BEFORE THE INDEPENDENT HEARING PANEL

AT GISBORNE

IN THE MATTER OF	the Resource Management Act 1991 (**RMA**)
AND	
IN THE MATTER OF	resource consent applications by **Gisborne District Council – Rivers and Land Drainage** for the construction and upgrading of approximately 4.2 kilometres of stopbanks, associated earthworks, road raising, drainage and stormwater infrastructure, works within and adjacent to the Waipaoa River, temporary water take and discharge activities during construction, vegetation clearance, temporary access works, service relocations, and landscape planting and site reinstatement, referred to as the Te Karaka Stopbank Flood Protection Scheme upgrade.

STATEMENT OF EVIDENCE OF RAMON BLAIR STRONG
ON BEHALF OF THE JRD AND PA COATES FAMILY TRUST

22 SEPTEMBER 2026

Introduction

1. My full name is Ramon Blair Strong. I am Principal River Engineer and Associate Director, Water and Maritime, with Haskoning New Zealand.

2. I have been asked by the JRD and PA Coates Family Trust and members of the Coates family (the **Coates Family**) to provide evidence in respect of the Coates Family submission on the resource consent application by the Gisborne District Council – Rivers and Land Drainage (**GDC**) for the upgrade of the Te Karaka Stopbank Flood Protection Scheme (**Application**).

3. My area of expertise is river engineering, flood hazard management, and infrastructure delivery.

Qualifications and experience

4. I hold the qualifications of both a NZ certificate and a Bachelor's degree in civil engineering from the Central Institute of Technology and University of Canterbury respectively. I am and have been a Chartered Professional Engineer (CPEng) for over 25 years.

5. I am Associate Director and Principal River Engineer at Haskoning where I have worked since March 2025. Previously I have held a range of consultancy and regional sector management and leadership roles. I have primarily worked in Aotearoa New Zealand but have also worked in Australia, Indonesia and the United Kingdom. My career experience in total (including the more geotechnical focus earlier in my career) totals more than 35 years.

6. My main practice areas are river engineering and flood hazard management. My experience includes 10 years as Engineering Manager with the Otago Regional Council and 5 years as Group Manager River Management for Horizons (Manawatū-Whanganui) Regional Council. The latter overlapped with my role as co-convenor for the regional sector River Managers' special interest group. From 2020 to 2025 I was part of the Engineering New Zealand affiliated NZ Society on Large Dams management committee. I returned to consulting in 2021.

7. My role with Horizons included responsibility (Project Director) for the latter stages of a $50M programme of capital works that sought to increase the flood protection standard for Horizons' Lower Manawatu Scheme. Elements of that scheme have parallels (albeit smaller-scale) with the Waipaoa River – the high suspended sediment load in the Oroua River tributary and the ongoing reduction in stopbank levels of service due to sediment deposition.

8. I am currently acting in the capacity as final independent auditor for Greater Wellington Regional Council (GWRC) in relation to a programme of flood hazard modelling projects that GWRC presently has in train. Four audits have been completed to date with two (including the Hutt River) scheduled. Those audits are in accordance with GWRC's Flood Hazard Modelling Standard (https://www.gw.govt.nz/document/16774/flood-hazard-modelling-standard/).

9. I am also currently advising Environment Canterbury (Canterbury Regional Council - ECan) in regard to the Ōtākaro Avon River Corridor (ŌARC) project. This project is "a massive 602-hectare urban regeneration and ecological restoration initiative in eastern Christchurch, New Zealand, turning land cleared after the 2011 earthquakes into a public green space". I have been engaged by ECan as a technical expert to review and provide comment on the application effects assessment as it relates to both the flood mitigation (raised / extended stopbanks and floodwalls to protect that part of Christchurch from Avon River / Heathcote Estuary inundation) and fish passage aspects of the Christchurch City Council fast-track application.

10. My early career experience specifically related to Gisborne involved geotechnical site investigations and associated analyses and reporting related to a proposed triboard mill development off MacDonald Road in Gisborne (1996). More recently, I have assisted both Hawkes Bay Regional Council (HBRC) and Gisborne District Council (GDC) with the development of land categorisation frameworks following the 2023 North Island Severe Weather Events (principally Ex Tropical Cyclone – ETC - Gabrielle).

11. That involvement was more substantive with HBRC. I was engaged by GDC to review and provide comment on their draft framework. I was subsequently engaged by GDC to assist in determining solutions for some of the 2P properties, as well as being engaged to provide property owners directly with advice.

