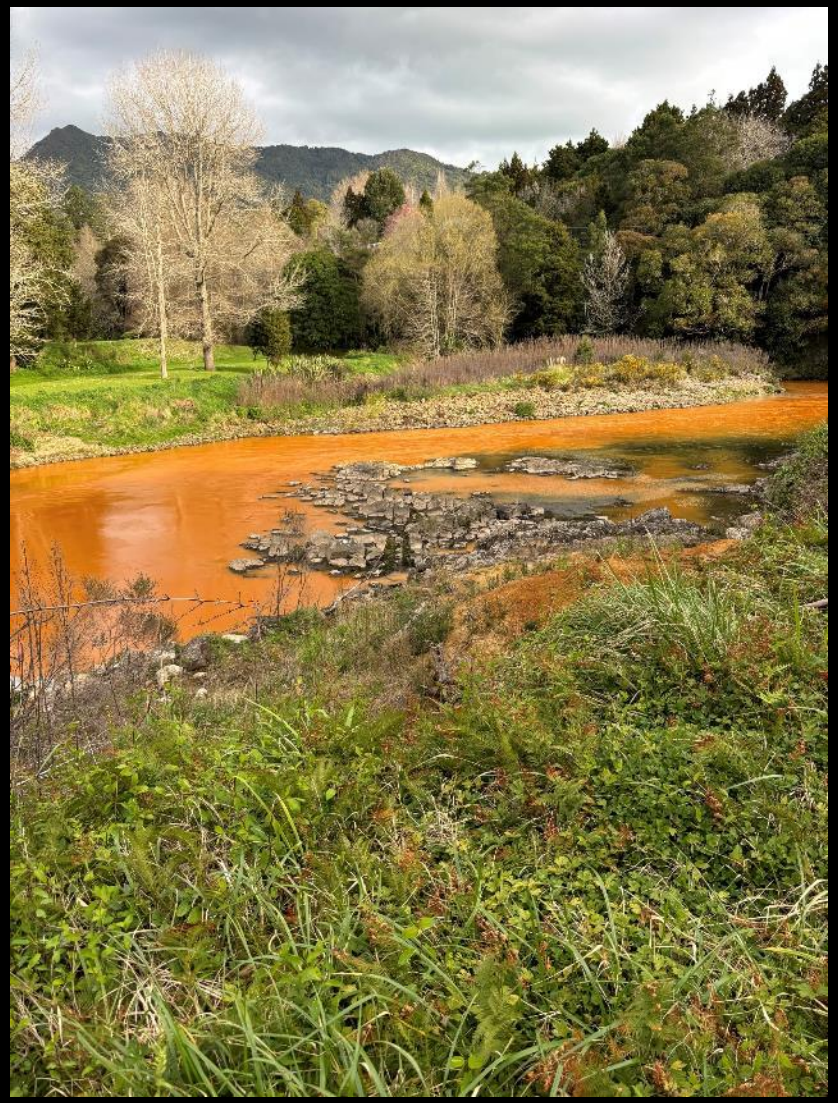
# When the river runs orange

Jonathan Caldwell

