Building resilience into future management of legacy landfills

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Overview

- Why build resilience?
- Impact of the 2023 storm events on assets
- Review of traditional assessment approach
- Case Study – Whangateau Closed Landfill
- Dynamic Adaptive Policy Pathways
- Other legacy landfill issues
- Summary

Why build resilience?

Auckland Council's programme of work:

- **Asset management**

  Prioritisation of sites for further investigation and potential remedial works

- **Monitoring programmes**

  Identifying signals and triggers for remedial works

Storm events 2023

Prioitisation of sites to be visited following Cyclone Hale and Cyclone Gabrielle events

Asset management

Prioritisation of sites for further investigation to determine climate related remedial works. (Extreme sites first > Insignificant)

Stakeholder engagement

Identifying key overlapping stakeholders that need to be engaged with (i.e. Auckland Transport, Parks & Community Facilities, Iwi)

Changes to how we monitor

Identifying sites that may need monitoring pre and post storm events

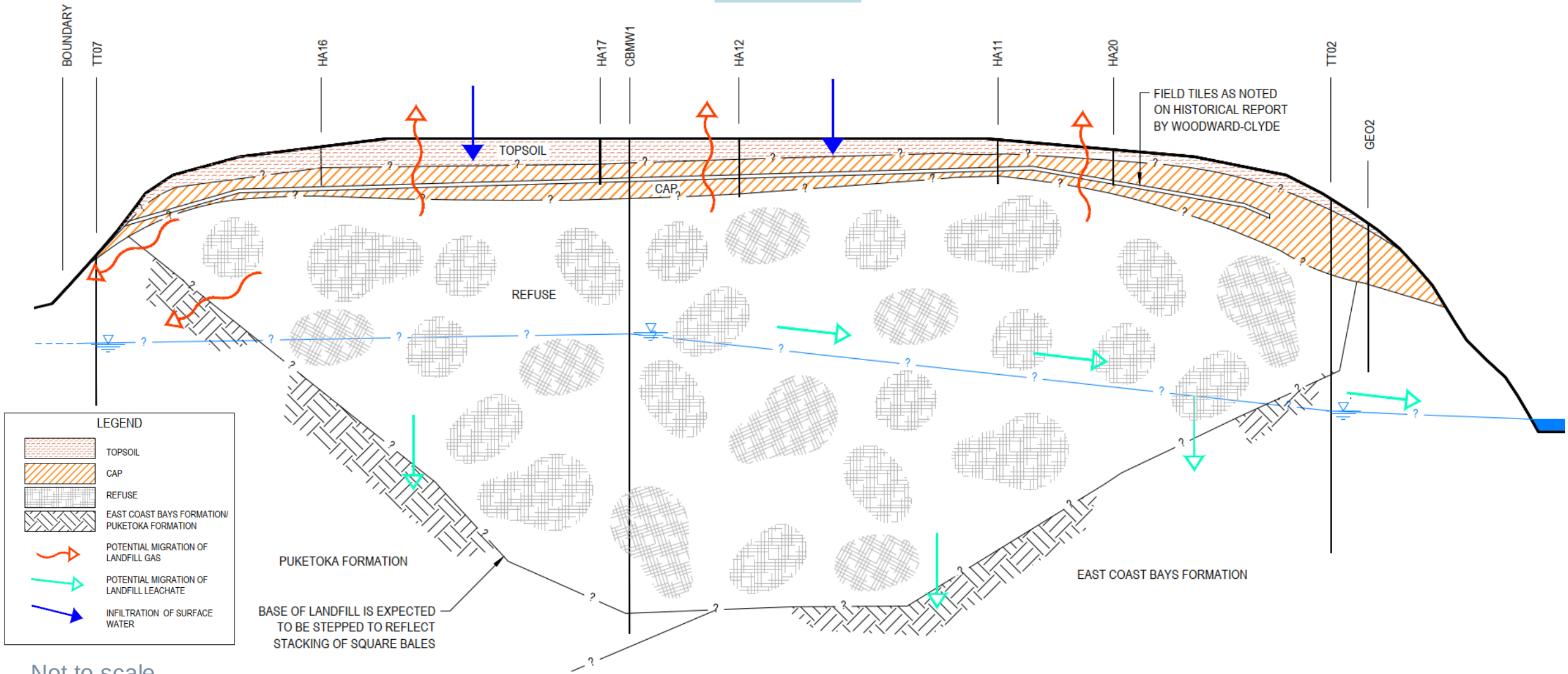
Asset management monitoring programmes to identify when signals and triggers of climate change are reached to carry out pre-determined remedial work

