Before Hawkes Bay Regional Council and Hastings District Council

| | |
|---|---|
| In the matter of | the Resource Management Act 1991 |
| And | |
| In the matter of | Application by Hastings District Council and Napier City Council to Hawke's Bay Regional Council for resource consents authorising the operation of Area B at Ōmarunui Landfill (**consent application**) |
| And | |
| In the matter of | A notice of requirement by Hastings District Council to Hastings District Council for alteration of designation for the Ōmarunui Regional Landfill (**NoR**) |

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# Statement of evidence by Dean Craig Miller on behalf of Hastings District Council and Napier City Council

Dated 2 September 2021

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## INTRODUCTION

1. My full name is Dean Craig Miller. I am a Principal Freshwater Ecologist at Tonkin & Taylor Limited (**T+T**). I set out my qualifications and experience as **Attachment A**.

2. I have 19 years' post graduate experience in environmental consulting and have been employed as a freshwater ecologist at T+T for 19 years. I have been a Principal Ecologist for over 4 years. I specialise in resource evaluation and management work in freshwater environments with specific areas of expertise in water quality, aquatic ecology and assessment of ecological effects.

3. This evidence relates to planning approvals which are being sought to authorise the operation of a landfill at Ōmarunui Regional Landfill (**Landfill**) in Area B (the **Project**), specifically:

(a) Application by Hastings District Council and Napier City Council, as owners of the Landfill, for regional consents from Hawke's Bay Regional Council (**HBRC**); and

(b) A notice of requirement by Hastings District Council as requiring authority to Hastings District Council (**HDC**) to alter Designation D123 – Ōmarunui Landfill in the Hastings District Plan.

4. I refer to Hastings District Council in its capacity as requiring authority and applicant, and Napier City Council as applicant, together as the **Applicants**.

5. I have been engaged by the Applicants to provide ecology advice in relation to the Project.

6. I was the reviewer of the Assessment of Ecological Effects: Ōmarunui Landfill Area B report (**Ecology Report**), which was attached as Appendix L to the Assessment of Environmental Effects (**AEE**) for the Project. The Ecology Report covers the potential effects of the proposed stormwater discharge from the Project on the ecology of the Upokohino Stream receiving environment, including discharges during construction and operational phases.

7. I have been involved with the Project since January 2018 when I planned and coordinated the ecological assessment of the site and receiving environment. Following lodgement of the Application I prepared a response to ecological matters raised in the s92 request for further information. This included preparation of an initial response, attending a workshop with Council reviewers Pattle Delamore Partners Limited (**PDP**), follow-up liaison with Council's ecology reviewer Ms Laura Drummond, of PDP and preparation of an updated Ecology Report to reflect the agreed matters. From my perspective there were no outstanding ecological matters with Council Reviewers following submission of the updated Ecology Report.

8. I am familiar with the site and associated receiving environments. I visited the site on 13 April 2021 including the proposed Area B and the Upokohino Stream in the vicinity of the landfill and at various points downstream to Omaranui Road. I also participated in meetings with submitters including Hawkes Bay Fish & Game and Ngāti Pārau Hapū Trust on 13 April 2021.

9. In preparing this statement of evidence I have read the application documents and the submissions received on the Proposal that raise matters relevant to ecology. I

have also read the section 42A reports prepared by Mr Philip McKay on the NoR, and that prepared by Mr Greg Shirras in relation to the consent applications.

## CODE OF CONDUCT

10. I confirm that I have read the Expert Witnesses Code of Conduct contained in the Environment Court of New Zealand Practice Note 2014. My evidence has been prepared in compliance with that Code in the same way as I would if giving evidence in the Environment Court. In particular, 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 I express.

## SCOPE OF EVIDENCE

11. My evidence covers the potential effects of the proposed stormwater discharge from the Project on the ecology of the Upokohino Stream receiving environment. My evidence addresses the following matters:

    (a) A summary of the ecological assessment methodology adopted for the Ecology Report. This includes the methods used to assign ecological values and determine the magnitude and level of potential ecological effects and the investigation methods.

    (b) A brief description the Project as relevant to the potential for effects on freshwater ecology.

