

10.1. General Manager Operations Report to Technical Committee

Prepared for: Technical Committee
Report No. EHS1856
Activity: Flood Protection & Control Works
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PURPOSE

- [1] To update the Council on the following matters:
- South Dunedin and Harbourside geotechnical drilling
 - Dart/Rees Flood Hazard
 - Flood Hazard of Manuherikia River at Ophir
 - Lake Snow in Lake Dunstan
 - SH85 (Brassknocker Rd) Stock Truck Effluent Disposal Facility

RECOMMENDATION

That the Council:

- 1) **Receives** this report.

SOUTH DUNEDIN AND HARBOURSIDE GEOTECHNICAL DRILLING

- [2] As of 28 May 2019, work on the South Dunedin and Harbourside drilling project is progressing well. The project (in association with GNS Science and Oceana Gold and with support from the Dunedin City Council and the University of Otago) is drilling and installing five groundwater monitoring bores in the coastal Dunedin Central Business District area (Harbourside) and drilling two deeper holes (to bedrock) in the South Dunedin area (Figure 1).
- [3] Four boreholes have been drilled to completion with a further three remaining (Figure 2). Because the drilling programme has progressed well an extra borehole has been added to the programme.
- [4] This project is part of ORC's work on future climate change and natural hazards. The data collected is assisting in gaining a better understanding of the geology of the area and will also be used by ORC to study surface water, tidal and groundwater interactions. The data collected during this project will also be used for the NZ SeaRise research programme, which aims to model the effects of sea level rise on groundwater in coastal aquifers.

- [5] Liaison between ORC and DCC staff on each organisation's activities to do with South Dunedin is occurring at an operational level.



[6]

Figure 1: Drilling to bedrock at Tonga Park (NZSR01), South Dunedin 22 May 2019.

