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1999 QUEENSTOWN FLOODS

OVER THE LAST FIVE YEARS PLANS HAVE BEEN PUT IN PLACE AND THE COMMUNITY IS MORE AWARE OF FLOOD RISK AND MITIGATION STRATEGIES THAN BEFORE 1999

Queenstown is one of New Zealand's most important tourist destinations, and any interruption to trading can have large flow-on financial effects.

When the town flooded following heavy rainfall in 1999, the central business district was badly affected. Some businesses were still flooded two weeks after the event, and some were out of operation for more than three months. Insurance claims were unusually high, ranking among the ten largest insurance payouts on record (Insurance Council of NZ data), and since then many insurance companies no longer provide flood cover to this area. The severity of the 1999 flood took many people by surprise.

The Institute of Geological & Nuclear Sciences' Hazards and Society programme includes research on "Planning for hazard reduction and recovery" and "Society's readiness and response to hazards". Case studies of responses to natural hazard events (e.g. Becker & Richardson 2000; Forsyth et al. 2004) can demonstrate elements of good practice and lessons for other territorial authorities.

GEOGRAPHIC SETTING

Queenstown lies on the shore of Lake Wakatipu, which drains via the Kawarau River (Figure 1). Inflows to the lake, during heavy rain and snowmelt, are higher than outflows. The Shotover River, a major tributary of the Kawarau, has large delta which impedes Kawarau flows, and further downstream there is a narrow gorge which also constricts flows. Because of these geographic factors, Queenstown has been flooded a number of times since its establishment.

PLANNING FRAMEWORK

Queenstown Lakes District falls within Otago region. Before the 1999 floods, the main Otago Regional Council (ORC) document dealing with Queenstown flood hazard was a Floodplain Management Report (ORC 1993).

One map shows Queenstown - Lake Wakatipu flood hazard zones, but not the area inundated by the very large 1878 flood. A later report from ORC (Johnstone 1999) does include data from large historical floods, but was not released until November 1999.

In November 1999, the Queenstown Lakes District Council (QLDC), was operating under a Transitional District Plan, with the 1998 Proposed District Plan in the hearings stage. This included generic policies relating to hazards in the district, with some specific rules relating to minimum floor levels as a means of reducing the flood hazard risk. The following rule applied to Kinloch, Glenorchy, Kingston, and the Queenstown Town Centre:

