Improvements in Trade Waste Breaches

Simon Winship
(Co-Lab Water Services)

What we do - Trade Waste

- Part of a greater water services team
- Provide centralised trade waste management for seven different councils.
  - Hamilton City Council
  - Matamata-Piako District Council
  - Rotorua Lakes Council
  - South Waikato District Council
  - Taupo District Council
  - Waipa District Council
  - Waitomo District Council

COLAB
BETTER TOGETHER

Breaches

- Some consents require sampling to monitor trade waste.

- Measured Characteristics can include but not limited to:
  - Volume
  - pH
  - Oil and Grease
  - Nitrogen
  - Phosphorus
  - Petroleum Hydrocarbons
  - COD/BOD

  - When a result is outside of the consent limit, it is a breach.

  - We class breaches as low-risk, medium-risk and high-risk.

  - The overall number of breaches has decreased since July 2022.

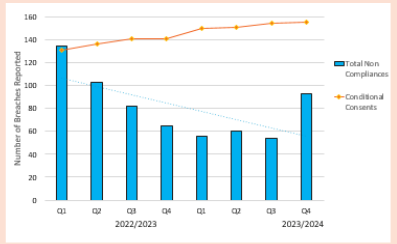


Figure 1. Total trade waste non-compliances and total active conditional consents reported by Co-Lab Water Services from July 2022 to June 2024

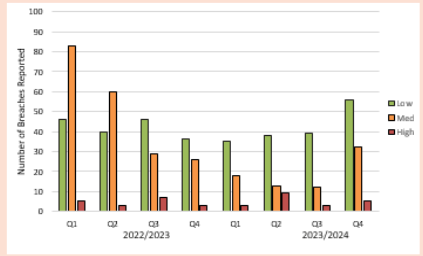


Figure 2. Trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024, grouped by risk class.

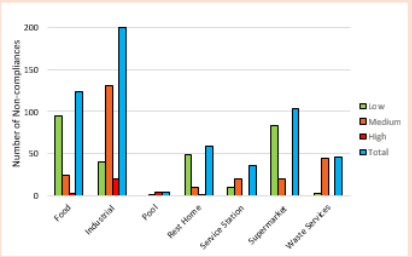


Figure 2. Trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024, grouped by business type and risk class.

CO-LAB
BETTER TOGETHER

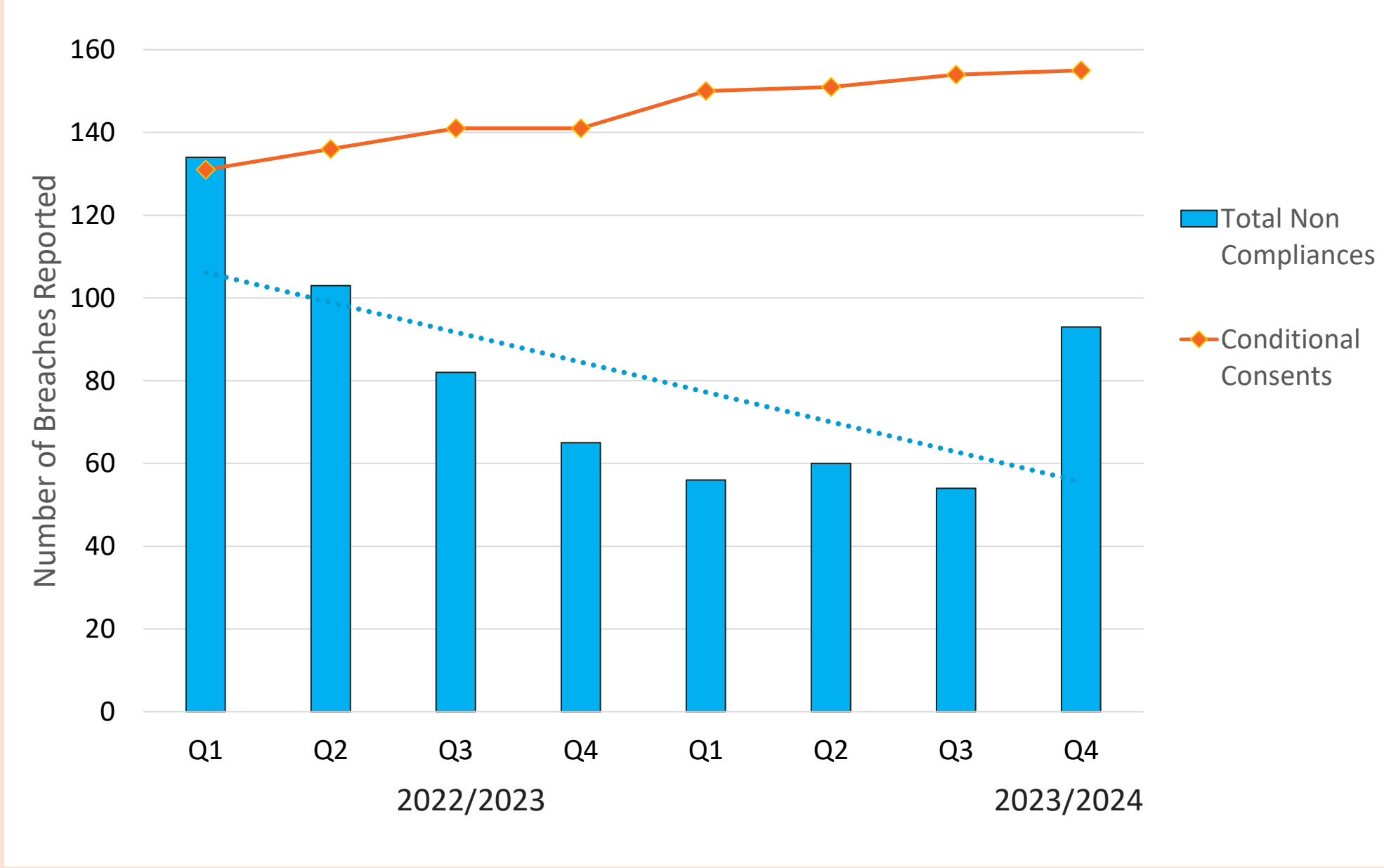


Figure 1. Total trade waste non-compliances and total active conditional consents reported by Co-Lab Water Services from July 2022 to June 2024

