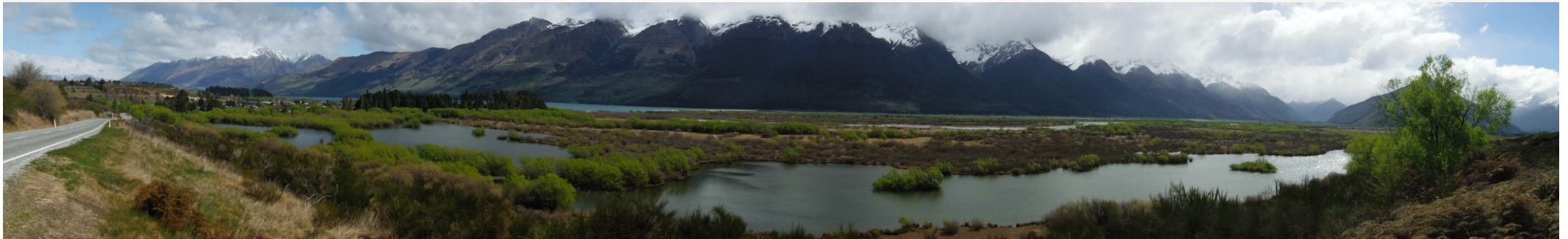


Glenorchy flooding

Update for GCA, 2nd July 2020



Gavin Palmer - General Manager Operations
Jean-Luc Payan - Manager Natural Hazards
Michelle Mifflin - Manager Engineering
Tim van Woerden - Natural Hazards Analyst
Scott Liddell - Senior Field Officer

