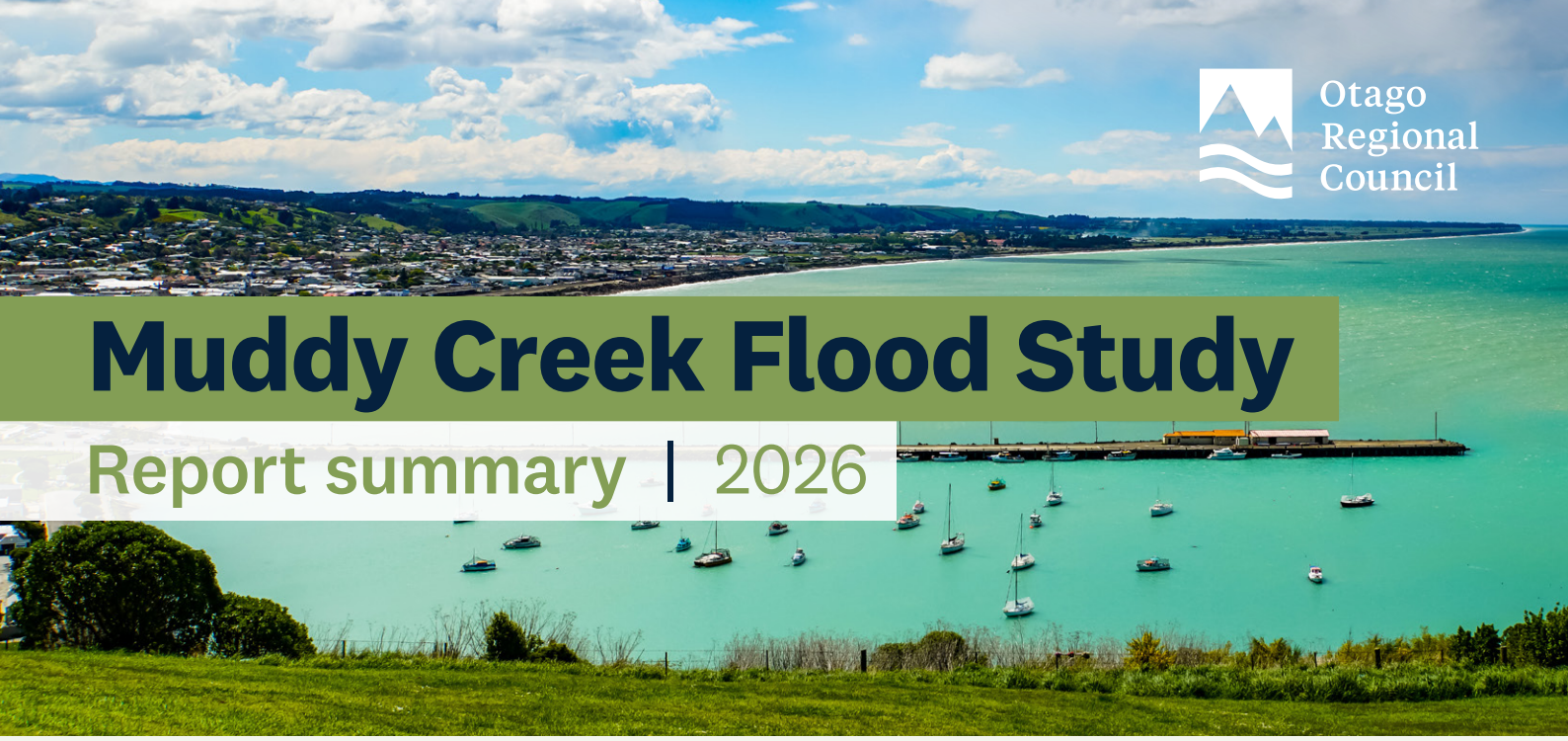


Otago Regional Council

Muddy Creek Flood Study

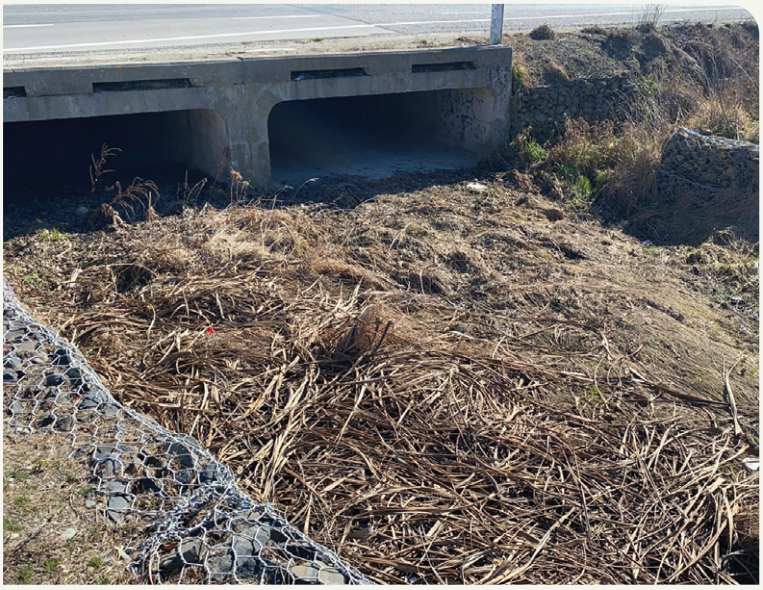
Report summary | 2026

Why was this study completed?

The Muddy Creek Flood Study was completed to help inform future planning and development decisions by Waitaki District Council (WDC), including the current Waitaki District Plan review.

The new study uses modern flood assessment tools and makes use of detailed landform and elevation data.

It improves understanding of where flooding may occur for a range of flood events and helps to answer questions from the community about flooding. It is not intended or suitable to assess flood hazard for individual properties.



Key study findings and messages

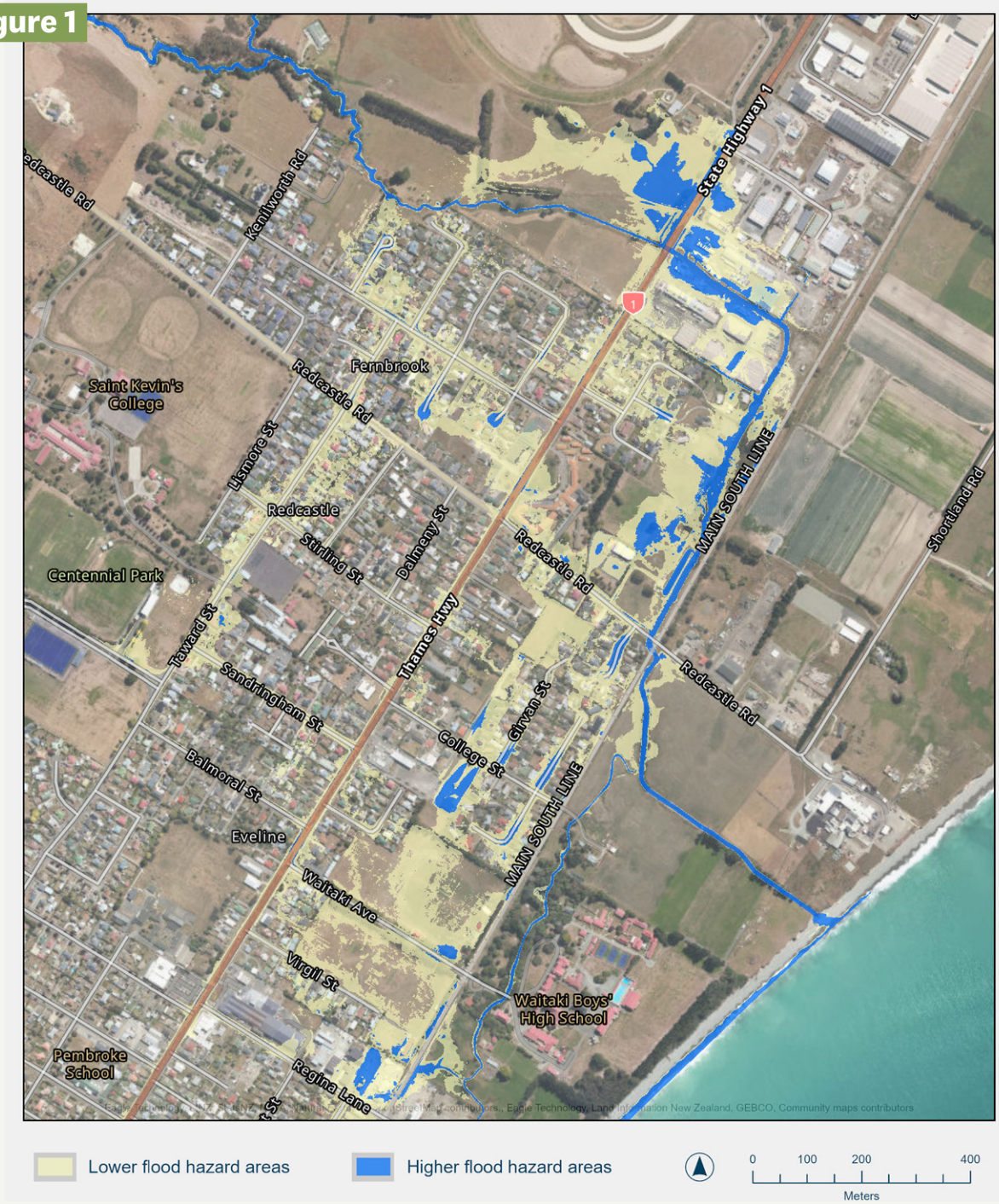
- **Parts of Ōamaru North sit on floodwater-dominated alluvial fans.** An alluvial fan is a build-up of stream (alluvial) sediments that forms where streams emerge from hill country onto a valley floor. During rainstorm events, water can overtop the stream channel and spread out across the fan surface. The surface flow paths are also influenced by urban development, stormwater systems and past modification of creek channels.
- The new flood hazard information **improves understanding of the creek channel capacity and flow paths** across the alluvial fan surface during large Muddy Creek flood events.
- Muddy Creek channel has a limited capacity, and during large floods, **floodwater is expected to overtop the creek channel** into the Ōamaru North urban area and generally flow south, following overland flow paths, including along some streets and roadways.

