

Understanding climate related impacts on closed landfills in the Auckland Region

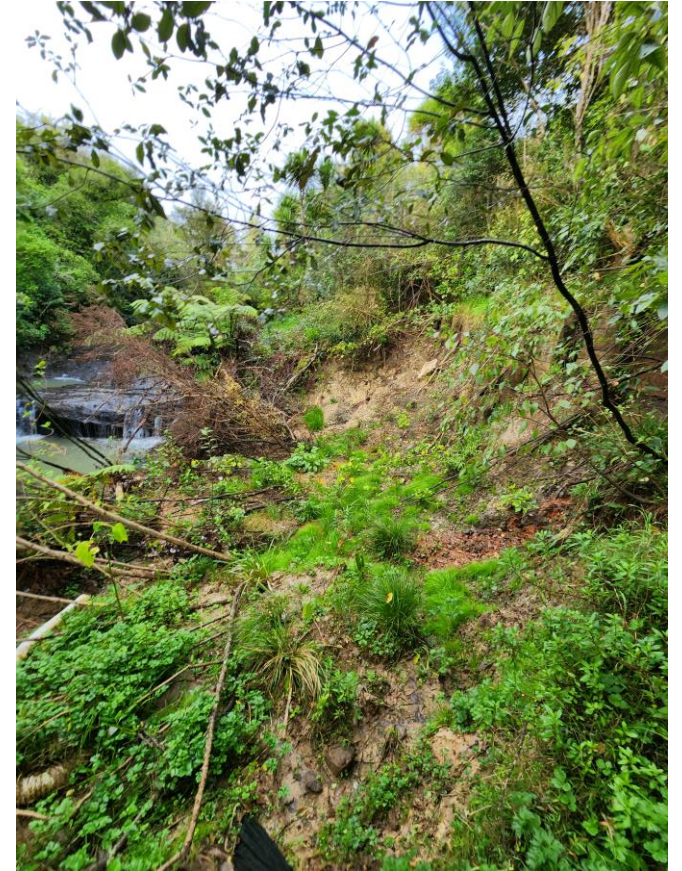
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Overview

- Background
- Methodology
- Evolution of the assessment
- Results
- Applications
- Next steps

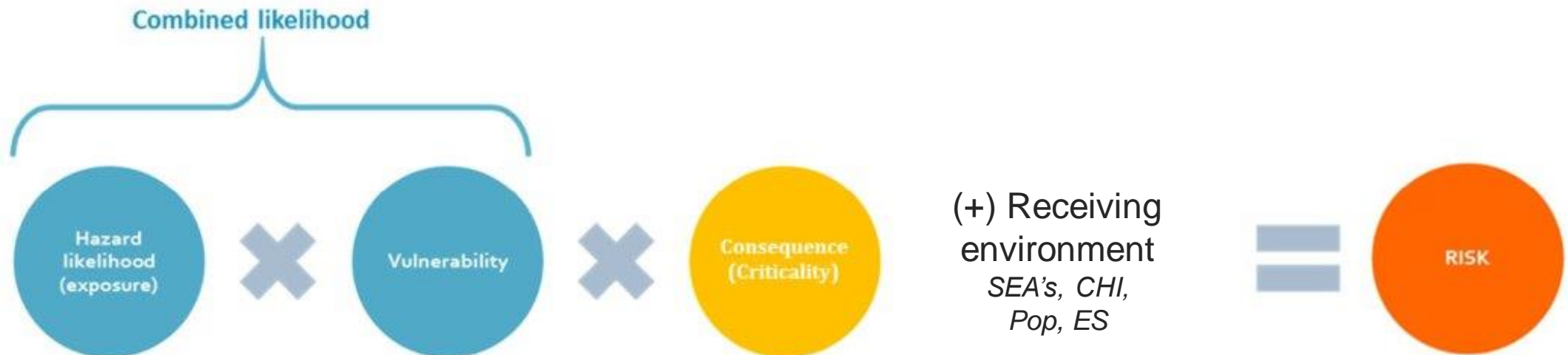


Background: National landfill risk assessment project

- Increase in frequency of extreme weather events.
e.g. March 2019 West Coast floods.
- “How many landfills are at potential risk to climate change related hazards?”
- **National landfill risk assessment project**
was developed to:
 - Prioritise closed landfills in terms of their exposure and vulnerability to climate change related natural hazards.