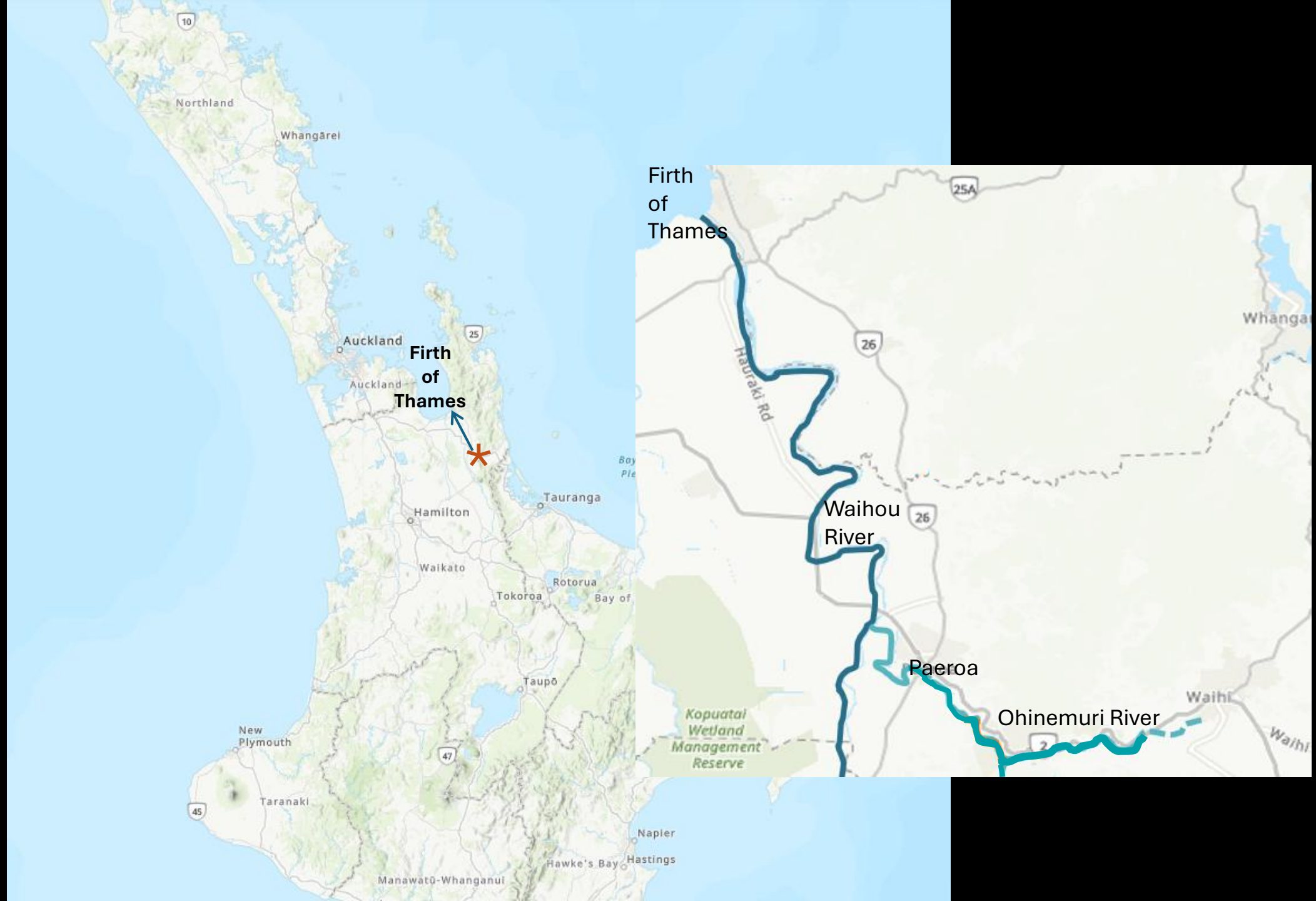
Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# Orange plume – Ohinimuri River