HEAD OF LAKE WAKATIPU HAZARDS STRATEGY

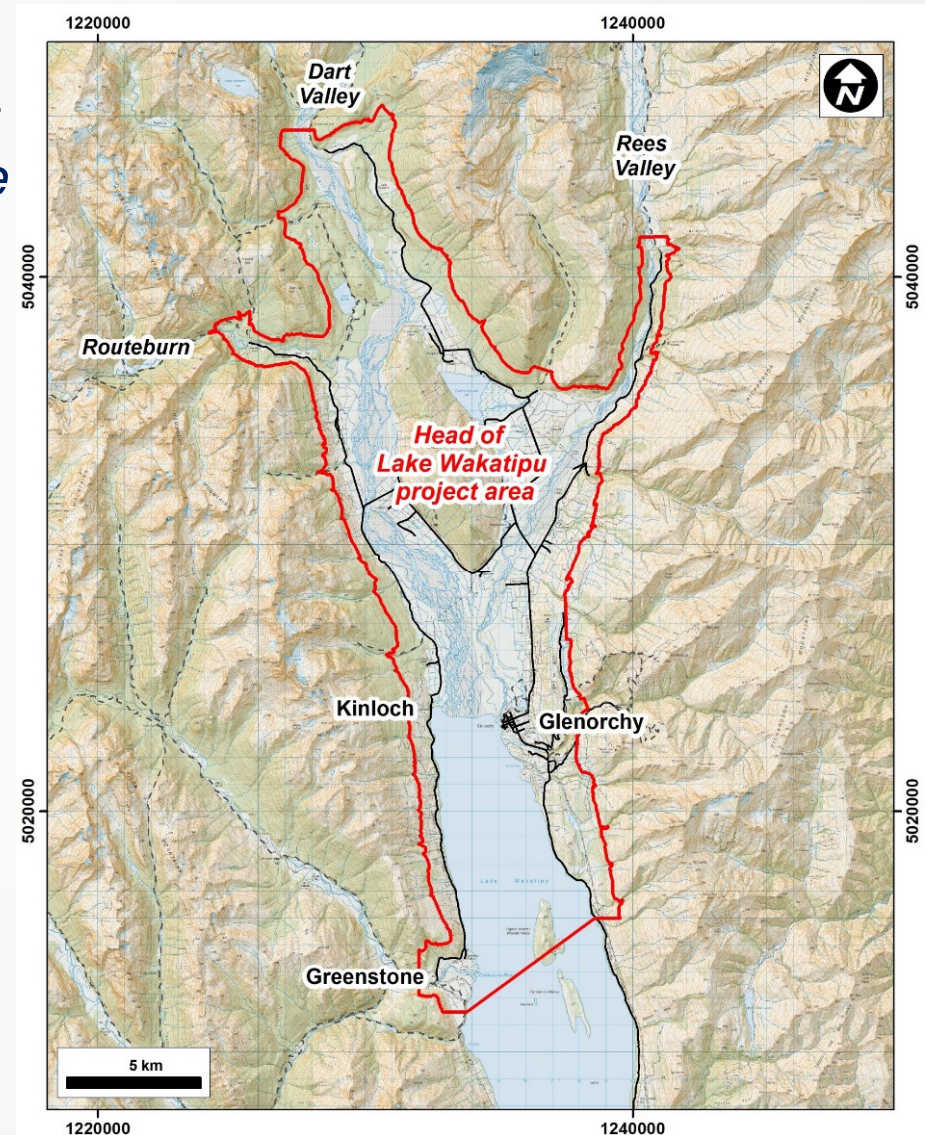
Project Objective

To provide a framework to actively manage risks associated with natural hazards for the resilience of the area located at the Head of Lake Wakatipu, including Glenorchy and Kinloch.

Project involving ORC, QLDC, DOC and Kai Tahu

Work to Date

- Project planning
- Hazards data compilation and review
- Initial risk assessment
- Review of 2019-2020 hazard issues (Kinloch Road, Glenorchy flooding)
- River morphology technical study (in progress)



