

Wellington Region Civil Defence Emergency Management Group

Group Debris Disposal Guidelines

July 2008 – June 2011

Note: The Wellington Region CDEM Group Debris Disposal Plan should be read in conjunction with the Wellington Region Civil Defence Emergency Management (CDEM) Group Plan 2005.



Hutt City Council
Porirua City Council
Upper Hutt City Council
Wellington City Council
Carterton District Council
Masterton District Council
Kapiti Coast District Council
South Wairarapa District Council
Greater Wellington Regional Council

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1. Foreword

This Debris Disposal Guide is for Civil Defence Emergency Management Offices in the Wellington region and is intended to be a starting point for Debris Disposal planning.

We encourage Wellington Region Local Authorities to use the guide as best meets their needs.

The Guide was developed using plans and guidelines from abroad and in consultation with Emergency Management staff in New Zealand.

1.1 Introduction

Major disasters during the last decade have raised questions regarding response delays and significant environmental impacts due to the debris generated. Urban Search and Rescue, Treatment and Movement of the Injured, Welfare, Health, Sanitation and restoration of lifelines have been delayed due to transportation difficulties as a result of roads blocked by debris.

The amount of debris generated was, in some cases, equivalent to months, if not years, of normal solid waste production in the effected areas. Landfill capacities were overwhelmed; roads were damaged by trucks hauling debris; dust produced by clearance annoyed the population and caused health problems for several months; tonnes of waste were burned; and some disposal sites were established without adequate environmental consideration (including disposal of hazardous wastes). The financial and environmental impacts have been devastating.

The benefits of advanced planning for disaster debris management include:

- Increasing local control of disaster debris management
- Reducing debris management costs
- Increasing the speed and efficiency of clean-up
- Minimizing the short and long term environmental and public health impacts

1.2 Use of the guide

This guide has been prepared to support planning at the local level in the Wellington region.

It has been developed in a format that allows it to be used in two ways:

1. As a reference document and an exemplar of good practice for Debris Disposal planning.
2. As a set of tools that can be utilised to prepare local authorities in the Wellington region for debris disposal following a major earthquake.

The guide has been separated into three distinct parts: Initial, mid-term and long-term. The Long-term response section will be leading into the recovery phase.

1.3 Duration of guideline and review

The effectiveness of the Wellington Region CDEM Group Debris Disposal Plan will be reviewed by the CDEM Group every three years or, if required, in the interim period.

1.4 Testing of plan

The Wellington Region CDEM Group Debris Disposal Plan will be tested during Wellington CDEM Group exercises. The effectiveness of this Plan will be reported on as part of the assessment of exercises.

1.5 Authority

This guideline has been developed under the authority of the Wellington Region Civil Defence Emergency Management Group Plan and will be effective from August 2008.

2. Types of debris

Three types of debris are associated with a disaster:

- Debris generated directly by the disaster, e.g., rubble, roofing, insulation, hazardous waste etc.
- Debris generated indirectly by the disaster, e.g., spoiled food due to power failure or excessive donations.
- Debris generated by abnormal patterns of life, e.g., greatly increased consumption of bottled water and canned food.

Classify and group debris into categories, this will help decision making concerning debris collection and disposal priorities. The criteria used to establish debris categories will depend on local variables, for example:

- Amount of debris generated.
- Type of region, e.g., urban, rural, coastal.
- Land use, e.g., agricultural, residential, industrial, commercial.
- Types of wastes, e.g., non-hazardous, special.
- Recycling infrastructure and programs.

A list of likely debris categories is attached. See **Appendix 1**

3. Initial response phase

Saving lives is the 'number one' concern of the initial/priority response phase. Debris must be cleared so that response vehicles (services, USAR etc) can gain access to those in need. Resources will be very limited as access to most of the region will be cut off. It is expected that this phase will last up to 7 days in parts of the region, especially in the Wellington CBD where access will be very difficult. The following chapters include information that is essential to the initial response phase.

3.1 Debris estimates

In the initial stages of the response, rough, holistic estimates of debris amounts will be used to determine how it will be dealt with and what heavy machinery and resources will be needed.

Estimates may be carried out in various ways, ranging from aerial photography to people on foot. Estimates must be relayed to the local Emergency Operations Centre (EOC) so they can be collated. It is important to keep estimates simple and easy to understand e.g. a pile 50m x 30m x 3m.

Prioritizing areas of concern will be hard to do at this stage as debris will be widespread. As the response unfolds and more information is at hand, priorities will be delegated by the local Emergency Operations Centre.

An example of an estimation chart is supplied. See **Appendix 2**

3.2 Debris collection

Collection of debris will require the use of static equipment (equipment that resides in the disaster area) or equipment that is temporarily in the disaster area (construction sites, landfills etc). Consideration should be given to the use of these resources. At times Memoranda of Understanding or other agreements may be useful and should be prepared now rather than in an event.

Management of available equipment will be a priority. It is important that you make prior arrangements with static equipment operators so that they know what is expected of them. Arrangements should include places for the operators to report so that they can receive instructions e.g. Fire Departments, Police Stations or EOC's. If Heavy machinery operators act alone they may hinder the response or endanger lives.

Machine operators may encounter areas that should not be disturbed (unstable structures, victims etc). In other international events red and green spray cans have been used to mark stop or go areas.

Body parts and corpses are the responsibility of Police. Machine operators or EOC's should inform the Police of body parts or corpses as soon as possible.

Diesel access and distribution is crucial as heavy machinery that is continuously in use will require refilling every 4-5 hours. Most petrol stations will be disabled, so prior arrangements for fuel supply must be planned for.

3.3 Temporary Accumulation

The most important action in the initial stages is to clear essential roads for all response vehicles. Limited static resources (bulldozers, front end loaders etc) will make moving large quantities of debris over distances difficult. The best way around this problem is to use free space in the disaster area (foot paths, parks, wharfs etc). Collapsed buildings are not a concern at this stage as they are for demolition crews to deal with during the recovery stage. Rubble associated with the collapsed buildings should be removed or pushed close to the buildings if it is safe to do so.

The use of temporary accumulation sites substantially increases the overall debris clearance costs, since debris is essentially managed twice, i.e., from the generation point to the temporary accumulation site, and from there to the final disposal site. Strategies to reduce the costs might involve the location of temporary accumulation sites:

- On or near primary roads, with in-out access, manoeuvring space, and where obstructions are not likely to occur.
- In areas not affecting other response activities, e.g., avoid debris near temporary accommodation.
- In places not to be used by any other disaster response components, such as Welfare centres, triage shelters, etc.
- Evaluation of storage risks.
- Mitigation of storage risks.

A case study has been carried out on suitable temporary accumulation sites in the Wellington CBD. It is an example of how information could be graphed / mapped. See **Appendix 3**

3.4 Hazardous Wastes

Hazardous substances may be released in an area affected by a disaster. Examples are retail supplies of fuels, pesticides, paints and solvents, cleaning materials and dry cleaning solvents found in almost every area. Printed Circuit Boards (PCBs), that are found in computers, and bio-medical wastes are also very common and a potential hazard.

Hazardous wastes will usually be discovered by people ill prepared to handle them. It is crucial that processes are in place for these people. Hazardous wastes must be isolated and marked (maybe using red spray cans) so they can be dealt with later in the response.

3.5 Public Information

It is important to include the Public Information staff in local planning processes to ensure the facilitation and distribution of essential information.

There may be a need to post general information messages that provide the public with debris clearance status, or health and safety information related to the debris (e.g. debris piles are unstable and may, if disturbed, cause injury.). The public will also need information on what to do with their daily waste as normal waste collection trucks will not be operational.

3.6 Communications

Communications in the initial stages will be very difficult. Response agencies may have their own communications equipment that allows them to talk to each other, but lack of communications with the Local Emergency Operations Centre may cause confusion and hinder the response. It is essential to plan roles and responsibilities prior to the event to minimise such confusion. Where possible, issue contact lists for the agencies involved in the response.

3.7 Staff Welfare

Stress may rise to unmanageable levels when overwork, decision making and responsibilities lead to an overwhelmed and tired staff. Nourishment and water provision may not be available on a regular basis. Being away from home may also aggravate the working situation. At this point, human errors increase and workers moral will deteriorate, delaying response times, increasing stress levels and reducing effectiveness. Managers must be flexible and promote rest periods as well as change performance expectations when visible signs of stress and fatigue such as repetitive mistakes, decreasing physical coordination, poor posture, and diminished responsiveness appear.

Also see 4.6 - Health and safety.