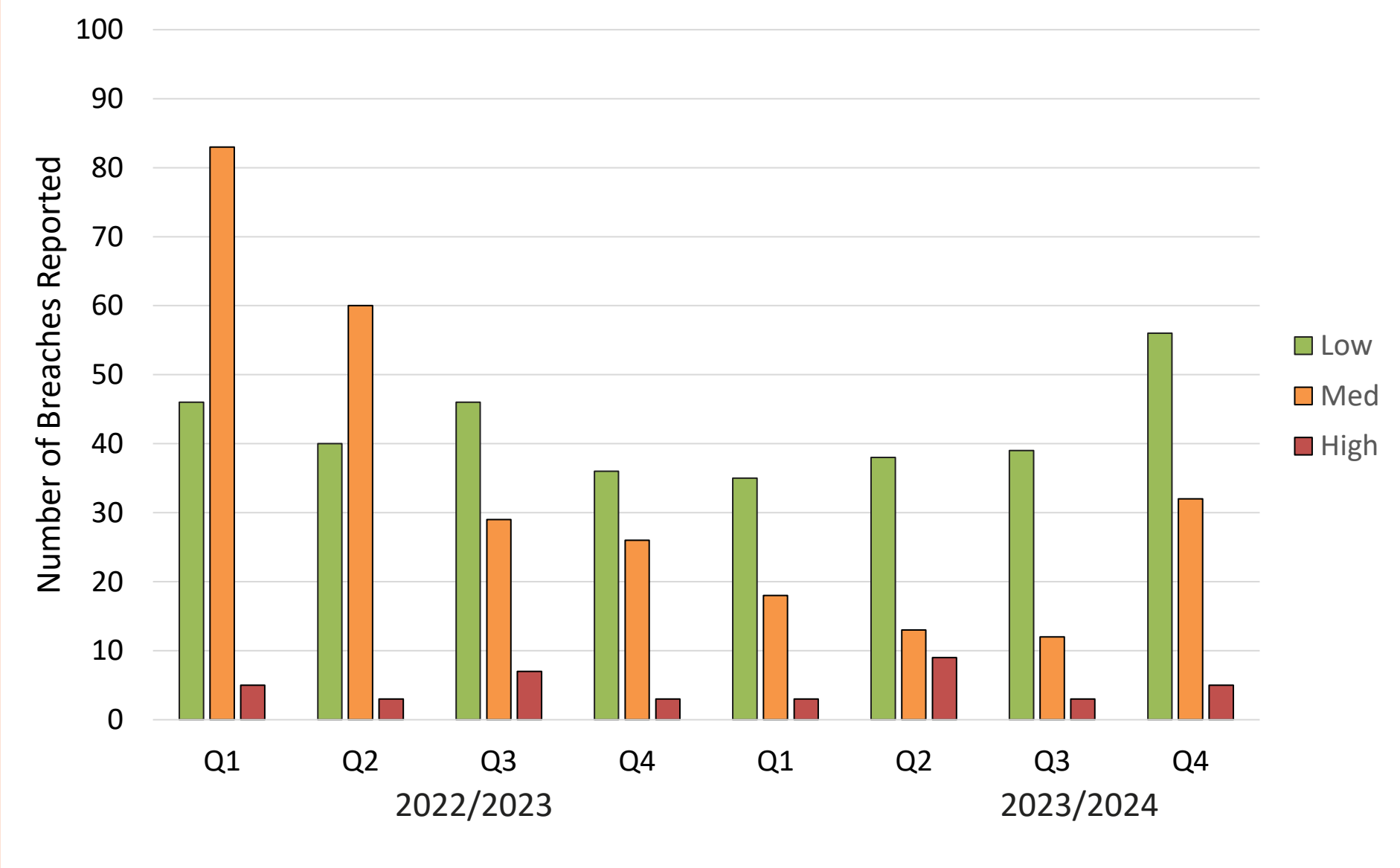


Figure 2. Trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024, grouped by risk class.