    (c) An overview of the existing freshwater receiving environment, including a summary of existing freshwater ecology values.

    (d) An overview of my assessment of effects on freshwater ecology, including actual and potential effects due to stormwater discharges.

    (e) I summarise the recommendations for addressing the potential effects of the construction and operation of the Project on freshwater ecology.

    (f) I respond to matters relevant to ecology that were raised in Submissions.

    (g) Comment on HBRC s 42A Report including conditions.

    (h) Comment on HDC s 42A Report including conditions.

(i) My overall conclusion.

12. My evidence is based on and summarises the version of the Ecology Report that was updated following the s92 responses and dated 30 October 2020. The Ecology Report can be referred to for additional detail.

13. By way of summary:

(a) My evidence assesses the potential effects of the proposed stormwater discharges from the Project, and specifically discharges of sediment to the Upokohino Stream. This includes sediment discharges during construction and operation and water quality effects associated with the placement and operation of the proposed stormwater treatment pond and wetland. Other contaminants are briefly assessed.

(b) My assessment is that Upokohino Stream is of 'low' ecological value in its current condition, which is due to extensive modification, poor macroinvertebrate community health and poor water quality.

(c) Stormwater from the Project will be treated through an appropriately designed sediment treatment pond and a polishing wetland. In my opinion, with erosion and sediment controls during earthworks, and with an appropriate and a well-maintained stormwater treatment pond, the level of effects of treated stormwater discharges on the Upokohino Stream will be 'very low'.

(d) All water falling on exposed refuse at the working face of the landfill will be discharged to the leachate system, and no water that has been exposed to waste will be discharged to the stormwater system. Therefore, in my view the overall level of effect of other contaminants from the landfill entering the Upokohino Stream will also be 'very low'.

(e) In my opinion there is a low probability that any measurable adverse effect on the water quality or ecology of Tūtaekurī River or Lake Te Rotokare will occur.

(f) I have recommended baseline and ongoing monitoring is undertaken to protect the health of the Upokohino Stream. I note that the proposed conditions of consent attached to the evidence of Ms Brabant appropriately adopt these measures.

## ECOLOGY REPORT EFFECTS ASSESSMENT METHODS

14. My assessment of ecological effects follows Ecological Impact Assessment Guidelines (EcIAG) produced by the Environment Institute of Australia and New Zealand (EIANZ, 2018[1]). The aim of using a standard framework and matrix approach is to provide a consistent and transparent assessment of effects. The steps involved in undertaking this EcIAG are outlined in the Ecology Report and summarised as follows:

    (a) Step 1 – Determine the level of ecological value of the environment. Ecological values were assigned on a scale of 'Low' to 'Very High' based on species, communities, and habitats, using criteria in the EcIAG. This is explained further in Section 2.3.1 of the Ecology Report.

    (b) Step 2 – Assess the magnitude of effect, which is a measure of the extent or scale of the effect and the degree of change that the activity will cause. The magnitude assessment considered intensity, spatial scale, duration, reversibility, and timing. Risk/uncertainty and confidence in predictions were also considered. The magnitude of the effect was scored on a scale of 'No Effect' to 'Very High'. The criteria for describing the magnitude of effect are set out in Table 2.3 of the Ecology Report.

    (c) Step 3 – An overall level of effect was determined using a matrix approach that combines the 'ecological values' and the 'magnitude of effects' on these values. The matrix describes a level of ecological effect on a scale ranging from 'Very Low' to 'Very High'. The matrix is shown in Table 2.4 of the Ecology Report. The overall level of effect can be used as a guide to determine whether effects management is required. Effects assessed as being 'Moderate' or greater warrant effects management measures.

## ECOLOGY REPORT INVESTIGATION METHODS

15. A site visit was undertaken by a T+T ecologist on 26 February 2018 to assess the immediate receiving environment for stormwater discharges from the Project (a farm drain system) and the Upokohino Stream. The farm drain system was dry at the

[1] Roper-Lindsay, J., Fuller, S.A., Hooson, S., Sanders, M.D., and Ussher, G.T. (2018). Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

time of the site visit and the Upokohino Stream appeared to be in low flow condition with shallow water depths and a dry area of streambed downstream.