3.8 Contractors: Types and Selection

There are a wide range of contractors whose services and equipment may be required to undertake or support the site clearance activity. Local Authorities' are responsible to have contact numbers and, if possible, prior arrangements with them.

A list of contractors and categories is supplied as **appendix 4**

4. Mid-term response phase

The mid-term response phase is when support, both mechanical and human, has arrived at the event location. Protecting property and recovering bodies is the main concern of this phase. Removing debris to create access for response vehicles must continue and will involve planning for debris collection and removal, transport routes and identifying areas for longer term disposal. The following chapters include information that is essential to the mid-term response phase.

4.1 Debris estimates

During the initial response stage temporary accumulation sites may have been used to clear roads. This should make estimating debris quantities easier. A debris plan should be developed during the mid-term response stage. It should include: mapping all existing temporary accumulation sites, amounts/types of debris, priorities for removal (See 4.3), transport routes, equipment and longer term debris storage or disposal sites.

It is possible to estimate quantity, collection and transport times using simple formulae that can be distributed to all response agencies. An example of an estimation chart is supplied. See **Appendix 2**

4.2 Debris collection

The following must be considered:

- Amount of debris generated
- Type of debris

- Urgency of site clearance (priorities)
- Disaster site characteristics
- Debris recycling possibilities
- Geographic complications

Ideally the medium term response phase will see the required equipment and resources on site. It is crucial to coordinate the resources to ensure debris is moved quickly and affected areas are returned to normal. Dividing larger areas into 'sectors', is an effective way to ensure that debris collection and disposal is managed properly. Distributing maps of sectors, transport routes, disposal sites and any additional information is a good way to coordinate the response.

Body parts and corpses are the responsibility of Police. Machine operators or EOC's should inform the Police of body parts or corpses as soon as possible.

It is important that consideration is given to the amount of fuel that will be required and how it will be accessed and distributed. Petrol stations will be disabled so prior arrangements for fuel supply must be planned for.

4.3 Priorities for site clearance

Priorities should be decided in regard to the normal function of effected structures, their location, the extent of damage and the risks they present as well as health and other factors. Many of these issues cannot be determined in advance of an actual incident. However, planners should consider, in advance, likely priorities. A suggested order of priorities is as follows:

(Note: Priorities should be developed in consultation with all responding agencies)

Priority 1: buildings/structures in or under which people are believed to be trapped.

Priority 2: Buildings/structures whose use is essential (e.g. hospitals, airports, or suitable locations for on-site medical facilities).

Priority 3: Buildings/structures or locations critical to forensic/evidential investigations or whose space is required for bodies to be stored.

Priority 4: Buildings/structures on a main arterial route or close to a major public thoroughfare;

Priority 5: Other structures in imminent danger of collapse – with priority given to dwellings to allow re-occupation or the cleaning of watercourses, drainage and stagnant water to prevent disease.

Priority 6: Damage assessment of other affected buildings/structures that may have suffered hidden/latent damage but are not in need of immediate attention.

4.4 Hazardous Wastes

During the initial response stage, some hazardous substances may have been discovered and contained or identified. In order to remove the hazardous wastes, Information on these sites must be collated and distributed to the appropriate agency. Hazardous wastes are not usually managed by local government agencies but by hazardous waste management agencies and the fire service. However, definition of roles, coordinated actions, and responsibilities should be

clarified prior to a disaster. Development of site specific management plans, to mitigate against and/or contain hazardous wastes are the responsibility of the Territorial Authority.

Waste Management Agencies must be informed of possible outcomes during a disaster and be included in planning. They should also be included in contact lists.

4.5 Public Information

As mentioned in 3.5, it is important to keep the public informed of the situation. Emphasis must be put on ongoing press releases and public information initiatives.

4.6 Communications

Communications will be crucial throughout the recovery. It is important to design a communications plan that can be distributed to all response agencies. A communications plan may include; Section Managers and staff, response vehicles in the area, disposal sites, forms of communication (radio, cell-phone, phone) and contact numbers.

4.7 Health and Safety

Debris management during an emergency imposes a greater health and safety risk than in normal waste management situations. The main reasons include:

- Time constraints demand a faster work pace which can reduce risk awareness.
- A higher risk of dangerous materials mixed with the debris, e.g., nails, glass, sharp objects, asbestos dust, and chemicals.
- Limited resources placing stress on contractors/responders.

Staff safety is always paramount during a recovery operation. Depending on the size of the operation, safety officers may be required to monitor the use of Personal Protective Equipment (PPE) and correct procedures. Most demolition and transport companies that are involved in the recovery will have their own procedures, but it is important to remember that there may be volunteers helping in the recovery phase. Where volunteers are concerned, it is suggested that they be paired up with (or a ratio of volunteers to staff) staff from construction and demolition crews to minimize risks. *Also see 3.7, staff safety*

4.8 Access to Debris

Debris salvage may interfere with the overall debris clearance. Affected individuals may claim the right to recover their possessions, to retrieve documents and inventories, or to salvage building materials and appliances. Pre-planning should include development of procedures and protocols to allow owners and occupiers safe access to their premises at the earliest opportunity. This can only be done after prior assessment of risks present and recognition of the need to preserve the integrity of the incident site for investigation purposes. Early, safe access, where practicable, enables owners to assess damage, recover items and depending on the circumstances, initiate repairs. Contractors may demand right-of-way and space for debris collection to open roads in the early stages of the response.

4.9 Disposal

Debris disposal will be one of the major challenges during the overall debris management of a disaster. Not only because the volumes generated could be overwhelming, but also due to potential hazards to the environment. In major disasters, total clearance may take months or years. For example; If Wellingtons Central Business District was hit by a severe earthquake, 2.25 million tonnes of debris could be generated, taking roughly 300 days for 50, 15 tonne trucks to remove.

When planning, consideration must be given to current solid waste disposal capabilities (landfill sites, recycling plants etc), followed by potential sites for disposal. When considering potential sites reference must be given to the Resource Management Act (RMA) to get advice on feasibility and consents issues as well as expert advice on potential pollution and control issues. Some strategies that could be used when faced with debris disposal problems include:

- Increase the number of disposal sites, e.g., gullies, natural or artificial cavities, etc.
- Increase the disposal methods, e.g., incineration, composting, etc.
- Recycling materials, e.g., metal, wood,
- Reduce the debris volume, e.g., grinding, chipping, crushing, granulating, mulching, etc.
- Controlling weather induced problems like run off and discharges with cover.

4.9.1 Disposal Site security

Effective site security and, where appropriate, screening is essential for health and safety. As well as protecting and preserving the integrity of the site for investigative and forensic purposes, it will prevent unauthorised access by traders, sightseers and other unsolicited visitors. Plans should include details of security firms, fencing contractors and contacts whose services may be required.

4.9.2 Temporary disposal sites

International experience has shown that, in the event of a major event, there may be a need to identify and establish an intermediate temporary site, or sites, between the site of the incident itself and the ultimate, final destination(s) of debris. Such sites may be required to aid forensic investigation as well as sorting and sieving away from the incident scene of materials not discovered earlier. These are likely to include:

- Human remains;
- Evidence associated with investigation of the incident;
- Property that may assist with identification of victims;
- Items of value; and
- Hazardous materials

Where possible use a suitable authorised waste management site (in consultation with the site owner). Where an authorised site is unavailable, the following issues should be considered:

- ***Sensitive environmental receptors***

Select sites away from sensitive environmental features, e.g. watercourses, groundwater source protection zones, conservation sites (e.g. sites of special scientific or cultural interest). See 4.10 *environmental concerns*

- **Buildings**
Store waste inside covered buildings that have aerial emission containment and/or dust suppression if possible.
- **Security**
Site security will be needed to screen unauthorised persons.
- **Drainage (containment)**
Store waste on impermeable pavements with sealed drainage systems (to trap surface water run-off and fire fighting run-off) and monitoring points. Take into consideration that the Wellington Regions weather can be harsh and that debris exposed to heavy rainfall will cause additional problems.
Consult your local council pollution control staff on discharge control systems that can remove contaminants from any discharges.
- **Segregate Debris**
Debris will be easier to manage if it is segregated in to categories.
- **Vehicles**
Any vehicles used to transport waste must be leak proof. Leak/spillage plans should be produced for the event of accidental release. Separate requirements for transport of contaminated material, body parts etc.
- **Nuisance**
Provide control and monitoring mechanisms for birds, vermin, insects, dust, odour, noise and litter.
- **Flooding**
Choose sites away from floodplains.
- **Records**
Records of waste in/out of the site **must** be maintained. It is critical for future removal/management of debris that detailed information is kept on all waste that was brought to particular sites.