12. Other experience relevant to this context:

    (a) Providing GDC with technical advice related to flood hazard management for a residential subdivision proposed north-west of Gisborne, off Back Ormond Road;

    (b) Assessing for GDC the vulnerability of an unconsented water storage dam located in the Te Arai valley to Te Arai River erosion and flood damage;

    (c) A retrospective assessment of potential adverse effects associated with emergency river engineering and flood protection works carried out by GDC operations staff for the Mangahauini River and Waiotu Stream in Tokomaru Bay.

    (d) A number of assessments for GDC regulatory staff related to various NZTA and GDC river engineering work to protect highway/ local road infrastructure, mainly concentrated on the Mangahauini River, but including other rivers and streams between Tokomaru Bay and Ruatoria.

    (e) A project for a private client that involved an assessment of the fluvial processes for the rivers that discharge to the sea between Te Araroa and Haupara Point (principally the Karakatūwhero River).

    (f) Investigation and design work for HBRC related to the use of Akmon groyne structures for the Waipawa River south of the town of Waipawa – a desktop assessment in part that considered the various types of proprietary concrete block groynes in existence at that time around Hawkes Bay and Gisborne (late 2023 / early 2024), including the Mangahauini and Waiapu Rivers.

13. In November 2022 I made a site visit to the upper Waipaoa River catchment in an advisory capacity to forestry plantation owner Earnslaw One. Reporting related to that project involved a somewhat cursory assessment of existing information related to sediment processes and general river dynamics for both Tikimore Stream and the upper reach of the Waipaoa River.

Code of Conduct

14. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

Executive summary

15. In most contexts, a higher standard of flood protection requires higher stopbanks. However, high stopbanks also give rise to high residual risks.

16. Discretisation is the process of simplifying the real world so that a computer can model it. It refers to how reality is broken up into smaller pieces or calculations, and therefore how accurately the model represents what actually happens or how well a model approximates reality. Differences between modelled flood levels and actual flood behaviour can arise because the model is only an approximation of reality.

17. The modelling undertaken to inform both stopbank design and the assessment of effects in this situation takes a disjointed and convoluted approach due to a range of factors. It lacks a systematic approach to project delivery from the outset and presents challenges in obtaining a clear picture of the application.

18. While the methodology and general approach appear satisfactory, the fragmented approach and qualifiers related to the peer review provide some cause for concern. A comprehensive treatise on catchment hydrology and flood frequency for the Waipaoa River at Te Karaka does not appear to have been carried out; certainty around such a key input is critical to having confidence in the output.

19. Consequently, I have a degree of apprehension and unease about what is proposed and the impacts it might have.

Scope of evidence

20. My evidence will focus on flood modelling and flood effects of relevance to the Application and what the implications are for the Coates Family Farm.

21. In my evidence I will address:

    (a) Background;

    (b) Section 42A Report;

    (c) Modelling;

    (d) Stopbank Alignment Optioneering; and

    (e) Implications for the Coates Family.

22. I am familiar with the wider area around the Coates Family Farm.

Background

23. The Coates Family has requested my support in relation to reviewing GDC's assessment of the adverse flooding effects of the Application on the Coates Family farm at 48, 62, 62a, and 76 Whatatutu Road (**Coates Family Farm**). The family are concerned that the Application is not sufficiently robust and accurate so as to identify the actual adverse effects of the proposal on upstream land, including the Coates Family Farm.

S 42A Report

24. I have read the s42A report prepared by the Council's reporting officer.

25. I note that the key issues list should include residual risk to the community and whether that is adequately addressed in the application.

26. I also note the recommendation to grant consent is qualified in regard to further technical evidence and river hydrology and consequential flood impacts.

Numerical Modelling

27. The nub of the application and the works proposed are based on the numerical modelling – e.g. using software to determine both an adequate stopbank height and longitudinal profile to protect the town and to quantify the likely effects to those not directly benefitting from the stopbank.

Primary Modelling

28. This modelling work is a somewhat complex arrangement between DHI (modeller), Land, River Sea (peer review of the numerical model), Tonkin and Taylor (base model sensitivity parameterisation, alignment optioneering, effects assessment commentary) and Christensen Consulting (quantifying the avoided flood damage costs attributed to the works). This complex arrangement appears to be (in part) borne from the use of an existing and possibly somewhat dated Waipaoa model originally built for GDC by HBRC using DHI's Mike software and incorporating a coupled 1D-2D MIKE FLOOD model.