16. During the site visit, water quality, sediment quality, macroinvertebrate communities and stream habitat quality were assessed at three sites on the Upokohino Stream. Site locations are described in Table 1 and shown on Figure 1. Figure 1 also shows the location where Upokohino Stream was dry at the time of the site visit.

17. The assessment also considered the data available on the New Zealand Freshwater Fish database (administered by NIWA) and in monitoring reports prepared by Hawke's Bay Regional Council.

| Site name | Location description |
|---|---|
| Upstream Landfill | Upokohino Stream approximately 170 m upstream of the confluence with the unnamed farm drain on the property boundary |
| Downstream Mixing Zone | Upokohino Stream approximately 480 m downstream of the confluence with the unnamed farm drain on the property boundary. |
| Downstream 2 | Upokohino Stream approximately 1km downstream of the confluence with the unnamed farm drain on the property boundary and immediately upstream of the landfill access road. |

Table 1 - Stream assessment site locations


Figure 1 - Aerial image of the Ōmarunui Landfill showing the three sampling sites visited on 26 February 2018 and the location of the dry area of stream bed ('stream dry') further downstream (Source: Google Earth).

## DESCRIPTION OF THE PROPOSED ACTIVITY

18. A detailed description of the Project is provided in the evidence of Mr Tony Bryce. A detailed description of the proposed stormwater management systems is provided in the evidence of Mr Rob Van de Munckhof. The following paragraphs summarise the parts of the project that are relevant to my assessment of ecological effects.

19. The Project will be constructed over five stages. Each stage will be developed over an area of three to four hectares. This allows the bulk earthworks of a single stage to be completed in one earthworks season (1 October to 30 April), reducing the likelihood of earthworks being required during winter. The exception to this is Stage 1 which is 9 hectares in extent and which will be completed over a number of construction seasons.

20. Landfill operations require ongoing movement of soils for placement of daily and intermediate cover and, in addition, regular construction projects are required to form new stages of the Project or to provide access or other works essential for the operation of the landfill. All of these activities have the potential to generate sediment erosion during wet weather conditions.

21. All water falling on exposed refuse at the working face of the landfill will be discharged to the leachate system, and no water that has been exposed to waste will be discharged to the stormwater system.

22. All stormwater discharged from Area B will be treated for sediment removal. Treatment systems will be designed to meet or exceed the requirements of *'Hawke's Bay Waterway Guidelines – Erosion and Sediment Control'* (Hawkes Bay Regional Council, 2009[2]).

23. For the development of Area B, stormwater will flow to the outlet of the Area B valley where it will be treated through a new sediment treatment pond and a polishing wetland. The sediment treatment pond will be sized to treat runoff from the estimated area of exposed/disturbed land during construction and operation of the Project. The wetland will not be sized to meet any specific design requirement but will fit into the area of land available, providing some further polishing of stormwater discharges.

[2] Hawkes Bay Regional Council, 2009. Hawke"s Bay Waterway Guidelines Erosion and Sediment Control 20090406.

## RECEIVING ENVIRONMENT DESCRIPTION AND ECOLOGICAL CHARACTERISTICS

24. Area B comprises a series of steep narrow gullies amongst a larger broad valley within the north- eastern portion of the Ōmarunui Landfill site. Land use comprises mostly grazed pasture but with some level plateaus, that have been heavily modified by borrow and fill activities as part of the ongoing landfill operation. Area B does not support any formed watercourse habitat or any terrestrial habitat of ecological value.

25. Surface water runoff from the Project area (Area B) and the neighbouring gully (Area C) flows via a farm drain and subsoil drainage system to the Upokohino Stream which subsequently enters the Tutaekuri River approximately 4 km downstream from the discharge point to the Upokohino Stream.

26. The farm drain system comprises a combination of 100 mm diameter sub-soil pipe sections and open drain. The open drain terminates around 50 m upstream of the Upokohino Stream with another 100 mm diameter sub-soil pipe section leading to Upokohino Stream. The system conveys flows from the whole of the valley (which includes the Project site). During dry weather there is unlikely to be flow or water consistently present in the open section of the Farm Drain. During rain events some catchment runoff (including the proposed discharge) will discharge to the Upokohino Stream via the two sub-soil pipes and some via overland flow. Given this discharge scenario I consider that Upokohino Stream is most relevant to consider as the receiving environment.

