

BEFORE THE COMMISSIONERS ON BEHALF OF THE DUNEDIN CITY COUNCIL

UNDER the Resource Management Act 1991

IN THE MATTER of Variation 2 to the Dunedin City Council's 2 GP

**STATEMENT OF MICHELLE ELLEN MIFFLIN
ON BEHALF OF OTAGO REGIONAL COUNCIL**

Dated 30th November 2021

EVIDENCE OF MICHELLE MIFFLIN ON BEHALF OF OTAGO REGIONAL COUNCIL

Statement of Professional Qualifications and Experience

1. My full name is Michelle Ellen Mifflin. I am the Engineering Manager at the Otago Regional Council (ORC), located at the ORC office in Stafford Street, Dunedin.
2. I hold the qualifications of a Bachelor of Civil Engineering from the University of Southern Queensland, in Toowoomba, Queensland, Australia (formerly known as the Darling Downs Institute of Advanced Education up to 1990) and a Bachelor of Laws, from the Monash University, Melbourne, Victoria, Australia.
3. I have over 20 years of engineering and management experience working in both local government and the private sector. During this time, I have been:
 - 3.1. Employed as the Manager of Engineering for the Otago Regional Council from July 2019 to present.
 - 3.2. Employed as the Project Manager for the feasibility investigations and management of Central Government (Crown Irrigation Investments Limited) funding for the upgrade to Falls Dam, by the Manuhierikia River Limited (2017– 2019).
 - 3.3. Employed as the South Island Operations Manager by PGG Wrightson, New Zealand for the delivery and installation of infrastructure, which included working on water delivery and storage schemes (2016 – 2017).
 - 3.4. Employed as the General Manager of Asplundh for the South Island, New Zealand for the strategic oversight and delivery of all aspects of the business (2015 -2016).
 - 3.5. Moved to New Zealand with my husband (2012 – 2015). During this time, I was an Associate Contracts Manager with Accenture Pty Ltd assigned to resources sector to manage client accounts, this role was a fixed term.
 - 3.6. Employed as the Global Contracts Delivery Manager for Sinclair Knight Merz, Australia, for where I had overall responsibility and authority for developing and managing the corporate contract function for project delivery in consulting and capital projects globally across the organisations business units (2010 – 2014).
 - 3.7. Employed as the Purchasers Representative for Carborough Downs Coal Mine, Australia, for the Supply of an integrated Longwall Mining System, valued at USD 330M. Responsible for the commercial

delivery of the system including full financial delegation. (2007 – 2010).

- 3.8. Employed as Commercial Manager for United Group Infrastructure, Australia, for the commercial management of infrastructure projects in the construction sector (2004 – 2007).
- 3.9. Employed as the Senior Contracts Advisor for MIM Holdings, including internal Legal Counsel as a Lawyer for Oaky Creek Coal, Australia responsible for the delivery of projects relating to underground coal mining (2000 – 2004).
- 3.10. Employed as a Contract Engineer in the Coal Mining industry for MIM Holdings, Corporate based, Australia to work within Legal Counsel team preparing and managing contract drafting, negotiation, resolution including the delivery of contract delivery framework across coal mines (2000 – 1998)
- 3.11. Employed as Operations Engineer in the Coal Mining industry for BHP Coal, Australia at the Goonyella/Riverside Coal Mine for the purpose of providing operational engineering function to all activities relating to pit dewatering, reclamation, and rehabilitation of mining areas. This included looking after the coal mines fleet of pumping assets (1998 – 1994).
- 3.12. Employed as a Construction Engineer for John Holland Pty Ltd, Australia as a graduate engineering, working across major civil projects, including bridge builds, railway upgrades, dam construction, infrastructure plant building, underground coal mining civil works (1990 – 1994).

Code of Conduct

4. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court's Practice Note of 2014 and agree to comply with it. I have complied with the Practice Note when preparing my written statement of evidence and will do so when I give oral evidence.
5. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in the evidence to follow.
6. Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Material considered

- 1 In preparing this evidence, I have reviewed the following documents:

- (a) Variation 2 to the Second-Generation District Plan (2GP); and
- (b) The s42A report prepared by Emily McEwan and Paul Freeland; and
- (c) The technical evidence from Dr Jean- Luc Payan, Manager Natural Hazards at the Otago Regional Council; and
- (d) The planning evidence from Anita Dawe, Manager Policy and Planning at the Otago Regional Council; and

Reason for Submission

- 2 The ORC has submitted on operational matters including buildings or works in or on flood schemes, for engineering reasons.
- 3 This evidence relates to the flood protection and land drainage schemes that are affected by Variation 2.

Scope of Evidence

- 4 My evidence will address the following:
 - (a) The reason ORC is involved in this process from an infrastructural process;
 - (b) An outline of the relevant legislation that relates to ORC's functions and responsibilities with land drainage, flood protection infrastructure and river management;
 - (c) A general description of what our land drainage and flood protection infrastructure is; and
 - (d) A general overview of the significant issues and constraints with the land drainage and flood protection infrastructure.