Risk assessment methodology & closed landfill inputs



Risk assessment framework adapted from AS5534

1. Landfill boundary information

2. Hazard exposure

- 1. coastal inundation
- 2. coastal erosion
- 3. river scour
- 4. rainfall induced flooding

3. Landfill vulnerability
Cap thickness,
known issues

4. Landfill criticality
Type of waste,
size of the site

5. Risk score

6. Risk score + RE

Climate risk score



The Climate Risk score is derived from the relationship between combined likelihood and criticality.

Comb

Risk level	Definition
Extreme (5)	Very high risk to the landfill and receiving environment that needs urgent attention.
High (4)	High risk to the landfill and receiving environment that need attention.
Moderate (3)	Moderate risk to the landfill and receiving environment.
Low (2)	Low risk to the landfill and receiving environment.
Insignificant (1)	Very low risk to the landfill and receiving environment.

Hazard
likelihood
(exposure)

(+) Receiving
environment
SEA's, CHI,
Pop, ES

Initial risk assessment

- 180+ Auckland Council controlled closed landfills*
- Sites contain a mixture of municipal solids waste, construction and demolition waste, and uncontrolled fill.

Challenges:

1 Aligning available data to the methodology.

5 Ensuring datasets are fit for purpose.

2 Following the same methodology as the national methodology.

3 The “unknowns.”

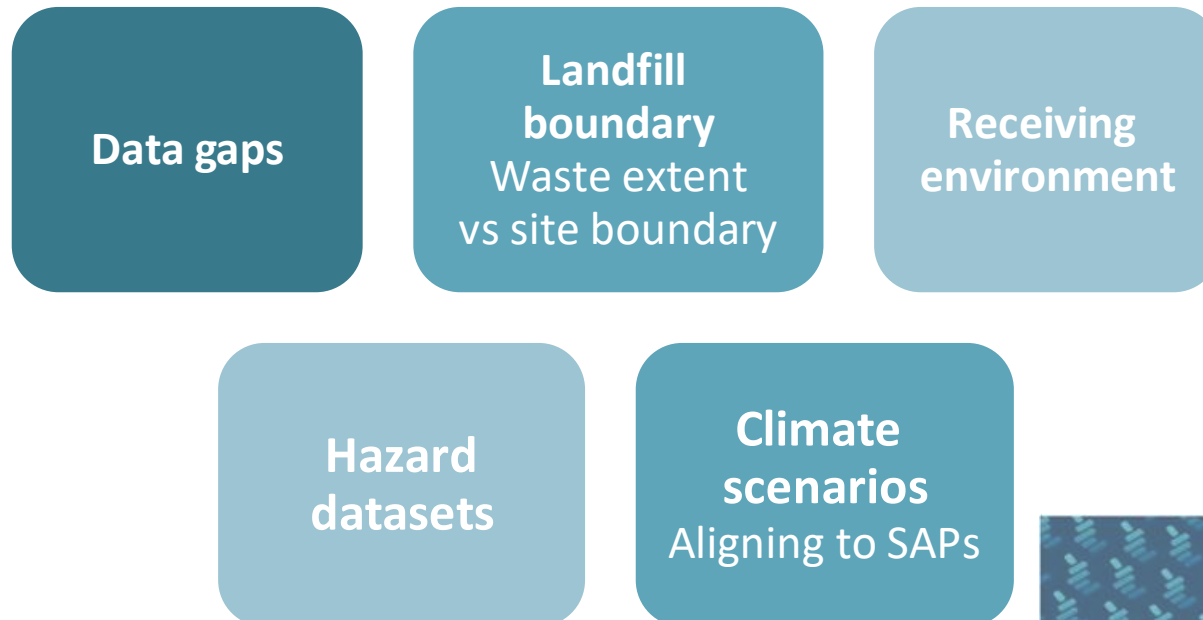
*Not including privately owned landfills within the Auckland Region.



Evolution of the assessment

- Initial assessment showed a significant number of sites at high risk of impact to climate related hazards
→ difficult to prioritise limited budget for further investigation / remedial works based on initial results.
- Refinement of model (twice) to better differentiate and prioritise sites.

Key areas of refinement



Risk definition

- A risk score of ≥ 5 indicates that the closed landfill is at a very high risk of impact from climate related hazard/s and should be prioritised for further climate related assessment, investigation and remedial works (if required).
- Is not a predictor of the magnitude of the consequence if the landfill is impacted.
- Tool does not account for existing coastal protections.



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Individual hazard scores

165 sites are exposed to at least one climate related hazard.

74 sites identified as being at extreme risk from at least one hazard.

Rainfall induced flooding hazard is the dominant hazard with 70 sites at extreme risk of impact.