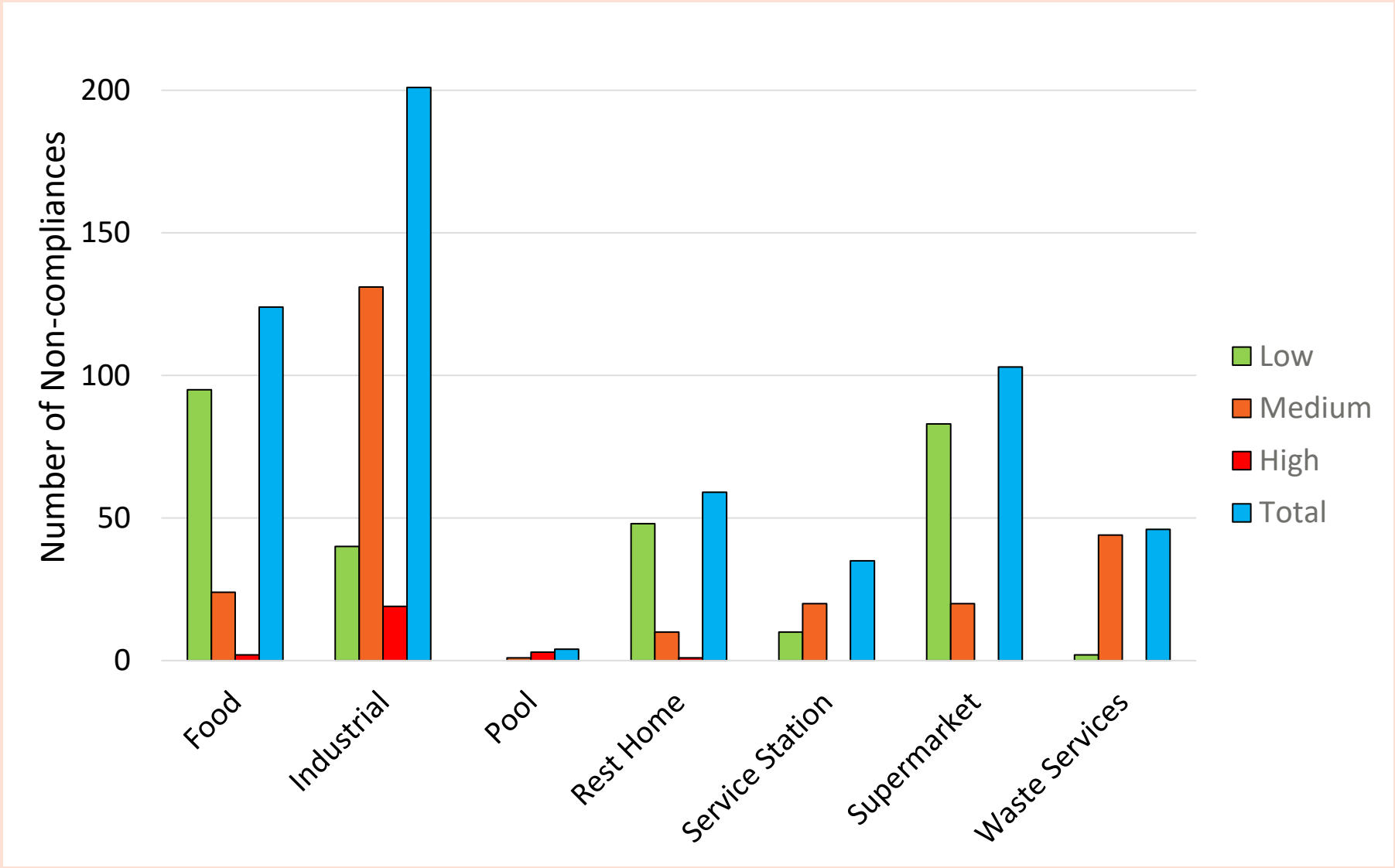


Figure 2. Trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024, grouped by business type and risk class.

Frequency of Breaches

- Breach data was collected from July 2022 to June 2024.

Table 1. Ten most frequent types of trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024.

Characteristic	
pH	293
Chemical Oxygen Demand (COD)	106
Fat, Oil and Grease (FOG)	82
TN	49
TKN	41
Biochemical Oxygen Demand (BOD)	23
Suspended Solids	23
Daily Volume	21
Total Phosphorus	20
Chlorine	17

