

# A guide to FLOOD PROOFING YOUR BUILDING AND CONTENTS



- **How do I flood proof my building?**
- **How do I develop an Emergency Operation Plan?**
- **What ongoing inspection and maintenance do I need?**



The Central Business Districts (CBDs) of Wanaka and Queenstown face an occasional, but potentially severe flood risk as witnessed during the 1994, '95 and '99 floods. In response to this risk, Queenstown Lakes District Council (QLDC) and Otago Regional Council (ORC) have actioned the development of a Flood Mitigation Strategy to provide consistent and comprehensive management of flooding of Lake Wakatipu and Wanaka and better equip the local communities to live with flooding.

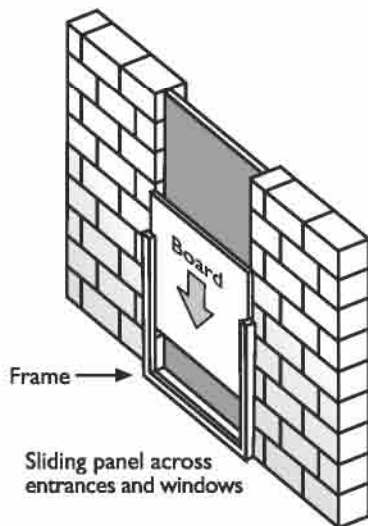
This guideline is one of the initiatives actioned under the Strategy and has the primary aim of providing guidance on the wide range of measures that can be undertaken to improve the flood resistance of new and existing buildings and consequently lessen your risk of flood damage, reduce repair costs and speed up recovery.

## DRY PROOFING YOUR BUILDING

One means of protection against flood damage is to 'dry proof' your building or 'seal' it to keep water from entering. Sealing of buildings to keep out floodwaters is appropriate primarily for slab-on-ground buildings with concrete or solid masonry walls. Sealing should not be undertaken over a height of one metre as the pressures exerted by deeper water can cause structural stress and lead protection measures to buckle or collapse. The 1999 flood in Queenstown resulted in water heights reaching over a metre in some buildings, thus professional advice should be sought to determine whether dry proofing is suitable for your building.

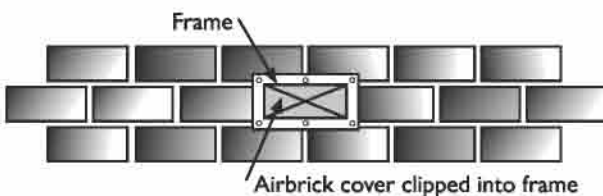
### Floodwaters can enter through

- Doors and windows.
- Airbricks.
- Cracks in walls and floors.
- Backflow through the sewerage system.
- The water supply system.

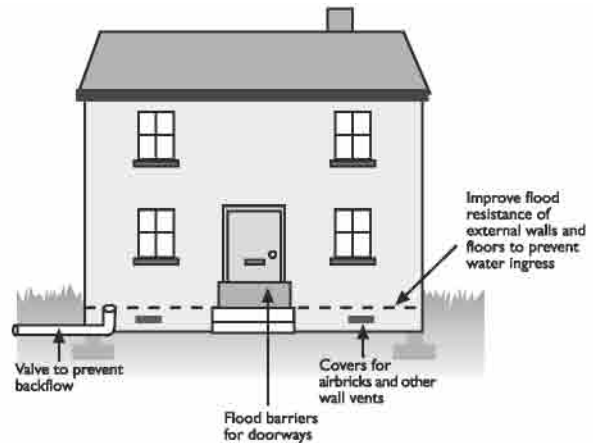


### To prevent or reduce the amount of water entering your building

- Install non return valves on all sewer pipes.
- Install watertight closures around doors and windows to allow the installation of water tight shields when floods threaten.



- Install covers over any airbricks when flood threaten.



### Dry proofing measures

#### Basements

- Professional advice must always be obtained before undertaking sealing of basements as restricting floodwater ingress may lead to possible structural damage. Construction of basements should usually be avoided for new properties within flood risk areas.

## WET PROOFING YOUR BUILDING

Wet proofing your building mitigates against flood damage through the use and design of water resistant buildings to withstand inundation rather than exclude water. Wet proofing provides the added assurance that if water enters your building, as is likely in a flood, your building is designed to handle it.

Wet proofing involves a mixture of measures including using the right materials, smart design and good flood response planning.