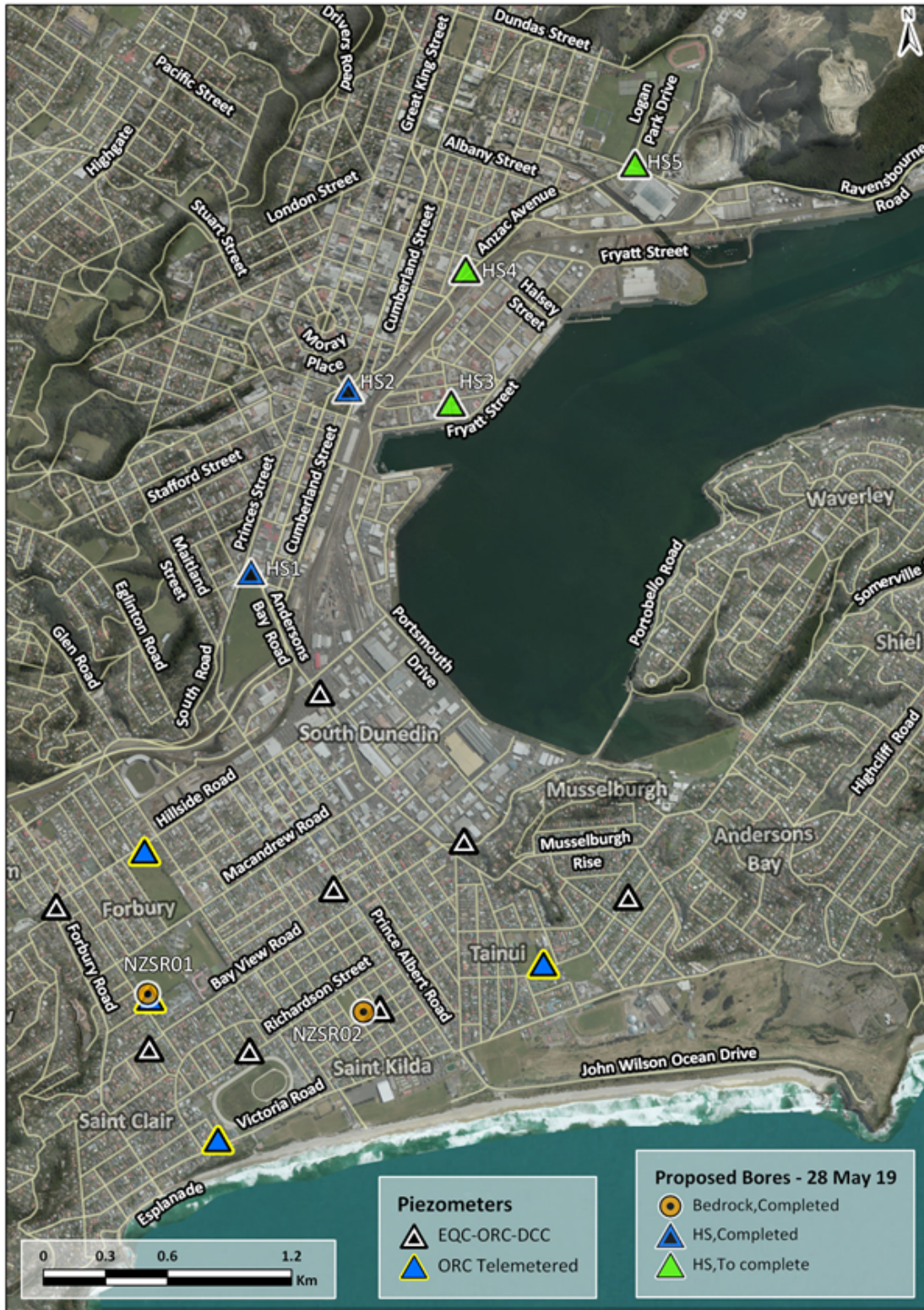


Figure 2: Existing piezometers and proposed borehole locations with progress for locations in the Dunedin central/Harbourside - South Dunedin area.

DART/REES FLOOD HAZARD

- [7] Flood events in recent years have increased bank erosion taking place on the true right of the Dart River at the head of Lake Wakatipu. The river bank is of similar elevation (within 1 m typically, Figure 3) of the active Dart River bed. This makes this area prone to erosion during natural shifts of the main Dart River channel over its floodplain. Bed avulsion resulting in channel shifts is a natural process and a characteristic of braided rivers such as the Dart River.

