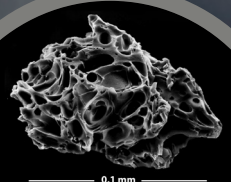


VOLCANIC ASH IS: HARD, HIGHLY ABRASIVE, MILDLY CORROSIVE & CONDUCTIVE WHEN WET.

VOLCANIC ASHFALL

ADVICE FOR **URBAN CLEAN-UP OPERATIONS**

Ash Clean-Up In Urban Areas

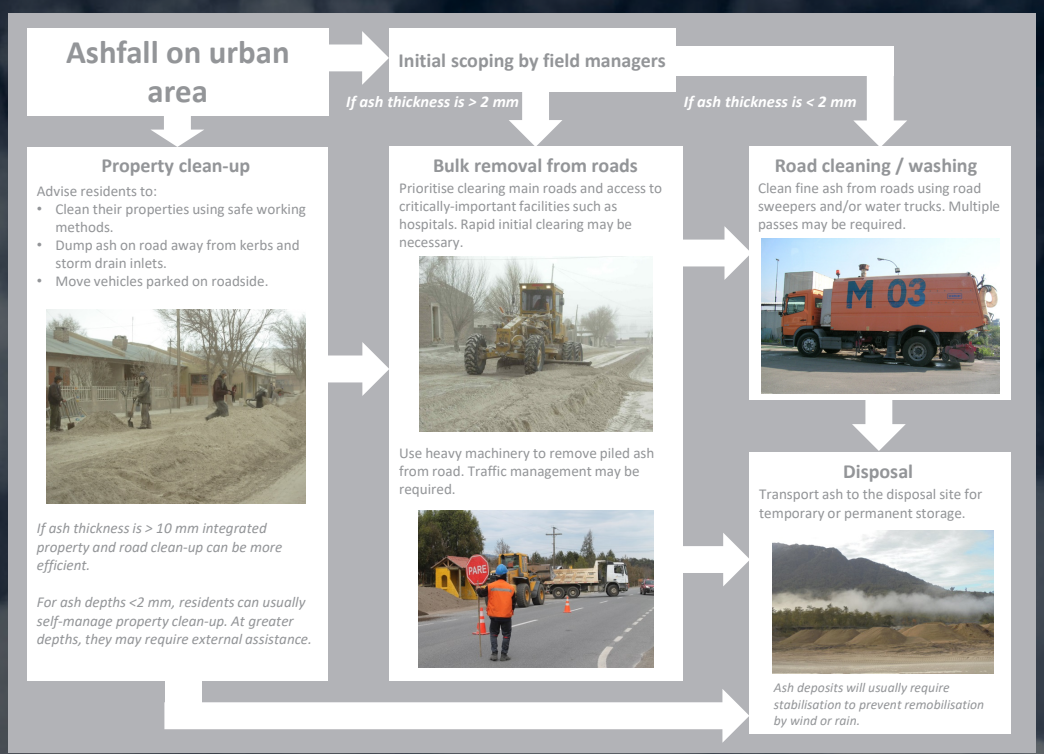
- Prompt clean-up of urban areas is essential to minimise damage and disruption.
- Ashfalls of only a few mm depth will generate large volumes of ash for collection and disposal.
- Experience has shown that efficient and effective clean-up operations need to be planned and coordinated.

IMPORTANCE OF ASH CHARACTERISTICS

- In general, ash is highly abrasive and can cause accelerated wear and tear on equipment.
- Fine ash (<0.5 mm particle size) readily remobilises into the air, so that conventional street cleaning equipment may not pick it up. Adding damp sawdust as a binder has been found to be effective.
- Coarse ash (> 1 mm particle size) is less readily remobilised, but may be crushed into smaller particles when driven on or moved.
- Some ash deposits may 'cement' over time, especially if wetted and then dried.