GLENORCHY FLOODING

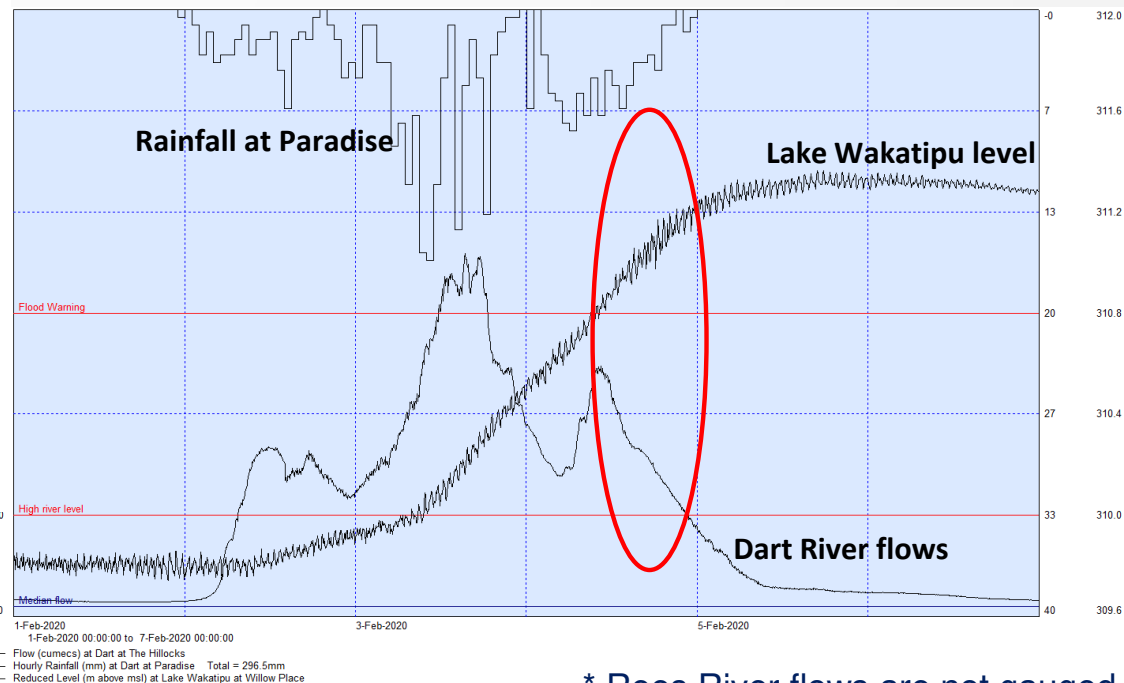
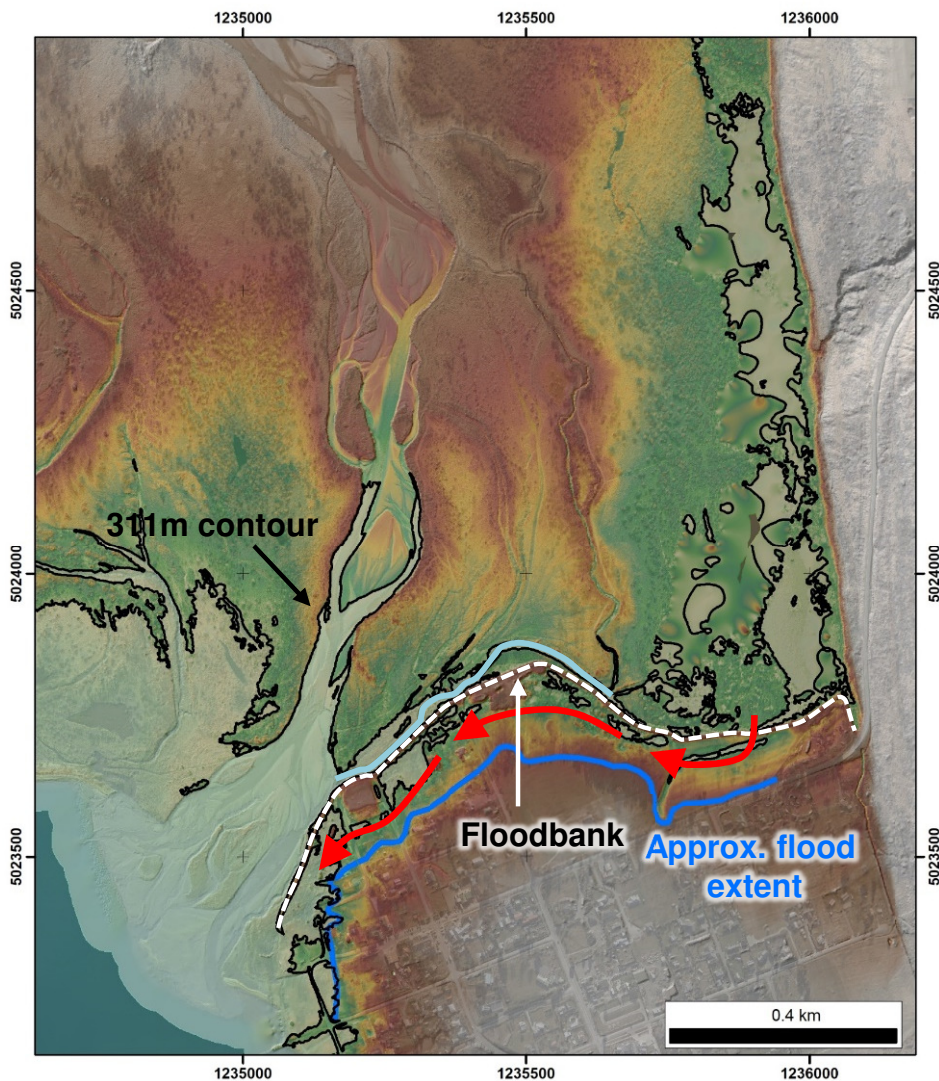
4th February 2020



*Note photos are not necessarily at flood peak

CONTRIBUTING FACTORS

1. Widespread, heavy rainfall
 - ~300 mm total at Paradise
 - (Nov 1999 was 341 mm at Hillocks)
2. High, sustained, river flows
 - Dart to ~1800 cumecs*, equal highest since 1996
3. Feb 4th flow peak coinciding with elevated lake levels
 - backwater effect on river flow



