



**Queenstown CBD in flood in 2005** (picture supplied by Otago Daily Times)

## Lake Wakatipu flood hazard | **QUEENSTOWN CBD**

**The Queenstown CBD area has a history of flooding.** This is a natural process resulting from extended periods of heavy rain and snowmelt. North-westerly fronts moving over the southern part of the South Island can cause heavy rainfall in the headwaters of Lake Wakatipu, especially if they 'stall' and hover over the Southern Alps for days at a time.

A series of such fronts is generally needed before lake levels rise enough to cause flooding. Several large rivers flow into the lake while only one (the Kawarau River) flows out. Flooding can occur when more water flows into the lake than can flow out, and when there is insufficient time for levels to drop between heavy rainfall events.

The Otago Regional Council (ORC) works with the Queenstown Lakes District Council (QLDC) to provide flood warning and information services. These are intended to help people prepare for, and respond to a flood.



**Queenstown flood hazard October 2014**

**Breaking waves and debris can cause additional damage within low-lying parts of Queenstown if strong onshore winds coincide with high lake levels.**

**The photo at left shows booms ORC placed across Queenstown Bay during the 1999 flood to help prevent debris entering the CBD.**

**Residents should be aware of strong winds when the lake is high.**

# Characteristics of flood events

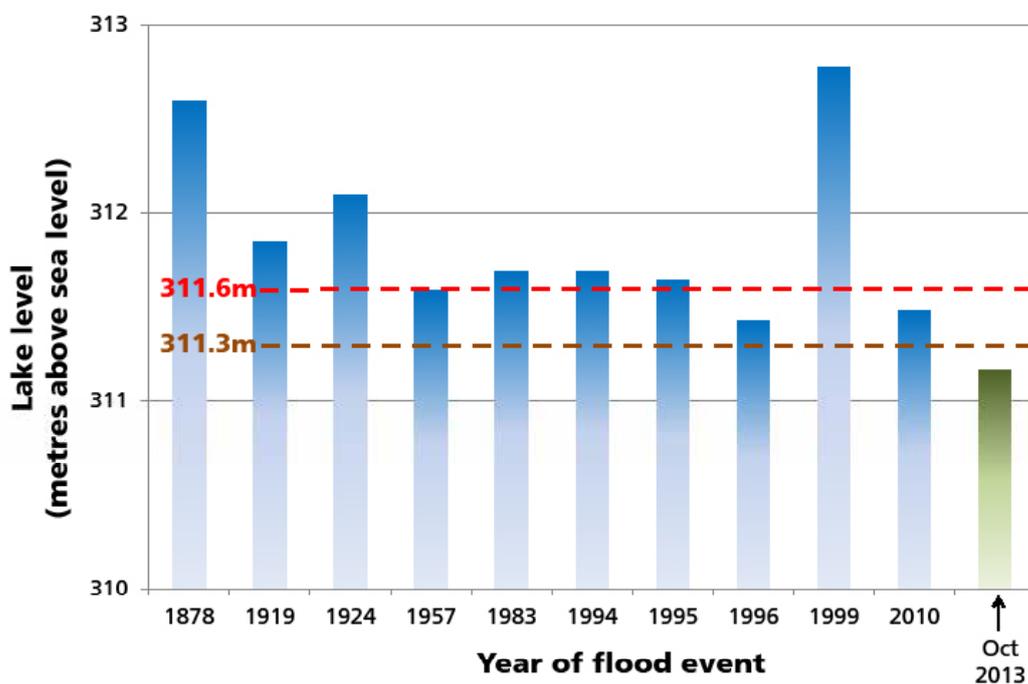
## How quickly do floods occur?

Every flood is different, and their severity will depend on the duration, extent, and intensity of rainfall across the entire catchment. Lake Wakatipu generally takes two or more days to rise to a level where flooding begins to occur after heavy rainfall. The lake can rise faster if the highest inflows coincide with a large flood peak in the Shotover River. This limits the amount of water flowing out of Lake Wakatipu until the Shotover recedes.

## How often do floods occur?

Although major floods have been few and far between during the past 10 years, there were several large floods involving Lake Wakatipu in the 1990's. Figure 1 shows that the most significant floods on record occurred in 1878 and 1999.

**Figure 1. The 10 highest lake levels since 1878, and the most recent flood event**



## When do floods start to affect the Queenstown CBD?

Lake Wakatipu begins to flood some Queenstown streets through the stormwater system at a level of 311.3m. This has happened during 20 separate occasions since 1878. There's a 13 percent chance of the lake exceeding this level in any year. There's a 75 percent chance that the lake will exceed this level at least once during any 10-year period.

Flood waters will reach the Steamer Wharf deck at a level of 311.6m. There's a six percent chance of the lake exceeding this level in any year. There's a 45 percent probability that the lake will exceed this level at least once during the next 10 years.