Why is the Otago Regional Council, Engineering engaged in Variation 2?

- 5 ORC has functions relating to flood protection and land drainage infrastructure that it owns, manages, and operates. These functions require

appropriate protection to ensure the safety and wellbeing of people and the communities that rely on the functionality of this infrastructure.

- 6 ORC has functions under the NPSUD
- 7 ORC has functions under the NPSFM
- 8 ORC has duties and obligations in respect of RPS's
- 9 ORC has duties and responsibilities in respect of its Infrastructure Strategy.

The relevant legislation that relates to ORC's functions and responsibilities with land drainage and flood protection infrastructure.

- 10 The Soil Conservation and Rivers Control Act 1941, Taieri River Improvement Act 1920, the Resource Management Act 1991 and Local Government Act 2002, are principal statutes that the ORC, Engineering has responsibility for flood protection, river management and erosion control.
- 11 The Resource Management Act's purpose (section 5) is "to promote the sustainable management of natural and physical resources. Apart from the requirement to control the use of land for the avoidance or mitigation of natural hazards (e.g., flooding) (section 30), the ORC is principally concerned with achieving the principle of sustainable management through managing or controlling activities that can have an adverse effect on achieving this, such as land use change.
- 12 Under the Local Government (Otago Region) Reorganisation Order 1989:
 - a. The Taieri River Trust was absorbed into the ORC.
 - b. The functions, duties and the powers of the ORC shall be:
 - i. The functions, duties and powers of a river board under the Taieri River Improvement Act 1920 and the River Boards Act 1908 and the Land Drainage Act 1908.
 - c. In respect of the Taieri River Drainage Area constituted by clause 17.1 of this order, the functions, duties, and powers of a territorial authority under part 29 of the LGA 1974;
 - d. The area of the former Taieri River Drainage and River District shall be deemed to be a drainage area constituted under ss504 of the LGA 1974;

- e. Notwithstanding anything else in this order, the provisions of the Taieri River Improvement Act 1920 shall, with the necessary modifications, continue to apply to the area of the former Taieri River Drainage and River District which is indicated by the West Taieri Drainage Scheme in Figure 2.

The Soil Conservation and Rivers Control Act 1941

- 13 The ORC has the functions and responsibilities of a catchment authority under the Soil Conservation and Rivers Control Act 1941 (the Act).
- 14 Section 126(l) of the Act provides that it shall be a function of every catchment board¹ to minimise and prevent damage within its district by floods and erosion (as amended by the Eight Schedule of the Resource Management Act 1991).
- 15 The Soil Conservation and Rivers Control Act 1941 gives Council its functions, powers and duties in relation to flood protection works. The Act is empowering.
- 16 Section 126(2) of the Act provides that each catchment board shall have such powers, rights and privileges as may reasonable be necessary or expedient to enable it to carry out its functions and in particular, for the construction, reconstructions, alteration, repair and maintenance of its works where it is necessary for:
 - a. Controlling or regulating the flow of water towards and into watercourses.
 - b. Controlling or regulating the flow of water in and from watercourses.
 - c. Preventing or lessening any likelihood of the overflow or breaking of the banks of any watercourse.
 - d. Preventing or lessening any damage which may be occasioned by and such overflow or breaking of the banks.
 - e. Preventing or lessening erosion or the likelihood of erosion.

¹ Regional councils as we know them today were established in 1989 which replaced the Catchment Boards, under the Local Government Amendment Act. This legislation rationalised the bodies carrying out functions at a regional and local level which effectively removed (and reduced) the catchment boards that had been developed over the last century from more than 800 to 86. **Sources/further reading:** *The Public Value of Regional Government: how New Zealand's regional councils manage the environment (2008)*, by Jeffrey McNeill; *Te Ara Encyclopedia of New Zealand*; *University of Otago Library Hocken Collection Bulletin no.31*

f. Promoting soil conservation.

- 17 Sections 131 to 140 of the Act confer upon the ORC as a catchment board a number of specific powers under the Public Works Act 1981 and other statutes, including to maintain, alter and improve the efficiency of all watercourses in order to provide defence against flooding and the power to deepen, widen, straighten, divert watercourses and to construct floodbanks and similar works.
- 18 The Engineering function of the ORC is responsible for carrying out these statutory functions with regard to flood mitigation. As part of that role, it undertakes flood protection, land drainage and river management plans and services.

Taieri River Improvement Act 1920

- 19 The Taieri River Improvement Act 1920 is an Act to make better provision for the improvement of the waterway of the Taieri River and tributaries, and the protection and drainage of certain land areas across Otago.
- 20 It constituted the Taieri River Trust ²(section 3).
- 21 The general powers of the trust (section 11) are to do all things in its opinion to be necessary to effectively cope with land drainage and the flooding of the district, either from the surface water or by floods and freshes in the Waipori and Taieri Rivers or any of their tributaries.
- 22 The trust may (section 12):
- a. Erect or make any dam or reservoir in, about, or across the Taieri or Waipori Rivers or any of their tributaries; or
 - b. Enter upon land within the district, divert any drain, stream, or river, and close up any outlet or inlet or from the same, without any payment of any compensation for loss of riparian or other water rights;
 - c. Divert, raise, lower or alter roads bridges and culverts where in the opinion of the Trust they interfere with the proper discharge of floodwaters.
 - d. Exercise these powers on any part of the rivers listed (section 16).