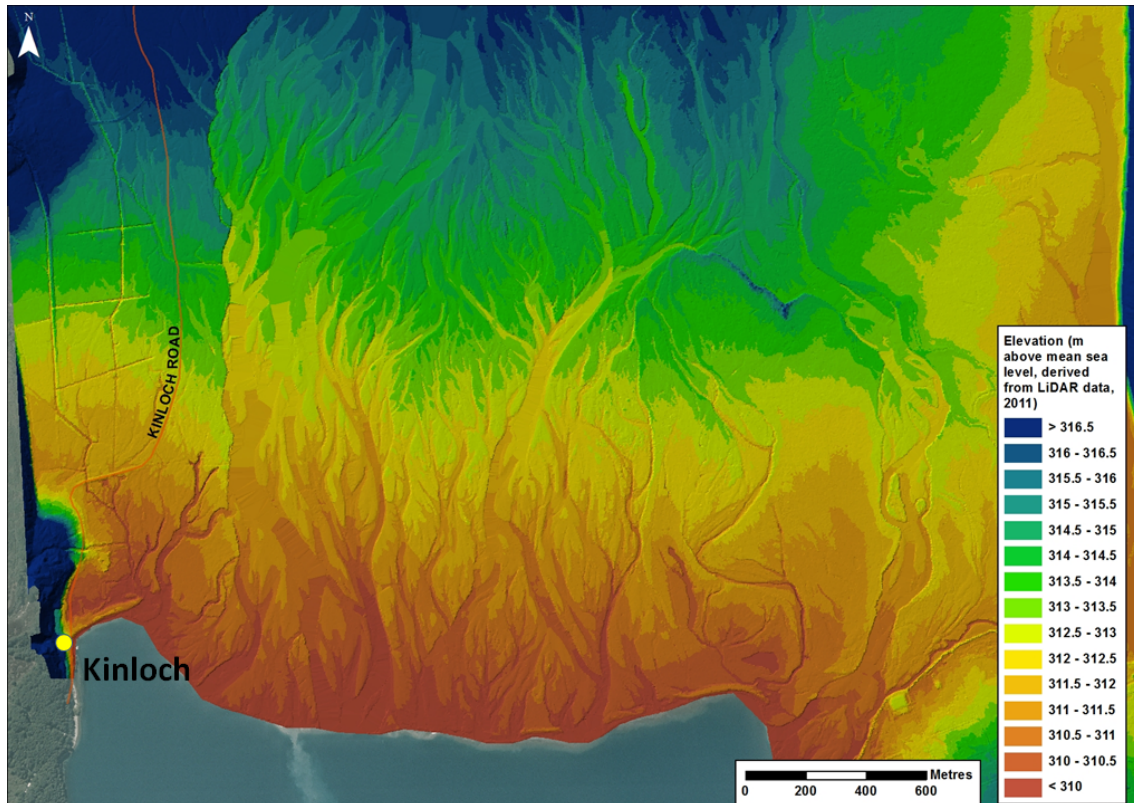


Figure 3: Topography of Dart and Rees River floodplain at the head of Lake Wakatipu derived from LiDAR data (2011)

- [8] Kinloch Road, the only terrestrial access to Kinloch, has low lying sections located on the right bank in the Dart River floodplain (Figure 4). The road is affected by bank erosion and flooding and can become impassable during high river flows. This road is used by residents and to access popular tourist attractions, facilities and accommodation.

