# TECHNICAL COMMITTEE AGENDA

# Wednesday, 12 September 2018

## 9:00 am Council Chamber

Level 2 Phillip Laing House, 144 Rattray Street, Dunedin

**Membership**

| | |
|---|---|
| Cr Andrew Noone | *(Chairperson)* |
| Cr Ella Lawton | *(Deputy Chairperson)* |
| Cr Graeme Bell | |
| Cr Doug Brown | |
| Cr Michael Deaker | |
| Cr Carmen Hope | |
| Cr Trevor Kempton | |
| Cr Michael Laws | |
| Cr Sam Neill | |
| Cr Gretchen Robertson | |
| Cr Bryan Scott | |
| Cr Stephen Woodhead | |

**Disclaimer**

Please note that there is an embargo on agenda items until 48 hours prior to the meeting. Reports and recommendations contained in this agenda are not to be considered as Council policy until adopted.

## TABLE OF CONTENTS


1. Apologies....3
2. Leave of Absence....3
3. Attendance....3
4. Confirmation of Agenda....3
5. Conflict of Interest....3
6. Public Forum....3
7. Presentations....3
8. Confirmation of Minutes....3
9. Actions....3
10. Matters for Council Decision....3
11. Matters for Noting....4
    11.1. Director's Report on Progress....4
    11.2. State of the Environment: Surface Water Quality in Otago (2006-2017)....13
13. Notices of Motion....17
14. Closure....17

## 1. APOLOGIES

## 2. LEAVE OF ABSENCE

Cr Ella Lawton
Cr Sam Neill

## 3. ATTENDANCE

## 4. CONFIRMATION OF AGENDA

## 5. CONFLICT OF INTEREST

Members are reminded of the need to stand aside from decision-making when a conflict arises between their role as an elected representative and any private or other external interest they might have.

## 6. PUBLIC FORUM

## 7. PRESENTATIONS

Yellow Eyed Penguin Trust – Quarterly Report (August 2018)

## 8. CONFIRMATION OF MINUTES

**Recommendation**

*That the minutes of the meeting held on 1 August 2018 be received and confirmed as a true and accurate record.*

**Attachments**

1. Minutes of Technical Committee 1 Aug 2018 **[8.1.1]**

## 9. ACTIONS Status report on the resolutions of the Technical Committee.

Nil

## 10. MATTERS FOR COUNCIL DECISION

Nil

# 11. MATTERS FOR NOTING

## 11.1. Director's Report on Progress

| | |
|---|---|
| **Prepared for:** | Technical Committee |
| **Report No.** | EHS1824 |
| **Activity:** | Governance Report |
| **Prepared by:** | Rachel Ozanne, Environmental Resource Scientist<br>Dr Sharon Hornblow, Natural Hazards Analyst<br>Dr Gavin Palmer, Director Engineering, Hazards and Science<br>Chris Valentine, Manager Engineering |
| **Date:** | 29 August 2018 |

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### 1. Précis

This report presents an update on the following matters:

2. Lake Snow Experts' Workshop
3. Otago Climate Change Adaptation
4. Rees-Dart River Delta Flood Hazard and Public Safety
5. Leith Flood Protection Scheme

It is recommended that this report is received and noted.

### 2. Lake Snow Experts' Workshop

"Lake snow" has been discussed at various Council meetings over the last two years and is the subject of research being funded by ORC[1][2]. The research programme was developed at an experts' workshop arranged and hosted by ORC on 20th December 2016. A second lake snow workshop for stakeholders and researchers was arranged and hosted by ORC on 8 August.

Workshop participants represented Landcare Research, NIWA, Waikato Regional Council, University of Otago, Ministry of Primary Industries (MPI), Queenstown-Lakes District Council, Environment Canterbury, and ORC. Environment Southland was invited to participate but were unable to be represented. Crs Deaker and Lawton attended.

The primary objectives of the workshop were:

1. To revisit the main themes from the December 2016 workshop documented in Ryder (2017);
2. Discuss the findings from priority work streams identified by workshop participants in December 2016;
3. Further discuss research work planned; and
4. Identify if further work is required and to identify potentially feasible methods to manage the effects of lake snow.

A report is currently being prepared by NIWA summarising the workshop and will be presented at the October meeting of the Technical Committee.

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[1] *Directors Report on Progress*, 25 January 2018, Report to Otago Regional Council Technical Committee Meeting on 31 January 2018, pp8-9

[2] *Genetic Analysis of Lindavia intermedia, the Diatom that causes Lake Snow*, Report 2017/1019, 29 August 2017, Presented to Otago Regional Council Technical Committee Meeting on 13 September 2017.

Among the findings of the research funded by ORC were that the diatom responsible for lake snow, *Lindavia intermedia*, is almost certainly invasive (there is no evidence that it was in New Zealand before 2001) and has been identified in archived samples from more than a dozen New Zealand lakes or lake outlets (Table 1).