29. The DHI report (Section 2) charts the history of development of the model. The DHI report (Section 9.2) notes that the "*current model extent and configuration, i.e. 2D in the Te Karaka area with 1D/2D and 1D downstream, is suitable to make assessments of flooding in and around Te Karaka but not of the Waipaoa scheme. Ideally, the 2D model would extend along the entire protected reach of the Waipaoa, to allow for consistent and accurate representation of the river and stopbanks*".

30. It is important to note at this point that there are a range of providers of numerical modelling software both in New Zealand and globally, of which DHI is one.

31. While it is generally accepted that the computational engines used by each software package largely give similar results, some packages are better suited to particular applications.

32. It is not clear from the DHI report who within the DHI New Zealand team undertook the modelling; the report suggests that this is Greg Whyte. The LRS memo is clearer – that Matthew Gardner undertook the peer review. If those assumptions are correct then both have in my opinion the requisite / appropriate qualifications and experience to undertake their respective roles.

33. There is little to suggest with the DHI report that anything other than accepted industry practice has been applied with the numerical modelling of the Te Karaka reach of the Waipaoa. Mesh size and geometry varies as expected, balancing model size and run time with where greater computation accuracy is required.

Peer Review

34. The package of information that supports the application includes (presumably somewhat belatedly given the date of the report) a peer review memo produced by Matthew Gardner of Land River Sea Consulting (LRS), noting that it contains a West Coast Regional Council logo in the footer.

35. I referred earlier to the GWRC Flood Hazard Modelling Standard. While I'm aware of work currently underway by the regional sector (which GDC as a unitary authority is a part of) to develop a national standard, the GWRC standard is (to my knowledge) the only document available in New Zealand that attempts to codify the review process.

36. The peer review undertaken does not reference that standard and while being only partly in accordance with the structure prescribed in that document, the omissions are also not considered substantive.

Concerns

37. There are in my opinion only two matters of concern in relation to the peer review:

    (a) the connections and particular dynamics between DHI and LRS through the use of MIKE software; and

    (b) the involvement of LRS at the model build phase of the project.

38. It could be perceived that there is something of a symbiotic relationship between DHI and LRS in regard to peer reviews, related in part to both the limited and diminishing number of MIKE modelling consultants in New Zealand and the fact that DHI is both agent for and user of MIKE software products in New Zealand. The GWRC standard emphasizes the need for independence for obvious reasons – the objectivity required to produce a meaningful peer review.

39. That view is strengthened by the comment contained in the DHI (Section 4) as follows: "*Several internal meetings were held during the early stages of the project, supported with test model simulations, to determine the best approach. In particular, the test simulations gave us an idea of the expected model run times. This internal process was followed by meetings with the peer reviewer before settling on a final model schematisation*.". Such early discussion with the peer reviewer on model schematisation is generally inadvisable, noting that LRS have been subject to application of the GWRC model standard in the past.

40. I note in that regard the first bullet point conclusion in the peer review report: "*The MIKE+ model schematisation is appropriate for the Stage 1 area of interest, with the mesh resolution, domain extent, and structural representation reflecting well-considered engineering judgement*.".

41. I note with the issues identified in the LRS peer review document, using a more complete review methodology, those comments would have been specifically put to DHI to comment to either resolve (close out) or action to the point where the modeller and reviewer are in agreement. It's not clear from Section 6 of the peer review report how consequential those matters are and whether they were resolved. It's also difficult without any accompanying figures to understand the context of those comments.

42. Numerical modelling of New Zealand rivers inevitably (and demonstrably with the weather events in 2023) requires an assessment of base assumptions and how they might change in the future. That covers a range of factors – alteration of topography over time (either due to natural processes, farming operations or land development / earthworks), changes in roughness,[1] changes in riverbed profile (aggrading or degrading trends) and factors such as flood entrained debris load.

Other matters

43. The Waipaoa River is (as noted in much of the documentation that accompanies the application) a large and very active catchment that has been the subject of much academic assessment. The dynamic nature of that catchment has a high relevance to an assessment of what is practical and achievable in regard to flood protection for Te Karaka.

[1] The basis for open channel flow calculations includes the use of a roughness coefficient, known as Manning's n value.

