BEFORE THE INDEPENDENT HEARING COMMISSIONERS
FOR GISBORNE DISTRICT COUNCIL

IN THE MATTER: of the Resource Management Act 1991

AND

IN THE MATTER: of an application by Gisborne District Council for resource consent associated with wastewater overflows

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STATEMENT OF EVIDENCE OF DR SHANE KELLY – ECOLOGY

18 June 2021

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INTRODUCTION

Qualifications and experience

1. My full name is Dr Shane Kelly. I am the Managing Director of Coast and Catchment Ltd, a consultancy I established in 2008.

2. Prior to this I was the Principal Advisor on research and monitoring for Auckland Regional Council, where I managed major research, monitoring, and strategic projects, including State of the Environment monitoring and research programmes for water quality, sediment quality and ecosystem health.

3. I have a BSc in Zoology and PhD in Biological Science, both from the University of Auckland.

4. My relevant expertise and experience includes:

   (a) provision of technical advice on the effects of numerous coastal and land use activities including coastal effects of stormwater, wastewater and industrial discharges, port and marina dredging and disposal, major pollution spills, aquaculture, reclamation, mangrove removal, and fisheries surveys;

   (b) lead author of four State of the Hauraki Gulf reports, and reports on the values and state of many other harbours and estuaries;

   (c) design and reporting on the harbour monitoring programme for New Zealand's largest wastewater treatment plant (Mangere); and

   (d) preparation of environmental assessments for stormwater management covering much of the Auckland Region, and assessments and advice for other cities including Wellington and Napier.

Code of Conduct

5. My qualifications as an expert are set out above. I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence. Except where I state that I am relying on the evidence of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

SCOPE OF MY EVIDENCE

6. My evidence addresses the following aspects of the application:

   (a) my involvement in the Gisborne Wastewater Overflows Resource Consent Application (**Application**);

   (b) ecological assessment;

   (c) response to issues raised in submissions;

   (d) proposed consent conditions including monitoring plans;

   (e) summary and conclusion.

MY INVOLVEMENT IN THE WASTEWATER OVERFLOW CONSENT PROJECT

7. My involvement in this project includes being commissioned to assess the aquatic ecological effects of overflows from the wastewater networks for Gisborne District Council (**GDC or Council**). My assessment (produced in collaboration with my colleague Dr Carina Sim-Smith) involved:

   (a) a desktop review of ecological values and relevant information produced by other technical experts working on the project;

   (b) a field assessment that included site inspections and ecological and sediment sampling carried out in May 2019;

   (c) an analysis of water quality data provided by GDC; and

   (d) the production of a report titled 'Ecological effects of wastewater overflows' dated July 2019 (and revised April 2020), which was included as Appendix H to the Application.

ECOLOGICAL ASSESSMENT

Existing environment

8. Gisborne is built around the confluence of two rivers, the Waimata River and the Taruheru River, which combine to form the Turanganui River. A number of smaller urban streams, the largest of which is Waikanae Creek, feed into this system.

9. The Waimata River system is around 460 km in length and has a catchment area of approximately 22,700 ha, with predominant land cover consisting of steep grasslands, exotic forest and manuka/kanuka. Less than 3.5 km of the main river channel runs through urban parts of Gisborne, of which, around 2 km is downstream of the only primary outfall[1] in its catchment (Seymour Rd/Turenne St), which discharges into an approximately 500 metre, intermittently flowing overland channel, fed by a combined stormwater and wastewater outfall.

10. The Taruheru River system is around 111 kilometres in length and drains a catchment of around 8400 hectares. The river system flows through a low-lying floodplain before reaching Gisborne township. Land uses in the catchment are dominated by cropping, orchards and grasslands, with urban development in the lower catchment. The gradient of the river is very flat through the 5 kilometre urban section and for around 10 kilometres upstream. Consequently, these sections are subject to tidal influences. Two of the primary and secondary outfalls that GDC aims to limit controlled overflows to, discharge directly into estuarine sections of the lower Taruheru–Upper Turanganui river channels (Wainui Road and Palmerston Road/Peel Street overflows). The Oak Street overflow discharges into a tidal section of a narrow creek, with the discharge point approximately 130 metres up from the Taruheru River junction.

