and odours.

**Table 1.** Estimated cost of chemicals.

	Megapac 23 volume (L)	Cost of Megapac 23 (\$)	*Cost of EarthTec®
Birchip WTP	444	\$1.08 - \$1.51/L \$480 - \$670	\$25/L  \$1500
Hopetoun WTP	-	-	\$1200
Rainbow WTP	630	\$680 - \$951	Storage 1: \$1050 Storage 2: \$850

\*EarthTec® was dosed at 2L/ML.

### Key Learnings

- Pre-treatment of raw water affected by algae is an important strategy for ensuring smooth operation of water treatment plants and the production of safe drinking water.
- Algal treatment may be multi-faceted and the product used, dependent upon the circumstances.
- Algae species are dynamic and can change in composition over time.
- Selecting the right treatment is important for effective treatment of the problem.
- Proactively monitor and anticipate issues through sampling programs and operator intervention.

### Conclusion

EarthTec® was successful at controlling taste and odours in the raw water storage and could be an effective option where WTPs do not have adequate removal processes. Coagulant dosing with Megapac 23 in the raw water storage was effective at decreasing the green algae concentration to allow effective treatment at the WTP, indicating that the selection of the right algal treatment is important for effective treatment.

### References

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