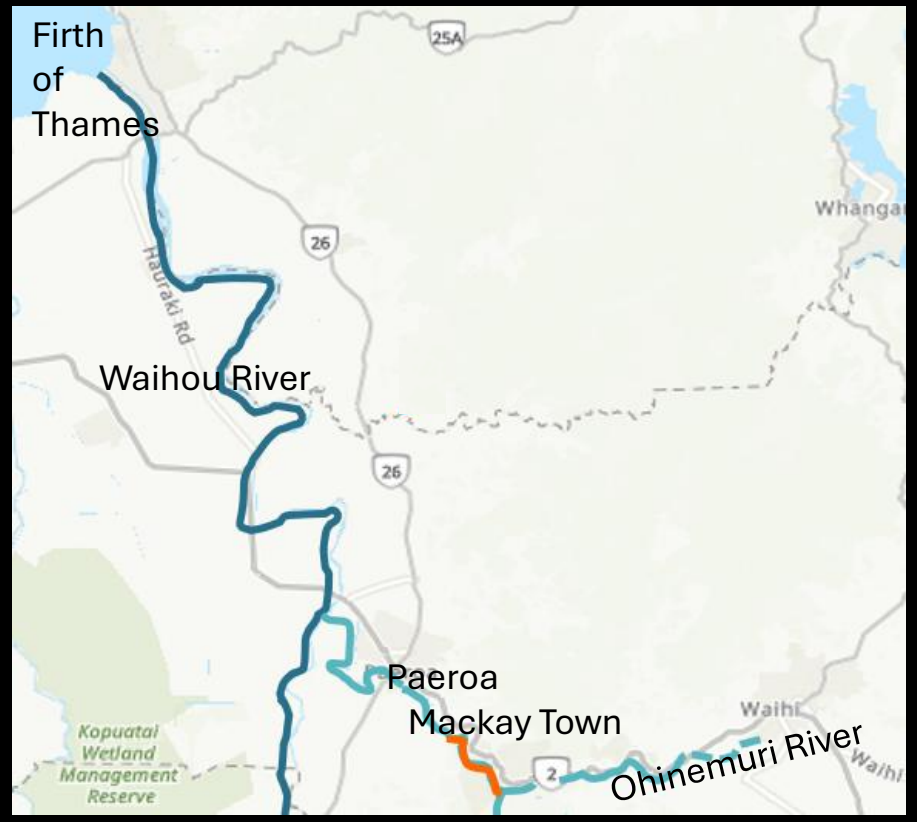
23 August 2024

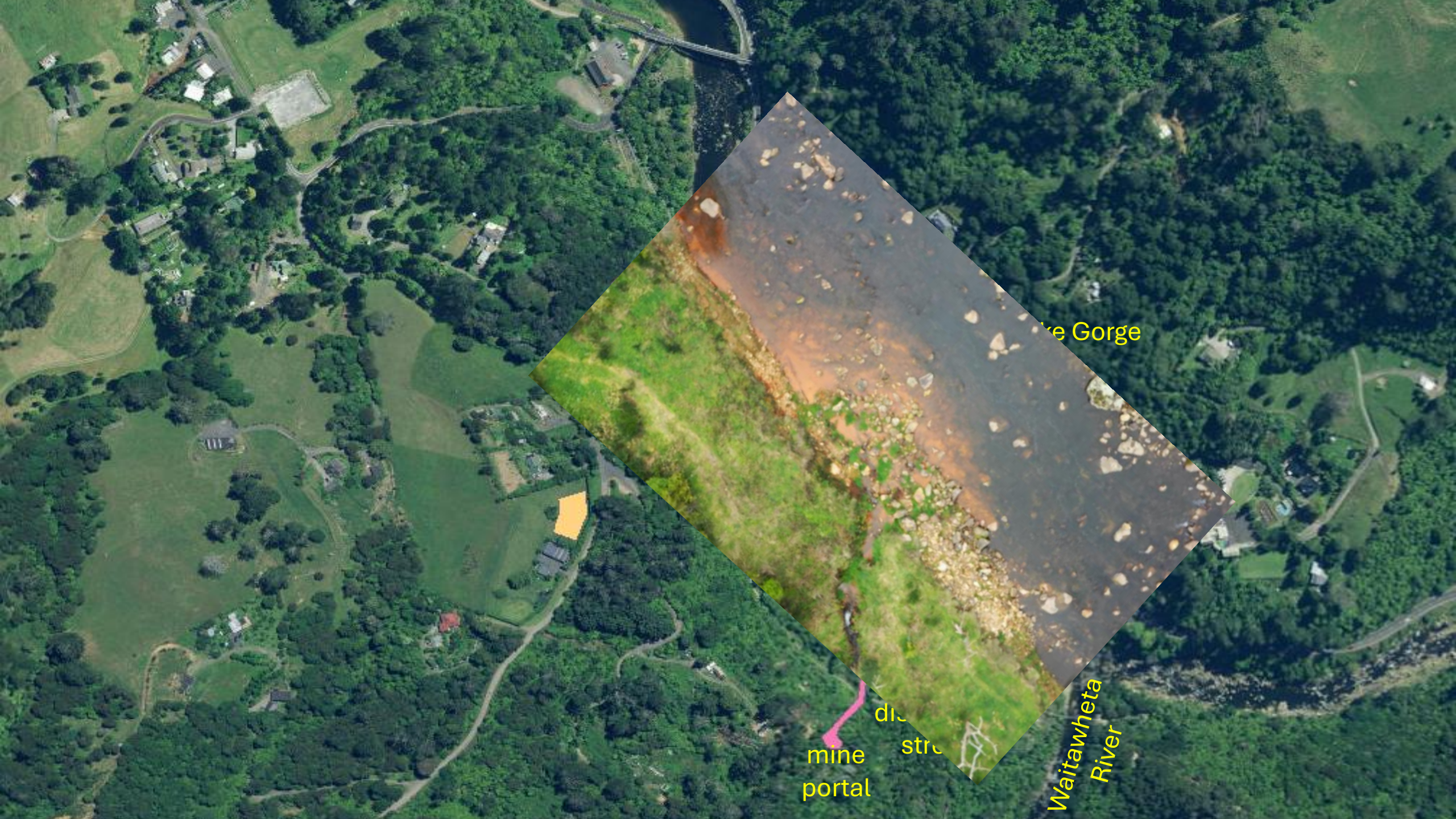
Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*