- This new information provides **improved information for future planning** and development decisions.
- This is a **planning-level study.** It is not intended or suitable to assess flood hazard for individual properties.

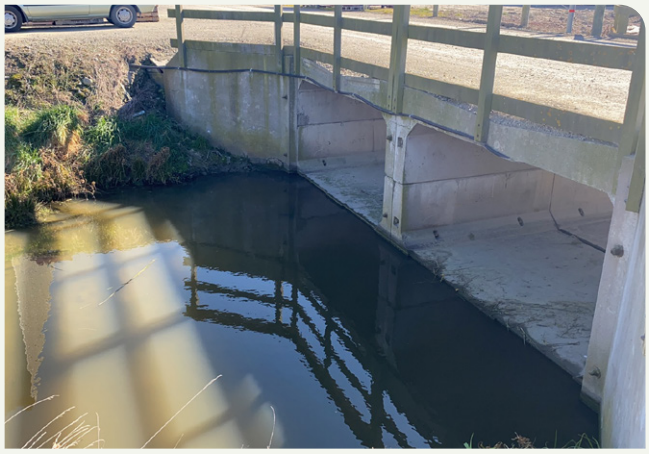
Muddy Creek Flood Hazard

Muddy Creek Catchment 1% Annual Flood | Ōamaru, Waitaki District Scale: 1:10,000

Figure 1



- **Figure 1** above shows the new information associated with a large flood event. The map **identifies areas of lower flood hazard (yellow)** and **higher flood hazard (blue)** for the 1% annual exceedance probability flood, also known as the '100-year flood'.
  - Flooding in the lower flood hazard areas (yellow) is not likely to affect people's safety, vehicle access and building structural stability because it is likely to be shallow and slow moving. Shallow flooding of buildings may still occur. This depends on the building floor level and local features, such as fences, affecting the overland flow paths.
- Flooding in the higher flood hazard areas (blue) is deeper or faster moving and is more likely to affect people's safety and vehicle access. It is useful to consider the higher hazard areas in two categories:
  - **Within and alongside the creek channels** — flood hazard is highest and may also be damaging to structures.
  - **Away from the channels** — some local areas of higher flood hazard are identified, including along some streets and roadways and in lower-lying spots where ponding occurs, but damage to structures is unlikely.