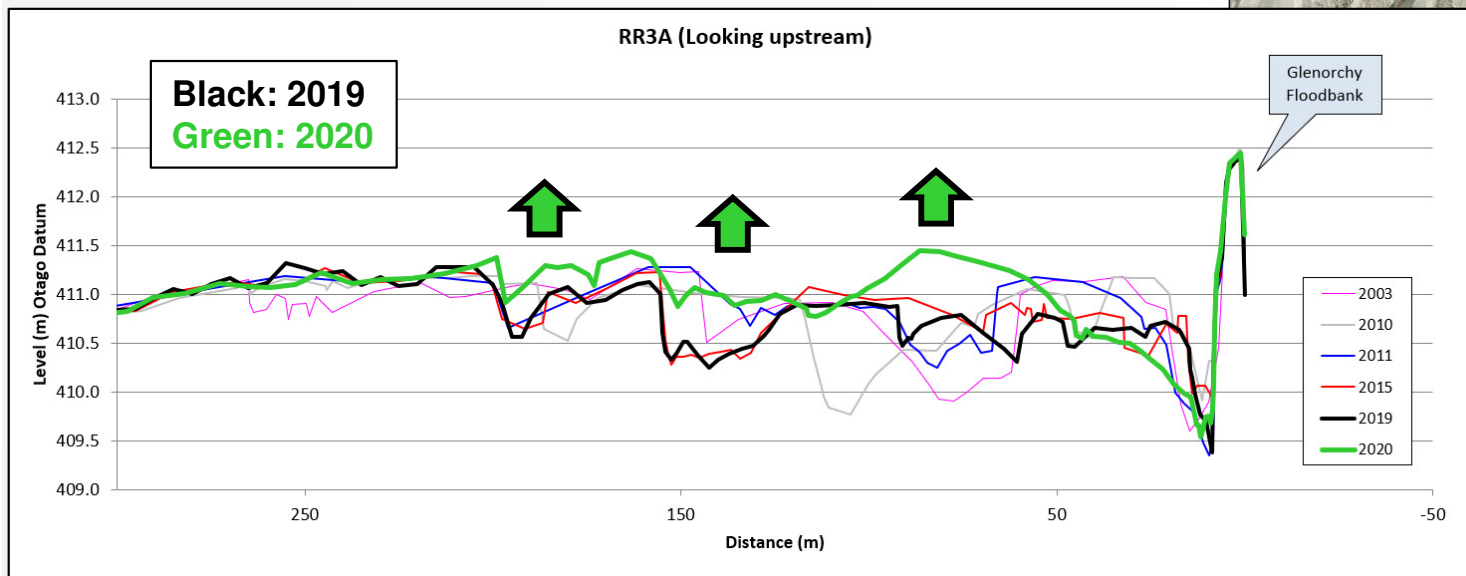
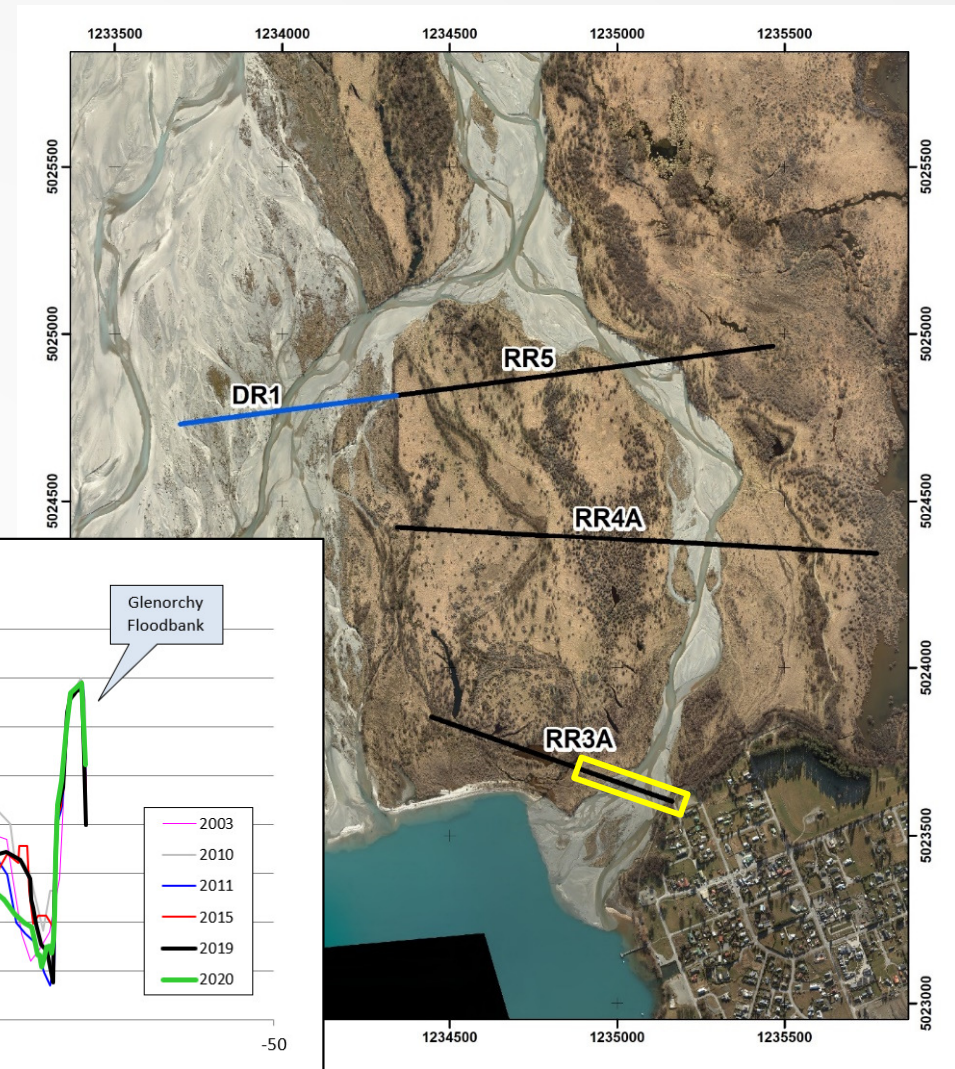
ORC POST-FLOODING ACTIONS