4.10 Environmental Concerns

While environmental issues should be a concern of response agencies, planning should pay consideration to the extent of which normal environmental codes, practices, and regulations may be relaxed during a disaster to facilitate the removal of debris. Health and safety should be paramount where any flexibility of regulations is exercised.

Appendix 6 contains parts of the Resource Management Act relevant to Civil Emergencies

4.11 Transportation

The efficiency of debris transportation will depend on the hauling time, i.e., time expended travelling between the debris clearance areas and the disposal sites. Some strategies to increase the transportation efficiency include:

- First consolidate a transportation network, and then clear whole sectors (see 4.2 *Debris Collection*). Transportation corridors progress from primary routes to secondary feeder roads to residential streets.
- Establish a transportation network with well-defined uses. Classify roads according to their:
 - Use (general public, debris transportation)
 - Vehicle Speed (emergency vehicles)
 - Destination Linkage (highways, disposal sites)
- Contractors may be assigned to sectors.
- Sectors prioritized so that access routes to essential service buildings are cleared first.
- Purchasing departments may establish prior claim on contractors through 'Memorandums of Understanding'. Procedures and practices developed in advance to ensure speedy procurement of services.
- Vehicles used in the transportation of debris (government, contractors and others) could be identified by an easily identifiable permit to ensure unimpeded access to disaster areas.
- Debris is accumulated at temporary accumulation sites. *Refer to 3.3*
- Debris volume is reduced before hauling.
- Access to disposal sites is restricted and controlled.
- Small vehicles may be needed where access is limited.
- Maps showing designated zones, contractors, debris concentration points and other relevant information are published through the media ('recovery information' newsletter).

4.12 Regional legislation and policies

The following documents issued by the regional council will be of use when planning for/responding to an event:

- Regional Air Quality management Plan (RAQMP).
- Discharges to Land Plan (DTLP) (In particular rules 1, 2 and 3)
- Fresh Water Plan (FWP)
- Resource Management Act (RMA)

5. Long term disposal of debris

This phase is almost 'business as usual' with TA's and waste management agencies responsible for the disposal of debris. Due to the fact that this phase is about 'recovery', only a certain amount of information is provided. A checklist is also provided, **Appendix 7**

5.1 Debris estimate

During the initial and mid term stages, estimates of debris would have been completed. You will be required at this stage to do a more accurate analysis of the debris and disposal possibilities to give you a clear understanding of:

- Amount of debris generated
- Type of debris
- Disposal capabilities and locations
- Debris recycling possibilities
- Geographic complications

5.2 Debris collection

Debris will have been moved from the affected area and be either in temporary or permanent disposal sites. Debris at temporary sites must be collected and disposed of. Other issues that will arrive at this stage are; repairing roads', cleaning streets of dust etc., returning daily solid waste collection to normalcy and reimbursement of costs involved in the response.

5.3 Public Information

It is important to keep the public informed of the situation. Emphasis must be put on ongoing press releases and public information initiatives.

Also see 3.5 and 4.5

5.4 Environmental Concerns

While environmental issues should be a concern of response agencies, planning should pay consideration to the extent to which normal environmental codes, practices, and regulations may be relaxed during a disaster to facilitate the removal of debris. Health and safety should be paramount where any flexibility of regulations is exercised. Parts of the Resource Management Act relevant to a Civil Disaster are attached as **appendix 6**

5.5 Potential markets and end-uses for recovered materials

Possible markets and other uses for the range of materials that may be generated by debris clearance and disposal should be considered. This should include identification of recyclers, processors and brokers who can divert the designated materials (concrete, brick, asphalt, dirt, steel); and the volumes they can handle. Reducing the quantity of waste debris, by utilising the full range of methods available will help conserve raw materials, keep down disposal costs and reduce demand for landfill capacity e.g. A potential use for wood is to collate it in one area and sell it to the public for household fires.

5.6 Regional legislation and policies

The following documents issued by the regional council will be of use when planning for/responding to an event:

- Regional Air Quality management Plan (RAQMP).

- Discharges to Land Plan (DTLP) (In particular rules 1, 2 and 3)
- Fresh Water Plan (FWP)
- Resource Management Act (RMA)

Appendix 1

Debris examples

Examples of debris that might be generated by a disaster include the following:

Type of Debris	Examples
Debris Subject to Putrefaction (decomposition)	Animal corpses: Cattle, pets and wild animals Food remnants: Meal leftovers or food spoiled as a result of power failure
Vegetation	Leaves, branches, uprooted shrubs and trees
Inert Environmental Debris	Dirt, mud, rocks, sand
Construction Debris	Asphalt, blinds, brick, carpet, concrete, GIB board, electrical wires, lamps, bulbs, glass and mirror, Insulation materials (fibreglass, Styrofoam, etc.), masonry, metals (steel, iron, aluminium, copper, brass, etc.), tiles, pipes, plastic, rubble, vinyl, wood
Appliances, Household Equipment and Furniture.	Beds and mattresses, upholstered furniture, computer equipment, telephones, typewriters, desks, chairs, chests, lamps, sofas, washing and drying machines, refrigerators, dishwashers, stoves, hot water tanks, furnaces
Personal Items and Objects	Art work, books and papers, clothing cooking utensils, china, glassware
Hazardous Wastes	Asbestos, biomedical wastes, cleaning agents, combustibles, explosives, fertilizers, oils, paints, pesticides, radioactive substances, solvents, other toxic substances or materials

Consideration must be given to the accumulation of daily household and business waste. It is very common in disaster areas for daily waste to accumulate in residential areas (often on the corner of the block or outside houses) as daily waste disposal operations are disabled.

Appendix 2

WORK SHEET ONE - DEBRIS ESTIMATION

Complete a separate Worksheet 1 for each Sector.

Transfer results from each Worksheet 1 to Worksheet 2.

CM = Cubic Metres

Figures that have been used in the charts are examples only and are not accurate.

Sector:			
Description:	N = Number	M = Multiplier	CM = (N x M)
A. Homes (600- 660 Square Metres)	100	300	30000
B. Garages	130	80	10400

C. Other Buildings	L = Length/M	W = Width/M	H = Height/M	CM = (L x W x H)
BNZ building – Willis Street	34	34	103	119068
Majestic Centre – Willis Street	60	35	116	243600
The Beehive	56	56	75	235200
Subtotal [sum the right column]				597868

D. Debris Piles	L = Length/M	W = Width/M	H = Height/M	CM
Bluebridge Ferry car park and wharf	195	86	3	50310
Chaffers New world car park	68	42	3	8568
Subtotal [sum the right column]				58878

WORKSHEET TWO - ESTIMATION OF DEBRIS QUANTITY

	Sector A	Sector B	Sector C	Sector D
<i>Debris Volume Estimate (cubic Metres/CM)</i>				
A. Homes [from Worksheet 1]	30400	4200		
B. Garages [from Worksheet 1]	10400	2400		
C. Other Buildings [from Worksheet 1]	5978668	1021		
SD = Structural debris (A + B + C)	638668	7621		
V = Vegetation Multiplier [see note]	1.1	1.1		
ST = Subtotal (SD x V)	702535	8383		
D. Debris Piles [from Worksheet 1]	58878	1200		
E. SV = Sector Volume (ST + D)	761413	9583		
TOTAL [add entries in row E above]	770996			

Note:

V= Vegetative Multiplier:	<u>Vegetative Cover</u>	<u>V =</u>
	None	1
	Light	1.1
	Medium	1.3
	Heavy	1.5

WORKSHEET 3 - ESTIMATING DEBRIS REMOVAL TIME

Worksheets 3 and 4 may be used to estimate the time it will take to remove a quantity of debris given information on the quantity and capacity of the hauling resources available and estimates of the cycle time for those resources. Cycle time is the time it takes a cargo truck to complete a round trip. Cycle time is computed by adding the time it takes to load a truck, the round-trip travel time between the loading point and the off-load point, unloading time, and any unproductive waiting time. This methodology will be most accurate if you use times observed during actual operations, not theoretical numbers.