27. The Upokohino Stream is a tributary of the Tutaekuri River and runs through agricultural land to the east of the Ōmarunui Landfill.

28. No flow data are available for the Upokohino Stream. The flow observed during the February 2018 site visit was low, with no observable flow velocity in the vicinity of the Project. The stream was observed to be dry immediately upstream from the landfill access road, suggesting the stream is intermittent in the lower reaches. The lower reaches of the Upokohino Stream downstream of the landfill access road to at least Ōmarunui Road were also observed to be dry during my site visit on 13 April 2021.

29. The Upokohino Stream in the vicinity of the Project and extending downstream to the Landfill access road was incised, had a wetted width of less than 1.3 m and an

average depth below 0.2 m. Stream bed material comprised a deep layer of mud and decomposing macrophytes. The stream was fenced on both sides and had a riparian margin of grass and tall weeds that provide limited shade. The stream has a highly modified trapezoidal profile and alignment in the vicinity of the landfill and in the downstream reach and low in-stream habitat diversity.

30. Water quality conditions were low at the time of the February 2018 site visit with either very low or highly elevated dissolved oxygen conditions reflecting decaying macrophyte material or abundant live macrophyte biomass and associated photosynthesis respectively. Water sample testing showed elevated phosphorous levels and ammoniacal-nitrogen concentrations were above the Hawkes Bay Regional Resource Management Plan acute effects guideline at the Downstream 2 site. Water samples were also tested for metals with copper concentrations exceeding the Australian & New Zealand Guidelines for Fresh and Marine Guidelines (ANZG[3]) 80 % level of species protection trigger level.

31. Sediment samples were also collected and analysed for concentrations of metals. Metals concentrations in sediment samples were below the ANZG default guideline values (DGVs).

32. Macroinvertebrate communities were characterised by low diversity at all three sample sites on the Upokohino Stream. Samples were dominated by species that are tolerant to reduced water and habitat quality conditions. Macroinvertebrate Community Index (MCI) scores ranged from 45 to 69. These scores reflect probable severe pollution and/or reduced habitat quality conditions at all sites.

33. No fish survey was undertaken but live and perished eels were observed in the stream. No records were found on the NZ Freshwater Fish Database for the Upokohino Stream. A wide diversity of native fish species and trout are present in the Tutaekuri River and species that are more tolerant of reduced habitat and water quality conditions such as eels, may move into suitable habitats in the Upokohino Stream when flow conditions allow. Habitat and water quality conditions, the intermittent nature of the downstream reach and existing culverts downstream of the landfill site will limit fish diversity in Upokohino Stream.

[3] Australia New Zealand Guidelines for Fresh and Marine Water Quality. 2018. https://www.waterquality.gov.au/anz-guidelines.

34. T+T was advised by HBRC staff that the Upokohino Stream can occasionally flow into Lake Te Rotokare via the lake's outflow drain. Therefore, the values of the lake and potential effects of the Project are briefly considered in the Ecology Report.

35. The Lake Te Rotokare outlet drain joins Upokohino Stream approximately 4.3 km downstream of the Project's proposed stormwater discharge point. I understand that backflow from Upokohino Stream to the lake can occur when flows are high in the Upokohino Stream and Lake Te Rotokare water levels are low. The frequency that this occurs is unclear. However, the catchment history is described in detail in a Wildland Consultants report on "Issues and Options for Ecological Restoration of Te Rotokare and its Margins" dated 2011[4] and suggests low frequency.

36. There is limited information on the lake water quality and ecology of Lake Te Rotokare, however aerial images suggest the lake is shallow with patches of vegetation (raupo-*Typha orientalis* according to Wildland Consultants, 2011) but otherwise algal dominated. According to Wildlands Consultants *"Although in a degraded state, the lake retains values for a variety of wetland birds (including threatened species), and is likely to contribute to the local and regional sustainability of some mobile bird species"*.[4]

## ASSESSMENT OF EFFECTS ON FRESHWATER ECOLOGY

37. This section presents my assessment of ecological effects for the proposed Area B landfill. There are no ecological values within the Area B footprint, and therefore our assessment focusses on proposed landfill discharges. My assessment follows the EcIAG framework as set out in Paragraph 14 of my evidence.