11. The Waikanae Creek system is only around 7.5 kilometres in length and borders the southwestern edge of Gisborne township. It is a low gradient, groundwater-fed stream that drains a catchment of around 1,100 hectares. The stream is tidally influenced, with the saline intrusion evident at least 4 kilometres upstream from the sea. Land use in the upper catchment is dominated by orchards and horticulture, while the mid to lower catchment is dominated by mixed urban (including industrial) development, though significant areas of urban parkland or open space are also present, including open space areas associated with closed landfills.

12. A number of small, fragmented urban streams feed into the main river channels. In places, vegetated riparian margins bound these streams, but those sections are commonly interrupted by piped, lined and channelised sections, or reaches with no riparian cover. Based on their highly modified nature and their surrounding land uses, the instream values of those streams are expected to be low with macroinvertebrate communities mainly, or wholly, comprised of tolerant species. None of the primary or secondary overflow structures feed into continuously flowing, freshwater sections of

[1] Although I understand from the evidence of Mr West that in response to submissions, this primary outfall is to be removed by GDC and relocated and replaced with a tertiary outfall.

these streams. However, several tertiary overflow points feed directly, or indirectly, into highly modified stream reaches. Regular wet weather overflows from these points are not expected, but the consent application does make provision for them to occur during extreme storm events.

13. Overall, the desktop review of Gisborne's urban waterways indicated that they have a history of modification, with freshwater streams generally consisting of piped, channelised and open stream reaches, with narrow riparian margins and little vegetative cover. Available macroinvertebrate data indicated that the quality of Gisborne's freshwater urban streams and rivers tends to be poor. However, they continue to support pollution-tolerant macroinvertebrates and fish including native eels (*Anguilla* spp.), and common bully (*Gobiomorphus cotidianus*), with banded kokopu (*Galaxias fasciatus*) and inanga (*Galaxias maculatus*) also being occasionally reported.

14. Estuarine sections of Gisborne's rivers have also been modified, but still support moderately diverse fish, birds and invertebrate assemblages, that are reported to include a variety of kai moana species such as cockles (*Austrovenus stutchburyi*), pipi (*Paphies australis*), grey mullet (*Mugil cephalus*), black flounder (*Rhombosolea retiaria*), kahawai (*Arripis trutta*) and kingfish (*Seriola lalandi lalandi*). Other fish such as snapper (*Chrysophrys auratus*) and yellow eyed mullet (*Aldrichetta forsteri*) are also likely to use these areas.

Potential ecological effects of wastewater overflows

15. Wastewater overflows have the potential to adversely affect receiving water, habitat quality and aquatic communities by increasing nutrient concentrations and productivity, through the deposition and decomposition of organic matter, and through the effects of toxic contaminants. They can potentially:

    (a) Promote microalgae and nuisance macroalgae blooms by increasing the nutrients available for primary productivity.

    (b) Reduce water clarity by promoting microalgae productivity (see above), increasing the concentrations of suspended solids, or the discharge of strongly coloured substances.

    (c) Decrease oxygen levels through the microbial decomposition of organic matter.

    (d) Release toxic contaminants that reduce the condition or survival of aquatic organisms. The key toxicants in metropolitan wastewater are ammonia, nitrate,

and oxygen-demanding substances. Heavy metals, and toxic organic contaminants may also be present (although generally at relatively low concentrations).

(e) Affect sediment quality and benthic communities through the deposition of organic matter and fine particulates that may accumulate in sediments causing anaerobic sediments and sulphide toxicity.

16. However, the actual ecological effects caused by any particular overflow depends on the nature of the discharges, discharge loads and frequency, whether overflows occur during dry or wet weather, and the values and assimilation capacity of the receiving environment.