A literature review funded by ORC identified the possibility of a biological control using an introduced parasite to reduce the presence of *Lindavia* diatom cells. This will require significant further investigation and securing of overseas samples to do some metagenomics analysis but presents an option that participants, on the advice of Dr Phil Novis (Landcare Research), thought should be further scoped.

It is evident that lake snow is a national issue and that regional councils and MPI should take a coordinated approach to further research. This matter is being discussed within the sector.

**Table 1:** A list of lakes known to contain *Lindavia intermedia* in New Zealand as of June 2018. Data from Kilroy et al. (2018) and Novis et al. (2017).

| Lake | Trophic status | Year *L. intermedia* first collected | Lake snow events known from lake? | Nature of event |
|---|---|---|---|---|
| Hayes (Otago) | 4 | 2002-3 | No | N/A |
| Waitaki/Aviemore/Benmore (Otago) | 1 | 2002-3 | Yes | Transient |
| Wanaka (Otago) | 2 | 2005 | Yes | Persistent |
| Moawhango (Manawatu-Wanganui) | N/A | 2005 | Unknown | N/A |
| Tennyson (Canterbury) | N/A | 2005 | Unknown | N/A |
| Gunn (Southland) | N/A | 2005 | Unknown | N/A |
| Opuha (Canterbury) | N/A | 2005 | Unknown | N/A |
| Heron (Canterbury) | 2 | 2005 | Unknown | N/A |
| Ohau (Canterbury) | 1 | 2005 | Unknown | N/A |
| Mason (Canterbury) | N/A | 2005 | Unknown | N/A |
| Moke (Otago) | N/A | 2008 | Yes | Unknown |
| Waikaremoana (Hawke's Bay) | 1 | 2008 | Yes | Transient |
| South Mavora (Southland) | N/A | 2009 | Unknown | N/A |
| Coleridge (Canterbury) | 1 | 2015 | Yes | Persistent |
| Wakatipu (Otago) | 1 | 2015 | Yes | Transient |
| Hawea (Otago) | 1 | 2015 | Yes | Transient |
| Sumner (Canterbury) | 1 | 2017 | Yes | Unknown |
| McGregor (Canterbury) | N/A | 2017 | Unknown | N/A |
| Tekapo (Canterbury) | 1 | 2017 | Yes | Transient |
| Kellands (Canterbury) | N/A | 2017 | Unknown | N/A |
| Alexandrina (Canterbury) | 3 | 2017 | Unknown | N/A |
| Ruataniwha (Canterbury) | N/A | 2017 | Unknown | N/A |
| Lyndon (Canterbury) | 3 | 2018 | Unknown | N/A |
| Rotoaira (Waikato) | N/A | 2018 | Unknown | N/A |
| Johnson (Otago) | 5 | 2018 | Unknown | N/A |
| Taupo (Waikato) | 2 | 2018 | Unknown | N/A |

*The lake trophic level index (TLI) indicates the health of a lake based on its degree of nutrient enrichment. The TLI ranges from 0.0 (very good water quality) to 7.0 (extremely poor water quality).*

## 3. Otago Climate Change Adaptation

The regional council sector is seeking to take a more coordinated approach to climate change adaptation planning and implementation. As part of this the Director Engineering, Hazards and Science is a member of a small staff group convened by Regional Council Chief Executives to stocktake sector adaptation initiatives. Progress with ORC's own climate change adaptation workstreams is summarised as follows.

ORC is working with GNS Science on technical capabilities, data needs for groundwater modelling, and a detailed timeline for a 'next generation' groundwater model for South Dunedin. This forms part of ORC's involvement in the NZ SeaRise Programme.[1][2] The model will link with Dunedin City Council's stormwater and wastewater network data so that the "water cycle" is accounted for in an integrated way. This month EQC, in partnership with ORC, DCC and GNS Science, are carrying out soil testing through South Dunedin and placing 9 piezometers in shallow bores. Figure 1 shows the location of future groundwater monitoring sites and soil testing. EQC are providing two sets of groundwater level and temperature measuring equipment and ORC will purchase additional equipment so that data gathering may begin this year. These data will increase knowledge of how the groundwater surface interacts with other waters, especially during heavy rainfall, and inform the groundwater model via calibration. This work is being undertaken in collaboration with DCC. Groundwater monitoring sites are planned through the area to the north as well so that the monitoring network has appropriate coverage (blue dots in Figure 1 show potential locations).

ORC is working with DCC to collect stormwater flow data to gain further insight into the behaviour of surface water through the steep, inner-city catchments. Over the summer ORC will have an array of exploratory bores advanced to bedrock (~50-70 m depth) in central South Dunedin and carry out pumping tests to gather data about the interactions between groundwater, surface water and sea water within South Dunedin and low-lying parts of the city to the north. Geological data will be used by GNS Science to ground-truth geophysics and create a robust geological model, to better understand the aquifer properties, stratigraphy, liquefaction risks and tectonic features of the area. This will improve understanding of the effects of future climate change and how the hazards and effects vary by location. A drilling project plan is currently being worked on by ORC and GNS Science staff which meets these needs. This work will inform climate and subsidence research by scientists at GNS Science as part of the NZSeaRise Programme. A report describing ORC's work to date on South Dunedin and the future programme and its governance will be presented to October committee.