Impact of 2023 storm events on landfill assets

Surface failures on steep sided closed landfill slopes in coastal areas

Landslip failures and environmental discharges at the base of retaining walls in fluvial areas

Traditional assessment approach



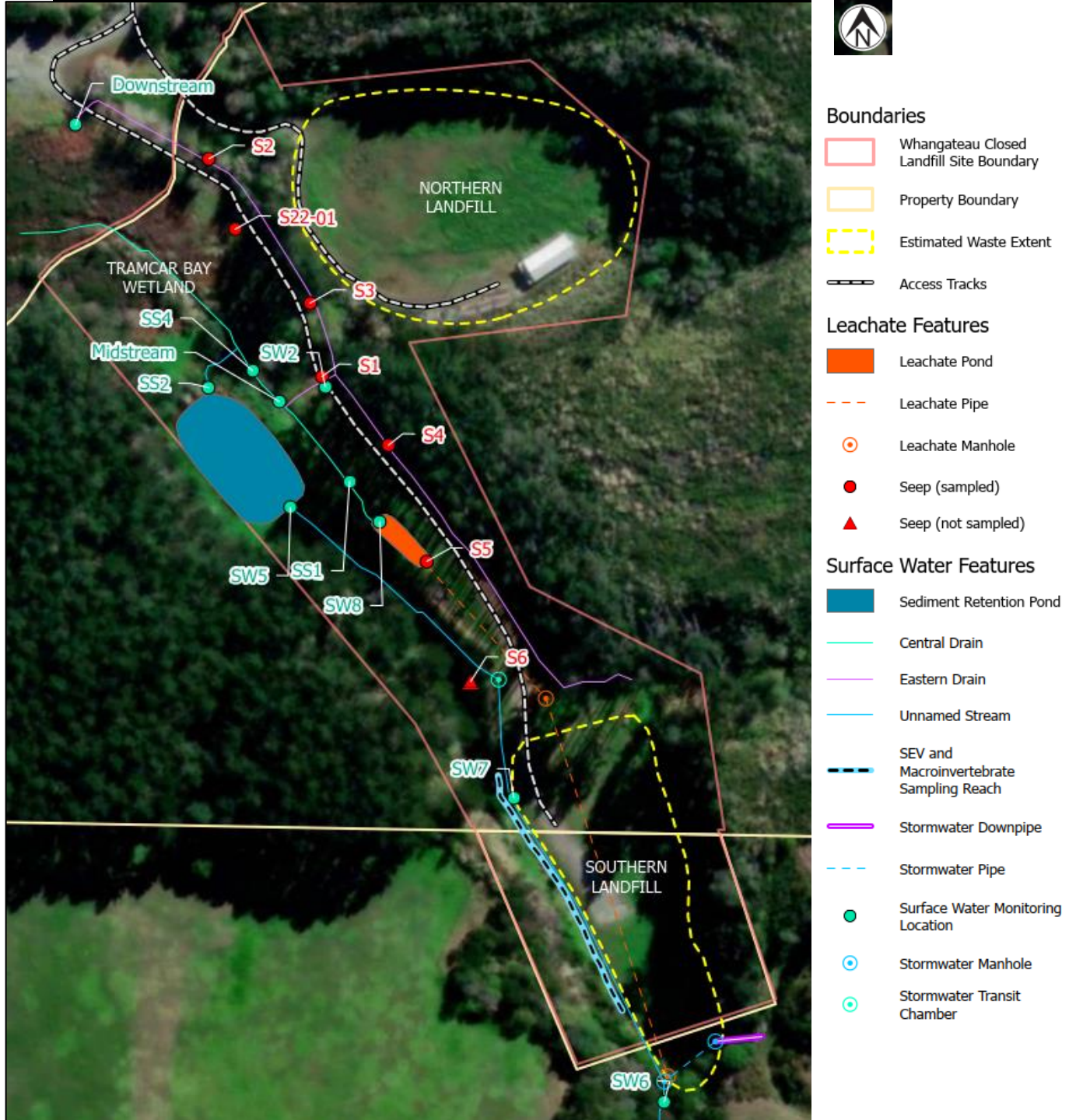
Not to scale

Case study