38. As described in Paragraph 21 of my evidence leachate from Area B operation will be managed by a leachate collection system (LCS) and disposed of by spray irrigation to areas of the landfill cap. All water falling on exposed refuse at the working face of the landfill will be discharged to the leachate system, and no water that has been exposed to waste is expected to be discharged to the stormwater system.

39. My assessment therefore focusses on stormwater discharges and specifically on discharges of sediment to the Upokohino Stream. This includes sediment discharges during construction and operation and water quality effects associated with the

[4] Wildland Consultants, 2011. Issues and Options for Ecological Restoration of Te Rotokare and its Margins. Consultancy report 2386 prepared for Kris Erickson.

placement and operation of the proposed pond and wetland. Other contaminants are briefly assessed.

*Receiving environment ecological value*

40. As set out in Paragraph 26 I consider the receiving environment for the proposed discharge is the Upokohino Stream. My assessment shows that Upokohino Stream is of low ecological value in its current condition. With reference to the EcIAG, the ecological value of the Upokohino Stream is 'low' due to extensive modification, poor macroinvertebrate communities (low metric scores) and poor water quality.

41. With reference to the EcIAG, I have assumed that the ecological value of Lake Rotokare is 'high' as the lake could support nationally threatened wetland birds.

*Effects of discharges of fine sediment*

42. An assessment of potential sediment loads due to the proposed discharge has been undertaken as part of the Landfill Engineering Report. In summary, a Universal Soil Loss Equation (USLE) assessment suggests a conservative (worst case and unlikely to occur) increase of 4 tonnes/year of sediment due to the discharge and relative to the existing situation. This estimate is after treatment in the proposed pond and wetland system.

43. During stormwater discharge events the Area B treated stormwater discharge would mix with other catchment flows and enter the Upokohino Stream via the drainage arrangement described in Paragraph 26 of my evidence. Some attenuation of sediment would likely occur within the open drain (which is vegetated with weeds) and on land. For context, the catchment area draining to the proposed pond and wetland system is around 19.49 hectares, which is around 7.1 % of the Upokohino Stream catchment upstream of the Landfill Access Road culvert (274 hectares).

44. My assessment shows that Upokohino Stream is of low ecological value in its current condition. However, without proper sediment controls and a well-maintained stormwater treatment system, stormwater runoff containing fine sediment from construction and operation of Area B could potentially enter the Upokohino Stream and cause a further decline in water quality and associated adverse effects on fish and macroinvertebrate communities. High levels of suspended sediment can reduce visibility for fish, damage fish gills and the filter feeding apparatus of invertebrates,

smother invertebrate habitat (if deposited on the stream bed) and carry nutrients and other contaminants into the stream.

45. Given the treatment system proposed and mixing with wider valley runoff, in my opinion it is unlikely the proposed discharge would elevate suspended sediment concentrations in Upokohino Stream to a level or for a duration where adverse ecological effects on stream fauna would occur. Eels are the only native fish likely to be present in the Upokohino Stream and are tolerant of short-term elevations in suspended sediment (Cavanagh et al. 2014[5]). It is also unlikely that the discharge will result in levels of deposited sediment that would have adverse effects on the ecology of Upokohino Stream.

46. Considering the low ecological value of the receiving environment, and the proposed stormwater management measures, the stormwater discharge is likely to result in only negligible effects on the Upokohino Stream. The potential for adverse effects is also likely to be partially mitigated by the likely additional dilution available during stormwater discharge events when the stream flows would also likely be elevated. My conclusion is on the basis that the stormwater treatment system and erosion and sediment controls are appropriately designed and well-maintained during landfill construction and operation. Any effects are not expected to extend past the mixing zone within the Upokohino Stream and very unlikely to extend to the Tutaekuri River.