[1] *Directors Report on Progress*, 25 January 2018, Report to Otago Regional Council Technical Committee Meeting on 31 January 2018, p15

[2] *Directors Report on Progress,* 14 March 2018, Report to Otago Regional Council Technical Committee Meeting on 21 March 2018, pp25-26

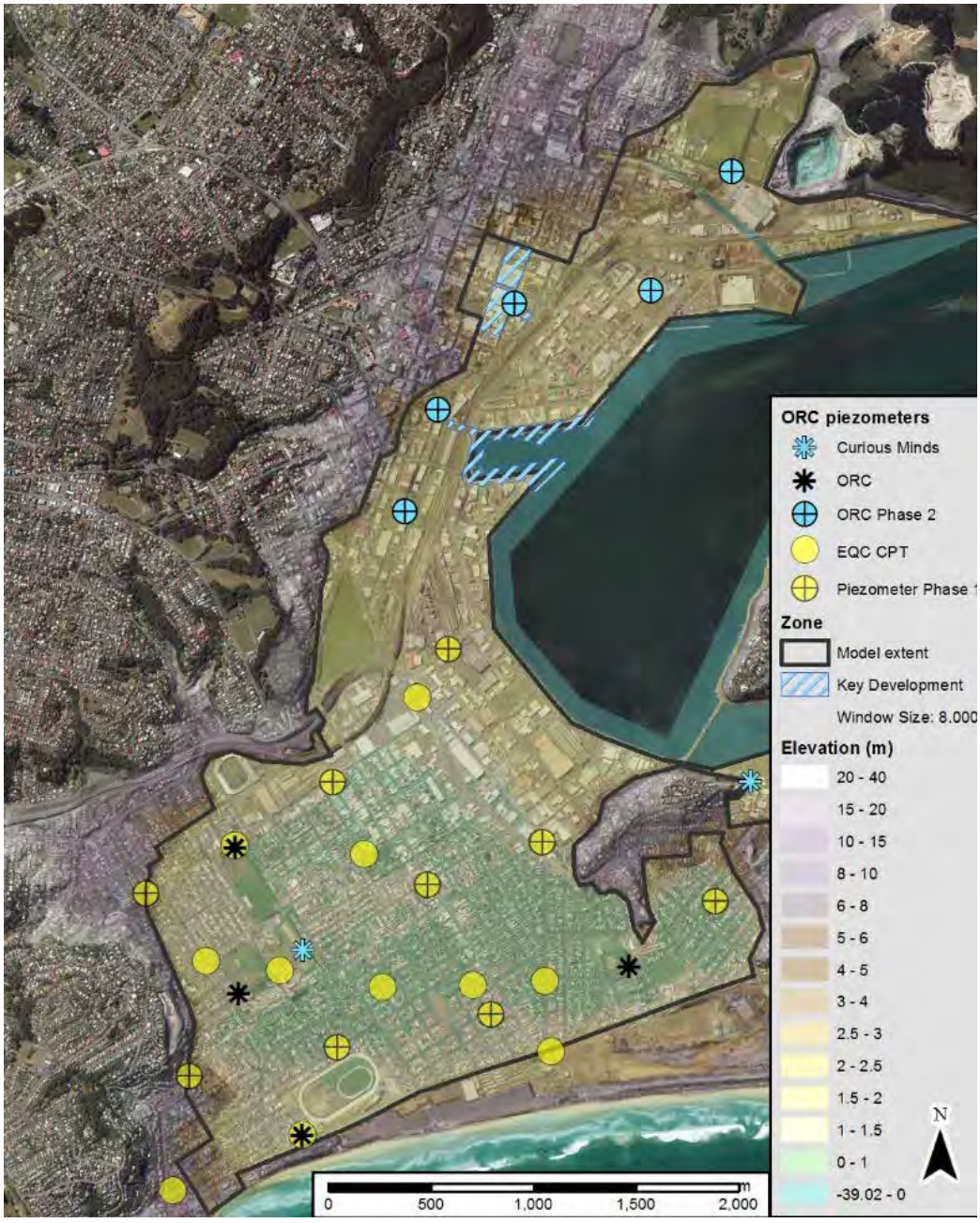


**Figure 1. The low-lying areas of South Dunedin and Harbourside and testing locations for Cone Penetrometer Tests (CPT) and new groundwater monitors. The four existing ORC bore locations in South Dunedin are shown in black.**

ORC has measured changes in the foredune position at Molyneux Bay (South Otago) over the past 5 years to assess the rate of shoreline retreat. Coastal parts of the Lower Clutha Flood Protection and Drainage Scheme at the southern end of the Bay will be at risk of erosion and associated direct inundation from the sea within 20-30 years if the recently observed retreat rates continue[1]. An extended episode of mouth-offsetting on the Matau occurred over 6 months last summer. This highlights the complexity of