Table 4.5: Summary of the number of sites in each risk category – present day

Hazard	Total potentially exposed	Risk				
		Insignificant (1.0 - 1.9)	Low (2.0 – 2.9)	Moderate (3.0 - 3.9)	High (4.0 – 4.9)	Extreme (5.0 – 6.0)
Coastal boundary (erosion)	61 (33%)	116	6	18	19	24
Coastal inundation	80 (44%)	99	6	22	24	32
River scour	63 (34%)	114	6	14	12	37
Rainfall induced flooding	158 (86%)	25	0	46	42	70

Multiple Hazard Risk Score (Overall Risk Score)

9 sites are classified as extreme risk scoring 5.0 or greater. 5 of these sites are at extreme risk from all hazards.

32 sites are classified as having a high overall risk, scoring between 4.0 to 4.9, with all these sites being at high or extreme impact from three or four hazards.

Incorporation of receiving environment score elevated 30% of sites into a higher risk category.

The results enable us to utilise our limited budget as effectively as possible by focusing on those sites with an extreme or high-risk score for further assessment and investigation over the next 10 years.

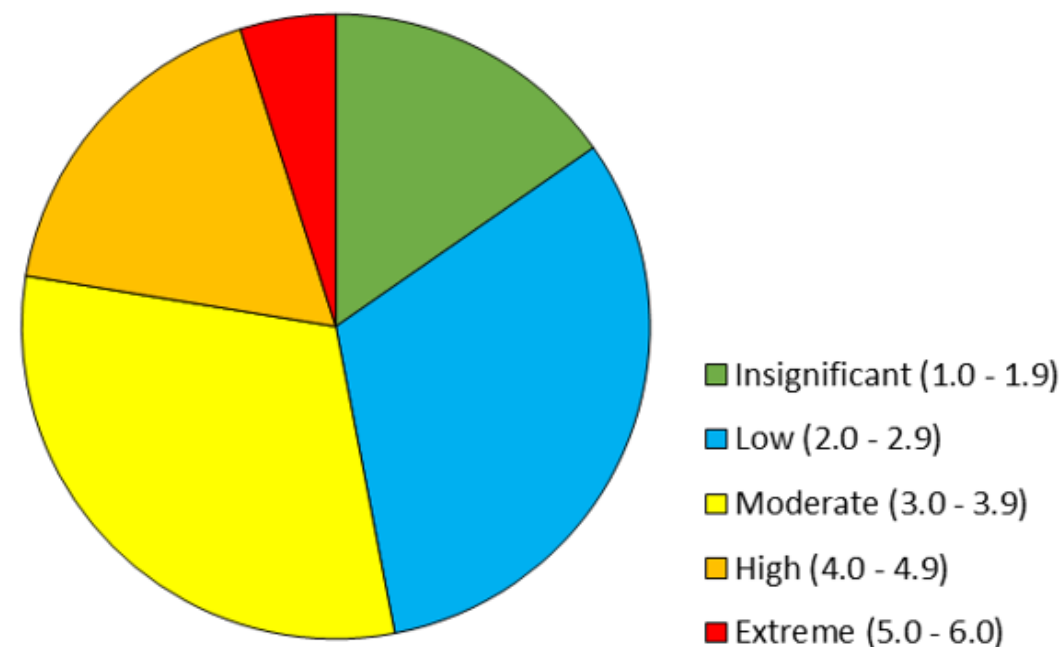


Figure 4.1: Overall risk score including receiving environment attributes.

Applications for Closed Landfill Team (CLT)

Storm events 2023

Prioritisation 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.

Ensures our mitigation approach aligns with their aspirations.

Changes to how we monitor

Identifying sites that may need monitoring pre/post storm events.

Integrate monitoring into our OSMPs, establishing triggers for climate-related signals that prompt the initiation of predetermined remedial actions.



Next steps

Prioritisation of sites for further assessment and investigation – allocation of funding over the next three years for key “at risk” sites.

Identify options and pathways to pre-emptively address the rising climate-related risks to closed landfills following a Dynamic Adaptive Policy Pathways (DAPP) approach.

From a traditional predict-then-act strategy to anticipating, monitoring and evaluating methodology. This is better suited to coastal environments where the pace and magnitude of changing risks are uncertain.

DAPP framework currently being developed by the Chief Sustainability Office at Auckland Council to ensure consistency across Auckland Council in adapting assets to the impacts of climate change.



Figure from MfE's Coastal Hazards and Climate Change Guidance (updated 2024).



Questions / Pātai?