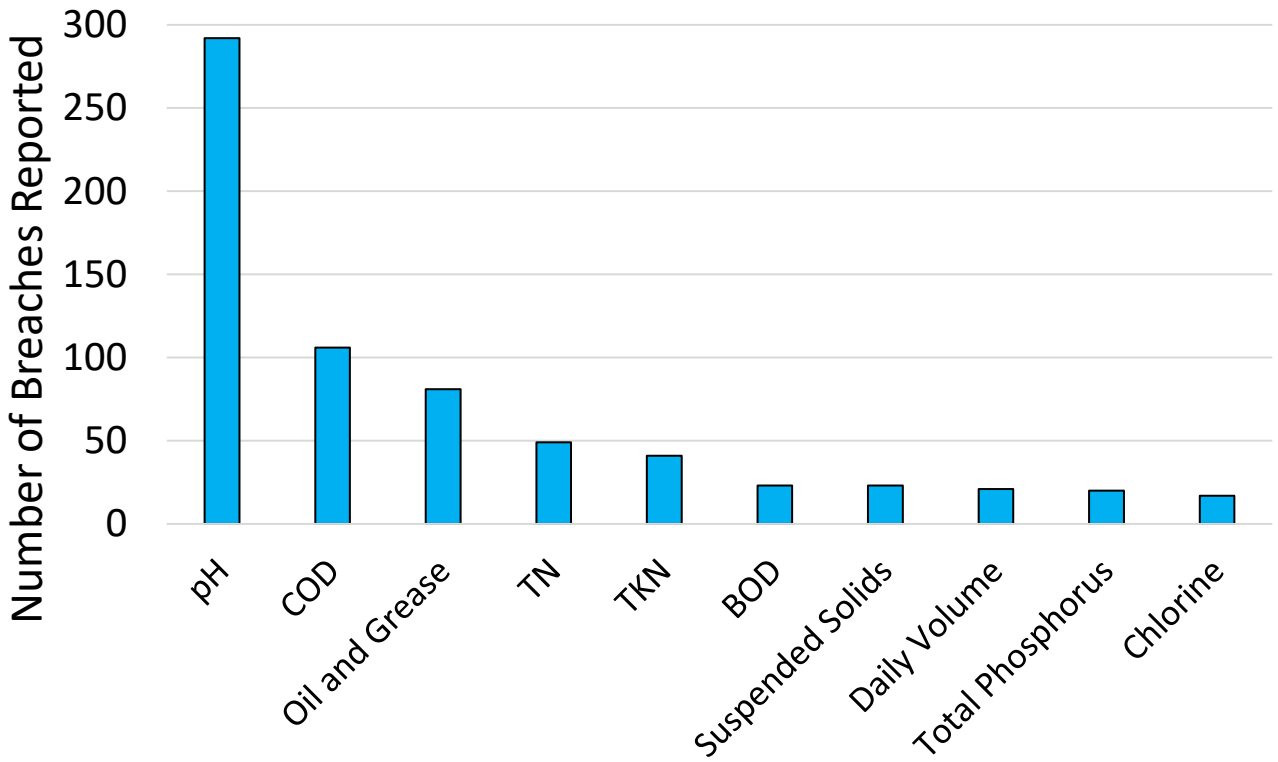


Figure 3. Ten most frequent types of trade waste non-compliances reported by Co-Lab Water Services from July 2022 to June 2024.

CO-LAB BETTER TOGETHER

pH

- Measures acidity.
- Bylaw limit is between 6-10.
- Some businesses have limits up to 12 such as commercial scale laundries.

- Water network is susceptible to corrosion from acidic and high alkali wastewater.
- High pH breaches may be caused by detergents and cleaning products.
- Low pH breaches may be caused by the breakdown of grease trap contents.

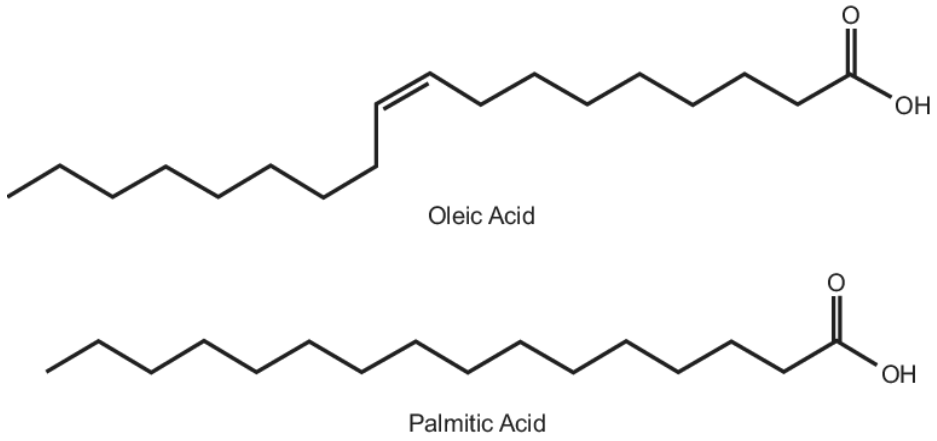


Figure 4. The most common fatty acids found in grease traps

Figure 5. Corrosion of sewer pipes from acidity

What can be done to prevent low pH?

- Service more often
- pH dosing
- Commercial enzyme products

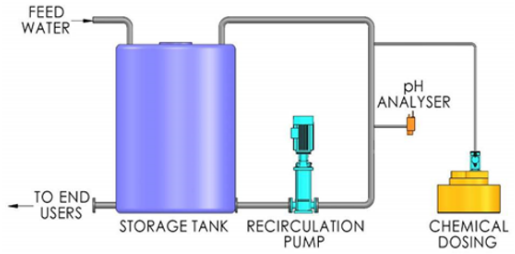


Figure 6. Example of a pH dosing system.

COLAB
BETTER TOGETHER

What can be done to prevent low pH?

