

# Te Wai Takamori o Te Awa Kairangi

## Sustainable Soil Reuse

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# Te Wai Takamori o Te Awa Kairangi



Programme of works being delivered jointly by NZTA, HCC and GWRC with our project partners Ngati Toa Rangatira and Taranaki Whānui ki te Upoko o te Ika for Te Awa Kairangi / Hutt River.

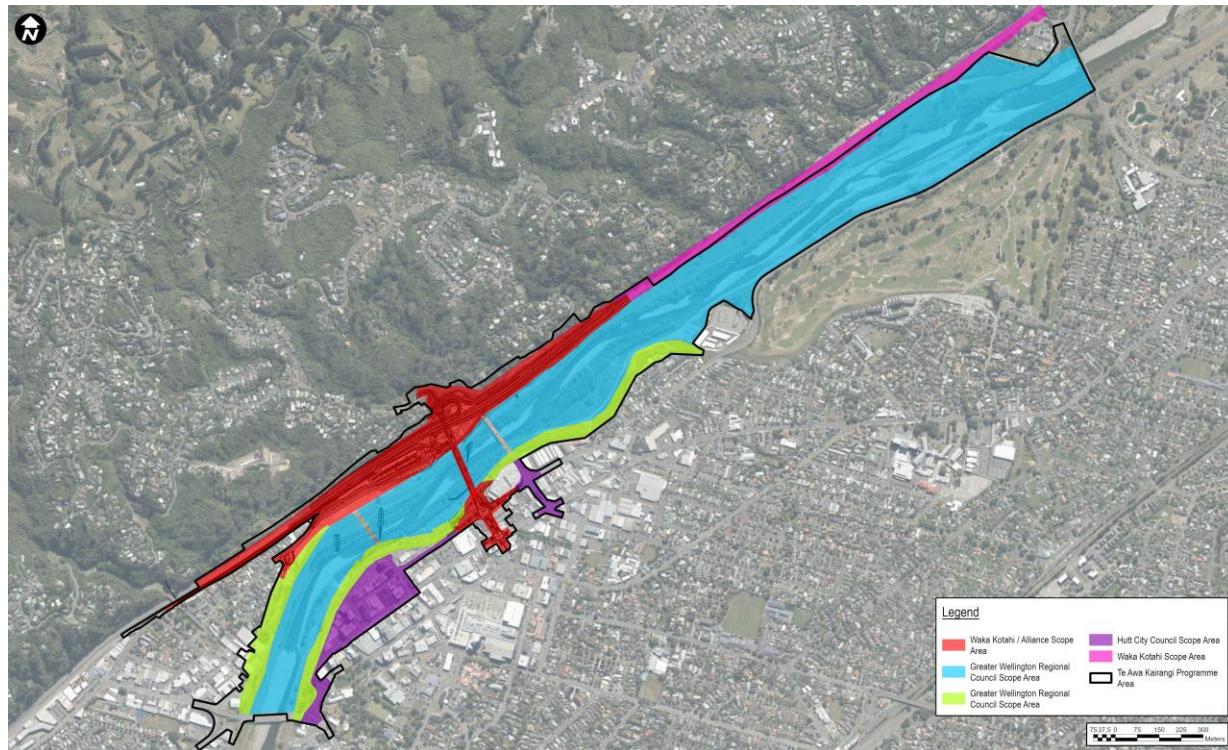
- Transport Improvements
- Urban Renewal
- Flood Protection

# Te Awa Kairangi Alliance

Melling Transport  
Improvements

Alliance between:

- AECOM  
(designers)
- Fletchers  
(constructors)
- NZTA



# Infrastructure Sustainability Rating

- Sustainability Targets set for contaminated land as part of resource efficiency credits:
  - Key sustainability goal for Project is to **minimise the disposal of contaminated soil to landfill**