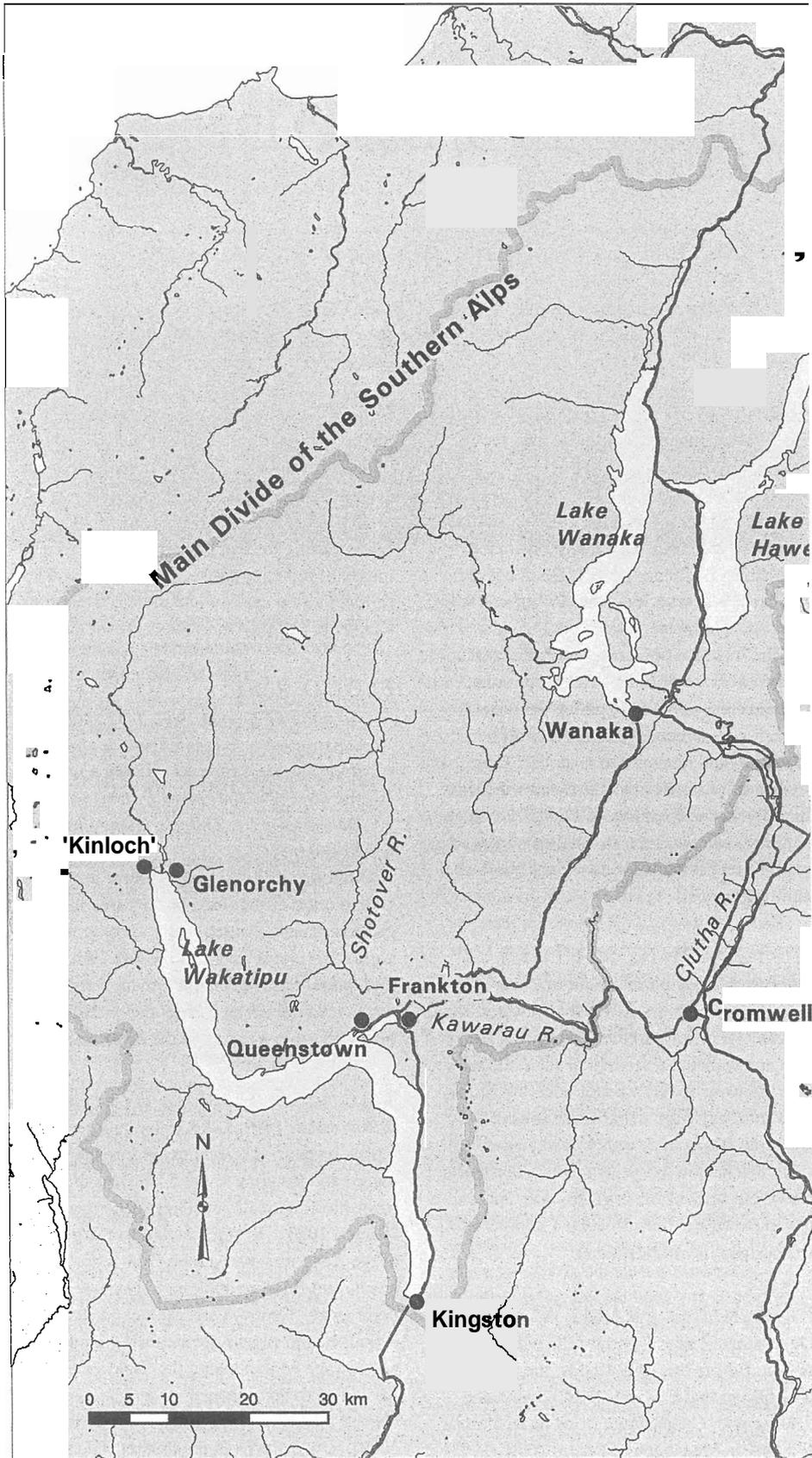
FLOOD RISK

No building greater than 20m² shall be constructed or relocated with a ground floor level less than RL 312.0m above sea level (412.0m Otago Datum) at Queenstown (or Kinloch, Glenorchy, Kingston)

Although this rule was in place, there was no depiction of the flood hazard area in the planning maps. Consequently, despite well-known historical floods in the late 19th and throughout the 20th century, there were no maps of flood-affected areas that would have provided some warning to the community.

THE 1999 FLOOD EVENT

In November 1999, Lake Wakatipu reached a peak level of 312.78m, exceeding the 1878 record and flooding about 5 hectares of the township (Figures 2, 3) (Otago Regional Council 2000). In some locations the peak of the flood was over a metre above floor levels, and flooding took up to two weeks to drain away. Central Queenstown became a serious health risk as decomposing mud, food and sewage contaminated the floodwaters. Areas had to be cordoned off and people were warned to stay away (Becker & Richardson 2000). Other towns in the district (Glenorchy,



Kingston, Wanaka) were also flooded. Insurance payouts in the immediate Lake Wakatipu area totalled \$46 million at the time of the flood event (\$50.9 million adjusted to 2004).

CENTRAL GOVERNMENT RESPONSES

Immediately after the flooding, central government appointed a Clutha Solutions Coordinator to explore ways of reducing the likelihood of future flooding along the river. His report (Adams 2000) listed a range of solutions, mainly physical works projects in and around Queenstown. It recommended that ORC and the district councils (Queenstown-Lakes, Central Otago and Clutha) combine their long term planning process into a catchment-wide approach.