	Sector A	Sector B	Sector C	Sector D
A. Debris to be Removed in cubic Metres (CM) from Worksheet 2	761413	9583		
<i>Removal Cycle (all times in hours)</i>				
B. Estimated loading time	.2	.2		
C. Estimated travel time (roundtrip)	.4	.6		
D. Estimated unload time	.1	.1		
E. Estimated waiting time	.1	.1		
F. Cycle time (B+C+D+E)	.8	1.0		
G. Daily work period	8.0	8.0		
H. Cycles per day (G / F)	10	8		
<i>Removal Time</i>				
I. Capacity (CY) per cycle [Worksheet 4]	136	136		
J. Capacity (CY) per day [H x I]	1360	1088		
K. Days to Clear Sector [A / J]	560	9		
L. Days to Clear All Sectors [add entries in Row K above]	569			

WORKSHEET 4 - EQUIPMENT

	A. Truck Capacity (CM)	B. Units Available	C. Group Capacity (AxB)
<i>Equipment</i>			
Dump Truck, Light	6	4	24
Dump Truck, Medium	8	4	32
Dump Truck, Heavy	10	8	80
Capacity Per Cycle (CY) [sum the right column]			136

Note: In estimating units available, it is essential to consider that some equipment may not be operationally ready each day. Hence, an out-of-service factor based on local experience should be applied to obtain a realistic estimate of equipment available for use on a daily basis.

WORKSHEET 5 - ESTIMATING DEBRIS DISPOSAL QUANTITY

Worksheet 5 provides a method of estimating the volume of debris that will have to be disposed of after volume reduction. It requires taking a **sample of the debris in each sector** to determine the percent of burnable debris (B below), the percent of burnable C&D debris (C below), the percent of non-burnable debris (D below) broken down by recyclable materials (D-1) and other material (D-2), and the percent of hazardous debris. In taking a sample, it is desirable to include debris from at least 10 properties.

	Sector 1	Sector 2	Sector 3	Sector 4
<i>Sample Debris Characteristics</i>				
A. Debris volume [from Worksheet 2]	58878	9583		
B. % Burnable Natural Debris	.30	.40		
C. % Burnable C&D Debris	.32	.28		
D. % Non-Burnable Debris	.35	.32		
D-1. Potentially Recyclable	.07	.10		
D-2. Landfill	.28	.20		
E. % Hazardous Debris	.03	.02		
<i>Disposal Volume (cubic yards)</i>				
F. Burnable Natural Debris (A x B)	17663	3833		
F-1. Amount to be chipped/ground ¹	200	0		
F-2. Amount to be burned	17463	3833		
G. Burnable C&D Debris (A x C)	18840	2683		
H. Total Burnable (F-2 + G)	36303	6516		
I. Volume for disposal after burning (H x .05)	1815	326		
J. Volume for disposal after chipping or shredding (F-1 x .25)	50	0		
K. Non-Burnable Debris (A x D)	20607	3067		
L. Less Non-Burnables to be Recycled	5400	767		
M. Volume of Non-Burnables for Disposal (K - L)	15207	2300		
N. Volume (Non-hazardous) for Landfill Disposal (I + J + M) ³	17072	5693		
N. Total for Landfill Disposal [add quantities in row N above]	22765			
O. Volume for Hazmat Disposal (A x E)	1766	191		
P. Total for Hazmat Disposal [add quantities in row O above]	1957			

Notes:

1. Local officials need to decide how much debris to chip or grind instead of burning. The quantity should be based on a) the amount of chipped/ground wood that local government wants to retain for use as mulch and b) the amount that can be disposed of without cost or at some profit to landscape products firms. Since chipping and grinding costs approximately the same as burning and produces a higher volume of residue, there is little reason to chip and grind instead of burning if you also have to pay to have the resulting mulch hauled away.
2. This number should be based on the proportion of recyclable materials for which you can determine there is a ready market. Recycling materials for which there is no market simply leaves you with sorted debris to haul to the landfill.
3. If mulch produced in the chipping and grinding operation is hauled away without cost, do not include it (Item J) in the equation because disposal of that material is no longer your problem.

WORKSHEET 6 - ESTIMATING REQUIREMENTS FOR DEBRIS STORAGE & PROCESSING SITES

This methodology may be used to determine the space required for debris storage and processing sites.

It assumes that:

1. Debris will be stacked 3 metres high.
2. 40 percent of a site will be used for storage; 60 percent will be used for sorting areas, separation between debris piles, roads, site buffers, and burn pits

A. Debris Volume in cubic metres (CM) [From Worksheet 2]	770996
B. CM per acre (4046.8 square metres) assuming 3m stack height	12138
C. Acres for debris storage only (A/B)	63.5
D. Multiplier for processing, roads, & buffers	1.66
E. Required facility area in acres ²	7.1

Notes:

1. If you plan to use a stack height other than the typical 3m, use the following formula to compute CM per acre (4046.8 square metres):

$$\text{CM} = (\text{stack height in metres}) \times 4046.8^2$$

2. Where the area requirement is large, the requirement is generally satisfied by establishing several sites that, taken collectively, provide the needed area.

Appendix 3

Case-study of the Wellington CBD Temporary accumulation areas.

Wellington City expects to lose 20% of its buildings during a major earthquake. The amount of debris created would be in excess of 2.2 million cubic metres, which is one and a half times the amount created by the collapse of the Twin Towers on 9/11/2001.

The table below is an estimate of how much room is available in the Wellington CBD for temporary accumulation. The locations have been selected from aerial view maps as they are visibly the largest open spaces. We expect that debris would be stored in similar locations for up to three weeks. The assumption was that in the initial stages debris would only be stored at 3m high.

The following two pages (8.1 and 8.2) contain the same information in map format, an example of what can be done with the information to make it understandable.

Location	Capacity in Cubic Metres (CM)
Interisland Ferry marshalling area	82602 CM
Wellington train yards (starting just North of the train station and ending just short of the SH1 overpass).	485407 CM
Bluebridge Ferry terminal car park and wharf	52260 CM
Train station drop off zone and surrounding area	6600 CM
Car park adjacent to the Train station drop off zone	6636 CM
Land surrounding the law school building	16356 CM
Michael Fowler car park	13338 CM
Post Office Square	4900 CM
Frank Kitts park and wharf	20385 CM
Grass area near the boat sheds (Frank Kitts Park)	9234 CM
Wharfs in front of Te Papa and the Boat shed	20340 CM
Waitangi Park, car park	27456 CM
Waitangi Park and Overseas Terminal car park	44274 CM
Chaffers New World car park	8928 CM
Total temporary accumulation	798,716 cubic metres

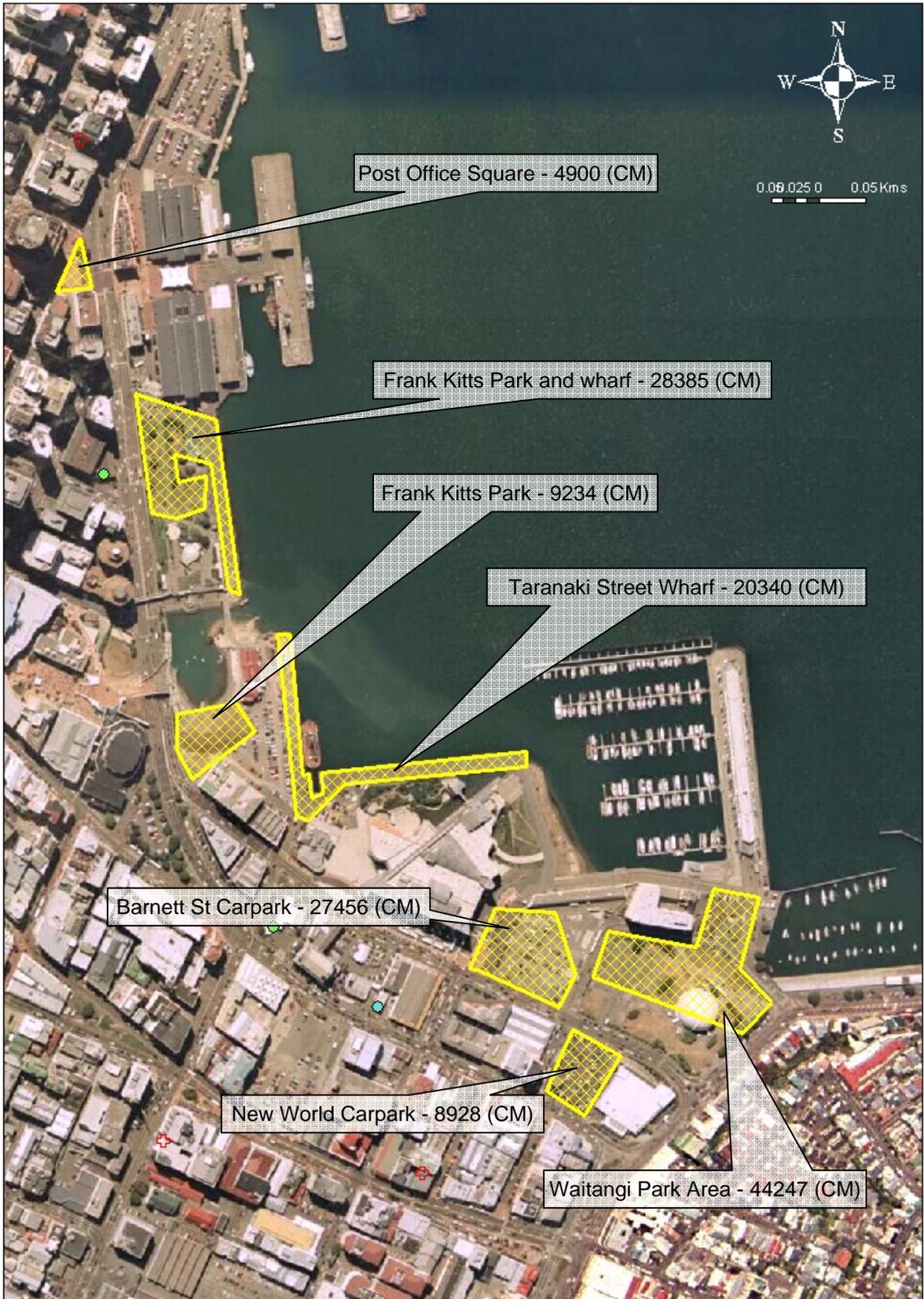
Although there are other areas that debris can be accumulated within the city (foot paths for example) it is evident that we have very limited space for clearing debris with the estimated debris quantity being 2250000 cubic metres.