Description of what ORC's land drainage and flood protection infrastructure is.

² The Taieri River Trust was absorbed into the ORC in 1989 (item 12 (a))

- 23 ORC manages flood protection and land drainage assets across the Otago region that are essential in reducing risks to communities associated with flood hazards. This contributes to the environmental health of waterways, the community wellbeing and balancing economic productivity.
- 24 ORC owns and manages three flood protection schemes and three drainage schemes as well as a combined flood protection and drainage scheme in the Otago region. They are the Alexandra Flood Protection Scheme, the Leith Flood Protection Scheme, the Lower Clutha Flood Protection and Drainage Scheme, the Lower Taieri Flood Protection Scheme, the West Taieri Drainage Scheme, the East Taieri Drainage Scheme and the Tokomairiro Drainage Scheme.
- 25 The flood protection and drainage schemes within the Dunedin City district are the Leith Flood Protection Scheme, the Lower Taieri Flood Protection Scheme, the West Taieri Drainage Scheme and the East Taieri Drainage Scheme.
- 26 The drainage schemes are designed and managed as rural drainage schemes, which provide a level of service to rural areas to enable the agricultural productivity of the Taieri Plains to be sustainable for farming.
- 27 The Taieri Plains is generally low lying and had large areas of wetland prior to European settlement.



Figure 1: Topography of the Taieri Plain looking North - East

- 28 The council also owns but commissions external management for parts of the Lower Waitaki River Control Scheme.
- 29 The majority of the schemes were initially built to provide flood protection to local communities and agriculture on the adjacent floodplains. These benefits include access to key transport infrastructure such as Dunedin Airport and State Highways, and protection of critical lifeline networks such as electricity substations. The schemes are essential to managing risks to communities associated with natural hazards, empowering economic prosperity and contributing to community resilience and well-being.
- 30 Central Government investment into flood protection and drainage projects ceased after the 1989 local government reforms, leaving it up to local ratepayers to develop and maintain the schemes. The schemes developed and constructed prior to this were largely funded by central government. There remains an ongoing need to operate and maintain these assets, ensuring the benefits they provide remain to be utilised.
- 31 The schemes (Figure 2), of the Lower Taieri Flood Protection, East Taieri Drainage and West Taieri Drainage will only be considered further in this evidence.