#### Water resistant building materials

- Use fixtures, building and cladding materials that are resilient to water damage and will dry easily.

#### Structural components

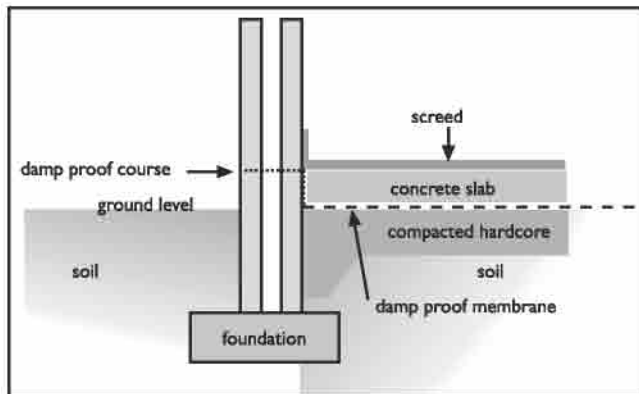
- Concrete, concrete masonry and steel are easier to seal, more resistant to flood damage, and stronger than conventional construction materials such as timber framing.
- Consider the effect of floodwater on any insulation and if possible install materials that are self draining and will dry quickly. Highly absorbent mineral wool insulation will need to be removed and discarded once exposed to floodwaters.

#### Doors and windows

- Solid doors and frames are less susceptible to flood damage than hollow types which can fill with contaminated floodwater and are difficult to drain.
- To avoid distortion, seal all faces of the door (including the bottom face) or frame with an oil based or waterproof stain or paint.

## Flooring

- Solid concrete floors with damp-proof membranes are generally regarded as the most flood resistant floor type and are usually easier to clean and restore compared to suspended floors. In particular solid floors do not have sub-floor voids which often require cleaning out after flooding.



- Chipboard flooring is easily damaged during flooding, instead use treated floorboards or exterior grade or weather and boil proof (WBP) plywood. Removable hatches should also be installed to allow access to the sub-floor void for ease of drying. If possible, provide a fall on the sub-floor surface to an identified drainage point.
- Underfloor heating will aid in drying out your building but may be damaged during a flood - check with a qualified electrician before reuse.
- Skirting boards are usually formed from softwood timber or MDF which are both easily damaged during a flood. Instead use treated timber, painted all over (including the back face and underside) to reduce water absorption and warping. After a flood remove the skirting boards to allow walls to dry out.

## Cladding materials

- Minimise use of timber which absorbs water readily but dries slowly. Instead use lime based plaster and ceramic tiles with water resistant tile resin or grout.
- Avoid paper finishes on walls as wallpapers will normally peel or become badly stained.
- Carpets will normally need to be replaced following immersion in floodwaters. Consider use of loose rugs that can be easily removed and stored during a flood event.

## Fixtures

- All fixings should be corrosion resistant materials such as copper, galvanised or stainless steel. Avoid mild steel materials which may cause rust and staining of wall surfaces.

## Raising services

- Have a licensed electrician raise electric components (switches, sockets, circuit breakers and wiring) as high as possible above projected flood levels.
- Raise your building's utilities including heating, air conditioning, water supply, and sanitary sewage services or make watertight and capable of resisting damage.

## Heating systems

- Closed cell insulation should be used on pipes below flood level.
- Pipe work routes should be easily accessible to allow pipes to be maintained and washed down following flooding.

## Anchoring

- Anchor gas bottles and storage tanks to prevent flotation and over-turning.

## Reinforcement against wave damage

- Reinforce and protect windows from waves and debris by installing fixtures or frames into which shields can be installed prior to a flood.