QLDC PLANNING RESPONSES

District Plan Variation

In 2001, a variation to the District Plan was enacted for the outlying townships of Glenorchy, Kingston and Kinloch (Variation No 3d). This raised the minimum floor level to 312.8 metres above sea level (masl), for any new or relocated building greater than 20 m² in floor area, an increase of 0.8 m.

In the central business area of Queenstown, however, the minimum floor level was not amended as part of Variation 3d, and remains at 312.0 metres above sea level. Reasons for this decision include:

- Raising the minimum floor levels but retaining current height levels would reduce usable space within buildings.
- Flood-affected buildings were mainly refurbished rather than rebuilt. Refurbishment would not require a resource consent and therefore would not be affected by any change to the minimum floor heights.
- Many of the buildings flooded in 1999 are within the Town Centre Heritage Precinct. Maintaining a balance between the flood risk and preserving the heritage character of these buildings is difficult, and both issues need to be considered together as part of any consent application.
- Raising minimum floor heights requires roads and footpaths to be raised to match new building levels. Such work across the



town centre would need to be planned and coordinated.

Despite the flood damage in 1999, commercial development in the central business area of Queenstown has not been deterred. Commercial advantages of these town centre/lakefront sites clearly outweigh any perceived disadvantages. Consequently, it is vital that adequate processes are in place to lessen the flood risk.

QLDC principally uses the processes available to it in the Building Act to negotiate with developers on key matters. Many of the flood-related issues are dealt with in the building consent process (especially through the use of section 36 of the Building Act) rather than by resource consent.

Section 36

Section 36 of the Building Act 1991 provides for the possibility of development on hazard-prone land if the council is satisfied that the risks have been reduced and the owner accepts the risk. The risk of a hazard is recorded on the title of the property, a serious step.

By using the section 36 provisions as a negotiating tool, QLDC has brought about many changes in fundamental building



design, which should result in less damage and faster re-instatement after any future flood. Although the minimum floor height is still set at 312.0 masl, QLDC has managed to negotiate this level upwards significantly.

Exceptions are where existing (especially heritage) buildings cannot be so modified, and where access difficulties would result.

Examples of modifications to building design and fittings, intended to reduce flood risk



and speed up re-instatement, are given below. These are collated from several case studies, notably Dux De Lux Restaurant (at left).

- Drainage channel and submersible pumps: ground floor of building ringed by drainage channel connected to storm water system, acting as barrier to flood waters.
- Isolated stormwater and sewerage services: reflux valves installed on sewerage and stormwater lines where they enter building.
- Perimeter wall construction: reinforced concrete blockwork used.
- Ground floor: 100 mm thick reinforced concrete layer over polythene sheeting.
- Electrical: All electrical wiring run through ceiling or perimeter drainage channel. All power points and switches above flood level. Ground floor slab includes electric heating cables to accelerate drying.
- Floor coverings: easily lifted in case of floods.
- Internal linings and fittings: marine plywood or impermeable materials. Shelving and other fittings movable (e.g. on castors).
- Flood exclusions: watertight doors and windows, sealable to prevent water entering building.
- Exterior areas: landscaped in pavers to mitigate the effects of wave action.

OTHER RESOURCE

CONSENT CONDITIONS

Many central Queenstown buildings were extensively refurbished after the 1999 floods, and where consents were required, conditions included submitting a Flood Management Plan. This included procedures for:

- Safe evacuation in the event of flooding.
- Closing the business and removing stock or fittings which pose a risk to others.
- Managing the risk of contaminating flood waters by stock, grease traps, etc.
- Managing the risk of damage from wave action and the potential hazard from broken glass or damaged structures.
- Managing electrical risk.
- Minimising risk and disruption to others when re-instating and reopening the business.