[1] *Natural Hazards on the Clutha Delta, Otago*, Report 2016/0803, 25 May 2016, Report to Otago Regional Council Technical Committee Meeting on 8 June 2016.

shoreline changes and response to regional seasonal trends and wider wave-climate change resulting from long-term climate shifts. The impacts of rising sea-level on the shallow groundwater table of the lower Clutha Delta will also significantly impact the viability of the low-lying areas currently protected from river and sea inundation by the Scheme. ORC's Infrastructure Strategy makes provisional allowance for adaptation of some of the Lower Clutha flood and drainage infrastructure in the Paretai area in the longer term. Non-infrastructural adaptation measures may also be required.

Scoping of the Lower Taieri Flood Protection Scheme performance and risk assessment is underway. The assessment will be undertaken over the period 2018/19 to 2020/21. It will include consideration of the effects of climate change on scheme performance. Henley will be included in the study area. Approximately 5,130 ha of West Taieri, including Dunedin International Airport, is lower than one metre above present mean sea level. ORC's Infrastructure Strategy makes provisional allowance for adaptation of flood and drainage infrastructure in West Taieri in the longer term.

Staff participated in a coastal hazards and climate change guidance workshop on 17 August, convened by the Ministry for the Environment (MfE). The workshop provided advice on how to apply the guidance published by MfE in December 2017[1]. The guidance is being used by ORC and Waitaki District Council (WDC) in the review of the coastal hazard provisions of the Waitaki District Plan[2]. ORC is supporting WDC with technical information and advice.

Scoping of the Otago Climate Change Risk Assessment is underway. This will be the first such assessment for Otago and will be undertaken over 2018/19 and 2019/20. The assessment will help ensure that climate change adaptation planning does not focus exclusively on natural hazards and sea level rise and overlook other, less obvious risks. Those could include, for example, the effects of temperature changes on ecosystems within Otago's alpine lakes. It will help ensure there is a comprehensive understanding of the risks, and how those risks change over time, and that adaptation initiatives of ORC and others are prioritised and staged appropriately. The assessment will inform preparation of ORC's 2021-2031 Long Term Plan and other activities.

**4. Rees-Dart River Delta flood hazard and public safety**

Staff have been progressing the actions arising from the site visit that took place with residents on 6 July, attended by Crs Laws and Lawton[3]. In response to residents' concerns and the need for the riverbank to be stabilised so QLDC could carry out road repair and maintenance, a plan to temporarily reinforce the old flood bank below Kowhai Bush with a gravel bund was agreed upon. Work to divert the main flow of the Dart River away from the true right bank where it has caused erosion to the Kinloch access road was completed in August (Figure 2). ORC has agreed to maintain this channel alignment whilst working with the Rees-Dart community and QLDC to develop a long-term adaptation plan (2019/20 and 2020/21). The plan will take a whole-of catchment, multi-hazards approach, and have regard to future climate change. It will include Glenorchy

[1] *Climate Change Adaptation*, 25 January 2018, Report to Otago Regional Council Technical Committee Meeting on 31 January 2018.

[2] *Directors Report on Progress*, 25 January 2018, Report to Otago Regional Council Technical Committee Meeting on 31 January 2018, p15.

[3] *Directors Report on Progress*, Report EHS1821, 2 August 2018, Report to Otago Regional Council Technical Committee Meeting on 31 January 2018, pp 10-12.

and draw on technical work undertaken by ORC and the PhD studentship funded by ORC.[1]

A survey of the riverbank position from downstream of the works to the Kinloch wetland was carried out at the end of August. Figure 2 shows the extent of the erosion between 2007 and 2018, as well as the change in the position of the active riverbed since 1966. Sections of bank up to 400 m wide have been lost on the lower Dart since 2007 with the loss of ~100 m wide sections over the past year occurring in several places (see Figure 3). The main channel has currently stabilised so that it flows through the wetland above Kinloch township and enters the lake at Kinloch Bay/campsite. Some of residents' concerns relate to safety of swimmers in the bay and people using the wharf as Dart River Adventures (Ngai Tahu Tourism) operate frequent jetboat tours using this channel to access the upper reaches of the river.

Dart River Safaris Limited hold a consent to "*carry out instream works involving disturbance of the bed, blasting rock, removal of the gravel, logs and other material in the Dart River for the purpose of maintaining access on the river for jet boats and funyaks*". The consent was granted by ORC in 2010 and expires on 4 March 2020. The mouth of the Dart River has shifted about 500 m towards the Kinloch settlement since the consent was granted. In response to the river erosion and safety concerns raised by residents, staff are investigating whether ORC, as consent authority, would have any liability, technically or legally, for any public safety incidents or river bank erosion arising from the exercise of the consent.

**Figure 2. Temporary erosion protection works on the true right of the Dart River where the Kinloch road is at risk of erosion. See Figure 3 for location.**

[1] Wild M.A. 2013, *Growth dynamics of braided gravel-bed river deltas in New Zealand*, PhD thesis, University of Canterbury, Christchurch, New Zealand, 228p.