## Drainage

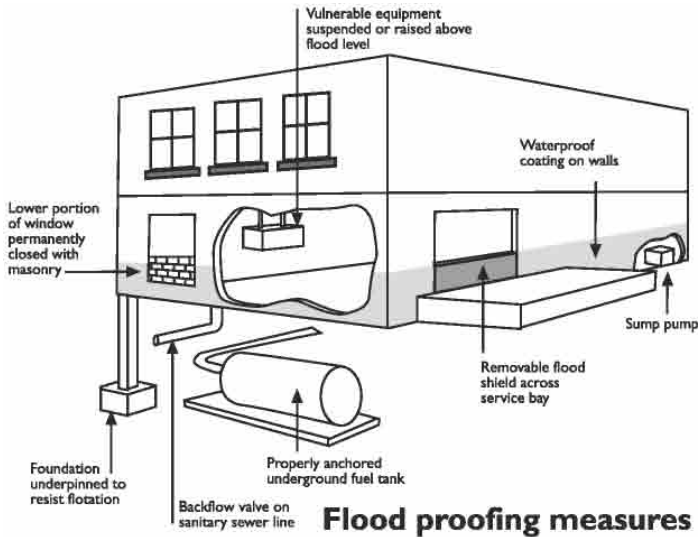
- Improve the ease of dewatering your building after a flood by installing a sump pump and foundation drain system. A small sump able to be uncovered on the floor, along with a reasonably good 12 volt bilge pump on a float switch should be considered. If the 12 volt battery is connected to a charger it will last longer depending on the amount of infiltration and will offer some period of use after a power shutdown.
- Install backflow or check valves in sanitary sewer and stormwater lines to avoid inundation by floodwater. It must be remembered that once a back flow valve has closed you are effectively disconnected from the public sewerage system and thus appliances such as toilets, washing machines and showers cannot be used until flooding has subsided and the device reopens.
- Incoming water mains should also have back flow preventors to prevent contamination of potable water.

## Grease traps

- Help lessen the risk of floodwater contamination by regularly maintaining your grease traps. As a minimum these should be cleaned annually in the spring period from September to October.

## Stock care

- Install mobile storage systems such as shelves on castors so it is easy to move stock when floods are imminent.
- Have an appointed dry area outside of the CBD which can be used to store stock.



**Flood proofing measures**

## EMERGENCY OPERATION PLAN

A key part of protecting your building and stock from flood damage is the development of a **Flood Emergency Operation Plan**. This is your primary means of advising staff on how to respond in a flood event.

Refer to the QLDC website for a template of an example Flood Emergency Operation Plan

A **Flood Emergency Operation Plan** is an integral part of any building's flood proofing design and is critical when the flood proofing requires human intervention such as the installation of flood shields. An adequate plan must include the following and should be posted in a clearly visible space:

- Details of the chain of command and leadership responsibilities.
- A procedure for notification of necessary parties when flooding threatens and flood warnings are issued.
- A list of specific duties and people assigned to those duties. Alternative people should be assigned in the event that the primary persons responsible are unable to complete their assigned duties under the plan.
- Details of how long it takes to successfully place flood proofing components, such as removable water or debris shields to ensure you commence the securing of your building in time.
- The locations of materials necessary to properly install all flood proofing components.
- An evacuation plan for all personnel identifying all possible ingress and egress routes for both personal and any stock you plan to move.
- A periodic training and exercise program to keep personnel aware of their duties and responsibilities. Training drills should be held at least once a year and should be coordinated with QLDC.
- Any alternative trading arrangements. During the 1999 flood a number of businesses had arrangements with other premises that allowed them to trade on a reduced basis.

## INSPECTION AND MAINTENANCE

Every flood proofing design requires some degree of periodic maintenance and inspection to ensure that all components will operate properly under flood conditions. Components that should be inspected as part of an annual (as a minimum) maintenance and inspection program include the following:

- Mechanical equipment such as sump pumps and generators.
- Flood shields and closures, to ensure that they fit properly and that the gaskets and seals are in good working order, properly labelled, and stored as indicated in the Flood Emergency Operation Plan.
- Walls and wall penetrations, for cracks and potential leaks.

Inspection and maintenance activities required by the plan should continue regardless of changes in the ownership of the flood proofed building. Any lease agreement should also contain clear language stating the leaseholder's responsibilities for the flood proofed building.

**These are just a few ideas on preparing your building to lessen the impacts of flooding. Before undertaking any of the flood protection measures outlined here seek professional advice and contact QLDC to see if the works require building and/or resource consent.**

**Refer to the QLDC / ORC 'What to do in a flood in the Queenstown CBD' brochure for more information on what to do in a flood event and to the New Zealand Building Code [www.building.govt.nz](http://www.building.govt.nz) for guidance on structural works.**



Please contact the Queenstown Lakes District Council at either Queenstown or Wanaka offices Monday to Friday.  
Ph: 03 441 0499 Queenstown. Office Hours: 8.00am and 5.00pm  
Ph: 03 443 8197 Wanaka. Office Hours: 8.30am and 5.00pm

[www.qldc.govt.nz](http://www.qldc.govt.nz)



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