ASHFALL DEPTH	TYPICAL IMPACTS IF NOT CLEANED UP	SCALE OF CLEAN-UP
<0.5 mm	Minimal	Usually no action required
0.5-2 mm	MInor traffic disruption due to covering of road markings, loss of traction and reduced visibility.	Minor clean-up Sweeping and wetting of roads, paved areas, and roofs/gutters usually sufficient.
2-30 mm	Substantial traffic disruption. Many gutters will collapse or be blocked. Ash may enter and block stormwater networks. Risk of severe damage to wastewater treatment plants with mechanically-cleaned screens.	Moderate clean-up All roads, roofs, and paved areas require cleaning. Private properties may require assistance with clean-up and ash removal. Need for coordinated clean-up. Ash dump or dumps established.
>30 mm	Severe traffic disruption. Most gutters will collapse. High risk of ash entering and blocking stormwater networks HIgh risk of severe damage to wastewater treatment plants with mechanically-cleaned screens.	Major clean-up As above, but with considerably larger volumes which will require greater resources and/or cleaning time. Parks and gardens may also require clean-up.

Ash Clean-Up Guide



Recommended Actions

WHERE TO FIND WARNING INFORMATION

See **www.geonet.org.nz** for ashfall forecasts in the event of a volcanic eruption.

HOW TO PREPARE

Urban areas exposed to volcanic ashfall hazards should develop plans for clean-up and disposal of ashfall, including the following aspects:

- Estimation of potential volumes of ash that will need to be handled and sent for disposal.
- Personnel and equipment requirements, including mutual support agreements for ash clean-up as part of regional contingency planning.
- Strategies for managing spontaneous volunteerism, including assigning a liaison officer, scheduling regular briefings and providing health and safety support.
- Coordinated road and property clean-up.
- An incident management system/database to manage clean-up operations.
- Identification of potential disposal sites in region.
- Strategies for stabilisation of deposits such as covering with a layer of soil or gravel and seeding to encourage vegetation cover.

FURTHER RESOURCES:

http://www.worksafe.govt.nz/worksafe (information on New Zealand's health and safety legislation**)**

http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/best-practice-guidelines-for-working-on-roofs/roofs-best-practice.pdf

http://www.geonet.org.nz (volcano monitoring information**)**

http://volcanoes.usgs.gov/volcanic_ash (volcanic ash impacts and mitigation encyclopedia**)**

https://volcanoes.usgs.gov/volcanic_ash/cleanup_disposal.html

http://www.ivhhn.org (information on volcanic health hazards)

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HOW TO RESPOND

If possible, delay clean-up until ash has stopped falling. However, repeated cleaning or multiple clean-ups may be necessary.

Health and safety

- Clean-up managers will have legal duties under the 2015 Health and Safety at Work Act. These include:
  - » Ensuring that workers have adequate personal protective equipment (long-sleeved clothing, heavy footwear, fitted goggles and a properly-fitted P2 or N95 dust mask).
  - » Ensuring a safe work environment.
- Working on roofs or at height is highly hazardous. Roof clean-up must be carefully planned and safe working methods must be used. See 'Further Resources' section.

Coordination and clean-up methods

- Prioritise cleaning main roads and access to key facilities such as hospitals.
- Stop ash from entering storm drains (e.g. by putting sandbags around inlets).
- Avoid using water to clean up because this depletes municipal water supplies as well as washing ash into storm drains. Dampening the surface of the ash lightly can help prevent it lifting into the air where it is a breathing hazard.
- Co-ordinate clean-up of private properties and roads in each neighbourhood to optimise resources and reduce recontamination of cleaned areas.
- Note that machinery is likely to need additional maintenance in ashy conditions. See 'Advice for Road Network Operators' poster for further information.

Communication

- Clear and ongoing communication with the public during clean-up operations aids efficiency, public trust and goodwill.
- Advise residents about appropriate methods of clean-up, safety equipment and protective clothing and where they should place ash for collection.

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