47. With reference to the EcIA guidelines (see Section 2.2), the ecological value of the Upokohino Stream is 'low' due to its heavily modified nature, poor macroinvertebrate communities (low metric scores), poor water quality and low diversity fish populations. In my opinion, with erosion and sediment controls during earthworks, and with an appropriate and a well-maintained stormwater treatment pond, the magnitude of effects of treated stormwater discharges on the Upokohino Stream will likely be 'negligible' and the overall effect will be 'very low'.

48. Due to the intermittent nature of the Upokohino Stream in the lower reaches and the distance of the landfill stormwater discharge from Lake Te Rotokare, I consider that there would be a low probability for the landfill stormwater discharge to have any measurable adverse effect on the water quality or ecology of Lake Te Rotokare. With reference to the EcIA guidelines I have assumed that the ecological value of

5 Cavanagh, J.E.; Hogsden, K.L.; Harding, J.S. 2014. Effects of suspended sediment on freshwater fish. Report prepared by Landcare Research for West Coast Regional Council.

Lake Rotokare is 'high' as the lake could support nationally threatened wetland birds. Due to the distance of the lake from the landfill discharge and the likely low frequency that Upokohino Stream would flow into the Lake, the magnitude of any effect of stormwater inflow on the health of the lake is likely to be 'negligible' and the overall effect would be 'very low'.

*Effects of other contaminant discharges*

49. Potential sources of other contaminants include accidental discharge from refuse or leachate entering the stormwater system from the operation of the Project. I understand leachate from the Project will be disposed of by spray irrigation to areas of the landfill cap, with sufficient balancing storage and irrigation to suit the expansion into the Project. Controls for spray irrigation drift and runoff are detailed in the Engineering Concept Design report and in the evidence of Mr Bryce.

50. As stated in Paragraph 21 all rain falling on exposed refuse is to be treated as leachate and will be discharged to the leachate system. Only stormwater which has not come into contact with refuse will be diverted to the stormwater treatment system.

51. Should contaminants from refuse or leachate enter stormwater due to unforeseen circumstances then the associated effects on aquatic life in the Upokohino Stream could comprise:

    (a) Ammonia: In sufficient concentrations, ammonia can cause both chronic (long-term exposure) and acute (short term exposure) toxic effects on aquatic life. The toxicity of ammonia increases with water pH and temperature. We detected elevated ammoniacal nitrogen at the Downstream 2 site.

    (b) Metals: Various metals (zinc, copper, lead, etc.) or metalloids (arsenic) can cause both chronic and acute toxic effects on aquatic life.

    (c) Ammoniacal-nitrogen: is a macro-nutrient directly available to plant growth. Under stable flow conditions, it can promote excessive growth of algae and macrophytes in waterways. High levels of macrophyte and algal growth can deplete oxygen levels in waterways overnight as the plants respire (use oxygen).

(d) Organic contaminants and nutrients: can increase the biological oxygen demand and lower dissolved oxygen levels in the stream. The decomposition of plant matter can also increase the biological oxygen demand consequently reduce dissolved oxygen in waterways.

52. With reference to the EcIA guidelines (see Section 2.2), the ecological value of the Upokohino Stream is 'low'. Without an effective stormwater and leachate treatment the magnitude of the effect of other contaminants from the landfill operation on the health of the Upokohino Stream is likely to be 'moderate' and the overall level of effect would be 'low'. This assessment is on the basis that any increase in contaminants could cause further decline in the already poor health of the stream.

53. However, with an appropriate and well-maintained stormwater and leachate management systems the likelihood of other contaminants from the landfill operation entering the Upokohino Stream is low. Therefore, with mitigation and with reference to the EcIA guidelines the magnitude of effects on stream health is expected to be 'negligible' and the overall effect 'very low'. However, monitoring water quality in the Upokohino Stream is recommended and will enable detection of any accidental contamination from the landfill operation.

*Stormwater wetland effects*

54. Ms Drummond raised concerns about potential for cyanobacteria blooms to occur in the proposed stormwater pond and associated effects on downstream water quality and any wildlife that use the stormwater pond. I am not aware of any cyanobacteria blooms occurring in similar pond systems on site, but the occurrence cannot be discounted. In my opinion the potential for these effects can be addressed by monitoring in conjunction with routine inspections. I recommend that response actions be developed as part of the stormwater monitoring and management/response plan if these issues arise.