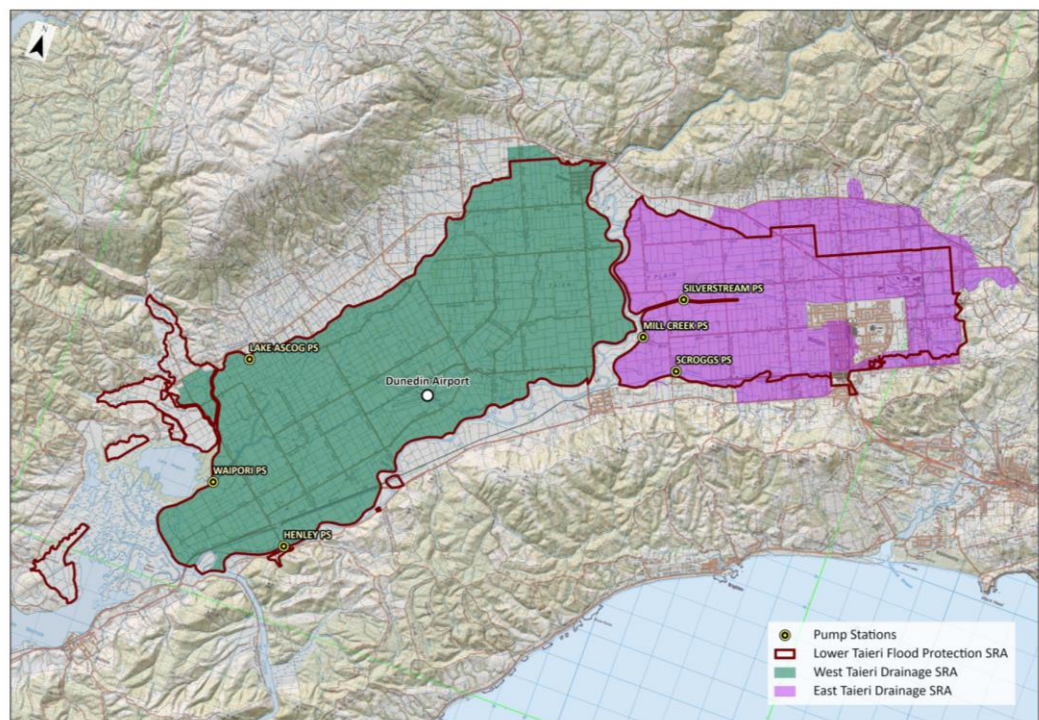


Figure 2: The relationship of the three Taieri Schemes

Lower Taieri Flood Protection Scheme

- 32 The Lower Taieri Flood Protection Scheme protects the Taieri Plain during flood events. It was the first to be developed, alongside the East and West Taieri Drainage Schemes, when works commenced in 1870.
- 33 It is complex, with multiple rivers affecting the scheme. This means flows can increase dramatically in widespread and prolonged rainfall events. The Silver Stream is also a significant river in the scheme. It flows out of the Silverpeaks area and has a far quicker response time than the Taieri River. Other rivers managed in this scheme are Waipori River and Owhiro Stream.
- 34 The Lower Taieri Flood Protection Scheme is comprised of 107km of stopbanks (floodbanks) which are ORC owned and managed. These stopbanks have multiple lease arrangements over them which ORC enters into with landowners for use of the stopbank and area surrounding the stopbank.
- 35 The use of the stopbanks is predominantly for grazing and access which is regulated by the ORC's Bylaws and Designations where applicable.

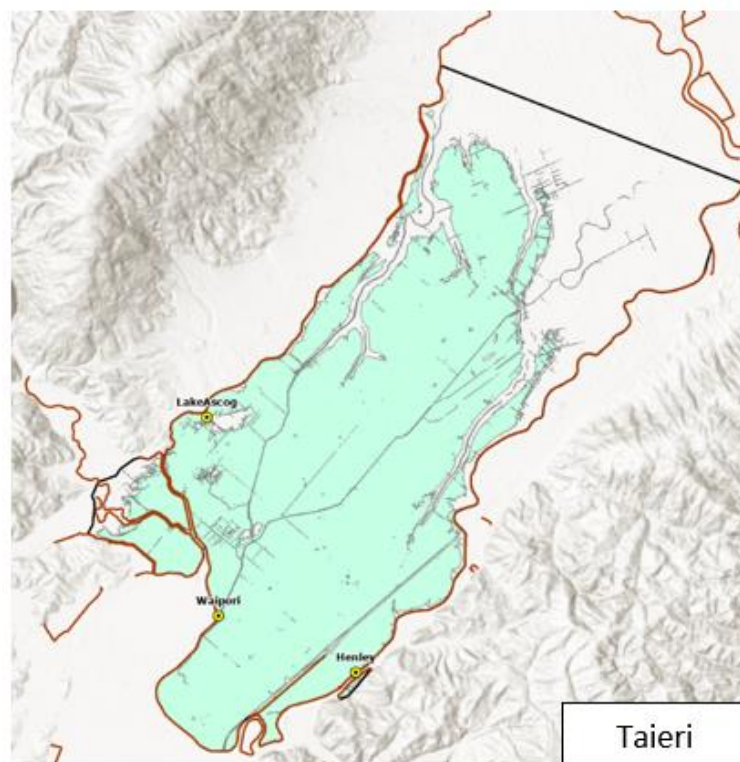


Figure 3: The Taieri catchment, highlighting land areas less than 1 metre above mean sea level

West Taieri Drainage Scheme

- 36 The West Taieri Drainage Scheme covers the area bounded by the Taieri River, Lake Waipori, and the West Taieri Contour Channel. A small part of the scheme lies in the Henley Floodway. The West Taieri area differs from the other drainage schemes in that water cannot drain out of the scheme under gravity: it must be pumped out. There are three pump stations in the West Taieri Drainage Scheme: Waipori; Henley; and Lake Ascog.
- 37 The West Taieri Drainage Scheme is comprised of 144km of drainage network, 3 pump stations, 22 culverts and 20 bridges, which are ORC's owned assets.