Actual existing and likely future effects

17. Separating the ecological effects of intermittent wastewater discharges from other stressors is difficult. Therefore, a "principles and data" driven approach was taken that combined our wider knowledge about wastewater effects on receiving water ecology, with specific information on the characteristics of Gisborne's waterways, wastewater and river water quality, predictions of dispersal and dilution from key outfalls, and sediment quality and benthic ecological data.

18. A desktop review of Gisborne's urban waterways indicated that they have a history of modification, with urban streams generally consisting of piped, channelised and open stream reaches, with narrow riparian margins and little vegetative cover. Available macroinvertebrate data indicates that the quality of Gisborne's freshwater urban streams and rivers tends to be poor. However, they continue to support pollution-tolerant macroinvertebrates and fish. Available information also suggests that estuarine sections of Gisborne's rivers also support a range of fish and moderately diverse invertebrate communities.

19. The analysis of wastewater samples, and samples obtained from rivers and streams before, during, and after controlled discharge events[2] indicated that wet weather discharges (**WWO**) did not have a marked impact on estuarine water quality in Gisborne's rivers. These results were consistent with model predictions, which suggest nitrogen, phosphorus and suspended solids concentrations from discharges will be rapidly diluted to levels well below those found in the receiving waters, as recorded in GDC's river monitoring programme. Elevated concentrations of key metals (copper

[2] Data provided by Gisborne District Council

and zinc) were detected in some receiving water samples, but these were attributed to stormwater discharges rather than wastewater overflows. Dissolved oxygen levels were also low in the upper estuarine section of Taruheru River and in Waikanae Creek, but neither area was subjected to controlled discharges during the period analysed, and therefore, this effect was not attributable to wastewater inputs. Finally, we sampled sediments directly below, and away from, key wastewater outfalls at 12 sites spread along tidal reaches of the rivers and did not detect adverse sediment quality effects that could be clearly linked to wastewater discharges.

20. The overall conclusion we drew from our data, water and sediment quality analyses, hydrodynamic modelling by MetOcean[3] and the intermittent nature of discharges was that the potential for the controlled wastewater discharges to degrade receiving water quality sufficiently to cause more than minor adverse ecological effects appears to be low.

21. The results of an intertidal benthic macrofauna survey that we conducted supported that conclusion. Benthic samples were collected from six sites in the lower river sections, where sediment quality testing was also carried out (Figure 1). Key findings from the analysis of ecological samples were:

    (a) Intertidal communities of the lower Waimata, lower Taruheru and Turanganui differed from each other. Those differences largely reflected variation in the relative abundance of individual taxa, rather than differences in the type of taxa present. Overall, the same seven taxa made up between 91% and 97% of the total specimens counted at the six sites sampled: the polychaete *Heteromastus filiformis*; the small bivalve *Arthritica bifurca*; cockles *Austrovenus stutchburyi*; wedge shells *Macomona liliana*; and the polychaetes *Prionospio aucklandica,* juvenile Nereidae, and *Scolecolepides benhami*. Relatively high abundances of cockles and wedge shells were notable because both species are considered to be sensitive to fine sediment and contaminants.

    (b) Benthic communities at sites directly below the two primary wastewater outfalls in the lower Taruheru and Turanganui zones were largely indistinguishable from the communities at other sites within those zones. However, samples obtained directly below the Peel Street (Taruheru 6) and Wainui Road

[3] MetOcean Solutions (2019) Scour event modelling: Poverty Bay. Report prepared for Gisborne District Council, MetOcean Solutions, Raglan.

(Turanganui 2) outfalls were notable for the high numbers of small cockles they contained.

(c) Overall, the effects of wastewater discharges on benthic ecology appeared to be of little practical significance in the receiving environments sampled.

22. I understand from the evidence provided by GDC that its intention is to remove the primary outfall site located at Seymour Rd/Turenne Street, currently shown as shown as a primary overflow site in Figure 1 below. GDC advice suggests that limiting discharges to the primary and secondary outfalls can be done without increasing discharge volumes at those outfalls.