## What are the effects of flooding in Queenstown?

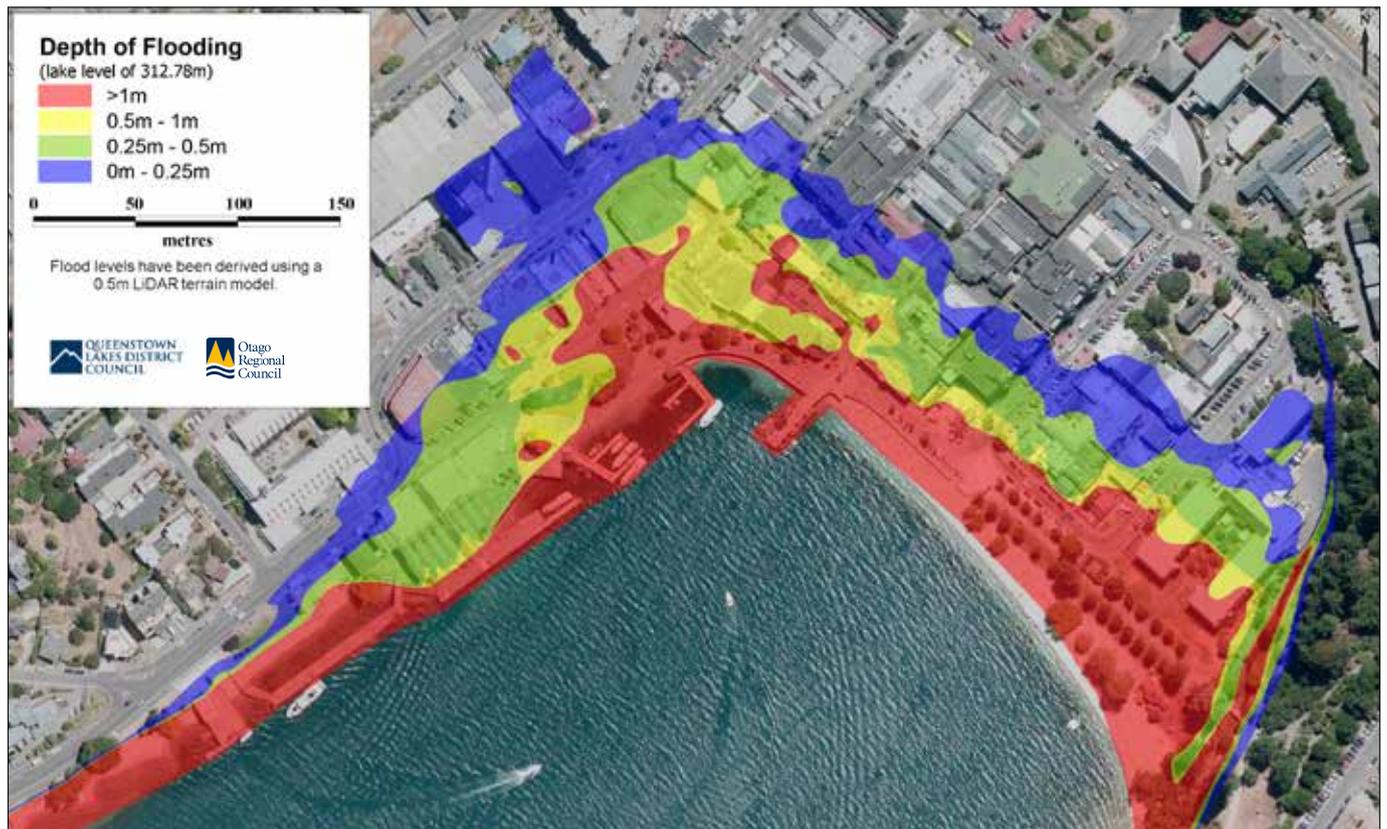
The November 1999 flood was the highest lake level on record at 312.78m. The depth and extent of water in the Queenstown CBD were such an event to occur, is shown in Figure 2. Waves and surges can cause the lake to be even higher. Where the floor level of a building is lower than the level of the ground (e.g. basements, carparks), it may have a greater vulnerability to flooding.

Once floodwater enters the town, it can result in damage to buildings and other property. The nature of this damage will vary depending on the length of time properties remain under water; and may include waterlogging, the accumulation of sediment, and damage due to breaking waves and debris.

Remember that it can be a week or more before Lake Wakatipu drops back below flood levels.

**Figure 2. Depth of flooding in Queenstown CBD at a water level of 312.78m**

(Note that this image shows depth of flooding over the ground. Floor levels can be elevated above, or lower than the surrounding land).



### **How long do floods last?**

A series of fronts bringing heavy rain to the headwater catchments can result in the lake staying at high levels for a long time. The lake peaked at almost 311.5m in April 2010, and was above 311.3m for five days. In November 1999, it peaked at 312.78m and was above 311.3m for two weeks.

### **What about the effect of the new Shotover Delta training line?**

Sediment and water flows from the Shotover River can restrict flows in the Kawarau River, particularly during flooding when the Shotover is high. This can extend how long the lake is at a high level.

Recent works on the Shotover Delta have been designed to prevent this restriction from becoming any worse. They include targeted gravel extraction to maintain a more efficient channel, and construction of a training line (an engineered rock wall) which 'guides' the river at the junction of the Shotover and Kawarau Rivers.

These works will not eliminate the flood risk for Lake Wakatipu communities, but are intended to ensure that it does not become any worse.