44. The basis for the technical assessment that supports the application is one where Tonkin and Taylor (T&T) have evaluated existing literature related to the Waipaoa, supported (in my opinion to a limited extent based on temporally closely spaced datasets and other inherent limitations with the analysis) with some Geomorphic Change Detection (GCD – in essence a comparison of LiDAR datasets). T&T have then passed that data to DHI to model and the model outputs have then been passed back to T&T.

45. This is, in my experience, an unusual approach and one with the potential to generate errors. It is an arrangement that has presumably been put in place in order to combine DHI knowledge of the model and competence with MIKE software modelling with T&T's expertise.

46. I have found it difficult to build a clear understanding of how key (one of the main governing inputs for the numerical model) hydrological information has been derived – a comprehensive / best estimation of the flood frequency relationship for the Waipaoa River at Te Karaka. Catchment hydrology – how the river responds to rainfall – is central to that analysis, particularly for such a large catchment where temporal and spatial variability of rainfall is potentially more consequential (with Te Karaka being located at the junction of the Waipaoa, Waikohu and Waihora Rivers).

47. I expected to find a comprehensive, stand-alone document that provides a commentary on Waipaoa River flood characteristics, outlines the derivation of the peak flow estimate referred to in several of the reports and summarises current thinking and analysis around likely climate change effects on the flood frequency relationship for the Waipaoa River at Te Karaka (beyond a nominal 25% additional flow). Consideration of flood characteristics in this context includes all information sources that capture natural variability beyond the recorded dataset (eg the Floods in NZ report that captures recorded floods back to the 1860s / 1870s).

48. Accordingly I'm unable to form a view around the adequacy or otherwise of the input hydrographs. I was involved with optioneering and design associated with the Esk River and associated Whirinaki flood protection upgrades north of Napier following the 2023 ETC Gabrielle event; underpinning that work is a comprehensive assessment of both catchment hydrology and recorded flood events as the foundation for the numerical modelling that follows (translating those hydrographs and peak flows to computed flood

depths across the floodplain), a summary of which is included in the overall ESNZ report on the hydrological aspects of the ETC Gabrielle as they apply to Hawkes Bay.

49. Added to that, there seems to be a general lack of ownership of the flood frequency assessment amongst the various practitioners that contribute to both the design and effects assessment. An example of that is in the T&T Te Karaka Consequential Flood Risk Assessment report, where it notes that "*The flows used in the flood model runs (by DHI Group) were provided to [DHI] and to T+T by GDC, as were the Annual Exceedance Probabilities (AEP) associated with these flows, which are approximate only. T+T has not reviewed these values (either peak flow rates, or AEP) and cannot comment on the adoption of these values for the flood modelling, nor the use of these values for the purposes of this assessment.*".

Numerical Modelling – Conclusions

50. While the numerical modelling and analysis that forms the basis of both the stopbank design (height) and effects assessment has been undertaken collectively by individuals and organisations with expertise in their respective areas, collectively the supporting technical work is disjointed and poorly sequenced.

51. It is light in particular areas (for example catchment hydrology) and falls short in that regard of what could be considered best practice in delivering a project of this nature. Accordingly I have a level of apprehension and unease around whether it is adequate given the context of the application and the highly dynamic environment.

Stopbank Alignment Optioneering

52. Optioneering in regard to stopbank alignment is covered in some detail in the application supporting information, with particular emphasis placed on the Multi-Criteria Analysis (MCA) used to identify the preferred alignment. An MCA approach can provide more robust outcomes (primarily transparent decision-making) than qualitative decision-making approaches, but clearly relies on the adequacy and completeness of both the structure adopted and the underpinning supporting information. I have recently seen it used to poor effect with a river debris management project in western New South Wales.

53. The overall optioneering and basis for the MCA approach appears sound but I did expect to see more in the report that supports the basis for criteria evaluated (potentially a literature review); a systematic basis for determining the evaluation criteria. For example, the criteria chosen (Table 8.1 of the T&T report titled Te Karaka Flood Management Optioneering – Final Option recommendation) don't appear to encompass important operational considerations such as network vulnerability (potential for riverbank erosion to undermine the stopbank, vulnerability to surficial scour to the riverside face of the stopbank) and safe operation under over / super design conditions when determining optimal alignment.

Stopbank Optioneering – Conclusions

54. As with the numerical modelling, while requisite expertise has been engaged to determine optimal stopbank alignment it appears to be somewhat out of sequence in regard to logical steps with project delivery. While that does not necessarily mean that the best alignment has not been selected (use of an MCA process to determine optimal alignment is a transparent and structured process, notwithstanding the comments made) it does inevitably generate doubts. As noted , the exchanges between separate consultants in regard to numerical hydraulic modelling and optioneering add to that apprehension.