- Service more often
- pH dosing
- Commercial enzyme products

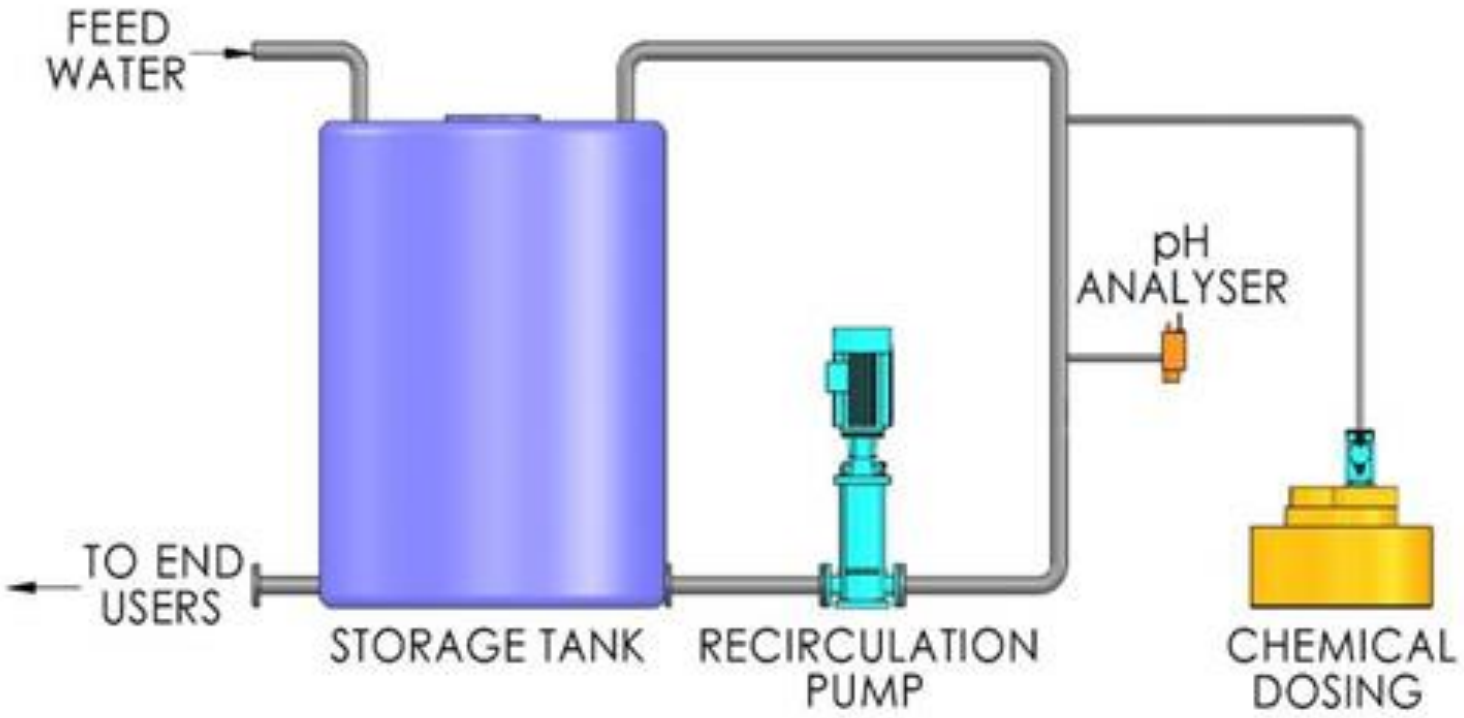


Figure 6. Example of a pH dosing system.

Organic Strength (COD & BOD)

Chemical Oxygen Demand (COD)

- Measures how much oxygen is required to break down compounds via oxidation.
- Defines the collective level of organic and inorganic contamination in wastewater.
- Only monitored in Hamilton City. Bylaw limit is 2000 g/m3 or 10 kg/day .
- Chemical manufacturing businesses and large-scale processing plants have much higher limits.

Biochemical Oxygen Demand (BOD)

- Measures how much oxygen is required for micro-organisms to break down compounds.
- Defines only the level of organic matter in wastewater.
- Bylaw limit is 1000 g/m3 or 5 kg/day (HCC only).
- Food manufacturing, breweries and large-scale laundries are susceptible to higher BOD output.

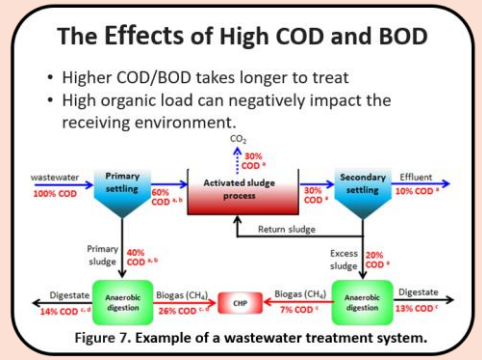


Figure 7. Example of a wastewater treatment system.

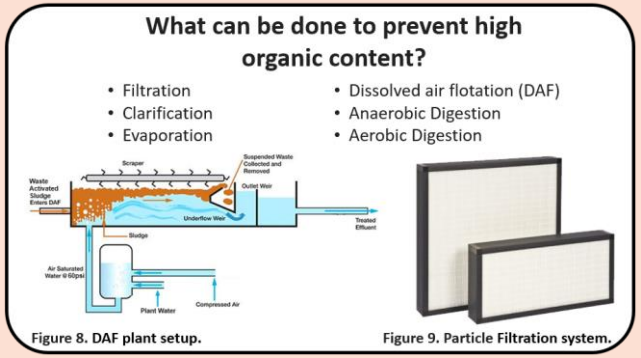


Figure 8. DAF plant setup.

Figure 9. Particle Filtration system.

The Effects of High COD and BOD

- Higher COD/BOD takes longer to treat
- High organic load can negatively impact the receiving environment.