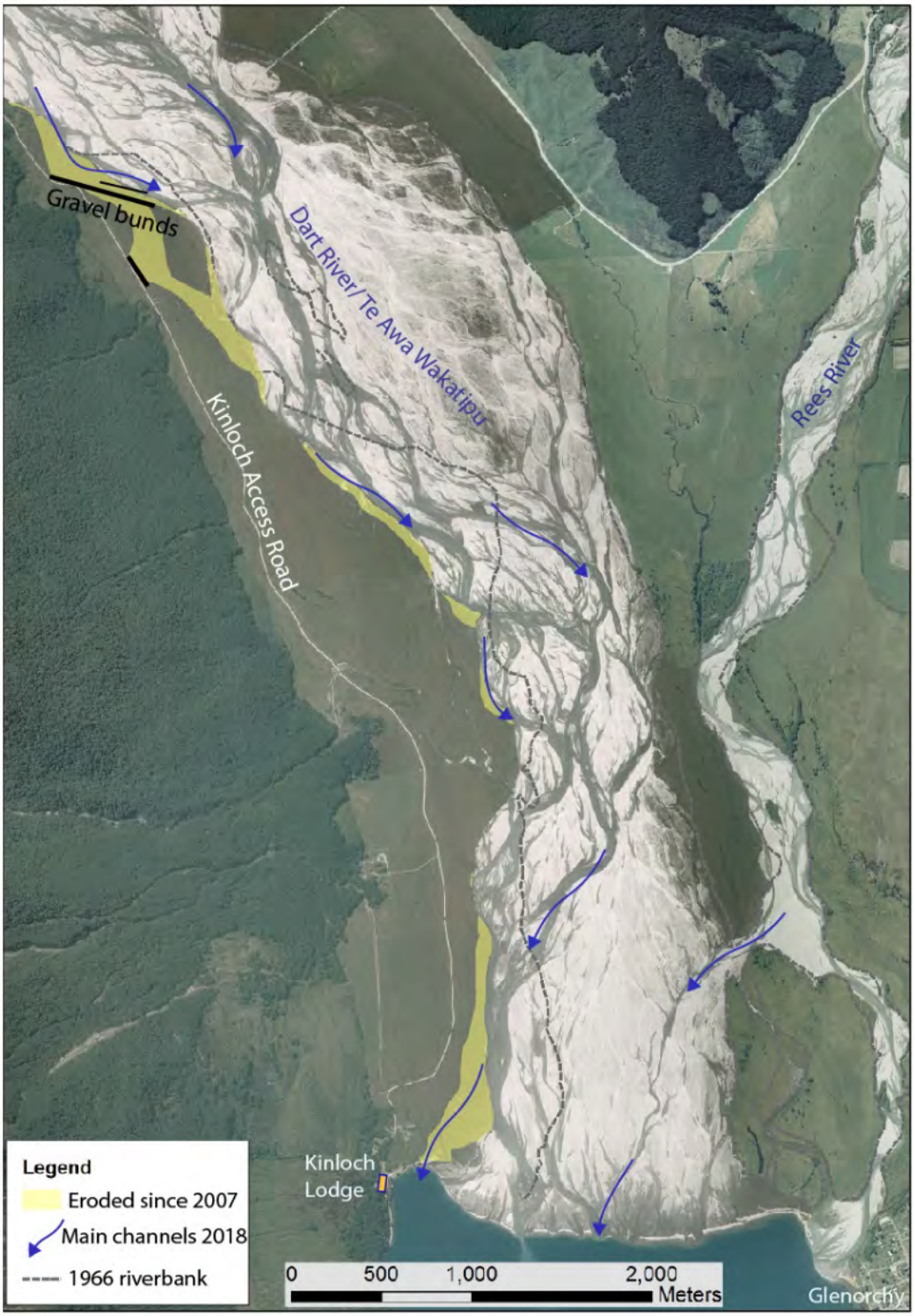


**Figure 3. Bank erosion extent and channel position on the Rees-Dart Delta, August 2018. In-river diversion works below Kowhai Bush (upper left of image) are marked.**

## 5. Leith Flood Protection Scheme

Engineering works on the Union to Leith Footbridge stage of the Leith Flood Protection Scheme are progressing. Work is progressing with the construction of instream bed level control weirs and the placement of rock riprap between the weirs in the bed of the river (Figure 4). The contractor (Downer NZ Ltd) continues to advise that the works will be completed during the first week of October.

**Figure 4. Looking downstream along the bed of the Water of Leith towards the Information Technology Services (ITS) Building (4 September 2018). Works are being undertaken below the ITS building and the river is temporarily diverted adjacent to the left bank wall.**

Construction tenders for the Dundas Street Bridge stage have been invited with tenders closing on 10 September. For timing reasons, approval will be sought from Council on 26 September for the Finance and Corporate Committee to be delegated the authority to award a construction contract. Giving the Committee this authority allows a contract to be awarded in mid-October and avoids unnecessary delay in commencement of the contract.