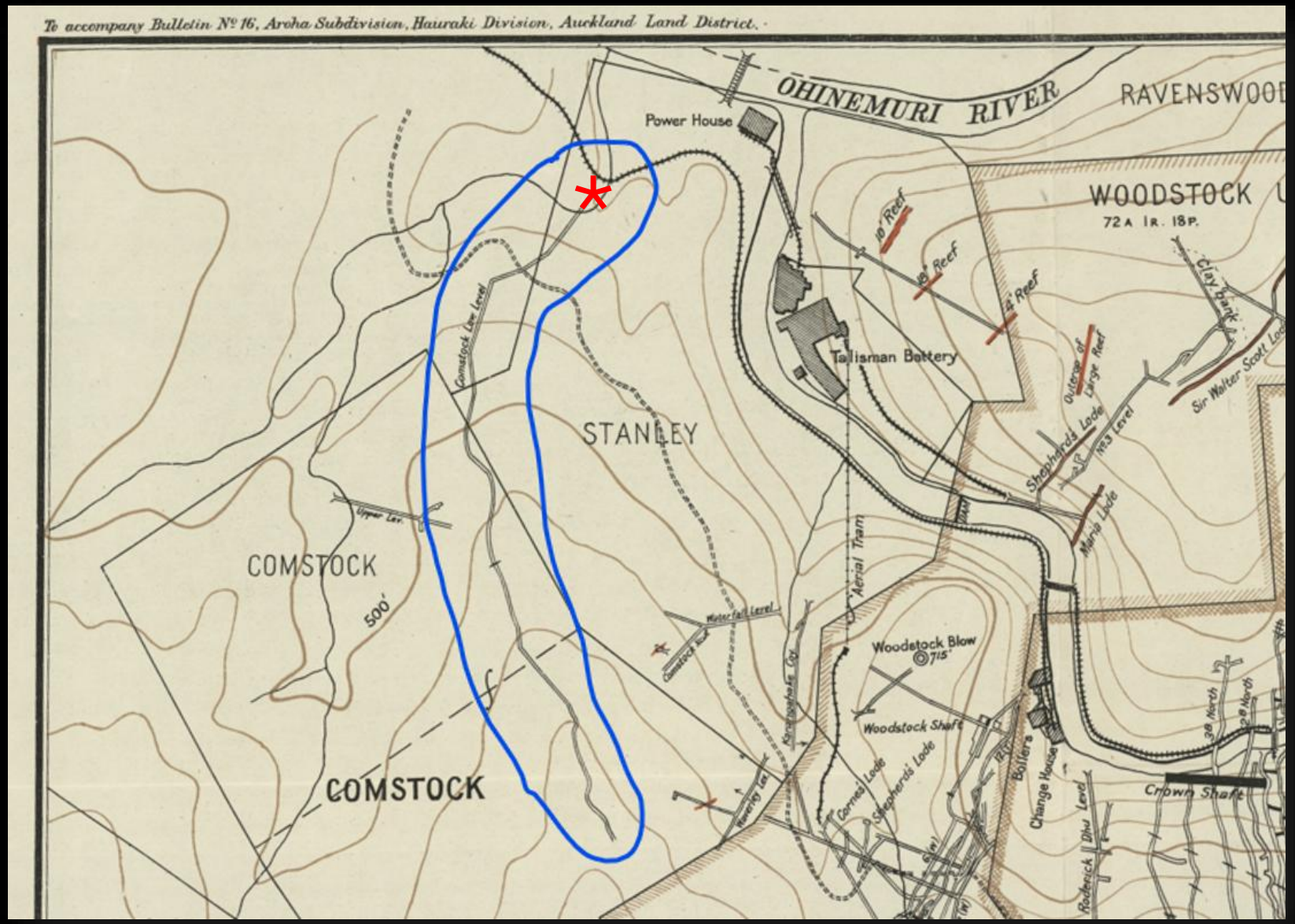

Waikato
REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

# Tracking the contamination




e Gorge
mine
portal
Waitawheta
River

# Comstock Low Level Drive




Waikato
REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

# History

- Developed in 1896
- 700 m
- No payable ore encountered
- Abandoned early 1900’s

## Contaminant investigation

- Field & sample collection for lab testing
- Is it acidic?
- Is there low oxygen?
- Are there high levels of heavy metals (arsenic, mercury, lead etc.) and cyanide?