Eastern CBD temporary accumulation sites



Temporary Accumulation Sites

Western CBD



Temporary Accumulation Sites

Appendix 4

Contractors: Types and Selection
Civil engineers
Structural engineer
Mechanical and electrical engineers
Construction and plant hire
Demolition
Decontamination
Asbestos removal
Specialist advisors ie. chemical, biological, radiological, food etc
Site security
Scaffolding and screening
Transport operators with vehicles suitable for removing large volumes of rubble or other debris (ie. Suitable licensing, covered vehicles)
Major barge operators
Skips and containers
Portable sanitation
Health and safety equipment provision
Utilities and communications
Portable cabins for temporary office accommodation and portaloos
Major carriageway and surfacing works
Street cleansing, washing down sewers and waste collection
Clearance of general and decomposing household waste and rubbish
Clinic waste collection by trained people
Waste transfer stations for local and neighbouring territories
High volume pumps
Drinking water restoration
Military resources (plans must not assume that these will be available if required)

Appendix 5



This map is an example of how information regarding police, fire and EOC locations could be given to responders. GIS has been used to develop this map and location information on services and EOCs is available from the Group Office.

Appendix 6 Resource Management Act (Emergency Waste Disposal)

The Resource Management Act (RMA) is a very complex document. Below is an indicator of RMA exceptions during a Civil Defence Emergency. The sections that are included are highlighted in bold in the paragraph below. If further information is required, refer to the RMA (available from the GWRC library or consents department)

S.18 Possible defence in cases of unforeseen emergencies

[(1) Any person who is prosecuted under section **338** for an offence arising from any contravention of any of sections **9, 11, 12, 13, 14, 15, 15A, and 15B** may raise any applicable defence that is referred to in section **341** or section **341A** or section **341B**.]

(2) No person may be prosecuted for acting in accordance with section **330** (which relates to certain activities undertaken in an emergency).

S. 338 Offences against this Act

(1) Every person commits an offence against this Act who contravenes, or permits a contravention of, any of the following:

- (a) Sections **9, 11, 12, 13, 14, and 15** (which impose duties and restrictions in relation to land, subdivision, the coastal marine area, the beds of certain rivers and lakes, water, and discharges of contaminants):
- (b) Any enforcement order:
- (c) Any abatement notice, other than a notice under section **322(1)(c)**:
- (d) Any water shortage direction under section **329**.

[(1A) Every person commits an offence against this Act who contravenes or permits a contravention of section **15A** or section 15C (which impose restrictions in relation to waste or other matter).]

[(1B) Where any harmful substance or contaminant or water is discharged in the coastal marine area in breach of section **15B**, the following persons each commit an offence:

- (a) If the discharge is from a ship, the master and the owner of the ship:
- (b) If the discharge is from an offshore installation, the owner of the installation.]

(2) Every person commits an offence against this Act who contravenes, or permits a contravention of, any of the following:

- (a) Section 22, which relates to failure to provide certain information to an enforcement officer:
- (b) Section 42, which relates to the protection of sensitive information:
- (c) Any excessive noise direction under section 327:
- (d) Any abatement notice for unreasonable noise under section 322(1)(c):
- (e) Any order (other than an enforcement order) made by the [Environment Court].

(3) Every person commits an offence against this Act who—

(a) Wilfully obstructs, hinders, resists, or deceives any person in the execution of any powers conferred on that person by or under this Act:

(b) Contravenes, or permits a contravention of, any of the following:

(i) Section 283, which relates to non-attendance or refusal to co-operate with the [Environment Court]:

(ii) Any summons or order to give evidence issued or made pursuant to section 41:

[(c) Contravenes, or permits a contravention of, any provision (as provided in Schedule 10) specified in an instrument for the creation of an esplanade strip or in an easement for an access strip, or enters a strip which is closed under section 237C.]

(4) Notwithstanding anything in the [Summary Proceedings Act 1957](#), any information in respect of any offence against subsection (1) of this section may be laid by any person at any time within 6 months after the time when the contravention giving rise to the information first became known, or should have become known, to the local authority or consent authority.

S. 9 Restrictions on use of land

(1) No person may use any land in a manner that contravenes a rule in a district plan or proposed district plan unless the activity is—

(a) Expressly allowed by a resource consent granted by the territorial authority responsible for the plan; or

(b) An existing use allowed by [section 10 or section 10A].

Editorial Note - Statutes of New Zealand

See s 4(3) of this Act as to this subsection not applying in specified circumstances.

(2) No person may contravene [section 176 or section 178 or section 193 or section 194 (which relate to designations and heritage orders)] unless the prior written consent of the requiring authority concerned is obtained.

(3) No person may use any land in a manner that contravenes a rule in a regional plan or a proposed regional plan unless that activity is—

(a) Expressly allowed by a resource consent granted by the regional council responsible for the plan; or

(b) Allowed by section [20A] (certain existing lawful uses allowed).

(4) In this section, the word **use** in relation to any land means—

(a) Any use, erection, reconstruction, placement, alteration, extension, removal, or demolition of any structure or part of any structure in, on, under, or over the land; or

(b) Any excavation, drilling, tunnelling, or other disturbance of the land; or

(c) Any destruction of, damage to, or disturbance of, the habitats of plants or animals in, on, or under the land; or

(d) Any deposit of any substance in, on, or under the land; or

[(da) Any entry on to, or passing across, the surface of water in any lake or river; or]

(e) Any other use of land—

and **may use** has a corresponding meaning.

(5) In subsection (1), **land** includes the surface of water in any lake or river.

(6) Subsection (3) does not apply to the bed of any lake or river.

(7) This section does not apply to any use of the coastal marine area.

[(8) The application of this section to over-flying by aircraft shall be limited to any noise emission controls that may be prescribed by a territorial authority in relation to the use of airports.]

S. 11 Restrictions on subdivision of land

(1) No person may subdivide land, within the meaning of section 218, unless the subdivision is—

(a) Expressly allowed by a rule in a district plan [and in any relevant proposed district plan] or a resource consent, and a survey plan relating to the subdivision has in accordance with Part 10—

(i) Been deposited by a District Land Registrar or a Registrar of Deeds; or

(ii) In the case of a subdivision by or on behalf of a Minister of the Crown, been approved by the Chief Surveyor for the purposes of section 228; or

(b) Effected by the acquisition, taking, transfer, or disposal of part of an allotment under the [Public Works Act 1981](#) (except that, in the case of the disposition of land under the [Public Works Act 1981](#), each existing separate parcel of land shall, unless otherwise provided by that Act, be disposed of without further division of that parcel of land); or

(c) Effected by the establishment, change, or cancellation of a reserve under [section 338 of the Maori Land Act 1993] ...; or

[(ca) Effected by a transfer under section 23 of the State-Owned Enterprises Act 1986 or a resumption under section 27D of that Act; or]

[(cb) Effected by any vesting in or transfer or gift of any land to the Crown or any [local authority](#) or [administering body](#) (as defined in section 2 of the Reserves Act 1977) for the purposes (other than administrative purposes) of the [Conservation Act 1987](#) or any other Act specified in Schedule 1 to that Act; or]

[(cc) Effected by transfer or gift of any land to the New Zealand Historic Places Trust or the Queen Elizabeth the Second National Trust for the purposes of the [Historic Places Act 1993](#) or the [Queen Elizabeth the Second National Trust Act 1977](#); or]

(d) Effected by any transfer, exchange, or other disposition of land made by an order under section 129B of the Property Law Act 1952 (which relates to the granting of access to land-locked land).