# Contaminated Land Setting



Date: 1958



Date: 1962

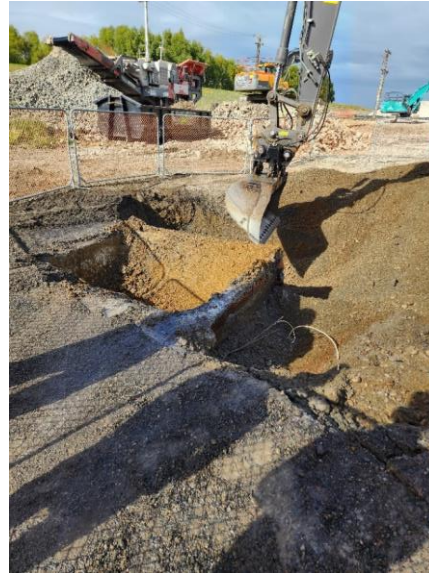


Date: 1951



- Numerous PSIs and DSIs completed or are being completed by AECOM and others

# Contaminated Land Setting



- Multiple HAIL sites identified – e.g market gardening, metal fabrication, transformers...
- Key contaminants of concern: asbestos in soil, metals, polycyclic aromatic hydrocarbons.
- Potential risks identified to human health (construction workers, future recreational users) and the environment (Te Awa Kairangi / Hutt River)

# Case Study 1: Rail Ballast and Reuse

- What do you do with approximately 3,000 m<sup>3</sup> of potentially contaminated rail ballast....



- The Alliance recognised this as a key opportunity for sustainable re-use within the Project.

# Case Study 1: Rail Ballast and Reuse



To assess suitability for reuse:

- Does ballast meet geotechnical requirements for re-use within the project;
- Ballast sampling and testing;
- Tier 2 Risk assessment;
- Communication and agreement with regulators.

# Case Study 1: Rail Ballast and Reuse

- Rail ballast contaminants of concern = asbestos, metals, petroleum hydrocarbons, PAH.
- This case study focuses on metals as the pCoC and the receptors being the Hutt River and groundwater.

Table 1: Preliminary Conceptual Site Model for Reuse of Rail Ballast.

Potential Contaminants of Concern (Source)	Potential Exposure Pathway	Potential Receptors	Pathway Potentially Complete
• Metals	Leaching of contaminants from the ballast	Shallow groundwater (Taita Alluvium)	<b>Unknown</b> – The contamination status of the rail ballast has not been assessed.
	Migration of contaminants via groundwater	Hutt River	<b>Unknown</b> – The contamination status of the rail ballast and potential leaching of contaminants into groundwater has not been assessed.

# Case Study 1: Rail Ballast and Reuse

Project:  
Te Awa Kairangi

Table B2: Metals  
SPLP Extract Analytical Results



Sample Location ID	Australia New Zealand Guideline for Fresh and Marine Water Quality Default Guideline Values *	Ballast SPLP									
		ML-TP402	ML-TP404	ML-TP405A	ML-TP406B	B01	B02	B04	B06	B0	B02
AECOM Sample ID	Trigger Values for Freshwater	305007.7	305007.8	305010.5	305007.6	405008.19	405008.17	405008.8	405008.0	405008.8	405008.9
Lab. Sample Reference	95% Specified Protection Level	5-Apr-25	5-Apr-25	5-Apr-25	5-Apr-25	14-Dec-25	14-Dec-25	14-Dec-25	14-Dec-25	14-Dec-25	14-Dec-25
Sampling Date	Aspens	0.002	-	-	-	0.0027	0.0007	0.0001	0.0003	0.0002	0.0024
Heavy Metals	Cadmium	0.0002	-	-	-	0.0003	0.0008	0.0023	0.0023	0.0023	0.0023
	Copper	0.008	0.002	0.006	0.006	0.007	0.003	0.074	0.005	0.006	0.05
	Lead	0.004	0.008	0.002	0.008	0.005	0.076	0.003	0.002	0.001	0.005
	Nickel	0.006	-	-	-	0.0029	0.0027	0.00094	0.00062	0.00054	0.002
	Zinc	0.008	0.003	0.007	0.005	0.009	-	-	-	-	-