23. Based on that, and the results obtained from our assessments, I conclude that the ecological effects of the proposed wet weather discharges are likely to be minor, as no patterns were identified in benthic ecology, water quality or sediment quality that could be definitively linked to existing overflows.

24. However, the potential for substantial (most likely short-term) impacts from dry weather overflows cannot be discounted if they make their way into streams and watercourses. I understand from the Application that discharges to water are infrequent with only nine recorded between the 2015-16 and 2019-20 financial years[4]. Ensuring effective systems and processes are in place for preventing, detecting and responding to such events is therefore recommended, and I understand from the evidence provided by Council that it has public awareness campaigns; monitoring and cleaning schedules and procedures; and contractor response plans which form part of its standard operating procedures. I agree with those measures, which are in line with my recommendation above.

[4] Application at p27

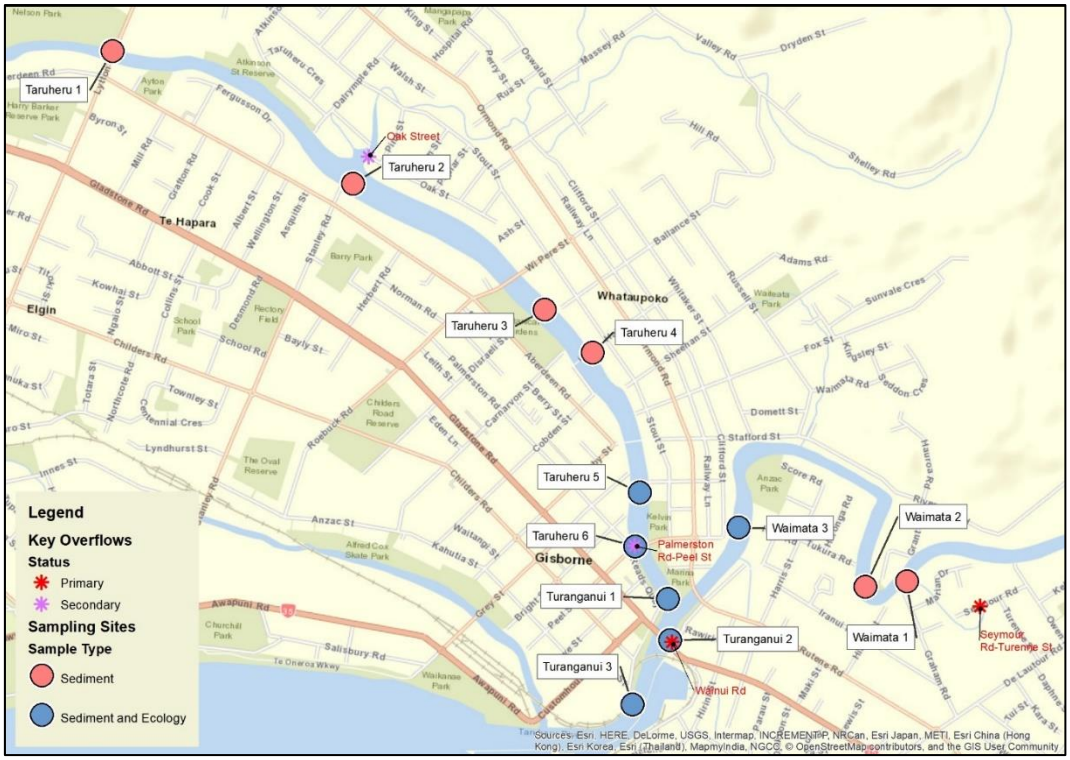

Figure 1: Sediment and ecological sampling sites. The locations of primary and secondary wastewater outfalls are also shown.

RESPONSE TO ISSUES RAISED IN SUBMISSIONS

25. One submission lodged with the Council (Margaret Ainsworth) states:

Environmental impact of continued long term discharging is unacceptable.