## RECOMMENDATIONS

55. I recommend the following measures to protect the health of the Upokohino Stream, and note where this is required by conditions with reference to the set attached to the evidence of Ms Brabant:

(a) Baseline water quality monitoring of the Upokohino Stream prior to construction commencing, at or about the sites sampled in T+T's February

2018 assessment. I recommend that monitoring be comprised of three sampling rounds during wet weather and three in dry weather with samples analysed for TSS and turbidly (Condition 58). I note Mr van Munckhof has recommended there be 10 total samples taken. I am also comfortable with that suggestion.

(b) Construction phase monitoring of the Upokohino Stream comprising turbidity-based water quality sampling at or about the three sites sampled in T+T's February 2018 assessment. Samples should be collected and analysed for TSS and turbidity at quarterly intervals when discharge occurs from the sediment pond (Condition 59(c)). Operational monitoring of the Upokohino Stream comprising water quality monitoring at approximately quarterly intervals when discharge occurs from the sediment pond. Monitoring should be undertaken at or about the three sites sampled in T+T's February 2018 assessment, with samples analysed for TSS, turbidity and parameters to detect accidental leachate contamination (Condition 59(d)).

(c) Instream sediment quality and macroinvertebrate monitoring should be undertaken annually, to check the stormwater pond and wetland are operating as intended and to detect any accidental contamination of stormwater from leachate or refuse (Condition 59(e)). Control of wind-blown litter by screening to prevent debris from the landfill (such as plastic bags) from entering the stream (Condition 28 and Designation condition, appendix 24, section 3.5 addressing Wind Blown Debris).

(d) Inspection based monitoring of the proposed stormwater pond for cyanobacteria blooms. The HBRC recommended conditions have this as Condition 59(g), however I consider this is better addressed as part of the updated O&M Manual. To ensure appropriate monitoring is addressed in the O&M Manual, I have suggested an amendment to Condition 6 to specifically require that the revised O&M Manual address monitoring for cyanobacterial blooms as part of stormwater and sediment controls.

## COMMENT ON SUBMISSIONS

56. I have read the submissions lodged on the Project that relate to freshwater ecology. Submissions from Marcus Simcox & Anna Murphy, Dave Kruger, Bruce Bates, Max Wood, Tipene Cottrell, Ngāti Pārau Hapū Trust and Hawke's Bay Fish and Game

Council raise concerns in regard to potential contamination and ecological health of the Upokohino Stream, Lake Te Rotokare and Tūtaekurī River. It is clear to me from the submissions and from the consultation meeting I attended with Ngāti Pārau representatives that these water bodies are culturally important.

57. As stated in Paragraph [21] in my evidence all rain falling on exposed refuse is to be treated as leachate and will be discharged to the leachate system and not to the Upokohino Stream. Only stormwater which has not come into contact with refuse will be diverted to the stormwater treatment system. However, monitoring is proposed to detect any accidental leachate contamination.

58. The main potential contaminant in the proposed discharge is sediment. In my opinion the treatment systems proposed to control sediment discharges are appropriate and the overall level of effects of the proposed stormwater discharge on the Upokohino Stream will be 'very low'. I have recommended baseline and ongoing monitoring to confirm this. I do not expect any adverse effects on Tūtaekurī River to occur.

59. As stated earlier in my evidence I consider that there would be a low probability for proposed treated stormwater discharge to have any measurable adverse effect on the water quality or ecology of Lake Te Rotokare.

## HBRC AND HDC SECTION 42A REPORTS

60. I have read the s42A reports prepared by Mr Shirras (HBRC) and Mr McKay (HDC). The reports do not specifically raise any outstanding matters relating to ecology. However, both reports summarise Submitter concerns including those relating to water quality and mahinga kai in Upokohino Stream, Tūtaekurī River and Lake Te Rotokare. My assessment is that the level of effect of the proposed stormwater discharge on the water quality and ecology of Upokohino Stream will be 'very low'. As such, the proposed stormwater discharge is unlikely to impact on mahinga kai resources in Upokohino Stream, Tūtaekurī River or Lake Te Rotokare.