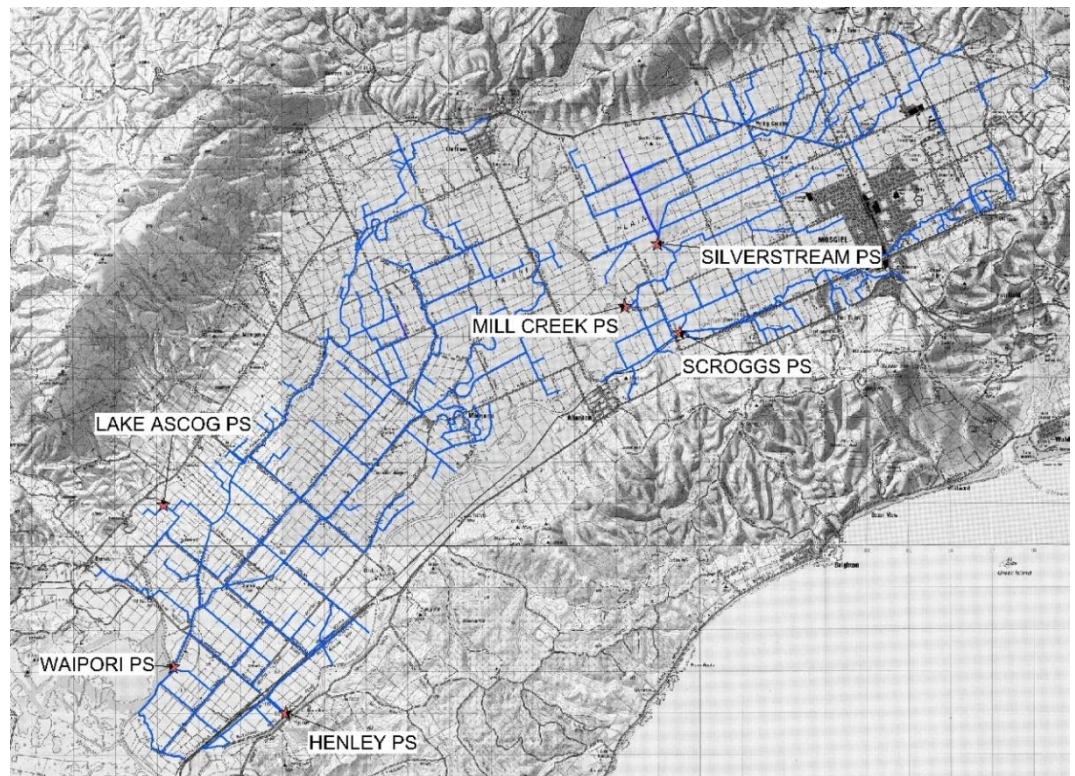


Figure 4: The West and East Taieri Drainage Schemes

East Taieri Drainage Scheme

- 38 The East Taieri Drainage Scheme is physically divided into two areas by the Silver Stream, which flows across the Taieri Plain in a south-westerly direction. Drains on the northern side of the Silver Stream generally flow toward what is called the Upper Pond area. Drains on the Southern side of the Silver Stream flow toward the Lower Pond area. When the Taieri River

is at low flow these drains flow out to the river by gravity, whereas when the Taieri is at high flows, gravity gates close and pumps must be used.

- 39 The East Taieri Drainage Scheme has 128kms of drainage network, 3 pumpstations, 84 culverts and 1 bridge, which are ORC's owned assets (Figure 5).

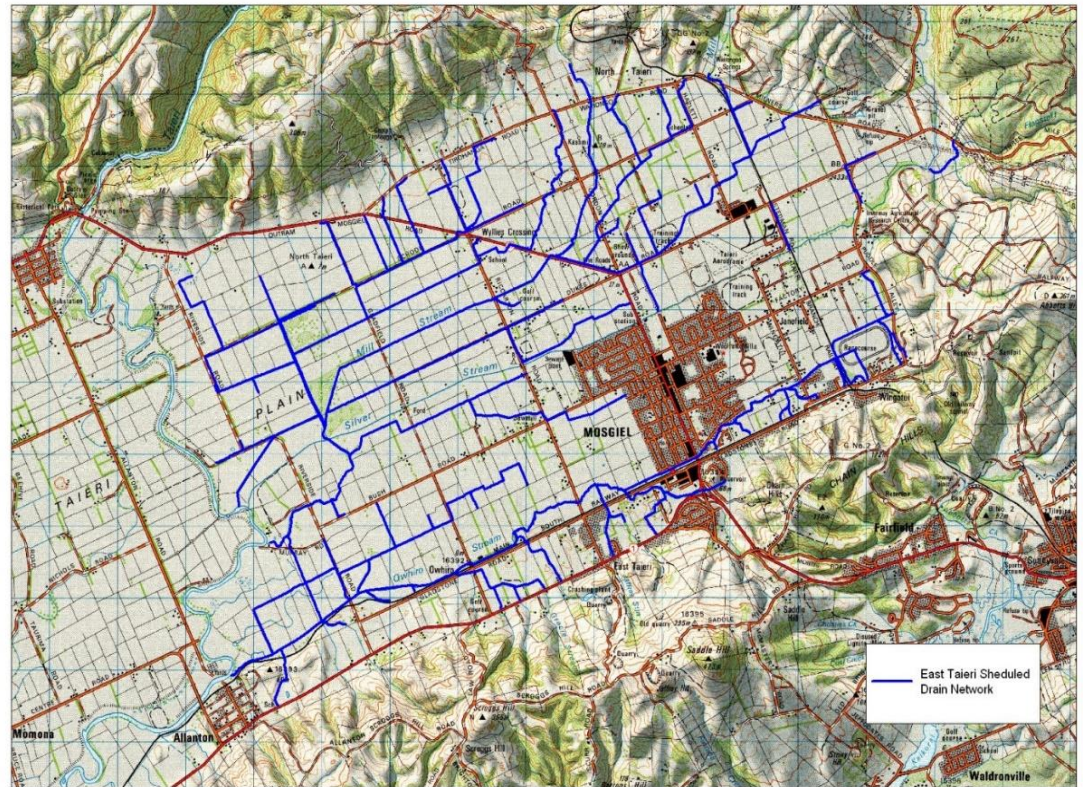


Figure 5: East Taieri Scheduled Drain Network

Leith Flood Protection Scheme

- 40 The Water of Leith catchment is located to the north of (and includes) the Dunedin Central Business District (CBD), and has a catchment area of approximately 42 square kilometres. This scheme (Figure 6) protects the area from the risk of steep headwaters overwhelming the shallower grade channels through the North Dunedin floodplain. Key Dunedin infrastructure such as the hospital, Otago University, Otago Polytechnic and stadium are protected by the scheme. Flood mitigation measures in the Water of the Leith include:

- Substantial lengths of concrete and stone wall to prevent bank erosion and facilitate urban development of the floodplain (e.g. University Campus);

- A boulder trap upstream of George Street (constructed in the 1950s) and a debris/boulder trap upstream of the Lower Malvern Street Bridge (constructed in 1963);
- Straightened channels including a high-velocity channel between George Street and Cumberland Street;
- Grade control weirs of varying heights along the Water of Leith;
- A double concrete-lined channel between Clyde Street and the Otago Harbour; and
- Channel enhancements downstream of Dundas St, constructed progressively since 2013.

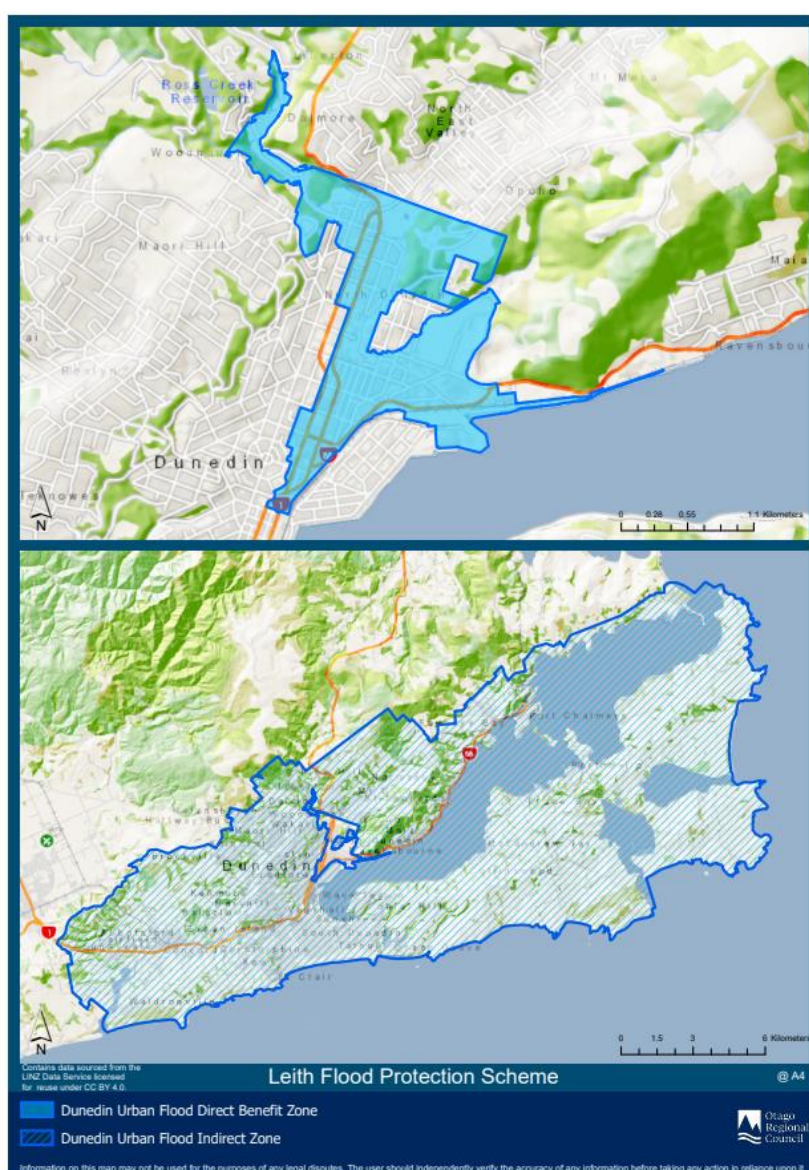


Figure 6: The Leith Scheme and extent of benefit zone³

³ Benefit zone is the area that the Leith Scheme provides protection to.

Lindsay Creek

- 41 The Lindsay Creek is not a flood protection or drainage scheme.
- 42 There are sections of the Lindsay Creek that have insufficient channel capacity to convey flood flows.
- 43 A higher and more uniform standard of flood protection for these areas, to provide a standard of flood protection that is consistent with comparable urban areas across New Zealand, will need to be considered, again⁴.