### **Summary**

Because it usually takes a few days for Lake Wakatipu to reach flood levels, lakeside communities will normally have time to respond.

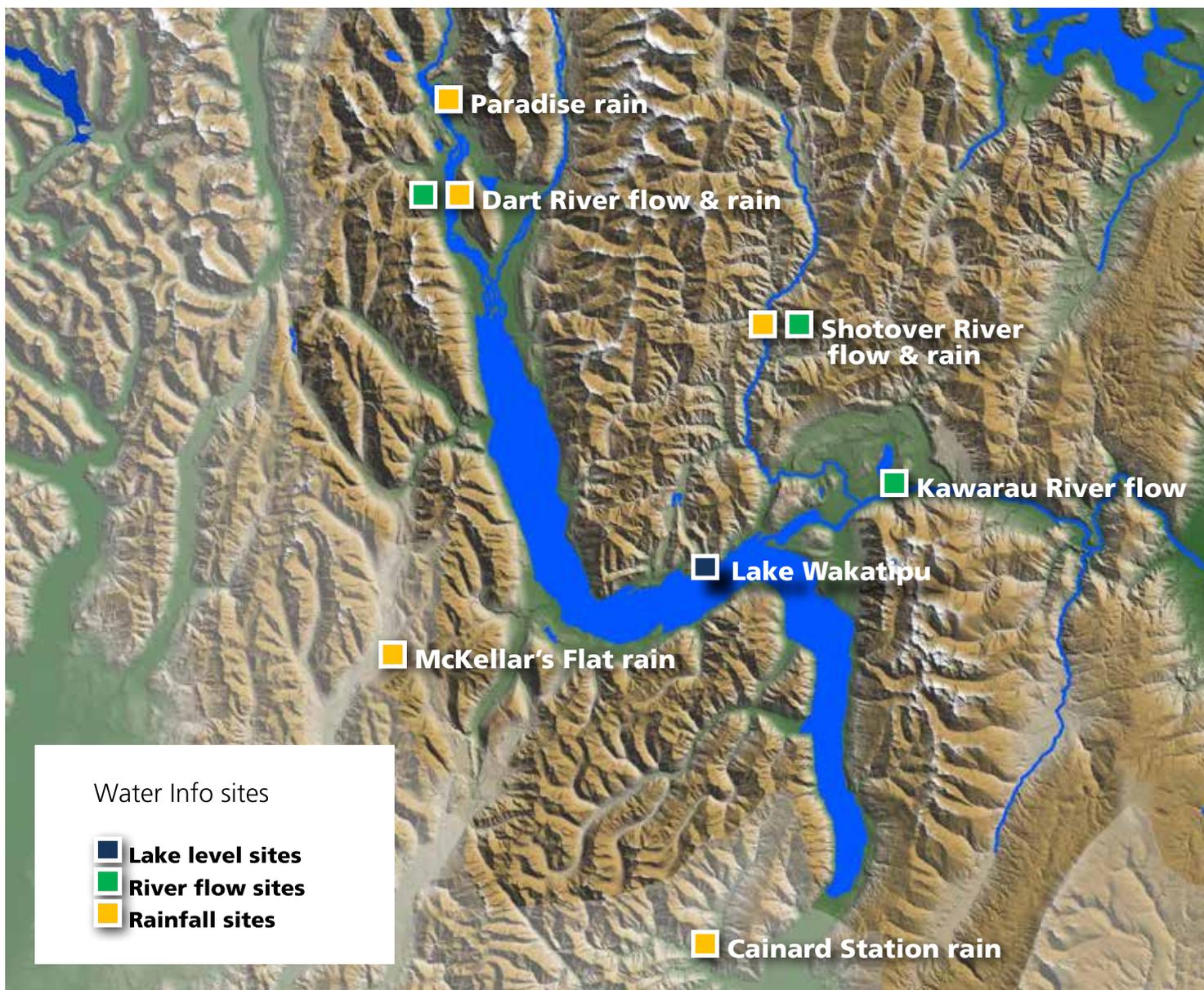
However, the ability to respond and to recover quickly depends on people being prepared in advance. Check with the QLDC on the best way to prepare for the effects of flooding. The ORC's Water Info service is also a useful source of information when flooding in Lake Wakatipu is possible (see back page).

Remember that it can be a week or more before Lake Wakatipu drops back below flood levels.

# Stay informed

Detailed flood and hazard information can be accessed at:  
[www.orc.govt.nz/waterInfo](http://www.orc.govt.nz/waterInfo)

- Using the ORC's WaterInfo service gives you the most recent river, lake, and rainfall information for the Lake Wakatipu catchment. Information is updated hourly during floods. To receive alerts about flood events straight to your cellphone, subscribe to ORC's flood alert service (see website on how to do this).
- For more information on a range of natural hazards in the Otago region, check out ORC's Natural Hazards Database.



The ORC also uses weather and rainfall forecasts to predict when Lake Wakatipu is likely to peak, what level it's likely to reach, and how long it is expected to remain above flood levels.

These predictions are supplied to the media, and are also available through the ORC and QLDC websites

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



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