Action	Purpose	Status
1. Re-survey of lower Rees River cross sections	Assess geomorphic change to river/delta since previous surveys.	Completed
2. Field inspection at Rees delta & floodbank	Assess bank erosion & floodbank stability at Rees delta	Initial assessment completed, scope of follow-up study discussed with consultants. In collaboration with QLDC
4. Site inspections at Lagoon Creek and lower Rees River	Review and assess if vegetation growth is an issue for flood hazard	Completed by ORC/DOC staff
5. Review of possible short-term river management options	Review immediate river management works which may provide benefits for flood hazards	Initial assessments completed, and quotes received for preferred options

REES RIVER SURVEYS

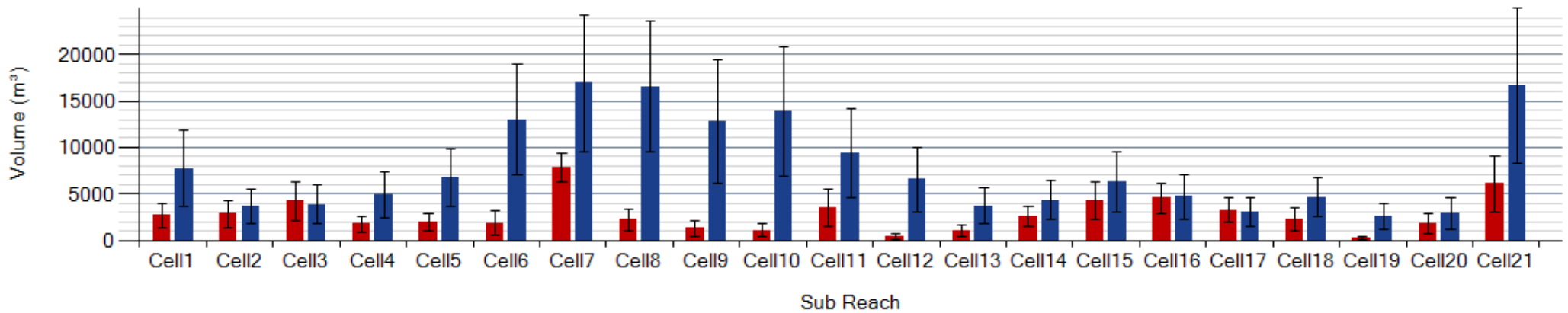
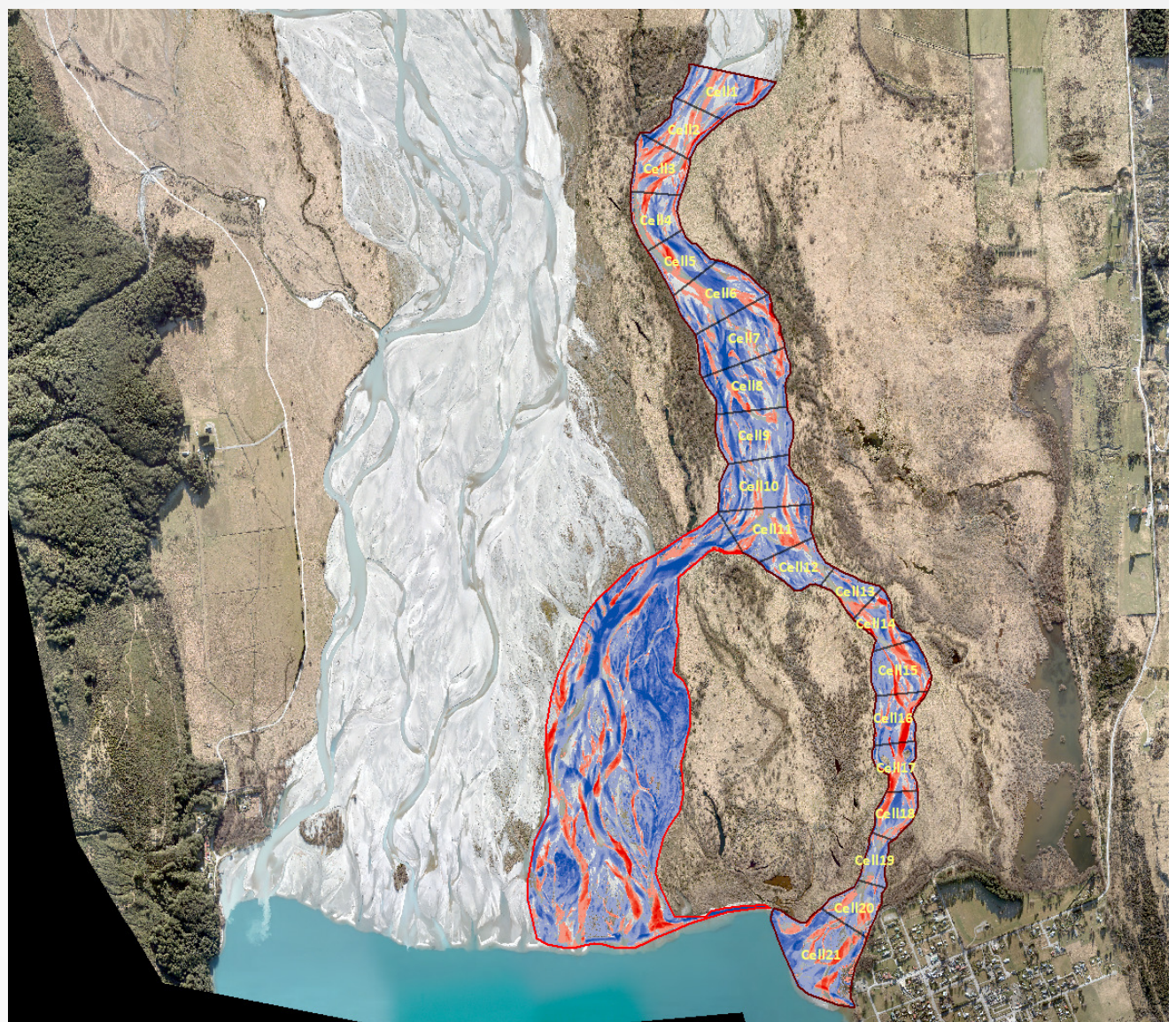
Changes 2019-2020

- **DR1:** 35-40cm degradation
- **RR4A and RR5:** no change (still within 15cm of 2019 bed level)
- **RR3A:** 25-30cm aggradation



REES RIVER BED LEVEL CHANGE – 2011-2019

Blue = sedimentation
Red = erosion



INITIAL INSPECTION

Initial Assessment

- Review of Rees River erosion and geotechnical issues at floodbank.
- Identified erosion, undermining and scarp formation on river-side of floodbank