The University of Auckland is finalising some supplementary tests using the 1:25 scale physical model of the Dundas Street bridge reach (Figure 5).

**Figure 5. Scale physical model of Water of Leith at Dundas Street bridge, looking downstream. The proposed new culvert is at the right of the channel.**

Public consultation for Forth Street to Harbour concepts for amenity improvements closed on 24 August. The project has continued to receive positive community engagement. Staff are preparing a report to summarise feedback and to inform an implementation plan for future works. Staff will bring an implementation proposal for the enhancement of Water of Leith amenity and ecology between Forth Street and Harbour to Technical Committee for consideration.

## 6. Recommendation

*That this report be received and noted.*

**Endorsed by:** Dr Gavin Palmer
**Director Engineering, Hazards & Science**

**Attachments**
Nil

## 11.2. State of the Environment: Surface Water Quality in Otago (2006-2017)

| | |
|---|---|
| **Prepared for:** | Technical Committee |
| **Report No.** | EHS1823 |
| **Activity:** | Environmental - Water Quality and Quantity SOE |
| **Prepared by:** | Rachel Ozanne, Environmental Resource Scientist |
| **Date:** | 6 July 2018 |

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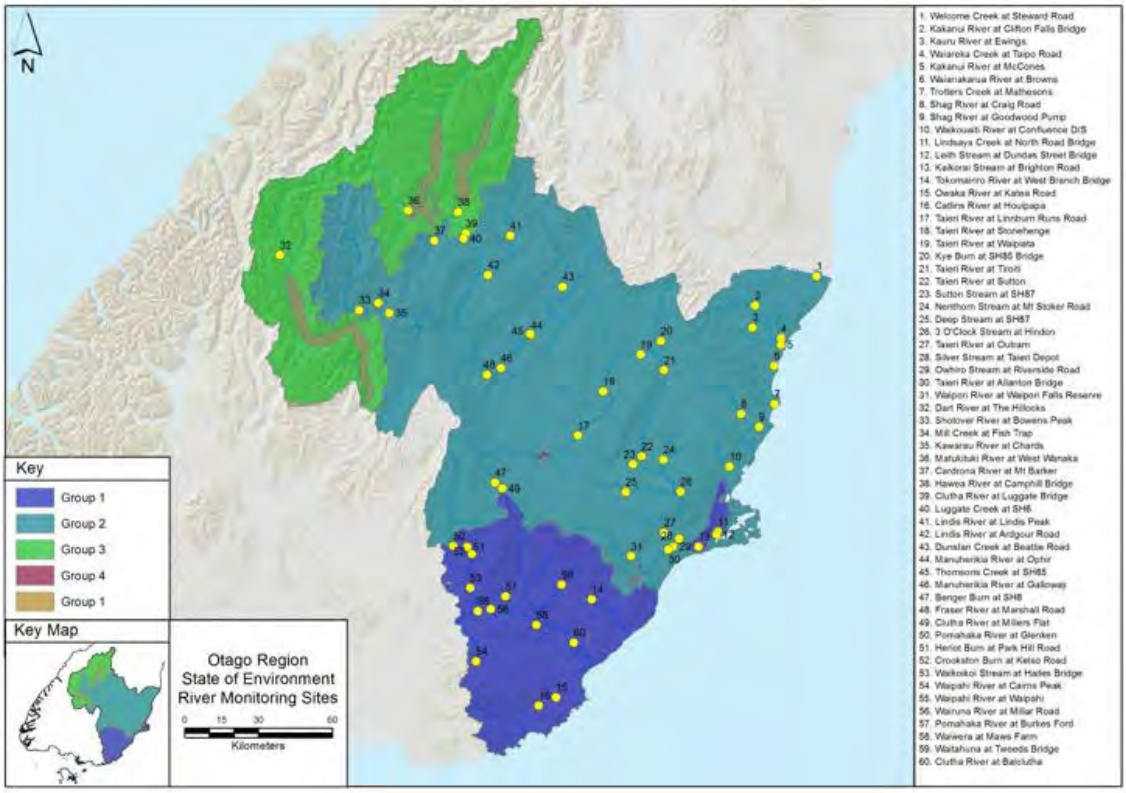
### 1. Précis

Otago Regional Council (ORC) operates a long-term State of Environment (SoE) water quality monitoring network in lakes, rivers and streams throughout the region. SoE monitoring provides information that underpins obligations under s35 of the Resource Management Act (1991).