(2) Subsection (1) does not apply in respect of Maori land within the meaning of the [Maori Land Act 1993](#) unless that Act otherwise provides.

S. 12 Restrictions on use of coastal marine area

(1) No person may[, in the coastal marine area,]—

- (a) Reclaim or drain any foreshore or seabed; or
- (b) Erect, reconstruct, place, alter, extend, remove, or demolish any structure or any part of a structure that is fixed in, on, under, or over any foreshore or seabed; or
- (c) Disturb any foreshore or seabed (including by excavating, drilling, or tunnelling) in a manner that has or is likely to have an adverse effect on the foreshore or seabed (other than for the purpose of lawfully harvesting any plant or animal); or
- (d) Deposit in, on, or under any foreshore or seabed any substance in a manner that has or is likely to have an adverse effect on the foreshore or seabed; or
- (e) Destroy, damage, or disturb any foreshore or seabed (other than for the purpose of lawfully harvesting any plant or animal) in a manner that has or is likely to have an adverse effect on plants or animals or their habitat; or
- (f) Introduce or plant any exotic or introduced plant in, on, or under the foreshore or seabed[; or]
- [(g) destroy, damage, or disturb any foreshore or seabed (other than for the purpose of lawfully harvesting any plant or animal) in a manner that has or is likely to have an adverse effect on historic heritage—]

unless expressly allowed [by a rule in a regional coastal plan and in any relevant proposed regional coastal plan] or a resource consent.

[(2) No person may, in relation to land of the Crown in the coastal marine area, or land in the coastal marine area vested in the regional council,—

[[a) Occupy any part of the coastal marine area; or]]

(b) Remove any sand, shingle, shell, or other natural material from the land—

unless expressly allowed by a rule in a regional coastal plan and in any relevant proposed regional coastal plan or by a resource consent.]

(3) Without limiting subsection (1), no person may carry out any activity—

(a) In, on, under, or over any coastal marine area; or

(b) In relation to any natural and physical resources contained within any coastal marine area,—

in a manner that contravenes a rule in a regional coastal plan or a proposed regional coastal plan unless the activity is expressly allowed by a resource consent or allowed by section [20A] (certain existing lawful activities allowed).

(4) [In this Act] ...,—

[(a) Repealed.]

(b) **Remove any sand, shingle, [shell,] or other natural material** means to take any of that material in such quantities or in such circumstances that, but for the rule in the regional coastal plan or the holding of a resource consent, a licence or profit à prendre to do so would be necessary.

[(5) The application of this section to overflying by aircraft shall be limited to any noise emission controls that may be prescribed by a regional council in relation to the use of airports within the coastal marine area.]

[(6) This section shall not apply to anything to which section **15A** [[or **15B**]] applies.]

S. 13 Restriction on certain uses of beds of lakes and rivers

(1) No person may, in relation to the bed of any lake or river,—

- (a) Use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed; or
- (b) Excavate, drill, tunnel, or otherwise disturb the bed; or
- (c) Introduce or plant any plant or any part of any plant (whether exotic or indigenous) in, on, or under the bed; or
- (d) Deposit any substance in, on, or under the bed; or
- (e) Reclaim or drain the bed—

unless expressly allowed by a rule in a regional plan and in any relevant proposed regional plan or a resource consent.]

(2) No person may—

- (a) Enter or pass across the bed of any river or lake; or
- (b) Disturb, remove, damage, or destroy any plant or part of any plant (whether exotic or indigenous) or the habitats of any such plants or of animals in, on, or under the bed of any lake or river—

in a manner that contravenes a rule in a regional plan or proposed regional plan unless that activity is—

- (c) Expressly allowed by a resource consent granted by the regional council responsible for the plan; or
- (d) Allowed by section [20A] (certain existing lawful uses allowed).

(3) This section does not apply to any use of land in the coastal marine area.

(4) Nothing in this section limits section **9**.

S. 14 Restrictions relating to water

(1) No person may take, use, dam, or divert any—

- (a) Water (other than open coastal water); or
- (b) Heat or energy from water (other than open coastal water); or
- (c) Heat or energy from the material surrounding any geothermal water—

unless the taking, use, damming, or diversion is allowed by subsection (3).

(2) No person may—

- (a) Take, use, dam, or divert any open coastal water; or
- (b) Take or use any heat or energy from any open coastal water,—

in a manner that contravenes a rule in a regional plan or a proposed regional plan unless expressly allowed by a resource consent or allowed by section [20A] (certain existing lawful activities allowed).

(3) A person is not prohibited by subsection (1) from taking, using, damming, or diverting any water, heat, or energy if—

(a) The taking, use, damming, or diversion is expressly allowed by a rule in a regional plan [and in any relevant proposed regional plan] or a resource consent; or

(b) In the case of fresh water, the water, heat, or energy is required to be taken or used for—

(i) An individual's reasonable domestic needs; or

(ii) The reasonable needs of an individual's animals for drinking water,—
and the taking or use does not, or is not likely to, have an adverse effect on the environment; or

(c) In the case of geothermal water, the water, heat, or energy is taken or used in accordance with tikanga Maori for the communal benefit of the tangata whenua of the area and does not have an adverse effect on the environment; or

(d) In the case of coastal water (other than open coastal water), the water, heat, or energy is required for an individual's reasonable domestic or recreational needs and the taking, use, or diversion does not, or is not likely to, have an adverse effect on the environment; or

(e) The water is required to be taken or used for fire-fighting purposes.

S. 15 Discharge of contaminants into environment

(1) No person may discharge any—

(a) Contaminant or water into water; or

(b) Contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or

(c) Contaminant from any industrial or trade premises into air; or

(d) Contaminant from any industrial or trade premises onto or into land—

unless the discharge is expressly allowed by a rule [in a regional plan and in any relevant proposed regional plan], a resource consent, or regulations.

(2) No person may discharge any contaminant into the air, or into or onto land, from—

(a) Any place; or

(b) Any other source, whether moveable or not,—

in a manner that contravenes a rule in a regional plan or proposed regional plan unless the discharge is expressly allowed by a resource consent[, or regulations,] or allowed by section [20A] (certain existing lawful activities allowed).

[(3) This section shall not apply to anything to which section [15A](#) or section [15B](#) applies.]

S. 15A Restrictions on dumping and incineration of waste or other matter in coastal marine area

- (1) No person may, in the coastal marine area,—
- (a) Dump any waste or other matter from any ship, aircraft, or offshore installation; or
 - (b) Incinerate any waste or other matter in any marine incineration facility—
- unless the dumping or incineration is expressly allowed by a resource consent.
- (2) No person may dump, in the coastal marine area, any ship, aircraft, or offshore installation unless expressly allowed to do so by a resource consent.
- (3) Nothing in this section permits the dumping of radioactive waste or radioactive matter (to which section 15C applies) or any discharge of a harmful substance that would contravene section **15B**.]

S. 15B Discharge of harmful substances from ships or offshore installations

- (1) No person may, in the coastal marine area, discharge a harmful substance or contaminant, from a ship or offshore installation into water, onto or into land, or into air, unless—
- (a) The discharge is permitted or controlled by regulations made under this Act, a rule in a regional coastal plan, proposed regional coastal plan, regional plan, proposed regional plan, or a resource consent; or
 - (b) After reasonable mixing, the harmful substance or contaminant discharged (either by itself or in combination with any other discharge) is not likely to give rise to all or any of the following effects in the receiving waters:
 - (i) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - (ii) Any conspicuous change of colour or visual clarity;
 - (iii) Any emission of objectionable odour;
 - (iv) Any significant adverse effects on aquatic life; or
 - (c) The harmful substance or contaminant, when discharged into air, is not likely to be noxious, dangerous, offensive, or objectionable to such an extent that it has or is likely to have a significant adverse effect on the environment.
- (2) No person may, in the coastal marine area, discharge water into water from any ship or offshore installation, unless—
- (a) The discharge is permitted or controlled by regulations made under this Act, a rule in a regional coastal plan, proposed regional coastal plan, regional plan, proposed regional plan, or a resource consent; or
 - (b) After reasonable mixing, the water discharged is not likely to give rise to any significant adverse effects on aquatic life.
- (3) Where regulations are made under this Act permitting or controlling a discharge to which subsections (1) or (2) apply, no rule can be included in a regional coastal plan, proposed regional coastal plan, regional plan, or proposed regional plan, or a resource consent granted relating to that discharge unless the regulations provide otherwise; and regulations

may be made prohibiting the making of rules or the granting of resource consents for discharges.