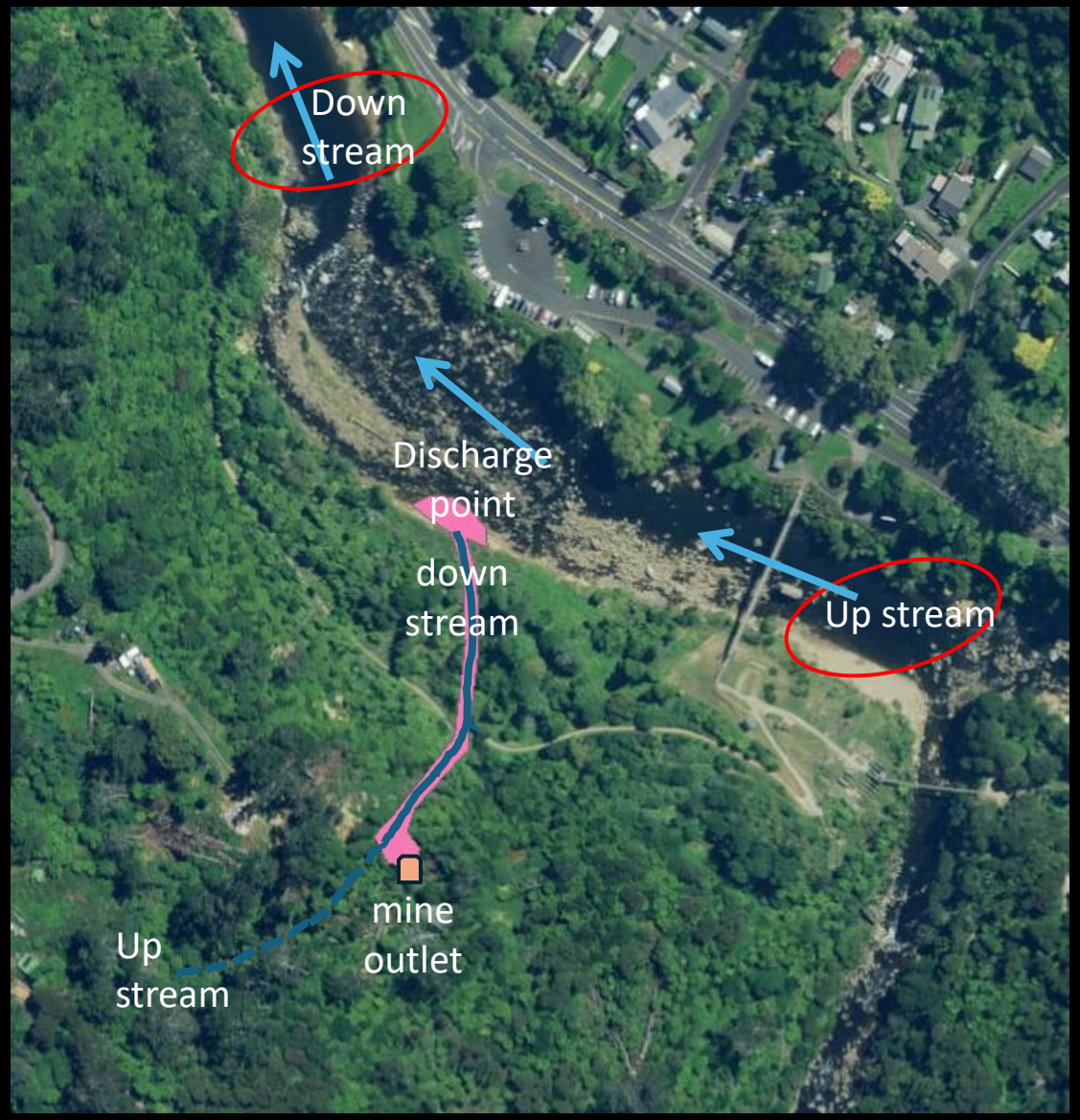
Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# Field results