NATURAL HAZARD

REGISTER

A Natural Hazard Register for the Queenstown

Lakes District was initiated in 1998, but at the time of the 1999 floods the hazard information had not undergone any verification and was not widely available. By March 2003, however, the hazard register included the levels of expected 50-, 75-, 100- and 150-year floods in Lake Wakatipu. The hazard register is now a public document, and data from it is included in all LIM and PIM requests.

The information is also available to the councillors, QLDC staff and contractors, and the public via QLDC. The hazard register now acts as the main form of providing hazard information to the community, and the Council has chosen not to put the hazard information in the District Plan.

WARNING SYSTEM

Considerable progress has been made on flood warnings for the central business district since 1999. ORC expects to give Queenstown up to 18 hours warning of damaging lake levels. When a trigger level (311.20 m) is reached, regular communication will be activated, and QLDC contractors will be placed on standby.

Commerce Queenstown has devised an action plan guide for retailers, which includes:

- Have pre-made ply cut outs to fit windows in shop fronts.
- Have sealant on the premises.
- Have an appointed dry area outside the CBD to store stock.
- Restaurants should clean out grease traps in the spring period.
- All retailers should understand their responsibilities in the event of a flood and those of the QLDC.
- Before leaving the building block off toilets, sinks and showers.
- Coordinate with Commerce Queenstown over emergency access to buildings.

As well as having evacuation plans in place, some businesses have plans in place to operate at other locations if floods occur. Two waterfront bars are reportedly able to dismantle the bar and fittings in 5-6 hours.

INSURANCE

Following the 1999 floods many insurance companies removed flood insurance cover from the insurance provided to businesses. Where flood insurance was still provided (i.e. insurance companies were themselves able to get re-insurance cover), premiums have been raised and excesses substantially increased to

between \$10 000 and \$100 000. Furthermore, the excess for business interruption increased from 7 days to between 21 and 28 days. This situation remains in place almost five years after the flood event. The Insurance Council considers that the flood risk in Queenstown has not been reduced, because no physical structures have been installed to prevent flooding.

PHYSICAL STRUCTURES

In the years following the November 1999 floods, several engineering projects were assessed in more detail:

- a flood wall to keep flood waters out of the town centre
- lower the outlet of Lake Wakatipu to maintain a lower lake level
- remove gravel from the Kawarau River bed to allow a faster flow of floodwaters out of Lake Wakatipu
- widen the Kawarau Gorge.

The first of these proposals was rejected in 2000 by the Queenstown community, partly on aesthetic grounds. The other three were formally proposed for resource consent by QLDC during 2001 and 2002. Two proposals were rejected following commissioners' hearings in 2003, mainly because of consequences on other communities further downstream, and the last proposal was withdrawn.

QLDC and ORC have now formed a joint working party to consider catchment-wide solutions for the future. ORC is taking primary responsibility for finding engineering works that would meet the needs of the whole region. Recently ORC has budgeted a substantial sum for finding acceptable solutions and conducting feasibility studies. QLDC has not explicitly set aside funds for flood prevention works, but continues to work jointly with the ORC in search of solutions.

CONCLUSIONS

Has Queenstown's flood risk been reduced in the years since the 1999 floods?

No physical engineering works have been agreed upon to prevent or mitigate the flood hazard to the town. However, there has been good cooperation between ORC, QLDC and the business community to develop a warning system and specific strategies to be followed in the case of future flooding. These have excellent potential to reduce business losses. Furthermore, new buildings and redevelopments in the CBD are taking

account of flood hazard in their design. This occurs by voluntary actions, by negotiation over the provisions of section 36 (Building Act), and by conditions of resource consents. Developers and QLDC are now much more aware of flood risk and mitigation strategies than before 1999.

Within the community there seems to be some acceptance of the flood risk as inevitable. Considerable thought has gone into ways to re-instate the town quickly after any future flooding. Accepting the hazard they live with, being resilient and reducing their own risk is now the primary goal of many. This will improve the outlook even if no acceptable physical engineering solutions can be found to prevent floods occurring.

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