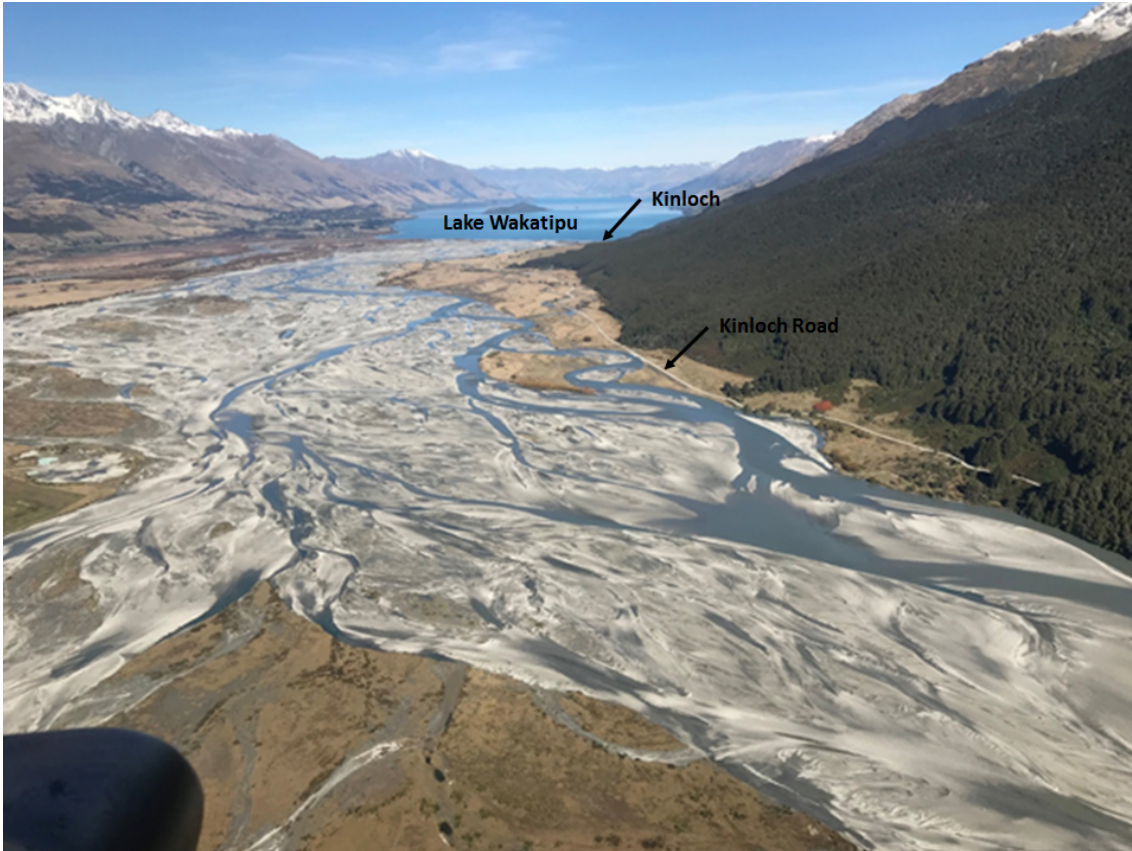


Figure 4: Dart River looking downstream towards Lake Wakatipu – Kinloch Road located on the right of the photograph (photograph taken by Geoffrey Thomson on 1 May 2019).

- [9] Queenstown Lakes District Council (QLDC) maintains the road and regularly repair flood and erosion damage.
- [10] In 2018, a flood channel broke through a remnant gravel bund between Kowhai and Turner Creeks and ORC agreed with residents and QLDC to reinstate this bund. The work was intended to provide limited protection to the section of Kinloch Road located downstream during small floods (Figure 5).

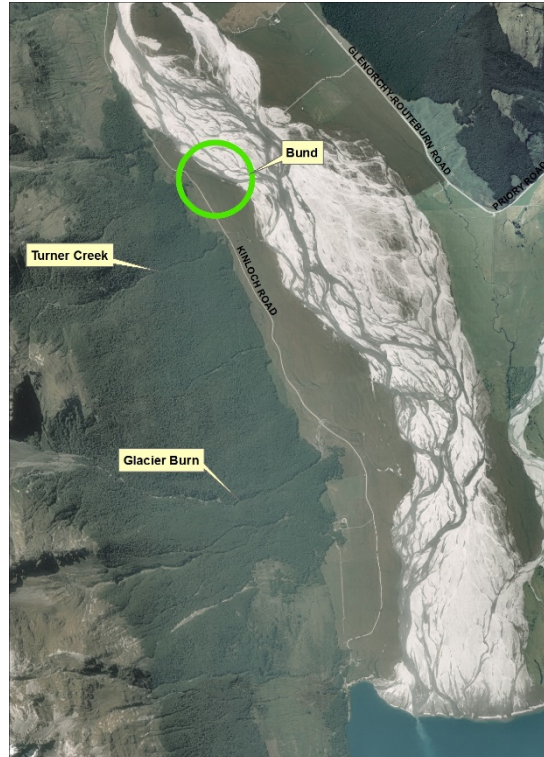
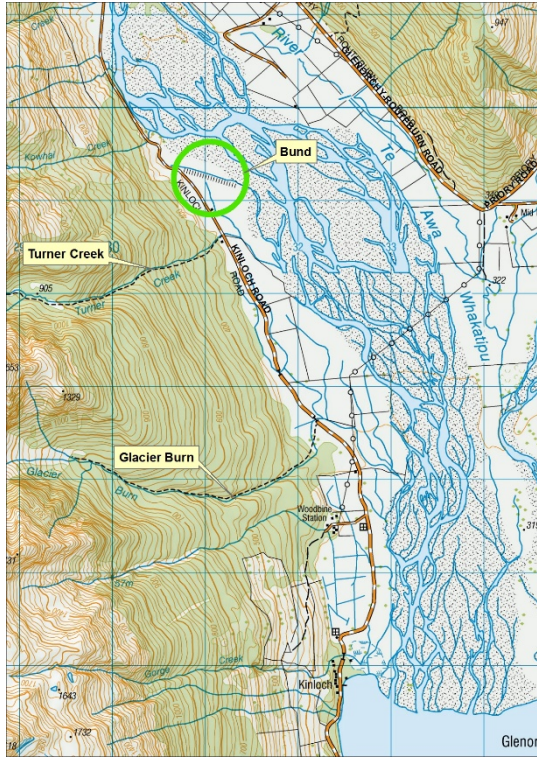


Figure 5: Bund location

[11] The bund was reinstated twice by ORC before it was entirely washed away in the record (since 1996) Dart River flows in March 2019. One active channel is now flowing in proximity to this section of road and the threshold at which Kinloch Road between Turner Creek and Glacier Burn becomes inundated has lowered (Figure 6).





