

Creating debris disposal plans for the Wellington region

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First thoughts

We don't know:

- What our next major hazard event will be
- The scale and nature of the event

We do know:

- Sooner or later, there will be an event
- Some event in the future will create a lot debris
- We'll have to put it somewhere



How we made/are making our disposal plans

One plan (covering five council areas): adopted August 2023

One plan (covering three council areas): planning underway



Our process

- Agree to make a plan
- Calculate quantities
- Engage with tangata whenua
- Run local workshops to identify disposal sites
- Run regional workshop to 'bring it together'
- Renew periodically



Calculating quantities

- For debris types and assumptions, Charlotte Brown's PhD provides a basis:
 - 8 debris types
 - Assume recyclable material is disposed of separately
 - Hazardous materials follow 'BAU' processes
 - Sensitive debris requires a temporary location
- Split the region into geographically distinct areas
- This is not an exact science...



Calculating quantities

EMERGENCY DEBRIS DISPOSAL PLAN		ASSUMED QUANTITIES											Tsunami ash											
Location	Household	Earthquake											Tsunami			Tsunami ash								
		Earthquake affected- assumption	Earthquake affected- brick	Earthquake affected- timber	# of assumed # of brick / site	Tonnage of wood	Tonnage of metal	Palaeofertile material m ³	Tonnage of other	Earthquake volume (m ³)	soil material [ONLY HOUSEHOLD AREAS] m ³	Clear fill	Tsunami affected brick houses	Tsunami affected timber houses	# of assumed # of brick / site	Tonnage of wood	Tonnage of metal	Tonnage of other	General mixed debris T	TSUNAMI TOTALS	Roads	Household	Total	
Harakiri	256	76.8	45.36	61.44	5,588	1,619	959	5	268	11,448	1,152	21	285	18,534	4,688	1,951	2,268	18,517			442	182	244	
Tawa	6793	2821.7	484.34	1617.36	146,371	42,456	18,519	195	28,247	914,923	68,631	1,348	5,351	487,984	124,382	35,849	67,358	355,819			1,796	2,636	4,432	
Jukansville	15484	4628.5	924.86	9636.24	334,518	97,826	24,826	388	45,289	688,292	63,582	3,888	12,321	1,145,832	272,218	88,885	154,818	843,479			3,199	6,168	9,367	
Waihi waihira suburbs (Hqain, Isl Ollaua Rd / Crofton Rd)	19499	4851.7	886.34	3235.36	231,835	84,666	28,365	263	48,517	688,263	68,478	2,688	18,251	372,584	244,382	63,883	134,338	783,379			2,835	5,376	7,411	
Karari	7637	3291.1	458.32	1852.88	165,876	48,118	14,544	153	32,911	341,511	17	1,527	6,118	22,513	187,465	33,712	76,378	483,294			1,279	3,855	4,384	
Waihi RORONCPD	14256	4276.8	855.36	3421.44	383,548	83,818	22,293	285	42,768	637,588	8	2,854	11,485	1,132,134	256,688	74,151	142,368	753,242	753,879		2487	3,782	6,189	
Heulaua (Waihi Hospital)	14683	4486.7	881.34	3523.36	313,845	32,541	22,315	234	44,867	656,863	8	2,338	11,751	1,863,484	264,482	76,383	146,838	775,273	155,183		2,334	3,876	6,263	
Waihi waihira suburbs (Happy Valley landfill, Brooklyn)	18331	3273.3	655.86	2623.44	237,421	68,865	17,852	219	32,733	488,812	38,379	2,186	8,745	731,484	186,358	36,841	183,318	577,157	57,745 m ³		1,786	4,372	6,158	
Waihi Riepai	5887	1582.1	388.42	1281.68	188,752	34,544	7,811	188	15,821	223,383	67,535	1,881	4,886	362,587	38,126	26,836	58,878	264,378	423,432		1,195	2,883	3,438	
Hiramar	18194	3858.2	611.64	2446.56	221,414	64,232	15,383	284	38,582	455,852	45,879	2,833	8,155	738,846	183,432	33,883	181,348	538,243	538,438		1,827	4,878	5,384	
TOTAL TONNAGE					2,148,484	628,859	159,736	1,371	235,647	483,447				7,194,548	1,773,882	512,455	385,438	10,485,724						
Assume houses / m ³					2.8	8.8	2.5	1.8	1.8	1.5				2.8	8.8	3.0	1.8	2						
Assume TOTAL m ³					1,878,242	776,879	61,495	1,371	235,647	268,584				3,567,424	2,247,353	178,818	385,438	8,478,567	1,927,635					