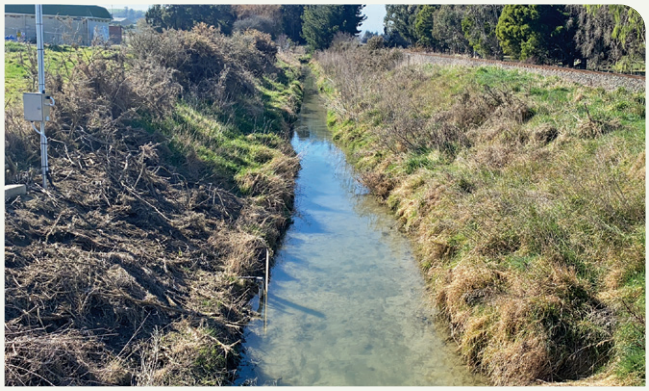
How was the flooding analysed?

The study uses modern computer modelling tools, rainfall and catchment information and detailed ground elevation data to assess flooding characteristics, such as the extent, depth and speed of water, for a range of flood events.

The main focus of the study was the '100-year flood' (also known as the 1% annual flood). This refers to a flood event that has a 1% chance of occurring in any given year. The flood extent and hazard areas for this event are shown in **Figure 1** on page 2.

The study looked at:

- **'10-year flood'** (also known as 10% annual exceedance probability flood)
- **'50-year flood'** (also known as 2% annual exceedance probability flood)
- **'100-year flood'** (also known as the 1% annual flood)
- **The effects of climate change on the flood hazard characteristics.**



What does the new flood information show?

The new flood information shows that large Muddy Creek floods may spread across a wider area than previously identified.

The flow paths are also influenced by urban development, stormwater systems and past modification of creek channels. During large floods, floodwater is expected to overtop the creek channel into the Ōamaru North urban area and generally flow south, following overland flow paths, including along some streets and roadways.

The new results for the 1% annual exceedance probability flood (the '100-year flood') are shown in **Figure 1**. The map identifies areas of lower flood hazard (yellow) and higher flood hazard (blue). The flood hazard depends on the depth and speed of the floodwater.

Flooding in the lower flood hazard areas (yellow) is not likely to affect people's safety, vehicle access and building structural stability because it is likely to be shallow (less than 30 centimetres) and slow moving. Shallow flooding of buildings may still occur. This depends on the building floor level and local features, such as fences, affecting the overland flow paths.

Flooding in the higher flood hazard areas (blue) is deeper or faster moving and is more likely to affect people's safety and vehicle access. Within and alongside the creek channels, the flood hazard is the highest and may also be damaging to structures.

Away from the channels, some local areas of higher flood hazard are identified, including along some streets and roadways and in lower-lying spots where ponding occurs, but damage to structures is unlikely.

Areas of deeper ponding are shown on the northern side of the railway line (e.g. between Regina Lane and Waitaki Avenue), in the industrial area south of Industrial Place (on both sides of Muddy Creek) and on the land between State Highway 1 and the racecourse.

The modelling showed that climate change may slightly increase rainfall and peak flood flows. However, the overall flood extent changes very little compared with the flood extent under the current climate.

Understanding how flooding may change over time helps support longer-term planning and community resilience.

Important limitations to understand

The new flood hazard information has limitations, which are important to understand:

- This investigation was primarily intended to inform the planning process; it is not intended to be used for flood hazard assessment at the individual property level and must not be used for this.
- Detailed modelling of the storm sewer network, culverts and bridges was not included.
- The flood model could not be checked against measured flood levels from past flood events because this information is not available for the Muddy Creek area.
- The study did not include a detailed assessment of how rainfall across the wider catchment may influence flood flows in Muddy Creek.
- A ditch along State Highway 1 carries flow from the adjacent catchment (south of Landon Creek) into the Muddy Creek catchment. There is uncertainty about the magnitude of this inflow during floods.

How will the new information be used?

The new flood hazard information and study findings will now help:

- inform future planning to implement the National Policy Statement for Natural Hazards 2025
- improve understanding of Muddy Creek flooding in the Ōamaru North area
- support future preparedness, planning and community resilience
- identify areas where further detailed study may be needed to support planning or development.