This report summarises the state of Otago's water quality with regard to the Regional Plan: Water (RPW) Schedule 15 limits, National Policy Statement for Freshwater Management (NPS-FM, 2014) National Objectives Framework (NOF) attribute bands, and state and trends of water quality across Otago Regional Council's SoE lake, river and stream monitoring sites for the period July 2006 to June 2017.[1]

### 2. Background




[1] An update to this report, covering the period 1 July 2013 to 30 June 2018 is attached as Appendix 1

**Figure 1: Location of long-term State of Environment monitoring sites covered in this report.**

The ORC SoE water quality programme has 52 core river and stream water quality monitoring sites spread throughout Otago. NIWA, until recently, monitored 8 sites in the Otago region as part of the National River Water Quality Network (NRWQN). These 60 river sampling sites span a range of geographical, source of flow and catchment land uses types. Figure 1 shows the location of the river and stream monitoring sites covered in this report. Included in Figure 1 are the Receiving Water Group (RWG) boundaries identified in the RPW.

ORC also monitors 9 lake sites. Long-term SoE lake monitoring sites consist of a mix of lake-outlet (lakes Wanaka, Wakatipu and Hawea) and lake-shore (lakes Dunstan, Hayes, Johnson, Onslow, Waihola and Tuakitoto) sampling sites. More detailed lake monitoring occurs at a subset of these lakes as part of ORC's Trophic Lake Sampling Program.

## 3. Water Quality: State and Trends

State analysis was based on water quality samples collected over a five-year period running from July 2012 to June 2017. This aligns with the five-year time period detailed in Schedule 15 of the RPW. Of the 69 sites monitored in the 2012-17 SoE programme, Table 1 shows the percentage of sites in each group that meet Schedule 15 limits.

**Table 1: Water quality results, expressed as a 'grade' according to the number of parameters at each site complying with the Schedule 15 limits (in each Receiving Water Group)**

| Water Quality 'Grades' | Number of parameters complying with Schedule 15 limit | RWG 1 (rivers) % sites n = 16 | RWG 2 (rivers) % sites n = 40 | RWG 3 (rivers) % sites n = 4 | RWG 4 (lakes) % sites n = 5 | RWG 5 (lakes) % sites n = 4 |
|---|---|---|---|---|---|---|
| 'Excellent' | 5 of 5 | 12.5 | 32.5 | 25 | 0 | 75 |
| 'Good' | 4 of 5 | 31.25 | 35 | 25 | 20 | 25 |
| 'Fair' | 3 of 5 | 18.75 | 20 | 50 | 20 | 0 |
| 'Poor' | 2 or less of 5 | 37.5 | 12.5 | 0 | 60 | 0 |

To determine whether water quality had improved or degraded, trend analyses (July 2006 to June 2017) was undertaken on water quality data from each of the water quality monitoring sites. A regional trend summary is shown in Table 2, which shows that in 30% of sites *E.coli* had a probable or significant increasing (degrading) trend versus 7% of sites that had either stable or decreasing (improving) trends.

**Table 2: Regional trend summary for all ORC and NIWA SoE monitoring sites across Otago.**

| Trend direction | $NH_4$-N | NNN | TN | DRP | TP | *E. coli* | Turbidity |
|---|---|---|---|---|---|---|---|
| Indeterminate | 28% | 58% | 57% | 41% | 75% | 51% | 55% |
| Increasing | 12% | 19% | 16% | 20% | 14% | 30% | 35% |
| Stable | 3% | 3% | 4% | 7% | 1% | 1% | 0% |
| Decreasing | 0% | 9% | 10% | 7% | 3% | 6% | 10% |
| < DL | 58% | 12% | 13% | 25% | 6% | 12% | 0% |
| Total | 69 | 69 | 69 | 69 | 69 | 69 | 69 |

Again, focusing on *E. coli,* trend analysis resulted in 63% of sites having either an indeterminate trend (51%) or too many results that were <DL (less than the detection limit) (12%). This highlights the severe limitations in the historical data set and constrains Council's ability to confidently assess trends, for example the analysis for lakes Wanaka, Hawea, Dunstan and Wakatipu are heavily influenced by the presence of numerous laboratory data records of being < DL.

These challenges are not atypical of long-term regional council SoE data sets. Improvements in laboratory detection levels and the move from bi-monthly to monthly sampling (in 2013) will remove some of these confounding factors in future analysis.

## 4. National Objectives Framework

The NPS-FM (2014) sets out the objectives and policies for freshwater management under the Resource Management Act 1991. The NPS-FM 2014 includes a NOF which includes river-related attributes for periphyton (as chlorophyll mg/$m^2$), nitrate-nitrogen (NNN), ammoniacal-nitrogen (NH4-N), dissolved oxygen (DO) - applicable to downstream of point-source discharges only, and *E. coli* (as listed in the 2017 Clean Water Package and NPS 2017 amendments); and lake–related attributes for Total Phosphorus (TP), Total Nitrogen (TN) and phytoplankton biomass (Chla).

NOF Attribute Tables set out A, B, C and D bands and defines these in narrative and numeric terms, with "A" being the highest/best quality and "D" being below the national bottom line. For Otago's rivers, NNN and NH4-N fall into the "A" or "B" band for all sites.