Whangateau closed landfill

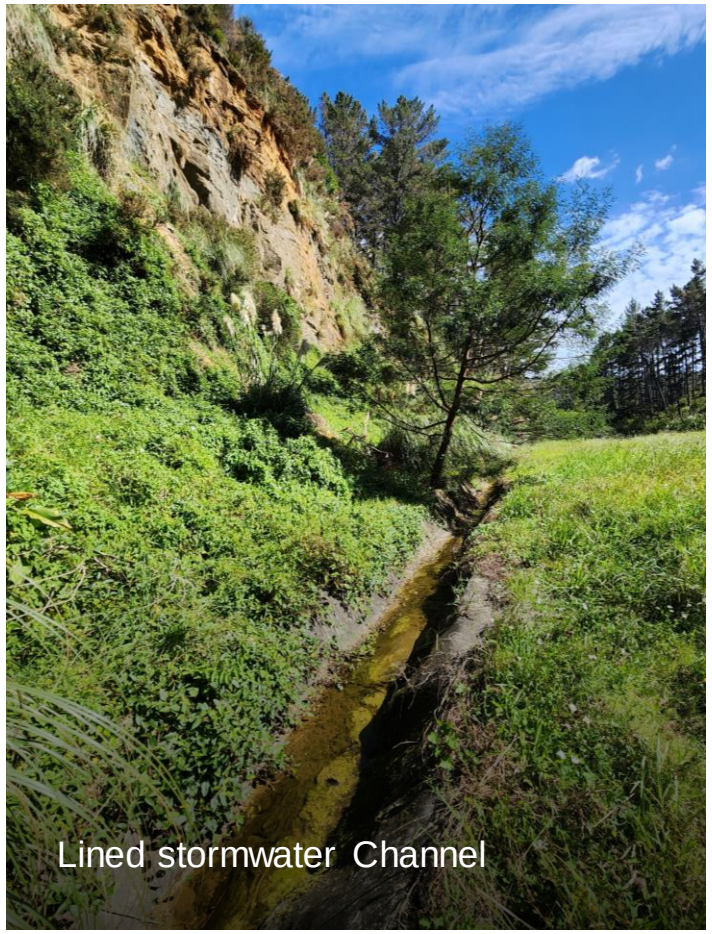
- Domestic and commercial refuse was placed in two quarried areas; the Northern and Southern landfills
- The Northern landfill is currently leased to Ngāti Manuhiri
- The Southern landfill is unoccupied and lies at the base of a steep sided rock face