Asset Criticality

- 44 In general, Council has a reliable understanding of its flood protection and drainage infrastructure, and regularly undertakes asset condition and performance monitoring, which in combination with modelling and other investigative activities, informs asset maintenance, renewal and replacement.
- 45 Central to managing risks, hazards and resilience is the criticality of assets. Critical assets are identified as those which have a high consequence of failure, such as a more significant financial, environmental and social cost to communities.
- 46 With regards to the flood protection and drainage schemes, critical assets are those that protect urban or high value areas or areas critical to effective operations of the schemes. The critical assets as identified in ORC's asset management plans are:
 - a. Flood banks that protect the towns and industrial areas of Outram, Mosgiel, Balclutha, Alexandra, the Silver Fern Farms Finegand Plant, and the Dunedin International Airport.
 - b. The Waipori Pump Station drains 95% of the West Taieri Drainage Scheme.
 - c. The Pump Stations of East Taieri Scheme which include predominately the Silver Stream and Mill Creek pump stations.

⁴ Lindsay Creek has been considered by Council previously as requiring a flood protection scheme. The Long-Term Plan 2021 – 2031 indicates that this will be required to be progressed for resilience in the future.

A general overview of the significant issues and constraints with the land drainage and flood protection infrastructure.

- 47 Managing infrastructure within an ever-changing physical environment will continue to pose challenges and opportunities as the ORC implements its Infrastructure Strategy⁵ under the Long-Term Plan 2021 - 2031. ORC will proactively monitor the physical environment in order to adapt to the challenges and opportunities posed by:
- a. The dynamic geomorphology of the Otago region that contributes to the behaviour of the river catchments and ultimately how the flood and drainage schemes perform.
 - b. The changing climate in Otago and the variable impact of climate change across the region, such as sea level rise, and more frequent and higher intensity rainfall events.
- 48 These changes and their consequences have the potential to compromise levels of service and will need to be understood and actively managed. The forward work programmes will therefore include monitoring and analysis to understand the impacts of the ever-changing physical environment on the infrastructure, including ongoing surveys to monitor channel morphology and participation in sea level rise studies to understand regional estimates and impacts. ORC will also continue the development of well-informed communication and adopt a consultative approach with the community as to the areas of natural risk and the measures in place to manage these risks.
- 49 The ORC's Infrastructure Strategy has identified significant issues facing the flood protection, river assets and drainage activities over the next 30 years and beyond.
- 50 These issues are presented diagrammatically in Figure 7. All significant issues are inextricably linked to one another, with one common denominator being 'Scheme Performance'.

⁵ The ORC is required to provide an Infrastructure Strategy which sets out how it intends to manage the flood protections, land drainage and river asset infrastructure in accordance with the requirements of the Local Government Act 2002 Amendment Act 2014. The Infrastructure Strategy is contained in the ORC's Long-term Plan 2021 – 2031.



Figure 7: Significant issues and associated links from the ORC Infrastructure Strategy.

- 51 The significant issue of Growth and Development from Figure 7 will be discussed due to its relevance to Variation 2.

Why is Growth and Development identified as a Significant issue in ORC's Long-term Plan?

- 52 In April 2017 changes were made to the RMA (Section 6) highlighting the increasing level of natural hazard risk and the need to ensure growth and development does not increase these risks and associated costs.
- 53 While population projections for Dunedin City are estimated to initially accelerate from 2021 to 2048, in the long term it is projected to decelerate⁶, some growth is proposed in areas of high or increasing natural risk, and there is a need for information to be available to assist in decision-making and managing community expectations.
- 54 For example, intensification of urban development along the right bank of the Silver Stream and some sections of the Owhiro Stream are likely to affect the runoff to, and consequently design capacity of East Taieri and Lower Taieri Schemes. Furthermore, this rising urban development is

⁶ Dunedin City Council statistics

changing the public's expectations on the levels of service that should be provided by the ORC's infrastructure.



Figure 8: Owhiro Stream, Hagart – Alexander Driver, July 2017.

- 55 Over the longer term there is potential to see some acceleration of land use change outside of urban areas, placing additional pressures on the flood protection and drainage services to provide protection. A better understanding is needed of the likely distribution of this growth and what additional demands this will likely place on flood management services.



Figure 9: The Lower Taieri Flood Protection Scheme at Outram in July 2017

ORC's preferred approach to managing this significant issue.

- 56 The preferred approach is to maintain current practice but consider innovative approaches to addressing population growth/decline and manage demand through land use controls.
- 57 Collaboration with territorial authorities will need to continue to effectively mitigate the impact of increased runoff through land use change and development. This will include identifying areas of potential risk and may also include opportunities for innovative approaches to managing the impacts of development. There is an ongoing need to ensure sufficient information is available to assist in informing where there may be risks associated with development. Subject to further discussion and agreement with the relevant territorial authorities, the ORC aspires to take an integrated, multi-agency approach to land use planning.

Managing growth and development in relation to ORC's assets.