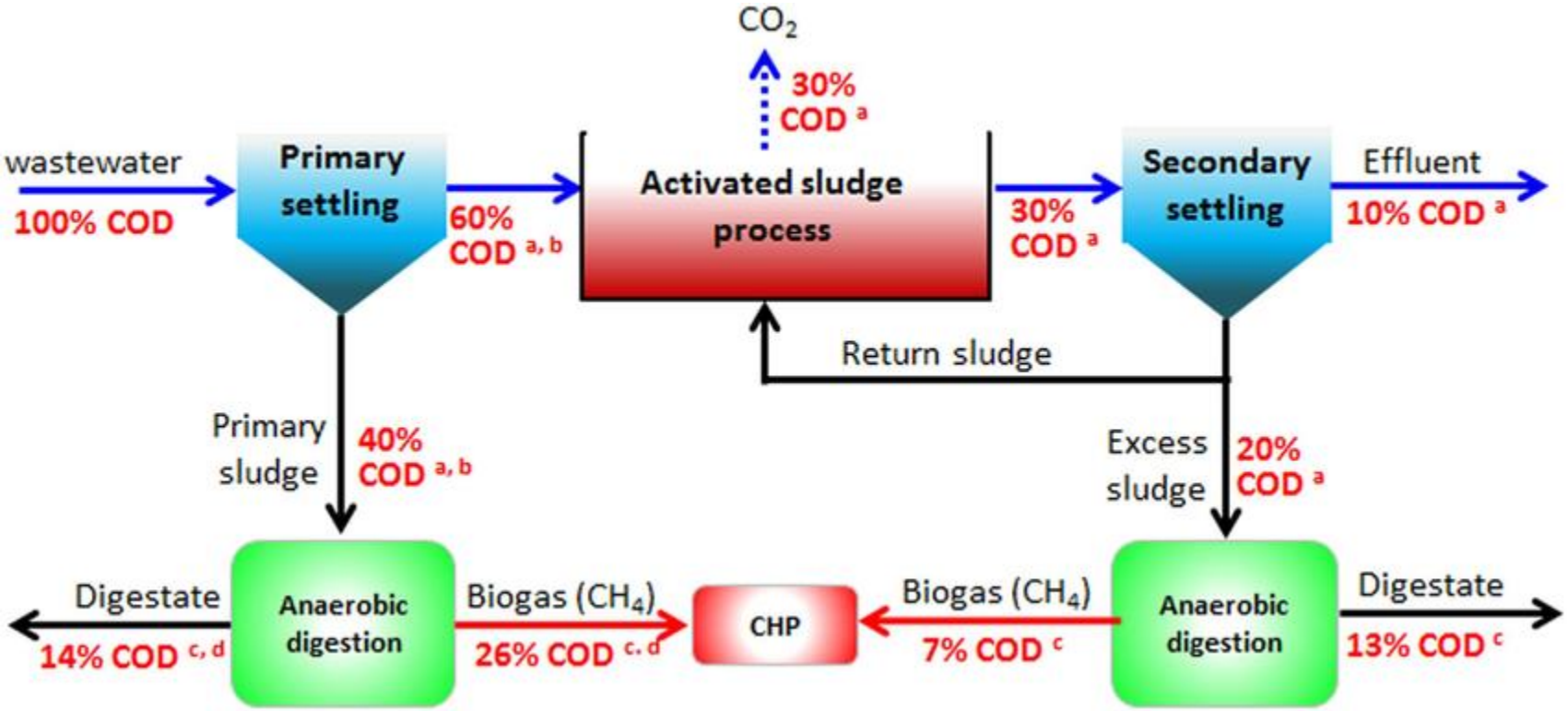


Figure 7. Example of a wastewater treatment system.

What can be done to prevent high organic content?

- Filtration
- Clarification
- Evaporation
- Dissolved air flotation (DAF)
- Anaerobic Digestion
- Aerobic Digestion

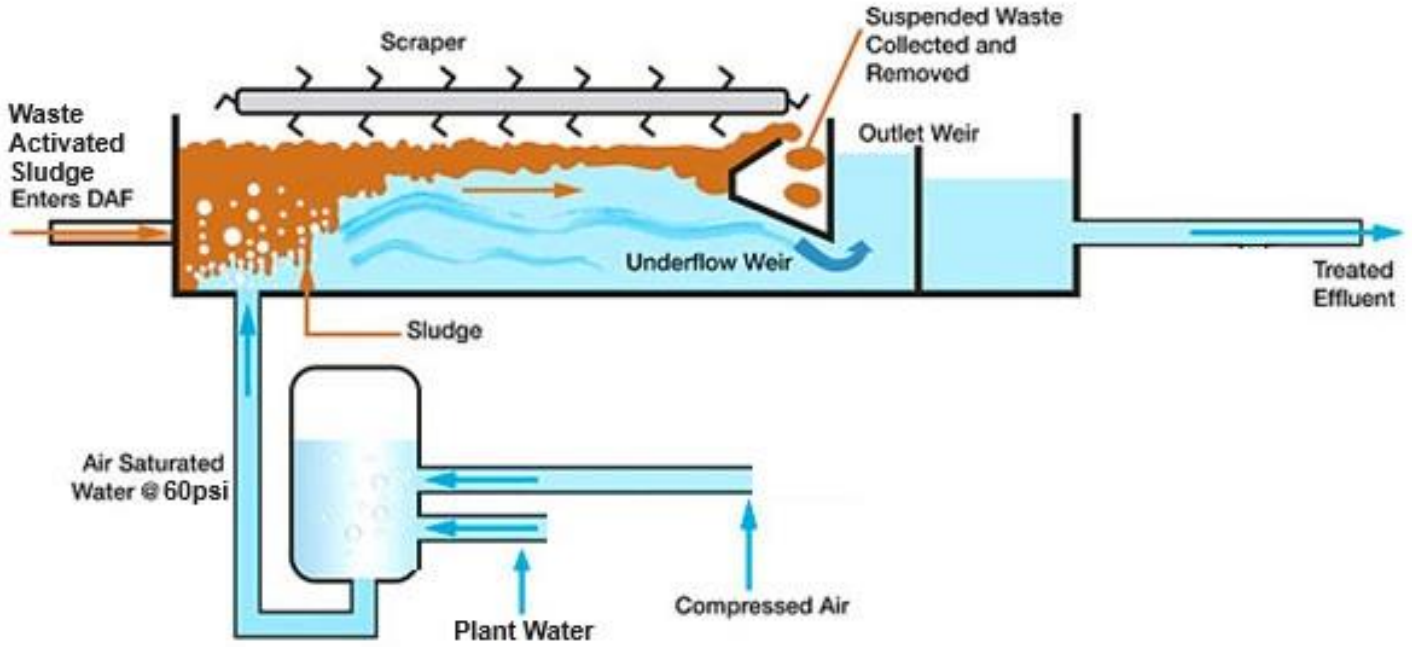


Figure 8. DAF plant setup.

Figure 9. Particle Filtration system.

Fat, Oil and Grease

- Measures level of hydrocarbons.
- Bylaw limit ranges from 200 g/m3 to 500 g/m3.
- Food businesses are highest risk for breaching oil and grease levels.

- Usually caused by infrequent servicing of grease traps.
- Sometimes, oils are discarded directly down drains.
- Can cause blockages in the water network.