(4) No person may discharge a harmful substance or contaminant in reliance upon subsection (1)(b) or (c) or subsection (2)(b) if a regulation made under this Act, a rule, or a resource consent applies to that discharge; and regulations or rules may be made prohibiting a discharge which would otherwise be permitted in accordance with subsection (1)(b) or (c) or subsection (2)(b).

(5) A discharge authorised by subsection (1) or subsection (2), regulations made under this Act, a rule, or a resource consent may, despite section 7 of the Biosecurity Act 1993, be prohibited or controlled by that Act to exclude, eradicate, or effectively manage pests or unwanted organisms.]

S. 341 Strict liability and defences

(1) In any prosecution for an offence of contravening or permitting a contravention of any of sections **9**, **11**, **12**, **13**, **14**, and **15**, it is not necessary to prove that the defendant intended to commit the offence.

(2) Subject to subsection (3), it is a defence to prosecution of the kind referred to in subsection (1), if the defendant proves—

(a) That—

(i) The action or event to which the prosecution relates was necessary for the purposes of saving or protecting life or health, or preventing serious damage to property or avoiding an actual or likely adverse effect on the environment; and

(ii) The conduct of the defendant was reasonable in the circumstances; and

(iii) The effects of the action or event were adequately mitigated or remedied by the defendant after it occurred; or

(b) That the action or event to which the prosecution relates was due to an event beyond the control of the defendant, including natural disaster, mechanical failure, or sabotage, and in each case ...—

(i) The action or event could not reasonably have been foreseen or been provided against by the defendant; and

(ii) The effects of the action or event were adequately mitigated or remedied by the defendant after it occurred.

(3) Except with the leave of the Court, subsection (2) does not apply unless, within 7 days after the service of the summons or within such further time as the Court may allow, the defendant delivers to the prosecutor a written notice—

(a) Stating that he or she intends to rely on subsection (2); and

(b) Specifying the facts that support his or her reliance on subsection (2).

S. 341A Liability and defences for dumping and storage of waste or other matter

It is a defence to prosecution for an offence of contravening or permitting a contravention of section **15A** if the defendant proves that the act or omission which is alleged to constitute the offence—

- (a) Was necessary—
 - (i) To save or prevent danger to human life; or
 - (ii) To avert a serious threat to any ship, aircraft, or offshore installation; or
 - (iii) In the case of force majeure caused by stress of weather, to secure the safety of any ship, aircraft, or offshore installation; and
- (b) Was a reasonable step to take in all the circumstances; and
- (c) Was likely to result in less damage than would otherwise have occurred; and
- (d) Was taken or omitted in such a way that the likelihood of damage to human or marine life was minimised.]

S. 341B Liability and defences for discharging harmful substances

- (1) In any prosecution for an offence against section **338(1B)** (which relates to the discharge of harmful substances, contaminants, or water, in breach of section **15B**) it is not necessary to prove that the defendant intended to commit the offence.
- (2) It is a defence to prosecution for an offence against section **338(1B)** if the defendant proves that—
 - (a) The harmful substance or contaminant or water was discharged for the purpose of securing the safety of a ship or an offshore installation, or for the purpose of saving life and that the discharge was a reasonable step to effect that purpose; or
 - (b) The harmful substance or contaminant or water escaped as a consequence of damage to a ship or its equipment or to an offshore installation or its equipment; and—
 - (i) Such damage occurred without the negligence or deliberate act of the defendant; and
 - (ii) As soon as practicable after that damage occurred, all reasonable steps were taken to prevent the escape of the harmful substance or contaminant or water or, if any such escape could not be prevented, to minimise any escape.]

S. 330 Emergency works and power to take preventive or remedial action

- (1) Where—
 - (a) Any public work for which any person has financial responsibility; or
 - (b) Any natural and physical resource or area for which a local authority or consent authority has jurisdiction under this Act; or
 - (c) Any project or work [or network utility operation] for which any network utility operator is approved as a requiring authority under section 167—
- is, in the opinion of the person or the authority or the network utility operator, affected by or likely to be affected by—

(d) An adverse effect on the environment which requires immediate preventive measures; or

(e) An adverse effect on the environment which requires immediate remedial measures; or

(f) Any sudden [event] causing or likely to cause loss of life, injury, or serious damage to property—

the provisions of sections **9, 12, 13, 14,** and **15** shall not apply to any activity undertaken by or on behalf of that person, authority, or network utility operator to remove the cause of, or mitigate any actual or likely adverse effect of, the emergency.

[(1A) Subsection (1) applies whether or not the adverse effect or sudden event was foreseeable.]

(2) Where a local authority or consent authority—

(a) Has financial responsibility for any public work; or

(b) Has jurisdiction under this Act in respect of any natural and physical resource or area—

which is, in the reasonable opinion of that local authority or consent authority, likely to be affected by any of the conditions described in paragraphs (d) to (f) of subsection (1), the local authority or consent authority by its employees or agents may, without prior notice, enter any place (including a dwellinghouse when accompanied by a constable) and may take such action, or direct the occupier to take such action, as is immediately necessary and sufficient to remove the cause of, or mitigate any actual or likely adverse effect of, the emergency.

[(2A) Sections **9, 12, 13, 14,** and **15** do not apply to any action taken under subsection (2).]

(3) As soon as practicable after entering any place under this section, every person must identify himself or herself and inform the occupier of the place of the entry and the reasons for it.

[(4) Nothing in this section shall authorise any person to do anything in relation to an emergency involving a marine oil spill or suspected marine oil spill within the meaning of section 281 of the Maritime Transport Act 1994.]

Appendix 7 Disaster Debris Management Checklist

Local Government Roles and Responsibilities

- Establish a debris management team
 - Outline who is responsible for the function identified? The following lists some of the major roles and types of staff that have typically been responsible for that function, although staffing will vary by community:
 - Pre-planning: This includes forecasting debris quantities, identifying local government and contractor resources, establishing a master street map and recommended debris collection routes, and identifying a debris management site(s) (*operations, contracting, planning*)
 - Estimating post-disaster debris quantities (*operations, Debris Management Site project manager, monitors and safety personnel*)
 - Local incident command: Overseeing debris management activities as part of the overall disaster response.
 - Conducting response activities (*administration, operations, engineering, contractors*)
 - Conducting response activities (*administration, operations, engineering, contractors*)
 - Monitoring and tracking costs for reimbursement purposes (*planning, administration, monitors*)
 - Managing reimbursement with Regional and National government (*contracting, administration*)
 - Communicating with regional and national emergency management offices (*local incident command, operations, public information staff*)
 - Preparing public information and outreach (*public information staff*)
 - Managing and overseeing applicable contractors, including what duties contractors will be responsible for (*contracting, operations, engineering*)
 - Establishing or updating mutual aid agreements/Memorandums of Understanding with adjacent and other nearby towns (*administration, legal*)
 - Ensuring that health and safety procedures are in accordance with local/regional health and safety standards/requirements (*administration, legal*)
 - Establish an organisational chart with names and contact numbers for distribution to the planning staff?
 - List information in different formats (i.e., paper and electronic) and in multiple locations?
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General debris management

- Have you coordinated with the Regional Council and Environmental protection agencies?

Does your plan do the following?

- Address health and safety procedures in accordance with local and regional health and safety standard/requirements?
 - Include a schedule to train staff and others on the debris management plan?
 - Include a debris collection and management site hazard analyses?
 - Identify equipment and other resources that could be shared among the neighbouring territorial authorities?
 - Identify local ordinances that may apply to debris management activities?
 - Identify procedures for acquiring required permits/consents and other approvals?
 - Ensure that debris management planning is addressed in the territorial authority Emergency management plan?
 - Include a schedule to update the debris management plan?
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Debris clearance and collection

Does your plan do the following?