Site features

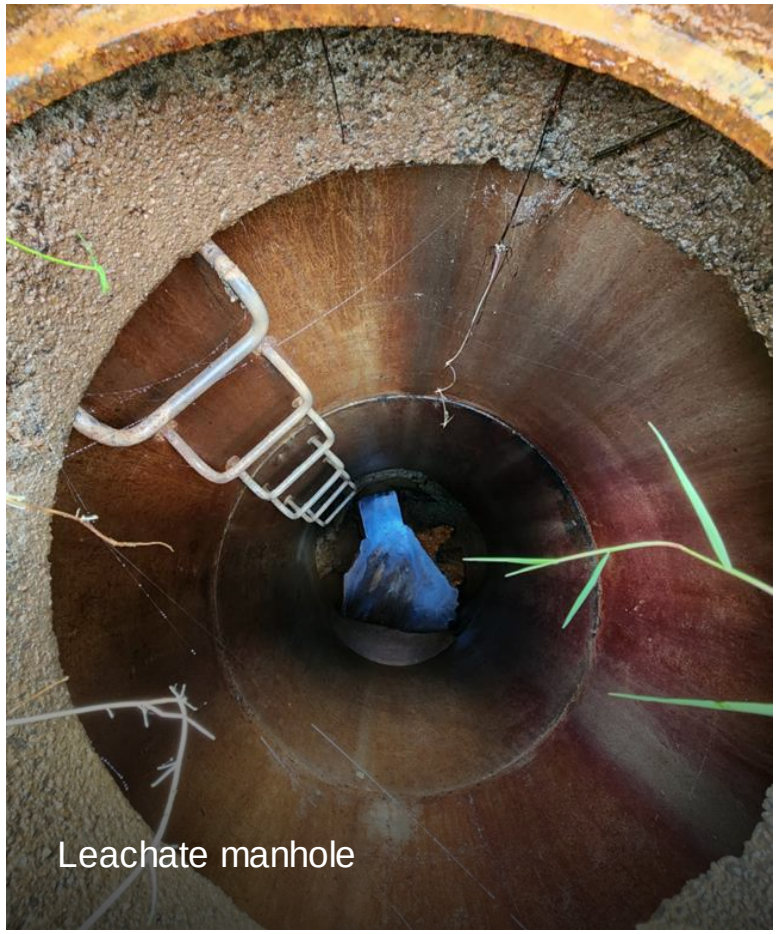
- Waste and contaminated soils
- Surface water channels and sediment retention pond
- Leachate pipes, manholes and pond
- Landfill bund
- Access track
- Rock slopes
- Leaseholder buildings - Ngāti Manuhiri
- Vegetation – trees and wetlands