**Figure 6: Top: Channel position – 2007 (left) and 2019 post March 2019 high flows (right)
Bottom: Kinloch Road flooding between Turner Creek and Glacier Burn – 31 May 2019**

- [12] The 2018-28 Long Term Plan (LTP) provides an additional \$50,000 per year over three years for urgent flood and erosion protection work to assist the protection of vulnerable sections of Kinloch Road. Between July 2018 and May 2019 ORC has spent over \$35,000 (excluding staff time) on bank and flood protection work in the Dart and Rees Rivers.
- [13] QLDC with assistance from ORC is currently considering short-term immediate options to improve flood and erosion protection to vulnerable sections of Kinloch Road with the intention to carry out the repair work in June 2019, pending on likely consenting requirements.
- [14] The 2018-28 LTP also provides for ORC to develop, in collaboration with QLDC and affected communities and stakeholders, a long-term natural hazards adaptation strategy for the wider area located at the northern end of Lake Wakatipu (including Kinloch and Glenorchy). This recognizes that engineering works are unlikely to be sustainable financially or environmentally. Further, there are wider issues that must be considered in a strategic and holistic way including future climate change, multiple and cascading natural hazards and pressure for land use intensification. This two-year project is planned to start in the 2019/20 financial year and has an associated total budget of approximately \$80,000 (excluding staff time). Initial work on the long-term natural hazards adaptation strategy has also started. Arrangements are being made to meet with QLDC staff to discuss and agree how to progress this work collaboratively.
- [15] Commencing in 2007, ORC funded a PhD studentship project, in collaboration with the University of Canterbury, to study decade-to-century braided, gravel-bed river delta growth dynamics (*Growth Dynamics of Braided Gravel-Bed Deltas in New Zealand*, Michelle Wild, 2013). The Rees-Dart river delta was selected as a study area and results from this project will be considered during the development of the long-term natural hazards adaptation strategy for the northern end of Lake Wakatipu.

- [16] Kinloch and Glenorchy are part of the Wakatipu River Management Special Rating District (SRD). The SRD is funded from targeted rates applied to all ratable properties in the Wakatipu Basin.
- [17] In the current financial year rateable properties in the Kinloch settlement pay \$41.66 in total into the SRD.

FLOOD HAZARD OF MANUHERIKIA RIVER AT OPHIR

- [18] In April 2019 ORC completed work to reinstate a section of the Manuherikia River left (south) riverbank and a low-level bund located approximately 1.5 km upstream of the Omakau Bridge (Figure 7). The purpose of the work is to slow the progression of bank erosion and to reduce the risk of the Manuherikia River re-occupying an old river channel on the floodplain. Reoccupation of the channel would increase the likelihood of a permanent and significant realignment of the river and the risk of parts of Ophir being flooded.
- [19] Following the November 2018 high flow event in the Manuherikia River, this section was severely eroded resulting in bank damage. A low-level bund located at the same location also collapsed, resulting in significant overland flow (Figure 8). The purpose of the bund was to provide limited flood protection during small floods.
- [20] Bank damage in this location occurred in the past and is the result of natural erosion processes, usually more pronounced on the outside river bends (concave side). Bank protection work in this section of the river existed prior to the November 2018 high flow event but were undermined by the high flows observed in November 2018.
- [21] The purpose of the work completed in April 2019 is to protect the damaged section of left bank and to reinstate the bund to the pre-November 2018 state. A channel was also formed close on the right bank to guide the river away from the left bank during high flows (Figure 9). Willow trees will be planted at the end of winter 2019 to reinforce the stability of the left bank.
- [22] These engineering works are unlikely to be successful in the longer term. Consideration will be given to incorporating a more comprehensive and strategic investigation of management options as a project in the Draft 2021-2031 Long Term Plan. Those options could include removing vegetation from the active river bed to restore channel capacity and give the river room to move.