26. Firstly, I note that WWO are not continuous. Based on the ecological assessment which integrated information on existing water and sediment quality, hydrodynamic modelling, and benthic ecology (which included sampling directly below major overflow points) I found little evidence of controlled overflows having adverse ecological effects.

27. As noted above, I cannot discount the potential for dry weather overflows to cause short-term adverse ecological effects depending on where they occur and whether they reach streams or watercourses. Given their unpredictability, I consider that the most appropriate way to avoid or remedy such effects is to ensure that effective systems and processes are in place for preventing, detecting and responding to such events. This matter is discussed further in the evidence of Mr Kanz and West on behalf of GDC,

which includes provisions for preventing, detecting and responding to such events through[5]:

(a) Council's public awareness campaigns, including DrainWise reminding members of the public about causes of dry weather overflows (**DWO**), as set out in the evidence of Mr Kanz);

(b) A comprehensive programme of proactive maintenance of the network, including jet cleaning (as set out in the evidence of Mr West);

(c) Systems control and duplication to provide for early warning systems (as set out in the evidence of Mr West);

(d) Trade waste compliance (as set out in the evidence of Mr West);

(e) Prompt response and clean-up protocols (as set out in the evidence of Mr West); and

(f) The inclusion of requirements for assessing the effects of dry weather overflows to waterways in the response protocol for DWOs.

PROPOSED CONSENT CONDITIONS INCLUDING MONITORING PLANS

28. I was provided with a copy of the draft consent conditions included with the Application and have provided further input to them. I support the amended draft condition framework, which provides for the management of the wastewater network through operational plans and protocols, supported by a performance criteria for overflows, monitoring and tangata whenua oversight and input on network management. I note that in response to input by myself and other parties, GDC have included requirements for assessing the effects of DWO to waterways in their response protocol, including:

(a) Sampling upstream and downstream of discharges, for at least 2 days following an overflow, or longer if downstream water quality is impacted;

(b) Testing for Escherichia coli, enterococci, ammoniacal nitrogen, dissolved oxygen, pH, temperature, BOD and COD;

(c) Checking for dead fish and preparing an event specific monitoring assessment if they are observed, which may include the assessment of other water quality

[5] The key methods for managing DWOs are set out in Section 2.5.2 (p28-29) of the Application.

parameters and ecological indicators depending on the scale and nature of the event.

S42A OFFICER'S REPORT

29. Ecological matters have been considered in the review carried out by Ms Juliet Milne (Appendix 4 of the s42A Officer's Report). I note that there appears to be a highly level of agreement on the potential ecological effects of the discharges, and in particular that:

    (a) the urbanised river reaches potentially affected are highly modified, and little, if any, evidence of adverse effects on benthic ecology, water quality or sediment quality that could be definitively linked to controlled overflows was detected through our ecological assessment.

    (b) dry weather overflow discharges can impact river water quality and ecosystem health, but they occur infrequently, and impacts should be short term and localised. Impacts may be greater if a large volume of wastewater enters a river over an extended period, and/or the overflow is to a small tributary.

    (c) risks of DWOs need to be managed through regular and proactive maintenance of the sewerage network and adherence to a robust dry weather overflow response protocol.

SUMMARY AND CONCLUSIONS

30. The ecological assessment, which integrated information on existing water and sediment quality, hydrodynamic modelling, and benthic ecology (which included sampling directly below major overflow points), found little evidence of controlled overflows having adverse ecological effects.

31. Due to the unpredictable nature of DWOs, there is the potential to cause short-term adverse ecological effects, if they make their way to streams and watercourses. However, I understand that this is a relatively infrequent occurrence and I recommend that effective systems and processes are put in place for preventing, detecting and responding to such events. Having considered the Application and the draft consent conditions provided by the Applicant, I consider that the systems and processes are proposed are sufficient to avoid or remedy potential ecological effects.

Dr Shane Kelly

18 June 2021