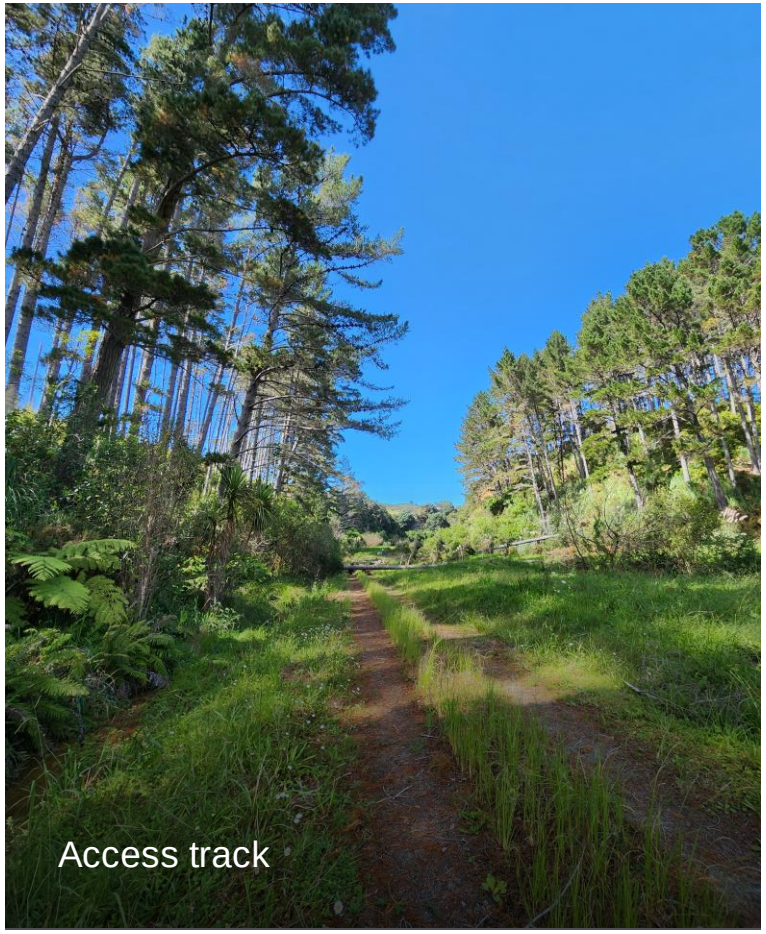
Closed landfill assets



Lined stormwater Channel



Leachate manhole



Access track

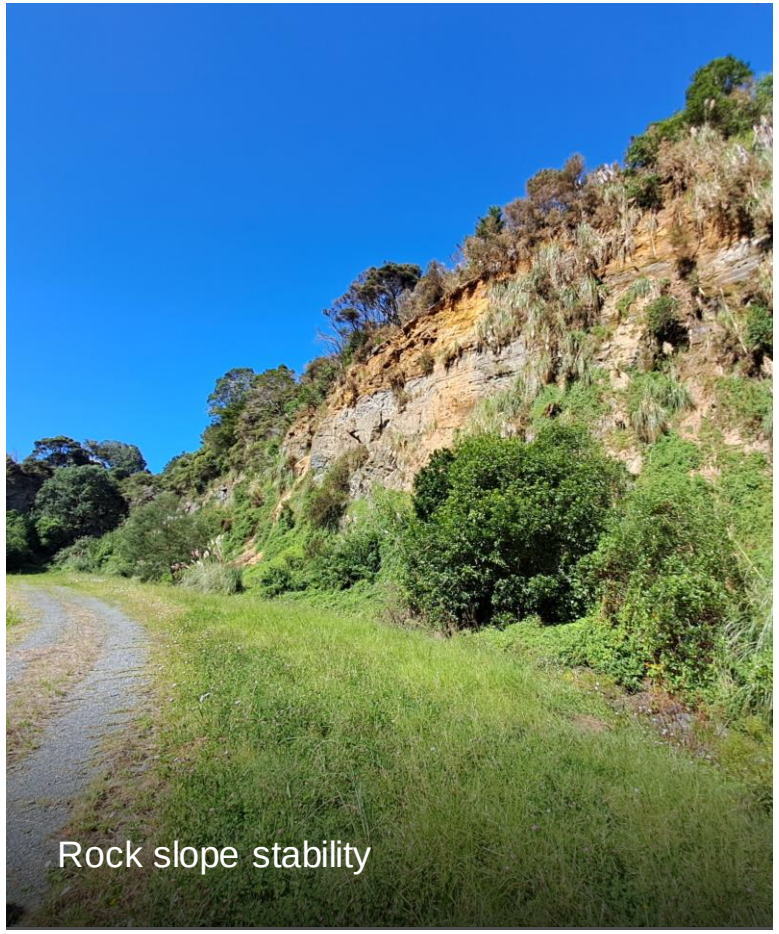
Asset assessment

Sediment retention pond

Tyre bund wall

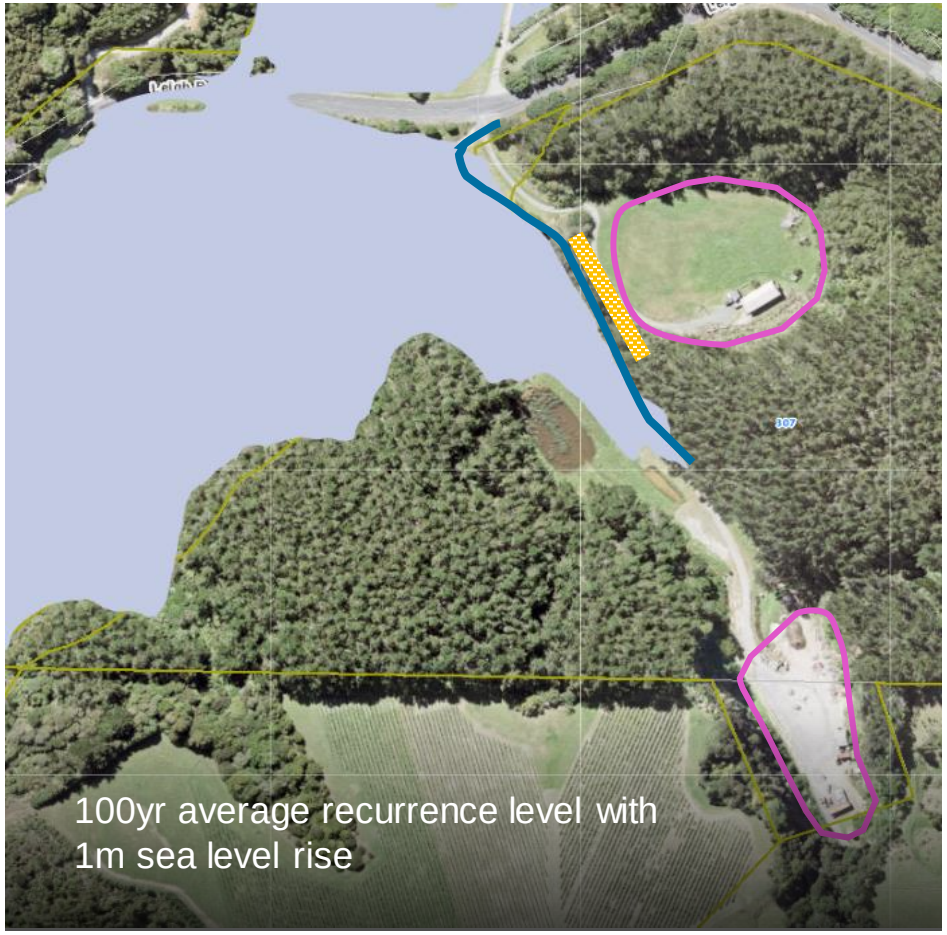
Asset assessment


Cover material


Rock slope stability

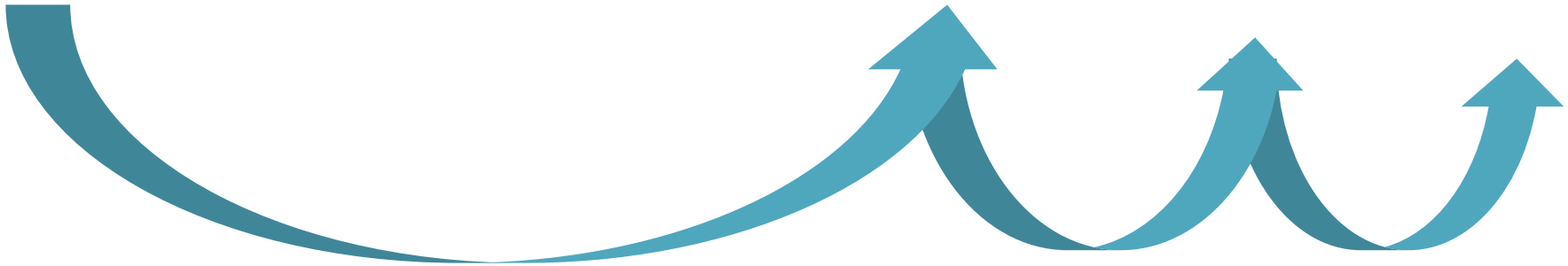

Ecological features

Sea level rise



A CSM for future management

Source	Pathway	Receptor	Pathway Assessment – present	Short (20 years, RCP 8.5)	Medium (50 years, RCP 8.5)	Long (100 years, RCP 8.5)



- Consider how the CSM might present in the short, medium and long term
- This has required a multi-disciplinary approach with assessments from geotechnical, civil, environmental, ecology and climate change specialists