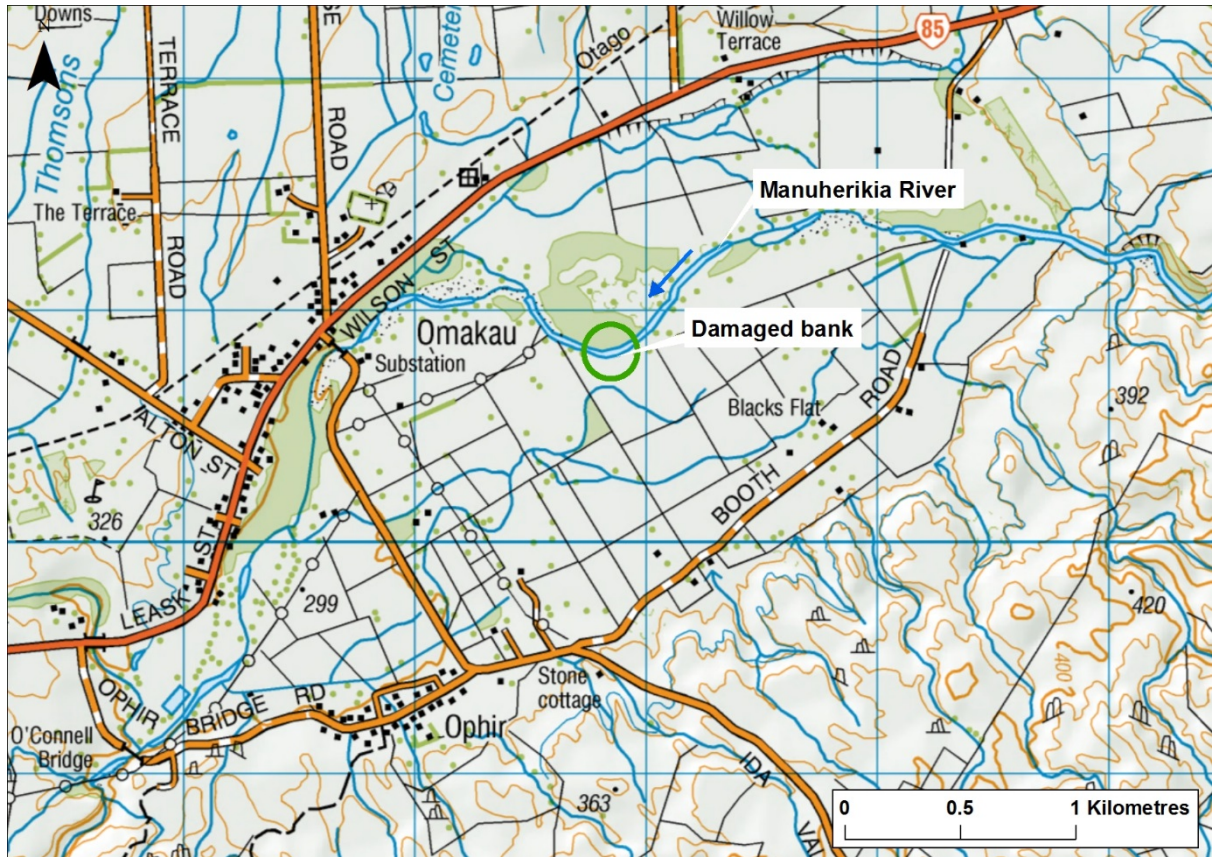


Figure 7: Location of the Manuherikia River breakout near Omakau



Figure 8: Manuherikia River – Left bank overflow – November 2018

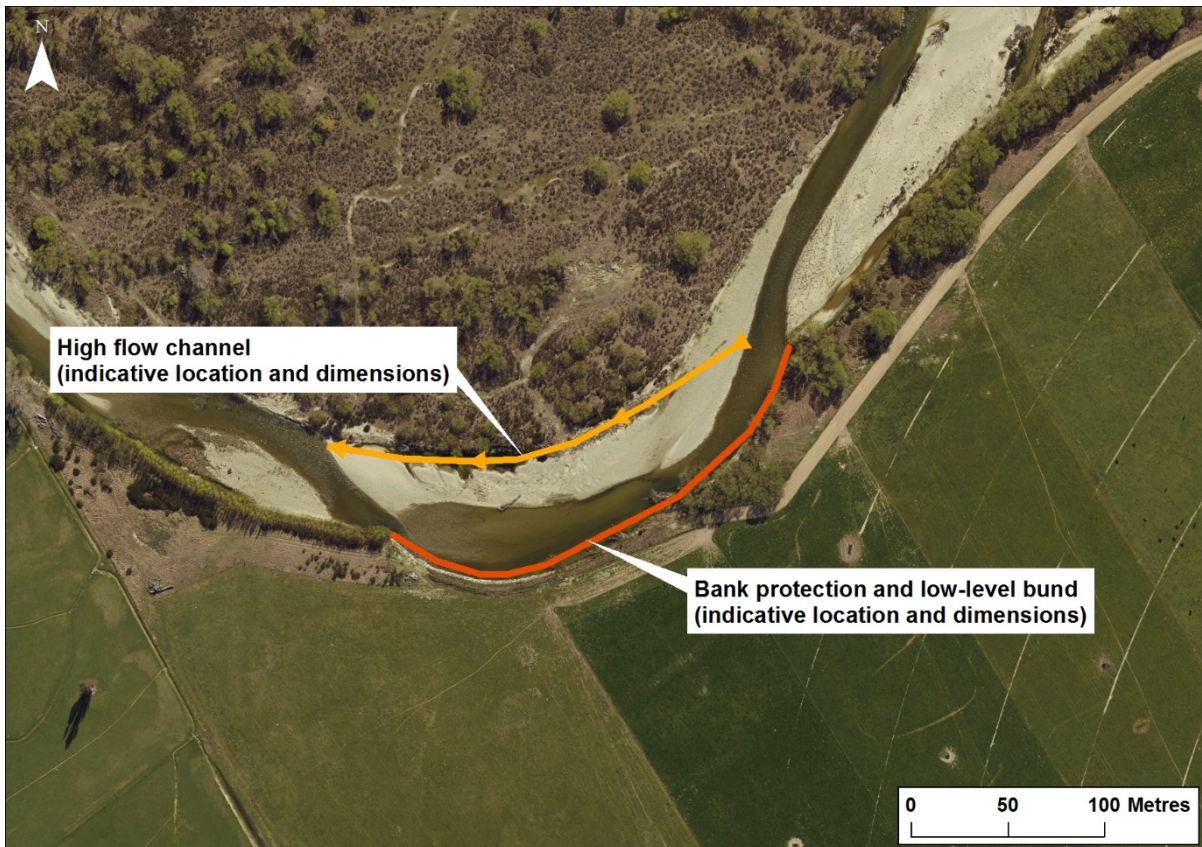


Figure 9: Indicative location and scale of the bank protection work completed in April 2019 on the Manuherikia River approximately 1.5 km upstream of the Omakau Bridge. The river flows from right to left.

LAKE SNOW IN LAKE DUNSTAN

- [23] Central Otago District Council (CODC) draws water through bores on the shore of Lake Dunstan for drinking water supply. During a water treatment pilot study, *Lindavia intermedia* was found in the bore water.
- [24] Lake snow has not been monitored in Lake Dunstan previously as the lake isn't part of ORC's trophic lake programme. Furthermore, Lake Snow has not been the subject of customer complaints for CODC, unlike the situation seen in Queenstown and Wanaka.
- [25] On 28 May 2019 ORC in partnership with CODC carried out Lake Snow tows at three different sites (Figure 10) in Lake Dunstan to compare dry weight concentration of Lake Snow with that found in Wanaka and Wakatipu. Lake Snow was found in all three locations sampled - results of dry weight concentration are still to be reported.
- [26] It is not unexpected to find *L. intermedia* in Lake Dunstan as the waterbody is downstream of lakes Wanaka, Wakatipu and Hawea, where the presence of Lake Snow has been confirmed.