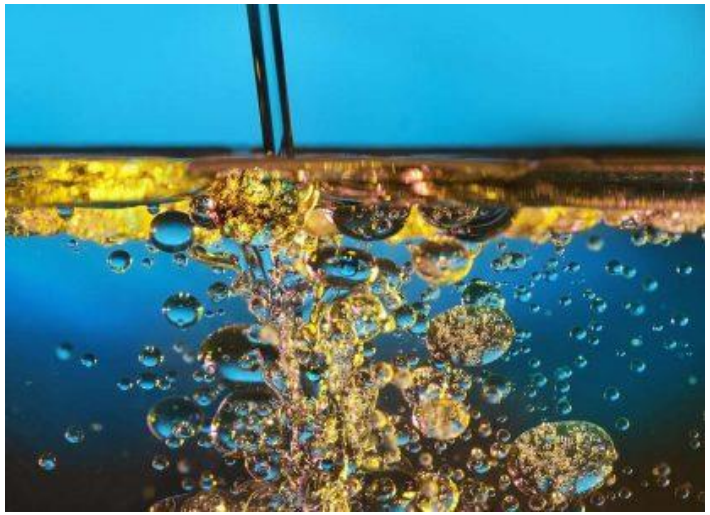


Figure 10. Oil and Water.

Figure 11. Fatberg found in sewer network.

What can be done to prevent high fat oil and grease in wastewater?

- Service more often
- Commercial enzyme products
- Ensure the sample is representative

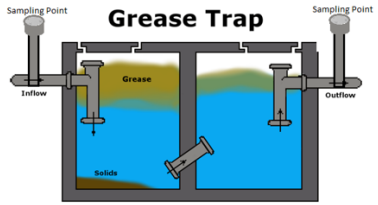


Figure 12. Typical Grease Trap Layout.

COLAB
BETTER TOGETHER

What can be done to prevent high fat oil and grease in wastewater?

- Service more often
- Commercial enzyme products
- Ensure the sample is representative

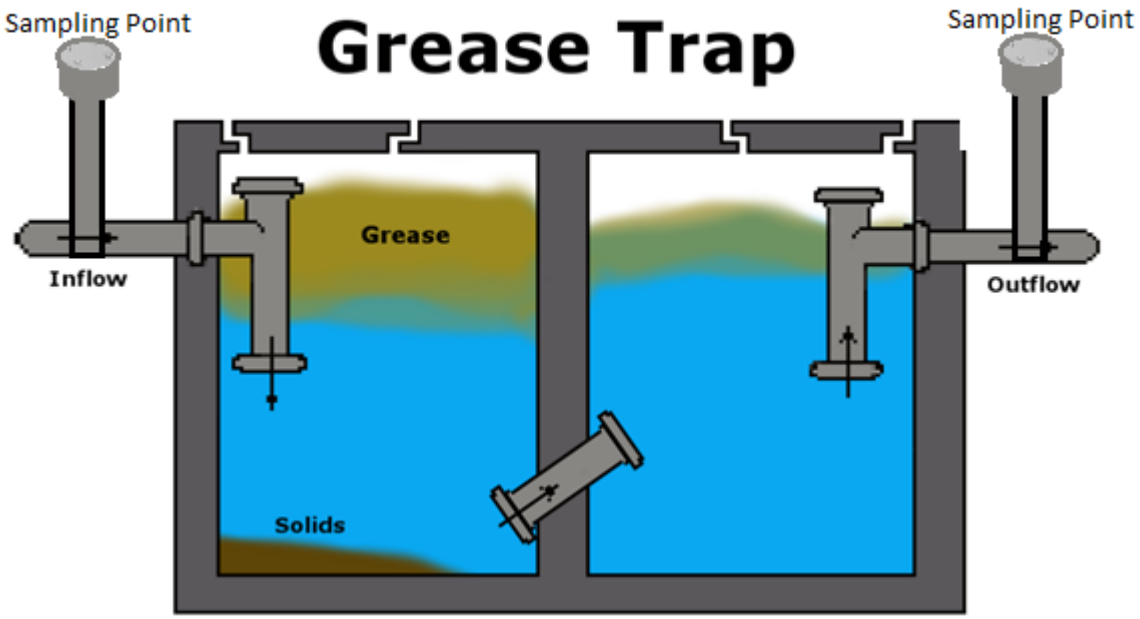


Figure 12. Typical Grease Trap Layout.

Total Nitrogen

- Classed into:
  - Total Kjedahl nitrogen (organic nitrogen + ammonium)
  - Total inorganic nitrogen (nitrites and nitrates)
  - Total nitrogen (Kjeldahl nitrogen + inorganic nitrogen)
- Bylaw limit ranges from 50 g/m3 to 150 g/m3 for Kjeldahl nitrogen
- Only allows for 50 g/m3 of ammonia.
- Seafood providers and livestock cartage sites are most likely to breach nitrogen.