**Notes:**

- \*Units are g/m<sup>3</sup>, unless otherwise stated
- (\*) - indicates below laboratory limit of reporting (LLOR)
- indicates no criteria / not analysed
- o indicates the value may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species)

**References:**

1. Australia and New Zealand Environment Guidelines for Fresh and Marine Water Quality (2008) (referred to as the Australia and New Zealand Guidelines (ANZGS) Default Guideline Values (DGVs))

**Exceedences:**

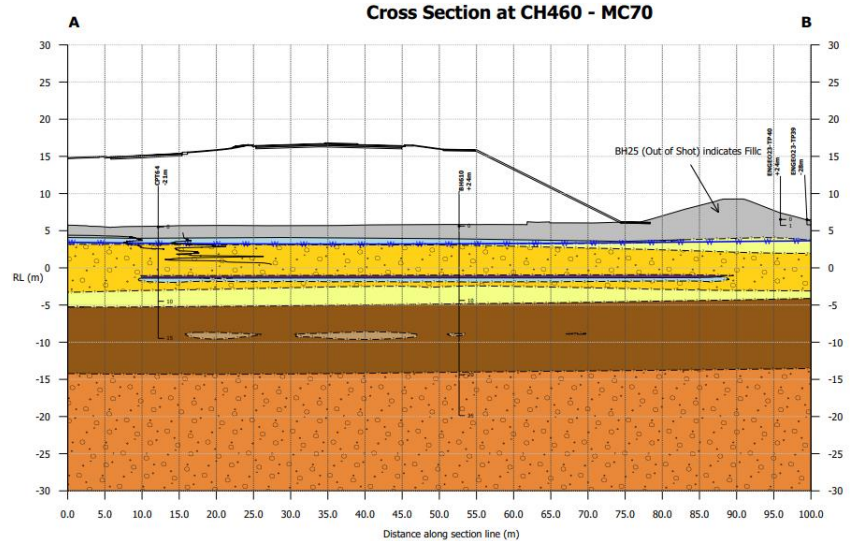
Exceeds the Default Guideline Values for Freshwater 95% Specified Protection



$$DF = 1 + \frac{K i Mz}{L Inf}$$

where,

- DF – dilution factor
- K – hydraulic conductivity (metres/day (m/d))
- i – hydraulic gradient
- Mz – mixing zone thickness (m)
- L – length of contaminant source parallel to direction of groundwater flow (m)
- Inf – infiltration (m/d)



Mā te mahi tahi  
Driving impact through collaboration



# Case Study 1: Rail Ballast and Reuse

Table 2: Revised Assessment Criteria.

Contaminant	Mean Result (mg/l)	Assessment Criteria (mg/l)	Dilution Factor	Revised Assessment Criteria (mg/l)
Cadmium	0.0032	0.0002*	76	0.0152
Copper	0.0846	0.0014*	76	0.1064
Lead	0.0711	0.0034*	76	0.2584
Zinc	0.0440	0.0080*	76	0.6080

Notes: \* ANZG 95% species protection;

Table 3: Revised Conceptual Site Model for Reuse of Rail Ballast.

Potential Contaminants of Concern (Source)	Potential Exposure Pathway	Potential Receptors	Pathway Potentially Complete
<ul style="list-style-type: none"> <li>Metals</li> </ul>	Leaching of contaminants from the ballast	Shallow groundwater (Taita Alluvium)	<b>No</b> – Tier 2 risk assessment has demonstrated that assessment criteria will not be exceeded due to dilution of contaminants.
	Migration of contaminants via groundwater	Hutt River	<b>No</b> – Tier 2 risk assessment has demonstrated that assessment criteria will not be exceeded due to dilution of contaminants within groundwater.