- Stream & mine pH 6.1-6.2
- River pH 6.9-7.1
- Dissolved oxygen good

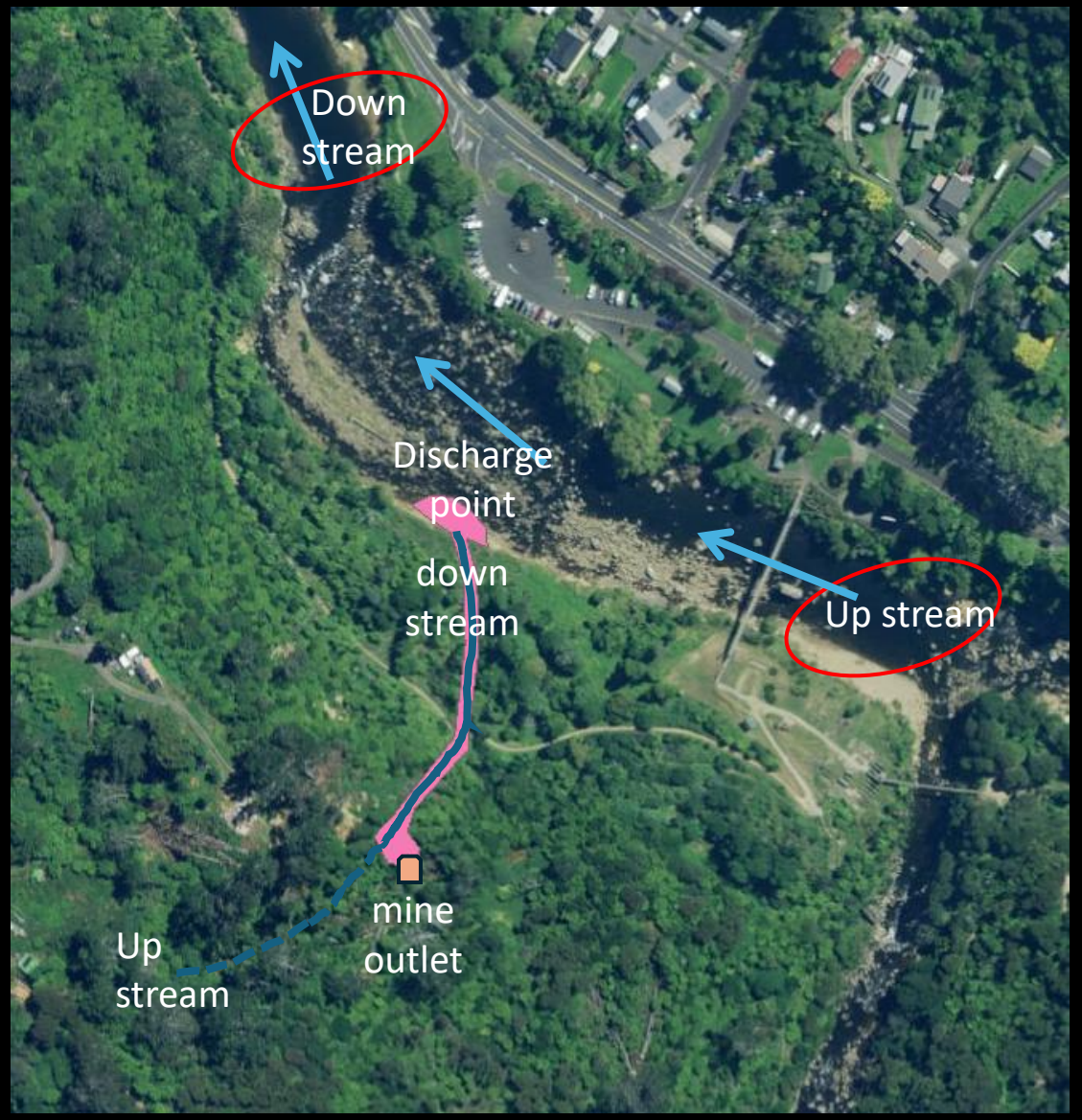

# Water sample lab results

- V. high tot. Fe & As in stream & river but low diss. As
- Max Tot. As in stream = 8100 ug/L (diss. 6 ug/L)
- Max Tot. As in river = 320 ug/L (diss. 3.2 ug/L)
- Diss. & tot. As in river < DL by Monday
- Tot. As from mine = 600 ug/L (diss. 148 ug/L)



# Water sample lab results

- Cyanide & Hg not detected
- Diss. Al & Tl exceed guidelines below and above mine outlet
- Ongoing DS monitoring in river indicates levels well within guidelines



# Sediment sample lab results

- High As & Fe
- High Sb (34 to 45 ppm)
- Hg, Pb and other metals within regional background levels
- Cyanide detected but well below health risk