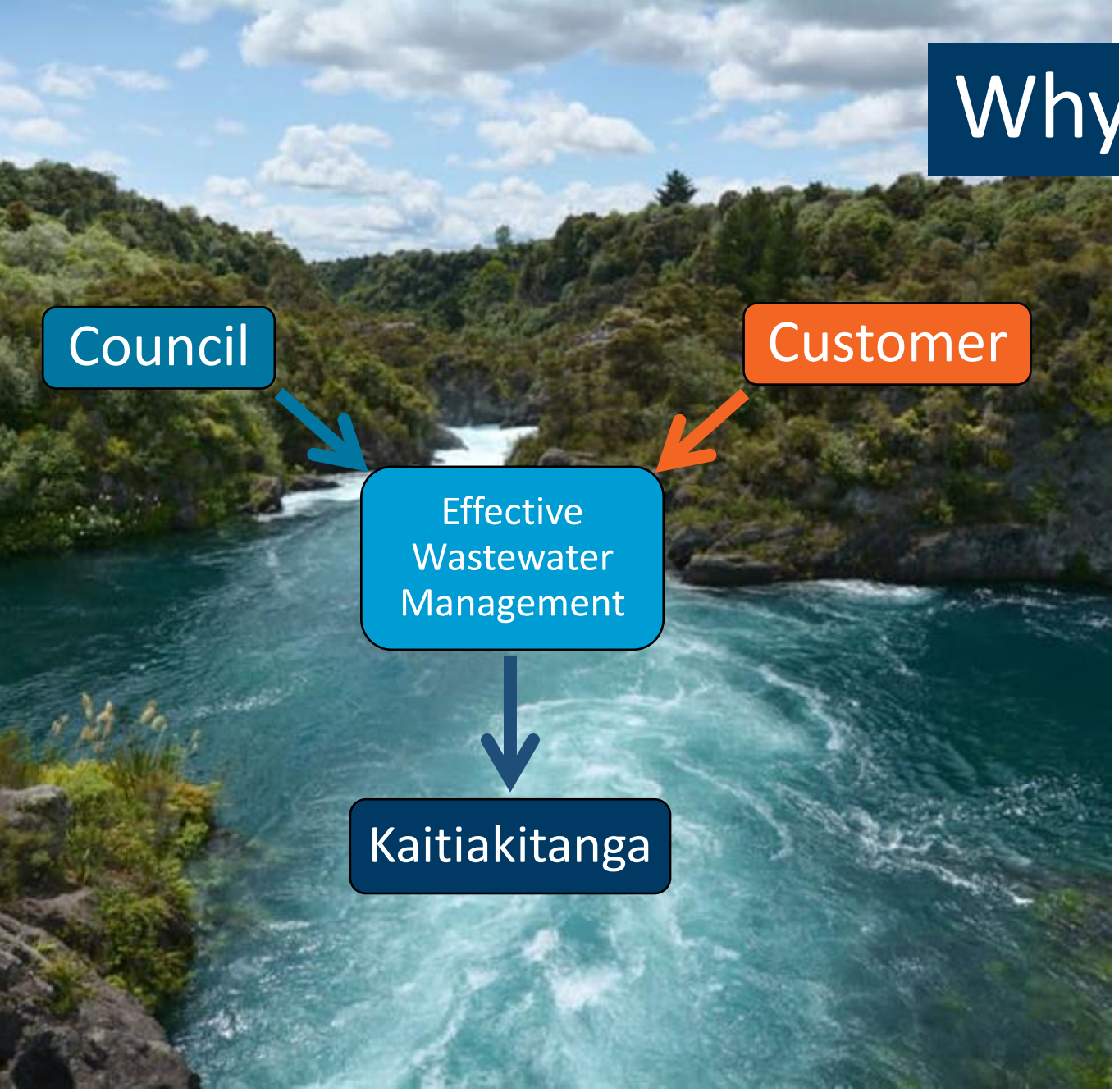
- Related to high throughput.
- Seasonal but mostly unavoidable.
- Increases nutrients and leads to excessive plant and algal growth which impacts ecosystems.

- For food manufacturing, breaches can be avoided by limiting food waste going down drains.

Figure 13. Eutrophication from high nitrogen.

COLAB
BETTER TOGETHER

Why we do it - Trade Waste



- Responsible Trade Waste management leads to:
  - Longer lasting network
  - Reduced maintenance costs
  - Less resources needed for treatment
  - Better output to our environment

Effective wastewater treatment takes two – Council and customer in partnership for the greater good of our people and places.

COLAB
BETTER TOGETHER

Ngā Mihi

CO-LAB
BETTER TOGETHER

- Samit, Shah & Cox, Arthur. (2009). A Role for IR-β in the Free Fatty Acid Mediated Development of Hepatic Insulin Resistance?. Biochemistry Insights. 2009. 10.4137/BCI.S2996.
- Ling Ying Tang, Ngie Hing Wong, Thion Am Chieng, Alex Kwong Jun Kiu, Chung Siung Choo, Yali Li, Chin Ping Tan, Abu Zahrim Yaser, Deni Shidqi Khaerudini, Gui Hua Chen, Jaka Sunarso, Physicochemical characteristics of grease-trap wastewater with different potential mechanisms of FOG solid formation, separation, and accumulation inside grease traps, Water Research, Volume 256, 2024.
- https://www.makwater.com.au/products/ph-adjustment-recirculation/
- Wan, Junfeng & Gu, Jun & Zhao, Qian & Liu, Yu. (2016). COD capture: A feasible option towards energy self-sufficient domestic wastewater treatment. Scientific Reports. 6. 25054.
- https://www.ubcleanwater.org/plant-tours/supplemental-content-tours/pages/12-dissolved-air-flotation
- https://www.setfil.com/fine-filtration/
- https://blog.veoliawatertechnologies.co.uk/high-cod
- https://advancedchemsys.com/
- https://www.nationalgeographic.com/science/article/fatbergs-fat-cities-sewers-wet-wipes-science
- https://teamaquafix.com/bioaugmentation-in-grease-traps/
- Felix Andrews, 2005-12-02, https://commons.wikimedia.org/wiki/File:River_algae_Sichuan.jpg
- https://www.rnz.co.nz/news/regional/299633/%27up-to-100-years%27-to-restore-waikato-river