- Include priorities for the clearance of debris and outline a response operation, including mapping critical facilities and anticipated concentrations of debris?
- Include priorities for collection of debris? What collection options does the plan include? (you may check more than one)
 - Curb-side collection through existing solid waste and recycling contractors
 - Additional clearance and collection routes run by local authority staff or additional contractors, potentially including specialized contractors for certain types of debris (eg., white goods or electronics, vehicles)
 - Collecting material at existing or temporary additional drop-off centres
 - Residents self-hauling material directly to debris management sites
 - Relying on regional or national collection contracts or staff if local resources are fully utilized
- Identify all local resources that may be available to assist with debris collection and management?

- Outline contracting needs/operations to be outsourced?
 - Emphasize debris separation to maximize recycling, composting and other diversion from disposal throughout all stages of debris management?
 - Identify a process for the collection of any materials that require separation (e.g., hazardous waste, white goods, vehicles etc)?
 - Address monitoring of the debris pickup sites?
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-

Debris destinations and debris management sites (DMS)

Does your plan include the following?

- Include an estimate of the number of hectares of debris management sites needed to handle the given quantities of debris?
- Identify all recycling, composting, construction and demolition processing and other diversion outlets within reasonable shipping range, as well as transfer stations, landfills and other territorial waste combustors that can be used?
- Include priorities for clearance, collection and disposal of debris?
- Include a process for the management of hazardous waste and/or white goods
- Design the necessary environmental controls for hazardous waste at the collection centres, such as liners and berms?
- List a selected DMS site(s) that meet the preferred selection criteria by the Resource Management Act (RMA). If it is not possible to meet all the criteria set by the RMA, sites that meet the criteria as closely as possible should be selected. Address notification to Regional Environmental protection agencies of the proposed DMS site locations?
- Baseline data and site plans for DMS sites?
 - Necessary permits or permission to operate
 - Baseline data for each location that includes photos and identification of any existing contamination
 - Appropriate ingress and egress routes for each site
 - Site layout and the proper flow of debris throughout the site
 - Proper site preparation
 - A process to consolidate materials for recycling

Volume reduction methods and procedures?

- For chipping?
 - For burning? (only with prior written approval from Council)
 - Disposing of materials that cannot be diverted?
 - Include an environmental monitoring programme? Are there sample debris monitor reports?
 - Have a site closure plan?
 - Whether the locality will contract out operation of the DMS? If so, are there clear contracting terms on proper management of the site?
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Private property demolition and debris removal

Does your plan address the following?

- Authority and processes for private property debris removal including condemnation criteria and procedures? Does it include?
 - Legal documentation
 - Demolition permitting
 - Inspection authority
 - Hazardous waste
-
-

Contracting

Does your plan do the following?

- Identify at least two pre-qualified debris management contractors?
 - Document how the contractor list was obtained including the solicitation of contractors with qualification requirements?
 - Maximize recycling, composting, and other diversion from disposal in the contract throughout all stages of debris management?
 - Provide incentives for contractors to separate debris for diversion?
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Communication and public information

Does your plan do the following?

- Address the dissemination of information to the general public and media?

- Identify and outline alternative communication methods that can be used?
 - Include pre-scripted information (e.g., flyers explaining collection and separation procedures, emergency contact information, etc)
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Funding, reimbursement, monitoring and record keeping

Does your plan do the following?

- Outline funding mechanisms for debris management?
- Include monitoring and support procedures and forms?

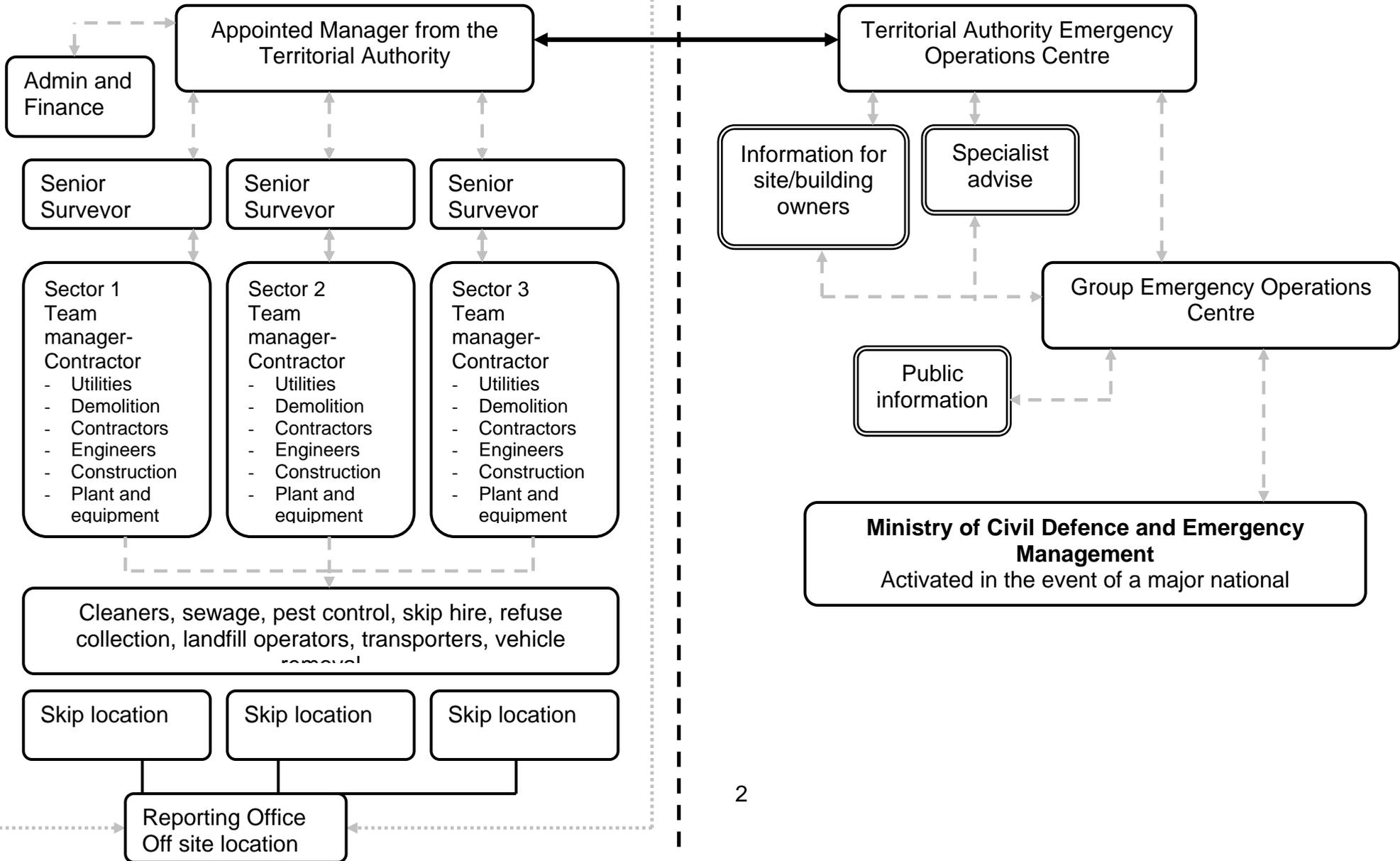
Does your plan do the following?

- Outline funding mechanisms for debris management?
- Include monitoring and support procedures and forms?

Appendix 8 Site Management

On Site Management

Off Site management



Appendix 9 - Useful reference material

Title	Author
A Guide to the Management of Clean-fills	By Beca Carter Hollings and Ferner Ltd
www.mfe.govt.nz	
Debris Management Guide	Federal Emergency Management Agency (FEMA)
http://www.fema.gov/gov/government/grant/pa/debris_main.shtm	
List of Solid waste, Composting and Construction and Demolition (C+D) Processing Facilities	Massachusetts Department of Environmental protection (MassDEP)
http://www.mass.gov/dep/recycle/solid/swfacil.htm	
Information on New Zealand's construction and Demolition wastes	Ministry for the Environment
http://mfe.resultspage.com/search?p=Q&ts=c2&w=construction+and+demolition+wastes&Submit=Go	
Guidance on development of a site clearance capability in England and Wales	Office of the Deputy Prime Minister: London
http://www.communities.gov.uk/publications/fire/guidancedevelopment	
Planning for natural disaster debris	United States Environmental Protection Agency (EPA)
http://www.epa.gov/epaoswer/non-hw/debris-new/pubs/pnnd.pdf	