## CONCLUSION

61. My evidence assesses the potential effects of the proposed stormwater discharges from the Project, and specifically discharges of sediment to the Upokohino Stream. This includes sediment discharges during construction and operation and water

quality effects associated with the placement and operation of the proposed stormwater treatment pond and wetland. Other contaminants are briefly assessed.

62. My assessment is that Upokohino Stream is of 'low' ecological value in its current condition, which is due to extensive modification, poor macroinvertebrate community health and poor water quality.

63. Stormwater from the Project will be treated through an appropriately designed sediment treatment pond and a polishing wetland. In my opinion, with erosion and sediment controls during earthworks, and with an appropriate and a well-maintained stormwater treatment pond, the level of effects of treated stormwater discharges on the Upokohino Stream will be 'very low'.

64. All water falling on exposed refuse at the working face of the landfill will be discharged to the leachate system, and no water that has been exposed to waste will be discharged to the stormwater system. Therefore, in my view the overall level of effect of other contaminants from the landfill entering the Upokohino Stream will also be 'very low'.

65. In my opinion there is a low probability that any measurable adverse effect on the water quality or ecology of Tūtaekurī River or Lake Te Rotokare will occur.

66. I have recommended baseline and ongoing monitoring is undertaken to protect the health of the Upokohino Stream. I note that the proposed conditions of consent attached to the evidence of Ms Brabant appropriately adopt these measures.

Dean Craig Miller
2 September 2021

## ATTACHMENT A

## QUALIFICATIONS AND EXPERIENCE

1. I hold the qualifications of Bachelor of Science and Master of Science and Technology with First Class Honours in Biological Sciences, from the University of Waikato. I am a member of the New Zealand Freshwater Science Society.

2. I have 19 years' post graduate experience in environmental consulting and have been employed as a freshwater ecologist at T+T for 19 years. I have been a Principal Ecologist for over 4 years. I specialise in resource evaluation and management work in freshwater environments with specific areas of expertise in water quality, aquatic ecology, fish passage and assessment of ecological effects.

3. I have been involved in aquatic ecology-related aspects of projects in New Zealand since 2002. This work has included preparation and implementation of ecological monitoring and management plans, specialist water quality and ecology advice, coordination of small and large-scale ecological evaluations, assessment of ecological effects for projects within and affecting freshwater environments, and technical review of resource consent applications.

4. The relevant projects I have been involved in include:

   (a) Tirohia Landfill Extension, Waikato – I was the lead freshwater ecologist for the landfill extension consenting project. Planned and implemented site investigations and prepared the assessment of freshwater ecological effects report. Gave expert evidence at the joint district and regional council hearing for the application.

   (b) Southern Landfill Stage 4 extension project in Wellington – I was the lead freshwater ecologist responsible for planning site investigations, undertaking the ecological effects assessment and preparing ecological management plans.

   (c) Turitea Windfarm, Palmerston North – I am the lead freshwater ecologist for the project. I have prepared adaptive receiving environment monitoring plans for the project and coordinated baseline and construction phase water quality and ecological monitoring.

   (d) Peka Peka to Ōtaki Expressway construction project, Wellington – I am the lead ecologist responsible for the preparation and implementation of the Ecological Management Plan for the project.

(e) Comprehensive Stormwater Discharge Consent monitoring, Hamilton – I have prepared and implemented a detailed and integrated receiving environment effects focussed monitoring programme for Hamilton City Council. I have coordinated the implementation the monitoring plan since 2012 including stream and lake ecological and sediment quality monitoring, flow proportional stormwater monitoring and containment load assessment for the Waikato River, comprehensive erosion assessment and monitoring and city-wide fish passage assessments.

(f) Silverstream Landfill Stage 2 extension project, Wellington – I was the lead freshwater ecologist and have a technical review role for the ongoing stream monitoring work.

(g) C&D Landfill extension consent process for Greater Wellington Regional Council (GWRC) - I was the Ecology Technical Reviewer for GWRC, responsible for reviewing freshwater ecology technical reports and I appeared at the hearing for the application.