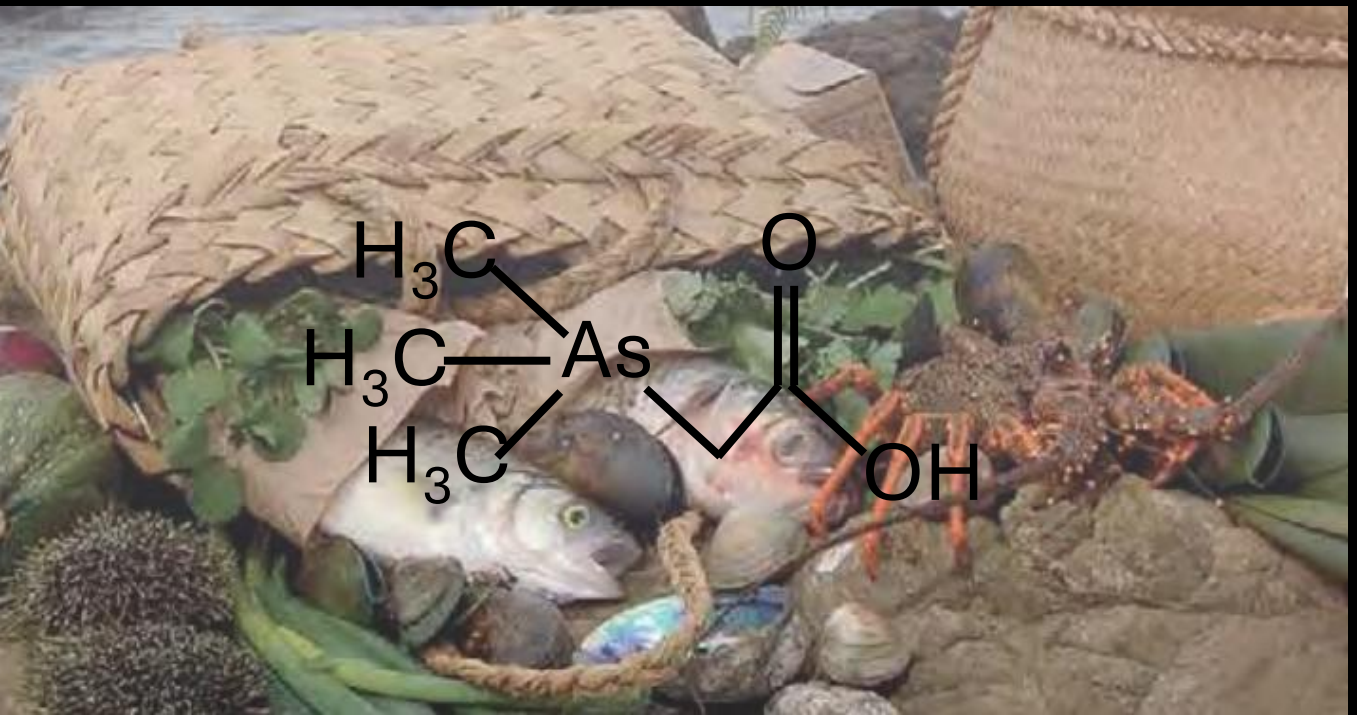
# Effects on aquatic organisms

- Fish not expected to be significantly affected (As strongly bound to hydrous iron oxides)
- Near neutral pH and normal oxygen levels & no reports of dead fish
- Sediments will have settled out, mostly downriver where lower flows
- Benthic organisms more likely exposed to arsenic than organisms living within water column

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# Human exposure

- Drinking water supply? $As^{V}$ vs $As^{III}$
- Consumption of fish?
- Consumption of watercress?




# Human exposure

- Exposure through skin?
- Main risk to humans would be through direct ingestion of contaminated sediments especially in proximity to mine outlet and stream bed

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# Department of Conservation

- DOC have commissioned a report on identified mining sites in the Karangahake Gorge, including water and sediment sampling which is currently being finalised
- This report will contribute towards development of a long-term management strategy for these sites

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# What worked well?

- Very quick “all-of-organisation” response which was well coordinated and managed
- Rapid updates to other agencies & stakeholders (DOC, iwi, Hauraki DC)
- Comms team did a superb job keeping the public updated on what was going on and sharing information as it came to hand on social media and webpages
- Post debrief with stakeholders

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# What didn’t work so well?

- Trying to communicate risk to public without all information to hand
- Managing unrealistic expectations around getting lab results and cleanup options
- Didn’t include public health until well after the event!

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*

# Summary

- Highly visible discharge from historic mine
- Very elevated arsenic and iron but not a lot else
- Arsenic likely well bound to iron so very little in dissolved form – greatly reduced environmental risk
- No evidence that the released material was processed mine tailings or concentrate
- DOC is preparing strategy for managing mine sites within the Karangahake gorge

Waikato
REGIONAL COUNCIL
*Te Kaunihera ā Rohe o Waikato*