SUMMARIES / TOTALS			
TSUNAMI - ASSUME TOTAL		In equivalent In...	
Location	m ³	brick [m]	approx m ³
Harakiri	0	0	0
Waihi RORONCPD	253,823	8	387
Heulaua (Waihi Hospital)	155,483	8	193
Waihi waihira suburbs	57,745	8	85
Waihi Riepai	423,132	8	238
Hiramar	231,431	8	253
Total	1,327,635	12	481

Tsunami ash - assume total		In equivalent In...	
Location	m ³	brick [m]	approx m ³
Harakiri	244	2	11
Tawa	4,432	2	47
Jukansville	3,233	2	58
Waihi waihira suburbs	7,411	2	61
Karari	4,354	2	47
Waihi RORONCPD	8,183	2	54
Heulaua (Waihi Hospital)	8,253	2	54
Waihi waihira suburbs	6,158	2	35
Waihi Riepai	5,181	2	48
Hiramar	5,384	2	34
Total	57,454	8	85

FORTWONK			
Location	Mixed EO m ³	Liquefaction m ³	Clear fill m ³
Harakiri	11,448	1,152	0
Tawa	384,355	68,631	0
Jukansville	688,292	63,582	0
Waihi waihira suburbs (Hqain, Isl Ollaua Rd)	688,263	68,478	0
Karari	341,511	17	0
Waihi RORONCPD	637,588	8	0
Heulaua (Waihi Hospital)	656,863	8	0
Waihi waihira suburbs (Happy Valley)	488,812	38,379	0
Waihi Riepai	223,383	67,535	0
Hiramar	455,852	45,879	0
SH1 Huaranga Gorge	0	0	0
SH Terrace Tunnel portals	0	0	0
Spentire waste	3,812	0	0
Wairangi	Level 100m for debris	0	0
Spentire waste	Level 100m for debris	0	0
Spentire waste	Level 100m for debris	0	0

ASSUMPTIONS	
Earthquake	
Proportion of houses that are brick (remainder timber)	0.2
Proportion of houses totally impacted in earthquake	0.1
Relative proportion of damage to remainder of houses	0.2
Assumed palaeofertile material per household	28 kg
For liquefaction quantity assume area to be cleared per household (plus access road)	300 m ²
Assumed depth of liquefaction material coverage over liquefaction source	high potential 0.85 m
Assumed depth of liquefaction material coverage over liquefaction source	moderate potential 0.83 m
Assumed depth of liquefaction material coverage over liquefaction source	low potential 0.81 m
Assumed depth of liquefaction material coverage over liquefaction source	variable potential 0.82 m
Assumed depth of liquefaction material coverage over liquefaction source	0 m
Additional assumption of horizontal liquefaction debris	1
Tsunami	
Proportion of houses in tsunami RED AND ORANGE evacuation zone totally impacted	1
Proportion of houses in tsunami YELLOW evacuation zone totally impacted	0.75
Proportion of debris in tsunami zone washed out to sea	0.85
Proportion of other general mixed debris generated, compared to rock house	0.5
Composition of typical houses	
Brick house - concrete/brick debris	128 houses
Brick house - wood debris	18 houses
Brick house - metal debris	18 houses
Brick house - other debris	18 houses
Timber house - concrete/brick debris	48 houses
Timber house - wood debris	28 houses
Timber house - metal debris	4 houses
Timber house - other debris	18 houses
Spentire waste	
Assume number of houses (equiv)	288 houses
Assume proportion of house debris held	0.8
Assume average house weight	32
Assume average house density	1.5 t/m ³
Tsunami ash	
Assume rock house debris this area of tsunami ash	288 m ³
Assume depth of tsunami ash to be cleared	2 m



Calculating quantities

Summarise quantities into sizes, e.g.:

- Putrescible material: suburb 'x', 135m^3 , 1m x 12m x 12m
- Mixed earthquake debris: council 'x', $4,400,000\text{m}^3$, 10m x 660m x 660m
- Volcanic ash: suburb 'x', $4,500\text{m}^3$, 2m x 50m x 50m

And, try a sensitivity analysis...