Implications for Coates Property

55. Inevitably with a project of this nature (a large river with a defined valley floor) preventing floodwater from accessing part of the valley floor will have consequential impacts for others.

56. It is important to note in this context that at its maximum (approximately 1.5km downstream of the Rangatira Road Bridge) the existing stopbanks currently constrict the floodplain to around 15% of its full unobstructed width. That is, it creates a 'bottle neck' in the floodplain, accordingly elevating flood levels upstream.

57. It is also important to note that while the application looks to raise the height of the stopbank it also reduces that constriction through further setback of the stopbank from the river (whether that was an outcome of applying the criteria through the MCA process is not clear from the T&T report). Irrespective of this, the nature of the river alignment

relative to the stopbank means that there appear to be no beneficial effects for upstream landowners – the peer review report notes the slight reduction in peak flows below the town and the consequent increase in computed flood levels upstream of the town.

58. Those impacts on both floodwater depth and velocity are grouped together in bands and presented in Figure 3.1 of the T&T Consequential Flood Risk Assessment Report and contained in Mr Hooker's evidence. Mr Hooker's evidence notes for the Coates property the model output – a 380mm (.38m) change in flood depth and little change in peak velocity at the house with the overdesign event, noting that "the hazard class remains unchanged at H5".

59. The consequential flood assessment report places some emphasis on the use of 'combined flood hazard curves adopted by the Water NZ Stormwater Modelling Guide (2024)'. The 2023 Hawkes Bay categorisation work specifically avoided the use of these curves on the basis that they are a product of the Australian Institute for Disaster Resilience and may not reflect the New Zealand context, noting that Water NZ could well have undertaken additional due diligence around the use of those in a New Zealand context that I'm not aware of.

60. Mr Hooker's evidence (10.36 to 10.44 inclusive of tables 4 to 6) summarises the wider impacts to the Coates property in some detail and these are not reproduced here (suffice to say the effects are categorised as being in the 0.25 to 0.5m range). It is worth noting that the precision used in both documents (the consequential flood assessment report and Mr Hooker's evidence) with respect to the numbers gives an impression of a level of precision and accuracy which is not reflected in the mesh size which the DHI model uses over the majority of the Coates property (DHI model report Figure 2). It would have been useful to have the difference in model output (modified stopbank minus current stopbank, both depth and velocity) presented spatially across the Coates property.

61. Clearly those impacts don't account for the dynamic nature of the Waipaoa catchment – impacts related to both aggradation of the river channel and the accumulation of sediment on the adjoining land over time. Constricting the valley floor floodplain at Te Karaka has some accelerating effect on both aspects for those properties located upstream of Te Karaka. It also potentially adds to the mobility of the river corridor at this

point. Accordingly, the actual effects at the Coates property may be greater than those predicted by the model.

62. Consideration of landslide dam risk in the Waipaoa catchment is also absent – although the nature of the catchment geology suggests relatively low risk it does warrant specific consideration and sensitivity analysis. The cross-section data presented in this report is very small scale and difficult to derive any meaningful observations from.

Implications for Coates Property – Conclusions

63. While the modelling suggests that effects on the Coates property may be relatively modest, the confidence that can be placed in that conclusion is constrained by the coarse model grid across the property and the static nature of the assessment, which does not fully capture the dynamic behaviour of the Waipaoa catchment over time, for example in relation to aggradation.

64. I am not satisfied that the full extent of potential adverse effects on the Coates property has been reliably quantified.

Conclusion

65. I agree there is a need to improve flood protection for Te Karaka. However, I remain concerned that the technical work underpinning the Application does not provide a sufficiently robust basis to fully understand the potential adverse effects on upstream landowners, including the Coates Family. In particular, the fragmented nature of the modelling and assessment process, the limited consideration of key hydrological and geomorphic factors, and the dynamic nature of the Waipaoa catchment introduce a level of uncertainty that, in my opinion, warrants further scrutiny before consent is granted.

66. In my view, greater confidence is required that the consequences of the proposed stopbank upgrade, both immediately and over time, have been adequately identified, assessed and addressed, particularly for those landowners who will bear the residual and consequential flood effects of the proposal.

Ramon Blair Strong

22 September 2026