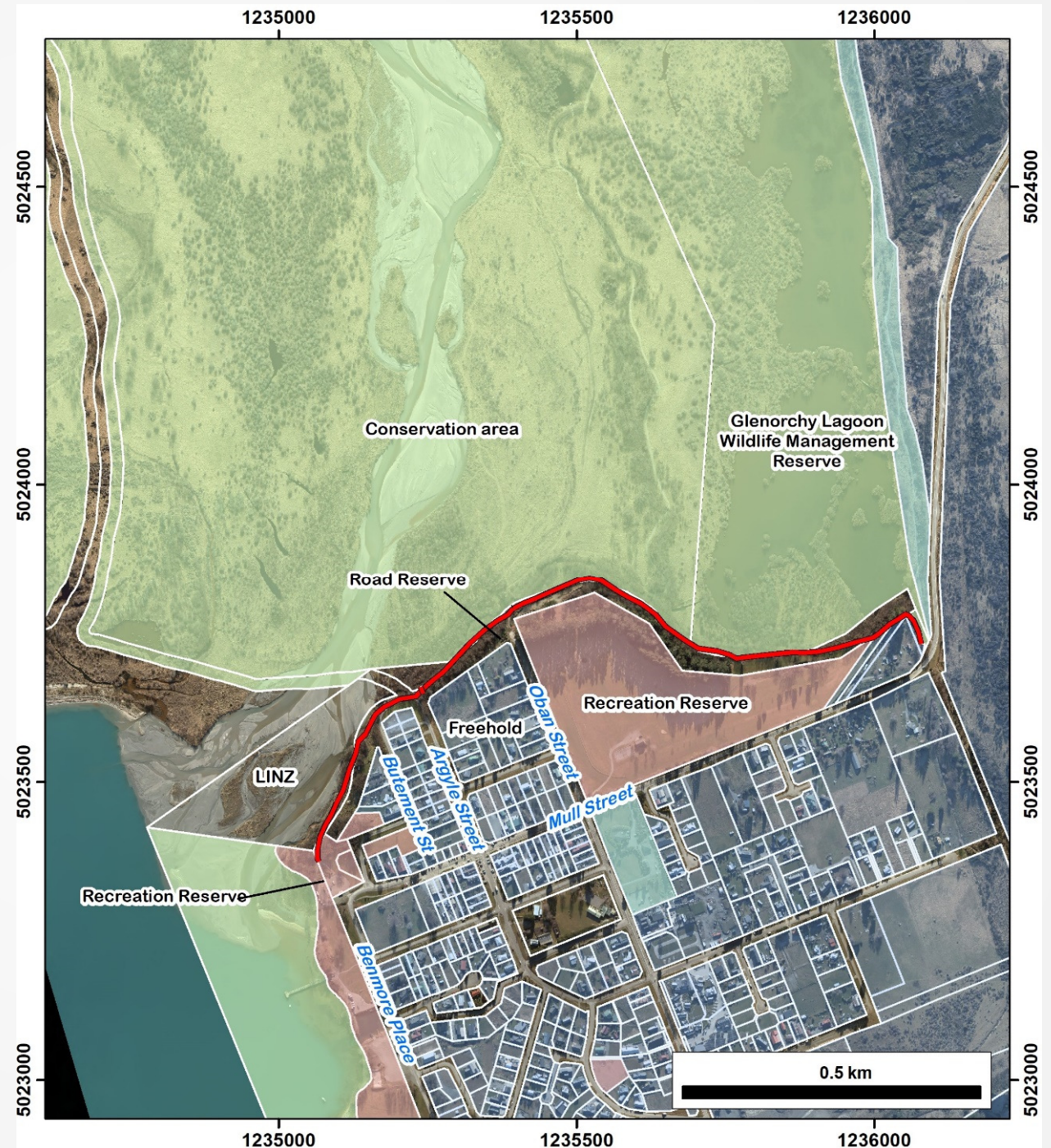
Proposed Follow-up

- Recommendations for bank protection/erosion control
- Evaluate potential for sudden floodbank failure, and possible consequences
- Recommendations for ongoing monitoring of this structure's integrity