- 58 The ORCs assets are currently designed to provide flood protection and rural land drainage.
- 59 The ORC does not have a responsibility for stormwater infrastructure, the DCC is the responsible authority.
- 60 The drainage network was designed to provide a level of service deemed to be acceptable for rural land use. This varies across the scheme but is generally means the containment of the 10-year flow ⁷event within the banks of the drains. This level of service will inevitably lead to some instances of overland flow and localised ponding for short periods in event larger than those with a 10-year return period.
- 61 Generally, the East Taieri Drainage Scheme in its current form provides an acceptable level of service to rural areas.
- 62 The level of service for land drainage schemes historically is defined by pump moduli⁸, which defines a nominated mm/day for drainage across the catchment area. This is achieved by the conveyance of rural drainage water

⁷ The level of service provided by flood protection schemes is higher level of protection for conveying river flood flows as opposed to the land drainage function of the drainage schemes.

⁸ Pump moduli nominates that the East Taieri Drainage Scheme pumps have a moduli range of 8mm – 10mm / day, the Upper Pond, 8mm/day and the Lower Pond 18mm/day. These pump moduli are contained in the respective scheme operating manuals.

through the network using the pump stations and other structures, such as gravity outflow gates.

- 63 Effective pump moduli are reliant on uniformity across the rural areas, that is, low lying areas will distort the pump moduli achieved, as does other receiving inflows.
- 64 Flooding from the Taieri River is dealt with by the Lower Taieri Flood Protection Scheme which generally operates in isolation from the East Taieri Drainage Scheme, apart from the common usage of the Upper Ponding Area.

Issues and challenges

- 65 The areas surrounding Mosgiel have developed rapidly in recent years, including land use change.
- 66 Land use has changed significantly since the East Taieri Drainage Scheme was first implemented, leading to a change in expectations regarding the level of service provided by the drainage network. Previously water flowing over or ponding on a paddock in the middle of a farm of several tens or hundreds of hectares for a short period was regarded as tolerable, water flowing over or ponding on a small holding or residential section is less acceptable.
- 67 This has created a challenge to optimise the drainage network so as to not exacerbate problems during flood events on the East Taieri Plain.
- 68 Traditionally urban areas on the Taieri have been serviced by a stormwater network, administered by the Dunedin City Council. Due to the higher density of housing, and the corresponding higher level of risk, the stormwater network provides a primary level of service similar to the East Taieri Drainage Scheme but increased super-design protection (up to 50-year protection). As the urban area has grown the boundary between the urban and rural networks has become less defined.
- 69 The DCC and ORC have generally had well defined roles in the past that reflected a more definitive demarcation between urban and rural. With the semi-urbanisation of rural areas, there has been an increased reliance on

the rural drainage schemes and existing waterways to provide storm drainage conveyance.

- 70 Given the level of development expected to occur within the drainage scheme boundaries and the associated increase in expected level of service, it is imperative to provide a regulated level of interface between the level of drainage that sits between the current urban and rural standards.
- 71 There remains a challenge to ensure that the growth and development, and subsequent design of storm drainage systems provide an appropriate level of protection that is consistent with the receiving environment.
- 72 Where land use is changing from rural to residential which results in the purpose and of the land drainage function being altered, there is a requirement for appropriate controls to be place.
- 73 This changes the behaviour of the scheme functionally as the pump moduli principle no longer applies, and an increase of discharge creates coincidental flows and in some cases a lagging of the peak flow from the attenuation systems into the land drainage schemes and waterways.
- 74 These effects can provide pressure on the land drainage schemes, and the adverse effects downstream which can result in increased duration of ponding and overland flows as water is conveyed through the system.

Conclusion

- 75 The ORC has statutory functions, powers and duties relating to land drainage, river management flood protection.
- 76 Land use change from resulting for the requirements of growth and development creates additional stormwater discharges into existing land drainage networks and waterways.
- 77 Land use change can result in adverse effects on the capacity and operation of ORC's land drainage and flood protection infrastructure.
- 78 Strategically the key controls for the ORC are to have fit for purpose stormwater management plans and design that will provide for an integrated water management approach across the Taieri Plain.
- 79 The key principles that support this are:

- a. Where a connection is available to DCC's stormwater network, that connection must be used,
 - b. Where a connection is not available, then, subdivision, use and development will not proceed without a stormwater management plan being approved through the resource consent process,
 - c. ORC will be recognised and treated as an affected party on any such consent application,
 - d. There must be no adverse effect on people, property, waterway levels and flows, land drainage schemes and flood protection schemes, and
 - e. The plan must demonstrate there is no adverse impact in hydrological characteristics on the existing land use as result of the subdivision use and development.
- 80 The land use change and interface with existing ORC infrastructure is a consistent threat to the functionality of those assets that were not designed for storm drainage.
- 81 The future of existing and new communities deserves the benefit of robust consideration of how water management across the Taieri Plains is developing. That includes, not only ensuring the current schemes and infrastructure are fit for purpose, but to ensure all the elements of stormwater design through land use change provide towards an integrated water management approach that does disadvantage one community from the other.
- 82 To achieve this, proper controls need to be in place that allow the ORC the ability to assess the impact on current scheme and river management functionality. This will be imperative to inform not only current state, but the future considerations and decisions of how the schemes and river management will interface with the increased demands of storm drainage.



Michelle Mifflin

Dated: 30th November 2021