For *E.coli* the attribute state must be determined by satisfying four numeric attribute states. Taking this into consideration, 23 sites in Otago are below the NOF "bottom line". For Otago's lakes, Lake Johnson is in the "D" band or below the "bottom line" for Chla, TN and TP, Lake Tuakitoto is below the "bottom line' for TN and TP and Lake Waihola is below the "bottom line' for TP.

## 5. Ecosystem Health

Currently ecosystem health assessment is limited to the Macroinvertebrate Community Index (MCI) that is measured at limited number of SoE monitoring sites. The MCI is used to compare sites; it is an index of sensitivity to organic pollution, based on the presence/ absence of macroinvertebrate taxa.

MCI scores from 36 SOE sites show that 19 sites were in the 'good' MCI category, 15 in the 'poor' MCI category and two in the 'degraded' category.

Recent amendments to the NPS-FM require councils to actively investigate reasons for a site returning an MCI below 80 (Policy CB3). Two sites had returned scores below 80, the Kaikorai Stream and Waiareka Creek.

## 6. Summary and Conclusions

SoE monitoring by ORC is focused on the collection of numeric information on a limited number of water quality variables. The overall ecological health of a river or stream is difficult to comment on as very little integrated information is collected that allows for confident assessments of overall stream and river health. For example, visual periphyton

cover and biomass estimates (as chlorophyll-*a*) and fine deposited sediment cover are not measured.

During 2017, ORC commissioned NIWA to undertake an independent review of the river and lake SoE monitoring program[1]. ORC has acted on the review recommendations and from August 2018 the SOE programme now has a representative number of sites across all river types and to comply with the NPS-FM, additional measures of ecosystem health are included across a greater number of (wadeable) sites, including monthly assessments of periphyton cover; annual monitoring of macroinvertebrates; and annual assessments of stream habitat.

Additional recommendations that need to be worked into the SOE programme to help future analysis include deposited sediment cover at a selection of sites, with both current and potential future land use pressures considered when identifying these sites; supplementing the existing annual biomonitoring programme with continuous measurements of water temperature and dissolved oxygen for periods of 1-2 weeks during the warmest months of year.

NIWA's recommendations for the lake monitoring programme have also been recognised in the LTP. This includes ongoing monthly sampling of Lakes Wakatipu, Wanaka, Hawea and Hayes as well as the installation of monitoring buoys to provide information on stratification and mixing. The consent for the Lake Hayes buoy was lodged with QLDC in August 2018 and the buoy is scheduled to be deployed in November 2018.

The findings of the NIWA review align with some of the limitations of the SoE monitoring program identified in this report. It is anticipated that future analysis and reporting will greatly benefit by having incorporated the recommendations of the review into the ORC SoE monitoring program.

In addition to the extended SoE monitoring programme, the LTP has also identified that that the budget for rural (and urban) water quality implementation will increase by $629K over the next three years. The main implementation component includes funding for catchment monitoring programmes to help property landholders understand how their activities may impact on water quality, as well as the Good Water Project which drills down to the individual farm level. The urban component is the development of an urban water quality strategy incorporating storm water, waste water and hazardous substances.

More detail on the Otago Rural Water Implementation Plan will be bought to Council later in the year with the aim of clarifying rules in the Water Plan as well identifying the focus for compliance and education programmes.

## 7. Recommendation

*That the report be noted.*

**Endorsed by:** Gavin Palmer
**Director Engineering, Hazards & Science**

**Attachments**

[1] https://www.orc.govt.nz/media/4615/technical_committee_agenda-21-march-2018.pdf

1. State of the Environment Surface Water Quality in Otago **[11.2.1]**
2. 2018 Updated SoE 6 A tables RO version **[11.2.2]**

*That the public be excluded from the following parts of the proceedings of this meeting, namely:*

*Discussion of Section 3 - Rees-Dart River Delta flood hazard and public safety) of Item 11.1 Director's report on Progress*

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

| General subject of each matter to be considered | Reason for passing this resolution in relation to each matter | Ground(s) under section 48(1) for the passing of this resolution |
|---|---|---|
| *Discussion of Section 3 – Rees-Dart River Delta flood hazard and public safety) of Item 11.1 Director's report on Progress* | To maintain legal professional privilege – Section 7(2)(g)<br><br>To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities – Section 7(2)(h) | Section 48(1)(a);<br>Section 7 (2) (g)<br>Section 7 (2) (h) |

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act or section 6 or section 7 or section 9 of the Official Information Act 1982, as the case may require, which would be prejudiced by the holding of the whole or the relevant part of the proceedings of the meeting in public are as follows:

*Discussion of Section 3 – Rees-Dart River Delta flood hazard and public safety) of Item 11.1 Director's report on Progress*

To maintain legal professional privilege – Section 7(2)(g)

To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities – Section 7(2)(h)

*I also move that Mr Alistair Logan be permitted to remain at this meeting, after the public has been excluded, because of his legal knowledge. This knowledge, which will be of assistance in relation to the matter to be discussed.*

## 13. NOTICES OF MOTION

## 14. CLOSURE