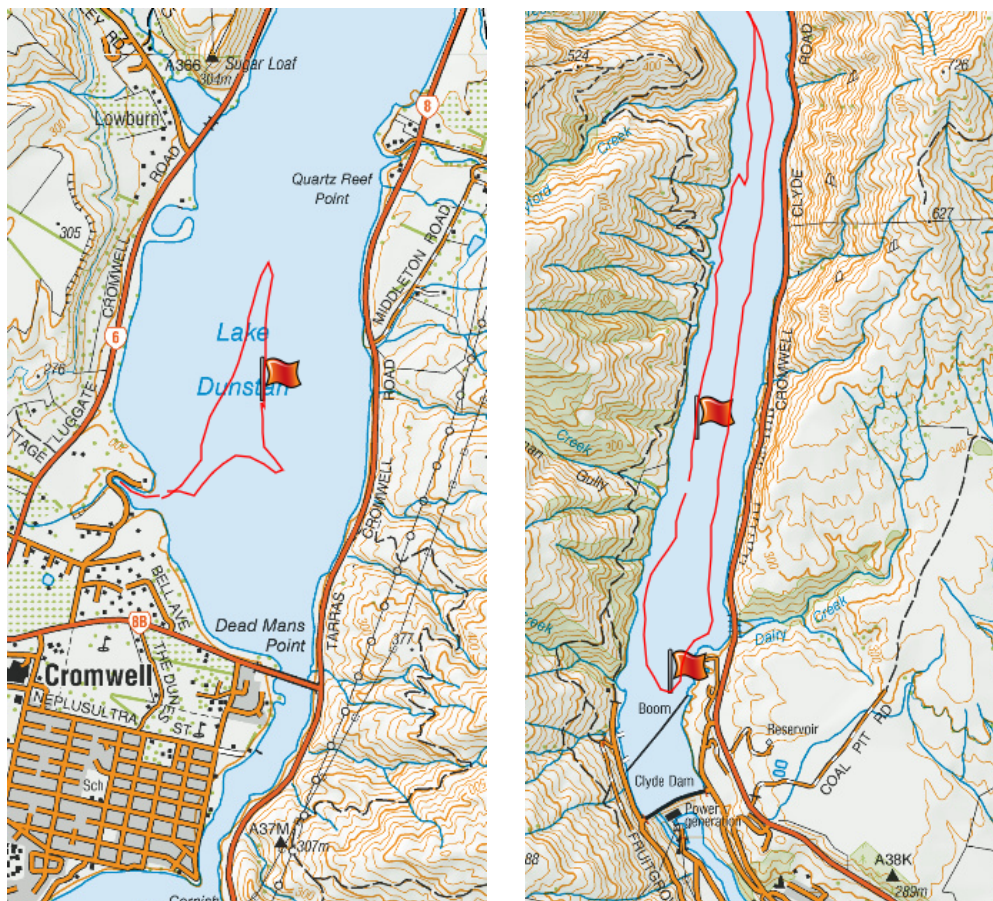


Figure 10: Sampling sites for Lake Snow tows (red flags) 28 May 2019. Left: Cromwell Yacht Club; Right: Champagne and Clyde Dam

SH85 (BRASSKNOCKER RD) STOCK TRUCK EFFLUENT DISPOSAL FACILITY

- [27] The SH85 (Brassknocker Road) stock truck effluent disposal facility (STED) is in service, bringing the number of STEDs in Otago to seven in total. Effluent collected within the facility will be removed by SJ Allen (Balclutha) Ltd and disposed at the Balclutha oxidation ponds owned by Clutha District Council. The contract with SJ Allen (Balclutha) Ltd has a term expiring in March 2021. The same company disposes the effluent that is collected within the other STED located in Central Otago (Raes Junction).
- [28] Figure 11 shows a stock truck discharging effluent into the SH85 (Brassknocker Road) STED on 26 May 2019. The truck had transported 42 dairy cows from Kelso (West Otago) to Lauder (Central Otago) for winter grazing. It had discharged effluent into the Raes Junction STED on the journey into Central Otago.



Figure 11: Stock truck discharging effluent into the SH85 (Brassknocker Road) STED on 26 May 2019 (photograph courtesy Bruce Robertson, Road Transport Logistics Ltd, Tapanui)

ATTACHMENTS

Nil