BEFORE THE COMMISSION
APPOINTED BY THE OTAGO REGIONAL COUNCIL

UNDER
IN THE MATTER

BY

the Resource Management Act 1991 (RMA)

Of an application by Dunedin City Council for resource consent being processed with reference RM20.280

Statement of Evidence Gerard Patrick Closs Date 22 May 2022

Introduction

1. My name is Professor Gerry Closs.

2. I have a PhD in freshwater ecology, graduating in 1991 from Monash University. I have been employed by the University of Otago since 1997, mainly teaching and researching in the area of freshwater ecology, but also have broad experience in ecology and zoology. I was Head of the Department of Zoology for seven years (2015-2021).

3. Whilst I do not have specific experience in the management of municipal tips, I have a good understanding of the impacts of pollutants in freshwater and estuarine systems, and the challenges of managing pollutants at a catchment scale.

4. With respect to the proposed Smooth Hill municipal tip, my primary concerns relates to the long term risk such a facility poses to the health of the Otokia Creek and estuary

5. I refer the Commissioners to the best practice document published by the Environment Protection Authority, Victoria, Australia "Siting, design, operation and rehabilitation of landfills. Publication 788.3* August, 2015. Page 12.

" 5.1.2 Landfill types

An important aspect of screening for potential landfill sites is the type of landfill to be developed. The four basic methods of landfilling and the hierarchy of their preference for use are discussed below:

- **the area method, where an existing hole such as a former quarry is filled**
- **the trench-and-fill method, where a hole is dug and backfilled with waste using the excavated material as cover**
- **the mound method, where most of the landfill is located above the natural ground level**

- **the valley or change of topography fill method, where a natural depression is filled.**

The most appropriate landfill type for a region will be determined based on local conditions as identified in the environmental assessment. The area method and the trench-and-fill method are, however, preferred.

The area method is preferred, as it achieves an additional outcome of rehabilitating an existing hole. It is also generally easier to manage litter and leachate (contaminated water that has percolated through or drained from a landfill) within the site.

Trench-and-fill landfills are favoured where there are no suitably located holes, or where the trench-and-fill alternative achieves better environmental outcomes. They also enable the operator to configure the excavation to provide the best possible design.

Mound landfills are to be avoided as their exposed nature requires significant litter controls and present a significant visual impact on the landscape. Further difficulties attached to these landfills are leachate seeps from the side of the landfill and the stability of the landfill cap.

Valley fill landfills are to be avoided as they have inherent environmental problems such as unstable slopes, water infiltration and leachate seepage. Due to the open nature of these landfills and shallow placement of waste, they consume a greater amount of soil for cover and capping than an equivalent volume landfill in a disused quarry.

Furthermore, because a valley fill landfill is located in a drainage line, extensive management is required to control surface run-off water ingress into the landfill, potential planes of geotechnical weakness from leachate flows within the landfill, and leachate seeping from the landfill. This type of landfill should be limited to select solid inert wastes that are part of an engineered solution for an erosion problem. "

6. To the best of my knowledge, valley fill landfills were prohibited in Victoria in the 1990s for the purpose of municipal tipping. These tips were banned on the basis that municipal waste is a complex material potentially containing many and varied pollutants, and placement of this material in a drainage line presents an unacceptable long term management challenge and risk.

7. Leachates from a tip represent the most significant management challenge and comprise a mixture of high concentration organic and inorganic contaminants, potentially including humic acids, ammonia nitrogen, heavy metals, xenobiotics (non-natural biologically-active chemicals) and in-organic salts, many of which can have severe long term impacts and represent significant contamination risks on receiving environments (Wiszniowski et al. 2006).

8. I note that the DCC plan to collect and treat leachate from the tip off-site. However, given that the breakdown of municipal waste takes many, many decades, collection of leachate will have to continue indefinitely into the future, representing an inter-generational pollution risk.

9. Further, should this highly-engineered 'solution' to the management of leachate begin to fail in any way (e.g. leaks in the tip lining material, excessive in-flow of water from surrounding catchment), the legacy of this tip cannot be easily reversed once it is in place. This risk will be present into the future for many decades to come. This is an unacceptable risk, and not one that we should be handing on to future generations to manage.

10. Finally, although I did not comment on the bird strike risk in my original submission, I have become aware of this debate and can offer an additional insight into this potential risk.

    In my capacity as a freshwater ecologist, I sampled the upper Taieri river close to its headwaters on the Lammermoor Range in the late 1990s. At that time, there were several relatively large breeding colonies of black-back gulls in the area, and whilst I haven't been into that area since then, it's quite likely they are still breeding there. If so, a direct flight from those colonies over Lake Mahinirangi and Maungatua to the proposed tip site would take the gulls more or less over the Dunedin Airport.

References

Siting, design, operation and rehabilitation of landfills Publication 788.3* August, 2015. Environment Protection Authority Victoria. 200 Victoria Street, Carlton, 3053.

Wiszniowski, J. et al. (2006) Landfill leachate treatment methods: A review. Environ. Chem. Lett. 4: 51-61.