# Case Study 2: North of Block Road

- Northern laydown area approx. 42,000 m<sup>2</sup>
- Works in this area:
  - Erosion & sediment controls
  - Topsoil stripping to place hardstand
- Historic gravel extraction and block plant (1949 – 1999)
- Initial PSI and DSI determined fill material across the area
- DSI did not identify any asbestos in visual assessment or in semi-quantitative analysis



# Case Study 2: North of Block Road



- During top soil stripping contractors identified bulk ACM fragments and immediately stopped work
- Undertook surface visual assessment to define area

# Case Study 2: North of Block Road



# Case Study 2: North of Block Road



# Case Study 2: Melling Station

- Asbestos dust in ceiling removed by licensed removalists
- Building 1m halo then excavated so the building could be relocated

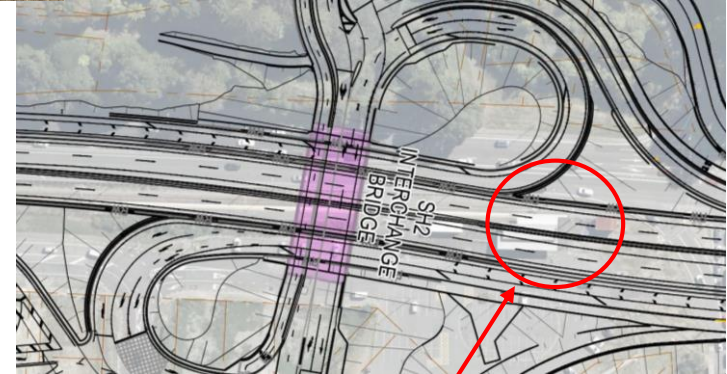


- During building relocation prep ACM discovered in building vents
- Bulk ACM removed by licensed removalists



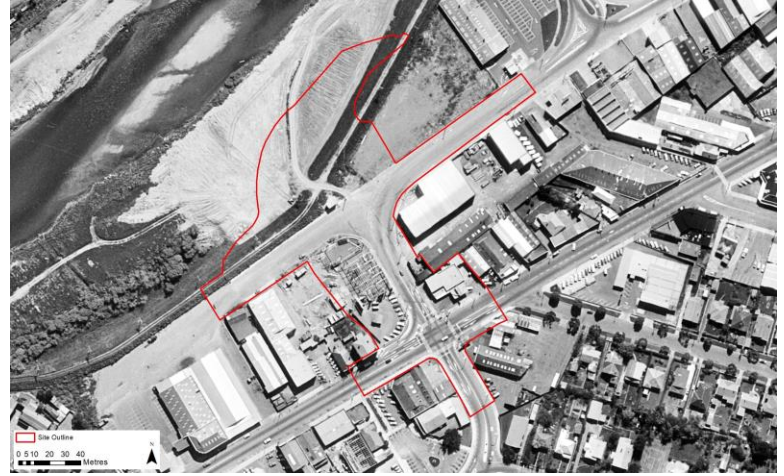
# Case Study 2: Melling Station

- Further ACM discovered in post building soil sampling under footpath area
- All material retained within building footprint
- Final design has former Melling Station under approx. 4m fill material and under centre of SH2 alignment



Former Melling Station

# Case Study 3: Riverbank Carpark



- Fill material circa ~1950's-1960's
- Material geotechnically unsuitable for reuse on site (wet, high clay & silt content)
- Bulk ACM in test pits and AF/FA in stockpile samples

# Case Study 3: Riverbank Carpark



- Stockpiles being removed off-site to Class 1 landfill
- ~1150T material, ~25T per truck & trailer.. 46 trips to the landfill = \$\$\$

# Challenges

- Soils not geotechnically suitable for construction;
- Project requires significant filling but are not at that stage of the project yet;
- Constant state of change within the project based on ground conditions;
- The only options for soil disposal in Wellington are Class 1 Landfill or Class 5 Clean fill.



# Opportunities

- Having a close working relationship with construction team means we have more influence over re-use decision making.
- We have developed a strong, collaborative relationship with the regulator and their peer reviewers, forming a trusted partnership that supports constructive discussions and agreement on potential soil re-use options.
- Research new technology in terms of potential asbestos destruction options.





THANK YOU!