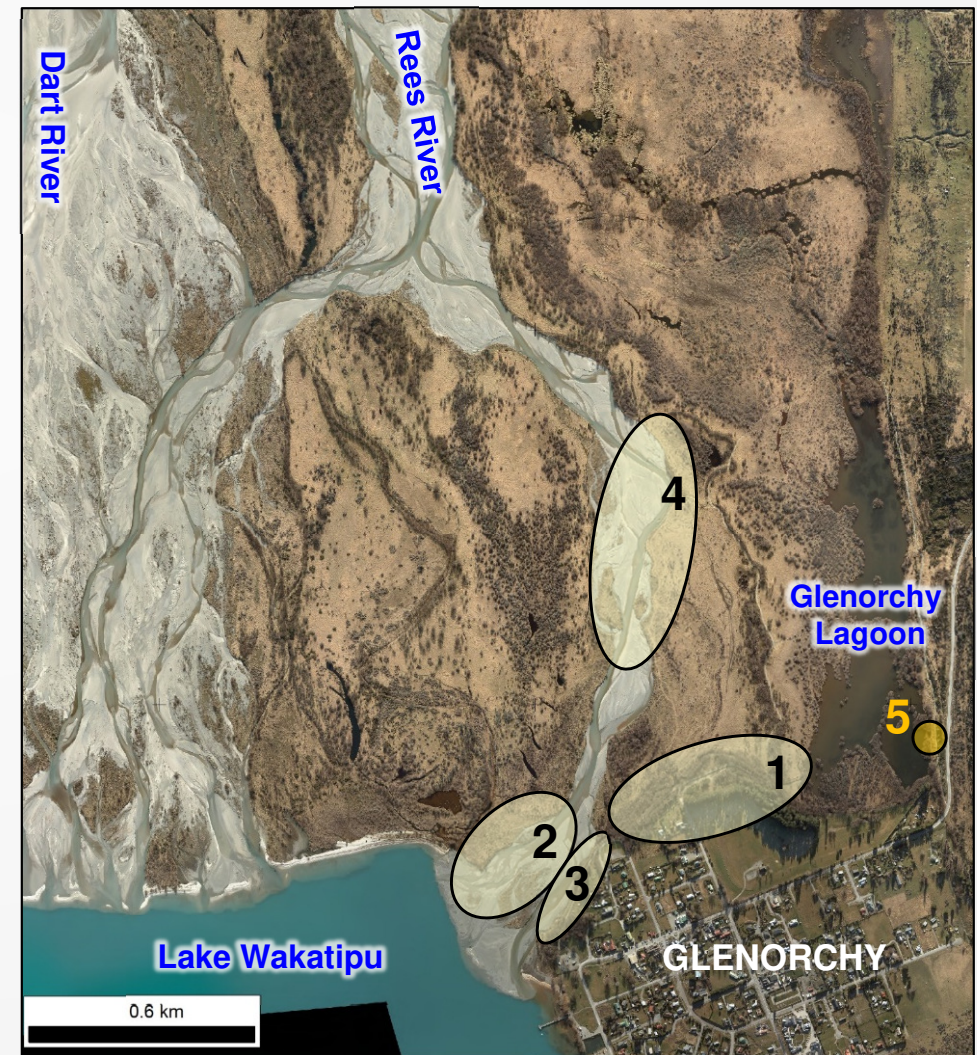
Headscarps forming at over steep bank downstream of the Lagoon stream confluence

LAND OWNERSHIP



PROPOSED SHORT-TERM OPTIONS - RIVER MANAGEMENT & MONITORING

Description	Proposed scope
1. Vegetation management	Vegetation clearance at/alongside Lagoon Creek
2. Channel works at Rees delta & creek confluence	Deepen true right delta channel to reduce flows against floodbank and at Lagoon Creek confluence
3. Glenorchy floodbank	Bank protection/erosion repair at floodbank
4. Rees River channel works	Work in Rees channel to potentially reduce overland flows to lagoon
5. Telemetered monitoring of lagoon water levels	Provide near real-time monitoring for flood warning, and increase understanding of lagoon behaviour



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