Engage with tangata whenua

CRITICAL step:

- Either start with this step (before all others) or after calculating quantities
- How does tangata whenua wish to be engaged?
- Two examples from the Wellington region:
 - Identify disposal sites and debris types, then tangata whenua provides input
 - ‘All’ council sites are identified and tangata whenua allocates debris types to those sites.



Run local workshops to identify disposal sites

- Maximum 20 people per workshop
- Have debris types, suburb and quantities on post-it notes
- Allocate debris to sites
- Invitees (minimum):
 - Tangata whenua
 - CDEM Controller
 - Council waste manager
 - Council town planner
 - Council Parks and Reserves manager
 - Council Roading Manager
 - Optional: local solid waste contractor



Run regional workshop to 'bring it together'

- Smooths out any cross-council-border issues
- Allows tangata whenua to address regional issues
- Prevents stakeholders trying to 'give debris to the neighbours'



Example DEFAULT plan

Debris type	Source area	Anticipated quantity	Permanent / Temporary	POTENTIAL debris destination	Notes
Putrescible material	Suburb 'x'	135m ³ = 1m x 120m x 12m	Temporary	First choice: ... Second choice: ...	
	Suburb 'y'
Earthquake debris, mixed	All areas	4,400,000m ³ = 10m x 670m x 670m	Permanent	First choice: ... Second choice: ...	Consenting issues to be considered for these sites.
Mixed debris (as from a tsunami or flood)	All areas	4,400,000m ³ = 10m x 670m x 670m	Permanent	...	Consenting issues to be considered for this site.
Volcanic ash	All areas	57,000m ³ = 2m x 170m x 170m	Permanent	First choice: ... Second choice: ...	Consenting issues to be considered for these sites.



Renew periodically

- Periodic renewals required to re-engage and keep the plan alive
- Opportunities to ensure that sites are being designed/prepared or re-allocated



Process on a page...

Simplifying it down, the process that should be taken in making a waste disposal plan should be:

Calculate the indicative quantities of waste/debris that will be generated from a large-scale, but representative, event, for each council area. This is not difficult to do, using GIS tools, with some simple assumptions, across a maximum of ten debris types. I find a simple spreadsheet makes this do-able. I have found that, with the right information and guidance on how to do this, each council area could be done within about five hours of work.

Approach tangata whenua and discuss how they would like to be engaged on this work. We have found two models in the Wellington region:

- Give the list of quantities/types of debris/waste to tangata whenua along with a map of council areas that could be allocated debris, for them to allocate debris to locations. Once done, council(s) can work out if this is technically feasible/acceptable. If it isn't discuss with tangata whenua.
- Run workshops on allocating debris types/quantities to locations (see below). Have tangata whenua representatives present to make sure that key sites are avoided and that locations are acceptable.

If running workshops for council areas, the key stakeholders to have in the room (maximum 20 people per council area, to keep numbers manageable) are:

- Tangata whenua representative(s).
- CDEM Controller (as council ultimate decision-maker).
- Council Waste Manager, for knowledge of waste disposal and of old landfills that could potentially be re-opened for some debris types.
- Council Parks and Reserves Manager (or equivalent), as some debris types are likely to be allocated to council land.
- Council Road Manager (for transport issues).
- A representative waste contractor, for on-the-ground experience.
- A MfE representative (if they wish to attend).

Run regional workshops, with all of the above stakeholders back in the room together. This helps to ensure that everyone does not simply try to 'give their debris to their neighbours' (at least, not without their knowledge). Aim to finalise, or adopt, the plan at this session.

Renew the plan every three years (in line with council annual plan cycles), with improvement iterations each time (e.g. council provide specific plans on the running of key sites, or consider re-zoning land that might be needed as disposal sites).



Next steps

- Councils assess nominated sites:
 - risk assessments
 - site designs
 - traffic considerations
- Update 3 years after initial adoption and repeat...
- If there is an event, use this plan as the default/starting point



Thank you

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