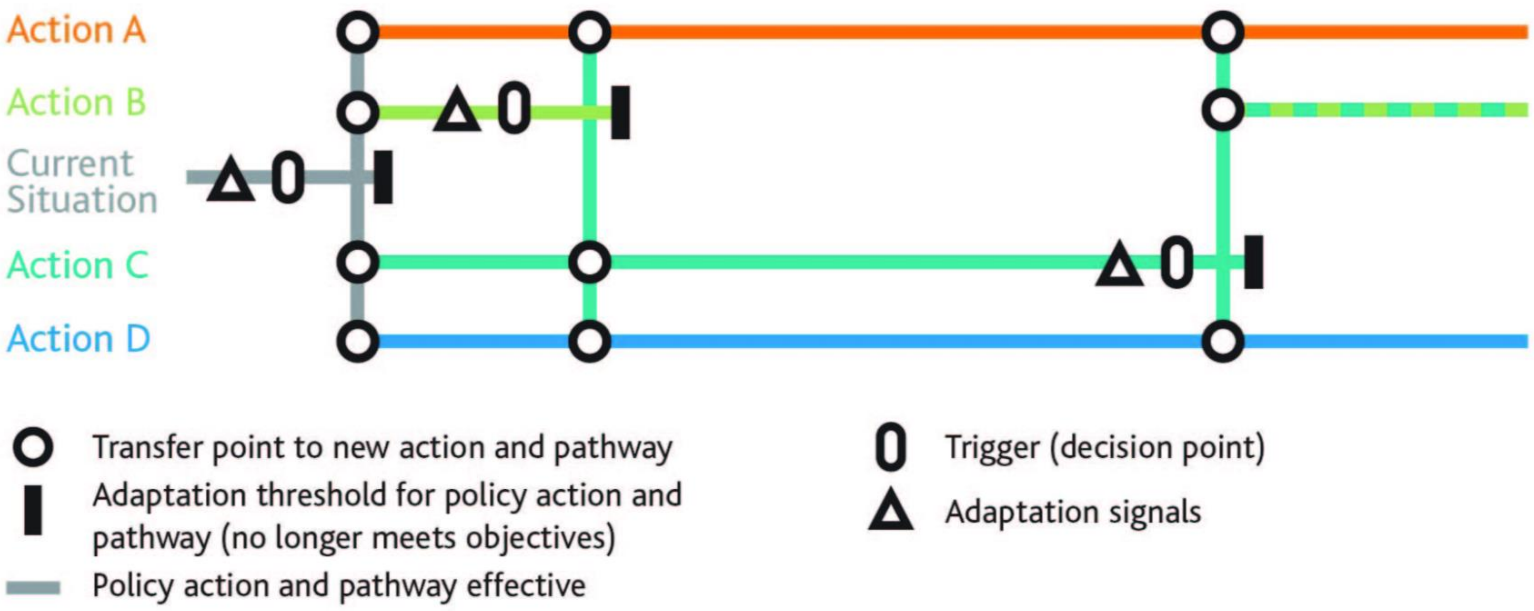
Whangateau closed landfill assessment

Issue	Current status	Climate change consideration
Waste and contaminated soils	Capping is present across both the Northern and Southern Landfills, isolating the wastes from people	Increase in extreme weather events and rainfall intensity with climate change could develop overland flow paths, increase erosion and expose waste
Surface water contamination	Leachate seeps pose a very low risk of toxicity to fauna	Potential increase of leachate generation, transport and direct discharge into Tramcar Bay
Condition of Northern Landfill bund	Failures of the wall (if any) are expected to be superficial Surface vegetation provides additional support	Progressive risk of scour from storm surges Rising groundwater levels may reduce slope FoS leading to bund failure and waste release
Landfill infrastructure	The sediment and leachate ponds, access track and stormwater channels require regular maintenance and minor repairs but are currently fit for purpose	Potential inundation of the access track and monitoring wells, and scour of the Northern Landfill bund from storm surges

Note: Other issues include but not limited to rock slope, maintenance of trees/vegetation and ecological features

Dynamic Adaptive Policy Pathways (DAPP)

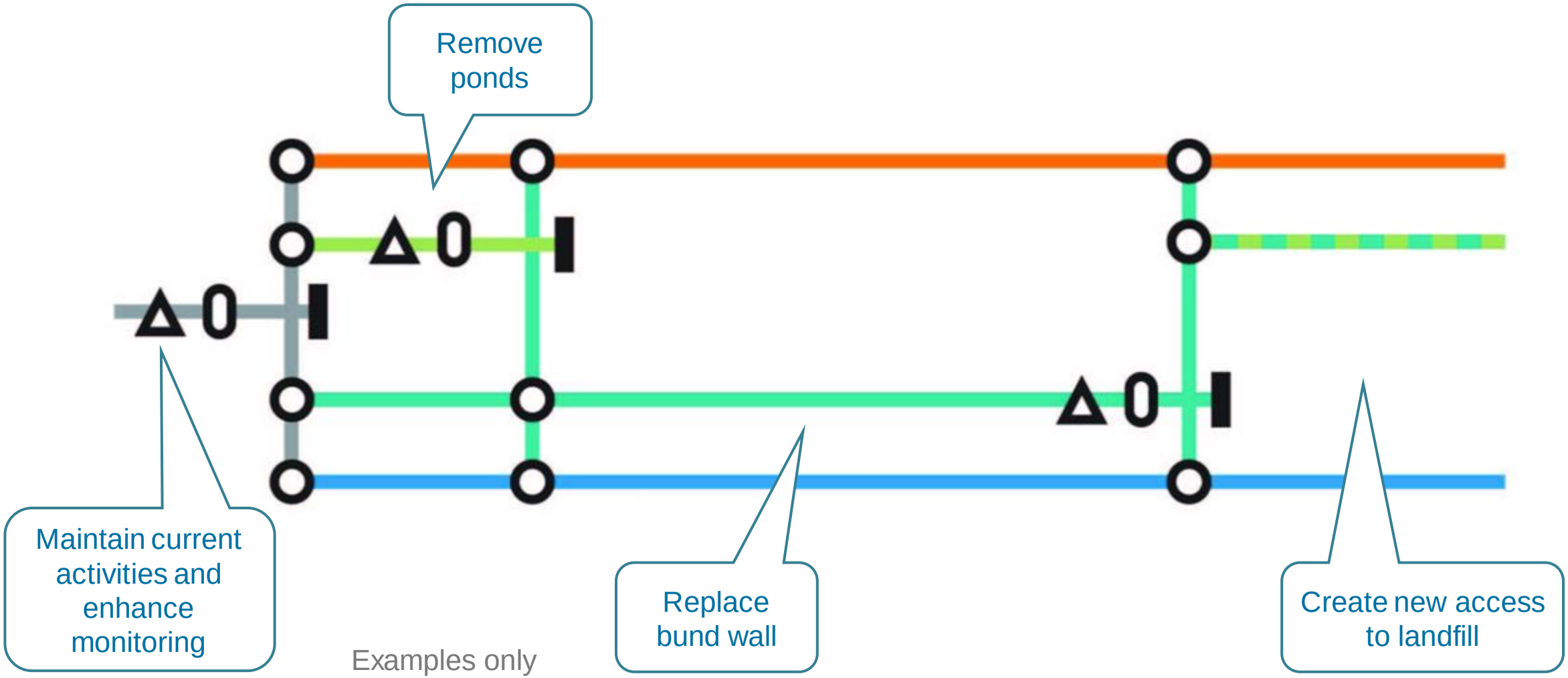
- At present, no significant issues need addressing
- This may change in the future
- **When?** How do we know when to act?



Triggers + signals

- Sea level rise
- Change in leachate/water quality or volume (e.g., higher salinity)
- Increasing operations + maintenance costs
- Frequency of hazard events (e.g., fallen trees at Northern Landfill bund)
- Increased health and safety risk (e.g., compromised access)

Dynamic Adaptive Policy Pathways



Examples only

Enhanced monitoring

- Visual inspections
- Water sampling and analysis for leachate parameters
- Landfill gas monitoring
- Stability monitoring

Additional considerations

- Groundwater/sea level change
- Rainfall intensity/frequency
- Asset condition and performance

Other legacy landfill issues

Summary

- The CLM Guidelines No 5 state that: "All pathways, whether complete, **potential or incomplete that may become complete in the future,** should be identified in the CSM"
- Consider climate change by adding a temporal element to a CSM
- Have an eye for other factors: stability issues, asset condition + performance
- Ensure that monitoring includes DAPP triggers and signals
- Incorporate DAPP into asset management planning

Any pātai/ questions?

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Ngā mihi nui

Thank you

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